Improving the assessment of pure ecological harm

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Chapter 1

Introduction

1. Background

In 2018, a claim for environmental harm was made before the International Court of Justice (ICJ) by the state of Costa Rica against the state of Nicaragua. Part of Costa Rica's overall claim for environmental harm, was the assertion that Nicaragua had caused pure ecological harm in the form of biodiversity loss. The *Costa Rica v. Nicaragua* case presented two ICJ 'firsts': it was the first time the ICJ adjudicated a claim for compensation of environmental harm and the first time the ICJ would find admissible a claim for pure ecological harm.

The issues before the Court had their origin in a territorial dispute between Costa Rica and Nicaragua over Isla Portillos, a small parcel of territory located on the border of Costa Rica and Nicaragua. [1] This area is covered by rainforest and hosts a freshwater wetland that has been designated under the Ramsar Convention on Wetlands of International Importance.[2]

On 18 October 2010, Nicaragua started dredging work on the San Juan River in order to improve the river's navigability. It also carried out work on the northern part of Isla Portillos, which consisted of the excavation of a canal (caño) on the disputed territory between the San Juan River and Harbor Head Lagoon. In 2013, Nicaragua excavated two more canals. Moreover, it sent military units and other personnel to the area.[3]

In excavating the 2010 and the 2013 eastern canals, Nicaragua removed close to 300 trees, of which the majority ranged between the ages of 50 to 100 years[4]. It also cleared 6.19 hectares of vegetation.[5] These activities caused serious damage to Costa Rica's protected rainforests and wetlands and significantly affected the ability of the two impacted sites to provide environmental goods and services.[6]

Unprecedentedly, Costa Rica formulated its claim before the ICJ by identifying and valuating specific ecosystem services that Nicaragua had harmed.

This so-called 'ecosystem services approach' departs, as the name already indicates, from the concept of 'ecosystem services'; the idea that people retain benefits in the form of goods and services from ecosystems. "*These include provisioning services such as food, water, timber, and fiber; regulating services that affect climate, floods, disease, wastes, and water quality; cultural services that provide recreational, aesthetic, and spiritual benefits; and supporting services such as soil formation, photosynthesis, and nutrient cycling.[…]*"[7] The ecosystem services approach uses economic valuation methods to attach a monetary value to the goods and services that people retain from ecosystems. In the ICJ case that Costa Rica initiated against Nicaragua, Costa Rica identified specific ecosystem goods and services that had been affected

[1] ICJ; Overview of the case https://www.icj-cij.org/en/case/150 accessed 8 June 2020
[2] https://www.informea.org/en/court-decision/costa-rica-v-nicaragua accessed 8 June 2020; Kindji & Faure 2019, p. 5
[3] *Costa Rica v. Nicaragua*, para 23 and 25
[4] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 75. Separate Opinion of Judge Donoghue to the Judgement for Compensation, para 9 and 11, but compare this to the Memorial of Costa Rica on Compensation 3 April 2017, p. 33 where it says: "*Some of the trees that were cut down by Nicaragua were over 200 years old (and the average age was 115 years)*".
[5] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 75
[6] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 1 and 75
[7] MEA 2005, v

by Nicaragua's actions and used economic valuation methods to attach a monetary value to the damage or loss suffered.[8]

Specifically, it identified 22 categories of ecosystem goods and services that could have been impaired following Nicaragua's actions. It claimed compensation only in respect of six of them, respectively: (1) standing timber; (2) other raw materials (fibre and energy); (3) gas regulation and air quality; (4) natural hazards mitigation; (5) soil formation and erosion control; and (6) biodiversity in terms of habitat and nursery.[9]

Costa Rica's 'ecosystems services approach' presented a novelty in environmental damage litigation. Moreover, the Court finding admissible Costa Rica's claim of loss of biodiversity in terms of habitat and nursery, appeared to have opened the door for claims for so-called 'pure ecological harm', meaning harm to those parts of nature that do not have property rights vested in them.

Naturally, Nicaragua disputed Costa Rica's claims, specifically as pertained to the valuation methodology applied and the valuation of the damages itself. What followed was a two-round exchange of written pleadings, in which parties argued their case. Particularly, the second round of written pleadings concentrated specifically on the matter of valuation methodology, which was subsequently explicitly addressed by the Court in its 2 February 2018 judgement in *Costa Rica v. Nicaragua*.[10]

Of the total of $6,711 million claimed by Costa Rica, the ICJ awarded $378,890.59. This corresponds to 6% of the claim. Part of the total sum claimed was an amount of $2,880,745.82 for all ecosystem services lost. The ICJ awarded $120,000 in this regard, corresponding to 4% of the original claim.

The manner in which the ICJ dealt with parties' valuation methodologies and valuations, showed that even the highest courts struggle with the matter of assessing ecological harm. Moreover, the vast difference between the amount claimed and the amount awarded raises curiosity about how the Court came to its decision and whether the approach taken by Costa Rica is the right way to move forward in environmental damage litigation.

A lot has already been written on the valuation of ecological damage; both in the academic and policy literature. Below, an overview shall be given of some of these publications.

2. State of the art

Over the years, much has been written on and around the topic of environmental liability and compensation of environmental damages. Below, a short overview shall be given of some of the publications that have shaped the academic literary landscape on these topics. Naturally, this overview is by no means exhaustive, but aims to illustrate in broad terms the state of the art as well as which focal points can be identified in the academic literature. In this regard, it is important to mention that depending on the jurisdiction and / or applicable legislation, different

[8] More on the concept of ecosystem services and their valuation follows in Chapter 4.
[9] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 55
[10] *Certain Activities Carried Out by Nicaragua in the Border Area* (Costa Rica v Nicaragua) *Compensation owed by the Republic of Nicaragua to the Republic of Costa Rica* (Judgment) [2018] ICJ Rep 4 (hereinafter "Judgement on Compensation"); Harrison 2018b, 528

terminology is used to describe harm done to the environment, e.g. 'impairment of the environment', 'natural resource damages', 'environmental damage', etc. This will be elaborated on more in Chapter 2. For the purposes of a description of the state of the art, this terminology will be used interchangeably, as I follow the terminology as used in the literature cited, which invariably traverses a variety of jurisdictions.

2.1 (Comparative) Environmental liability

A much written about topic concerns liability for environmental harm or natural resource damages.

In his 2001 work, Bergkamp discussed issues of environmental liability in general.[11] Over the years, Faure has written extensively on (comparative) environmental liability in general, but also specifically as it pertains to oil pollution, paying attention to matters of civil and criminal liability[12], the dichotomy between fault and strict liability,[13] and the insurability of environmental damage.[14] In her 2015 publication, Orlando conducted a comparative environmental liability analysis and identified a "*progressive path of convergence across the different legal orders - national, regional (European) and international - towards the coexistence of traditional schemes of civil liability with new regulatory models of liability based on a public, administrative approach to the recovery of damage to natural resources*". She also found that natural resource damage assessment methodologies first developed in the United states have gradually been borrowed at the regional level, identifying an "*upward process of transplantation, from national to international law*".[15] In regards to liability and insurance, see De Smedt & Faure's 2016 publication on liability and insurability of environmental damage caused by shale gas extraction.[16] In 2019, Wibisana wrote on the possibilities that fault-based liability and strict liability offer in the Indonesian government's lawsuits against timber and palm oil plantations for fires that have occurred within concession areas. Wibisana argued that the application of strict liability to wildfires is defendable in so far it can be proven that the defendant has previously conducted the clearing and drainage of peatlands.[17]

2.2 International law

In his 1996 publication, Brans examined the then newly enacted Protocols to the International Convention on Civil Liability for oil Pollution Damage and the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage, paying special attention to the amendment of the definition of "pollution damage" and assessment of damage to the environment *per se*. He concluded that the Protocols presented an improvement "*because the definition of pollution damage is clearer and explicitly holds someone liable for environmental damage where restoration is possible*". What appeared to remain a matter of

[11] Bergkamp 2001
[12] Faure & Heine 2005, Faure 2010a, Faure et al. 2010b, Faure 2017a, Faure 2017b,
[13] Faure 2009
[14] Faure & Hartlief 1996a, Faure & Hartlief 1996b
[15] Orlando 2015, p. 301
[16] De Smedt & Faure 2016
[17] Wibisana 2019

concern was "*compensation for environmental damage which is less easy to quantify*".[18] Xue's 2003 work on transboundary damage in international law, examined international liability and ventured out into a deeper examination of the concepts of due diligence, standards of conduct, and *erga omnes* obligations.[19] Following the 2010 BP Deepwater Horizon oil spill, in 2012, Schoenbaum published a comparison of, among others, recoverability of natural resource damages under the international civil liability oil spill regime and the US Oil Pollution Act of 1990. Schoenbaum found that, under the international regime, environmental damages claimed are relatively rare other than cleanup costs and lost economic profits to maritime-dependent enterprises. In contrast, in the USA OPA 90 provides explicitly for the recovery of natural resource damages.[20] Although related exclusively to climate change damage, important to mention is Toussaint's 2021 publication in which he explored the effect of climate litigation for loss and damages on the negotiations under the United Nations Framework Convention on Climate Change. He found that "*[through legal procedures,] countries do not seek to stop negotiations under the UNFCCC, but rather aim at enforcing the Convention and existing rights and obligations under international law*". Noting that successful litigation for liability and compensation on the one hand "*threatens to undermine the authority and legitimacy off the UNFCCC and particularly the WIM[21] as a political forum to address loss and damage (rather than primarily addressing mitigation and adaptation*". On the other hand, it can "*spur greater ambition on the issue under the UNFCCC by forcing the parties to engage with questions of liability and compensation*".[22]

2.3 European Union Law

In 2005, Brans wrote about liability for damage to public natural resources under the then newly enacted 2004 EC Environmental Liability Directive, finding that the Directive drew much inspiration from the US Oil Pollution Act, and that it covered interim losses, contrary to the international civil liability conventions. He also concluded that the Directive remained vague on important topics, such as the measuring of the extent of natural resource injuries and/or loss and the determination of the scale of restoration measures.[23] In 2008, Hinteregger provided a comprehensive analysis of environmental liability law in Europe in 'Environmental Liability and Ecological Damage in European Law', addressing among other things, relevant international treaties, the environmental liability directive, and conflict of laws issues regarding transboundary environmental damage. Importantly, it provided an extensive legal comparative analysis of thirteen national jurisdictions within Europe as pertains to private law aspects of environmental liability.[24]

Specifically as pertains to the European Environmental Liability Directive, many works have already been (and continue to be) published on its function, practicability, and effectiveness. Therefore, this research shall not focus on the ELD, other than briefly touching upon it as part

[18] Brans 1996, p. 302
[19] Xue 2003
[20] Schoenbaum 2012
[21] Warsaw International Mechanism on Loss and Damage
[22] Toussaint 2021, p. 16 and 29. In this regard, see also Mace & Verheyen 2016
[23] Brans 2005
[24] Hinteregger 2008

of the relevant existing legislation on the topic of environmental damage. Nevertheless, a short overview of some of the important and informative literature on this topic in provided.

In 2002, Faure & De Smedt wrote about harmonization of environmental liability legislation in Europe.[25] A 2005 publication by Mellenbergh & Uylenburg examined the implications of the, at the time, new Directive.[26] As did Brans' 2005 publication, mentioned already above. In 2007 Brans wrote about the implementation of the ELD in the Netherlands. [27] As did Faure et al. in 2010.[28] In her 2008 publication, de Smedt addressed the question "*whether the harmonisation of environmental liability rules in the European Union was desirable from an economic point of view and for what reasons harmonisation did take place*". She concluded that "*the shift of environmental liability rules to the European level was inefficient and does not correspond with the economic criteria for centralisation. Moreover, the content of the Directive itself shows inefficiencies. At the same time, the analysis makes clear that the existence and the content of the Environmental Liability Directive largely can be explained by private interest distortions.*"[29] In a 2009 publication, De Smedt critically analysed whether the ELD could reach its ambitious objectives, since, following the difficult negotiations during the development phase of the Directive, the final decision on crucial elements of the liability regime were left to the Member States. De Smedt found that the ELDs implementation was diverse and ranged from a minimum implementation to a strict environmental liability regime, with most Member States being in the first category. This meant that the liability regime as foreseen in the ELD, in practice, was weakened, and that it was doubtful whether the goals of implementing the polluter-pays-principle and the creation of a level playing field among Member States by having them adhere to the same environmental standards could be realised.[30] In 2012, Casotta critically analysed the European Environmental Liability Directive and its role towards the future in environmental law.[31] In 2013 Bergkamp & Goldsmith published an all-encompassing work on the ELD.[32] In regards implementation at the member state level of the ELD, Fasoli's 2017 publication should be mentioned (which is elaborated on, below).[33] In his 2022 publication, Brans, among many other topics, touched upon the scope of the ELD, emphasizing that the ELD only applies if it can be shown that "*damage has been caused to protected species and habitats and that this damage is significant. Not all forests, fens, natural grasslands and wetlands fall within the scope of the directive. Only those that are situated in Natura 2000 areas do*".[34]

It is expected that much more shall continue to be published on the topic of the ELD, also in the near future, considering the recent evaluation of the ELD in April of 2023 that aimed at a revision of the ELD. The revision, among other things, is aimed at increasing harmonization of the ELDs implementation in Member States, aligning it with the Paris Climate Agreement, creating an EU ELD task force to aid in the implementation process in the Member States, and

[25] Faure & De Smedt 2002
[26] Mellenbergh & Uylenburg 2005
[27] Brans 2007
[28] Faure et al. 2010a
[29] De Smedt 2008
[30] De Smedt 2009
[31] Cassotta 2012
[32] Bergkamp & Goldsmith 2013
[33] Fasoli 2017
[34] Freely translated from Brans 2022, p. 48

exploring a mandatory financial security system to cover environmental damage costs, so these do not burden tax payers. [35]

2.4 National law

Already in 1979, inspired by developments in the United States, Bocken wrote about the possibility and desirability of a movement to protect the environment through judicial procedures under Belgian liability law. Attention was paid to the possibilities that a fault-based liability versus a strict liability approach offered, concluding that Belgian liability law already offered many possibilities, provided it was applied to its fullest extent.[36] In 1991, several works on transboundary pollution and liability, specifically as they pertain to the River Rhine, were collectively published, highlighting issues such as the effect of licensing on liability, types of liability (read: fault and strict liability), and the legal position of the municipality as a public trustee.[37] Baughen's 2016 publication reviewed the EU's response to Deepwater Horizon through the Offshore Safety Directive 2013, specifically addressing what the UK's legal regime offered in case a Deepwater Horizon type of catastrophe would happen in UK waters.[38]

2.5 Policy

Where it comes to cataloguing their decline and emphasizing the value of ecosystem goods and services, the ground breaking Millennium Ecosystem Assessment of 2005,[39] the 2019 'Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem

[35] See the European Parliament's press release from 20 May 2021 at https://www.europarl.europa.eu/news/en/press-room/20210517IPR04121/environmental-liability-rules-need-revamping where it states: "*In order to enforce implementation and increase citizens' trust in EU rules, and to prevent and remedy environmental damage more effectively, Parliament demands that the Environmental Liability Directive (ELD) and the Environmental Crime Directive (ECD) be improved. Recommendations from MEPs include: Revising and transforming the Environmental Liability Directive into a fully harmonised regulation that would apply to all companies operating in the EU; aligning the ELD with other EU legislation on environmental protection, including the ECD and the Paris climate agreement; increasing efforts to harmonise its implementation in member states; updating the Environmental Crime Directive following a thorough impact assessment to take into account new types of environmental crimes; looking into how "ecocide" can be recognised under EU law and diplomacy; clarifying key legal terms under the ELD and ECD and developing harmonised classification of environmental crimes; creating an EU ELD Task Force (made up of experts and Commission staff) to help with implementation in member states, and to offer support and advise victims of environmental damage on legal recourse in the EU; assessing if a mandatory financial security system (e.g. covering insurance, bank guarantees, bonds or funds) could be introduced so taxpayers do not have to bear the costs of environmental damage.*" See also the website of the European Commission at https://environment.ec.europa.eu/law-and-governance/compliance-assurance/environmental-liability/implementation-commission_en where the results of past evaluations (in 2010 and 2014) of the ELD by the European Commission are succinctly listed. It also states that the upcoming 2023 evaluation is "*included in the Zero Pollution Action Plan as an action to improve compliance by all relevant national authorities with EU pollution prevention laws. The scope and objectives of the evaluation are explained in the call for evidence published in November 2022*" (available at https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13251-Environmental-Liability-Directive-evaluation-_en)

[36] Bocken 1979

[37] Van Dunné 1991

[38] Baughen 2016

[39] MEA 2005

Services',[40] and the 2022 'Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services' 'Summary for policymakers of the methodological assessment regarding the diverse conceptualization of multiple values of nature and its benefits, including biodiversity and ecosystem functions and services (assessment of the diverse values and valuation of nature)'[41] should be mentioned. As well as, the Ecosystem Services Valuation Database (ESDV) [42] and the System of Environmental-Economic Accounting - Ecosystem Accounting (SEEA).[43]

2.6 Valuation of ecological harm

Some jurists have raised the question of how environmental damage and, in some cases more specifically, pure ecological damage should be quantified and/or recovered. The 1992 study conducted by Kottenhagen-Edzes regarding tort law and the environment provided insights into the practicability of a tort law approach to environmental damage and addressed some early environmental damages valuation techniques. In 1996, Sands & Stewart published a comparative analysis of environmental valuation approaches in the US and international law, covering CERCLA, OPA, and the report of the Expert Working Group convened by UNEP on the legal principles that would govern Iraq's liability for environmental damage caused by the Gulf War. Sands & Stewart pointed out, among other things, that domestic (US) laws are of influence on international law in the area of valuation of environmental damage rather than the other way around.[44] Carette's 1997 work delved into, among other things, legal tools for compensation for harm done to *res communes* and *res nullius*.[45] Roomberg's 2000 work addressed liability matters as well as specific valuation techniques.[46] In 2001, Brans wrote on liability for damage to those natural resources that are of interest to the public and are protected by national, European or international law. Among other things, his work focused on assessment and valuation issues, the issue of standing in cases of injury to (un)owned natural resources, and the determination of ways to repair, restore and compensate for natural resource injuries and the associated loss of ecological and human services.[47] In a 2011 publication, Fejes et al. argued the importance of the development of a transparent and consistent framework for assessing non-market costs of oil spills in the Baltic Sea based on the European Commission's REMEDE (Resource Equivalency Methods for Assessing Environmental Damage in the EU) toolkit. Specifically, equivalency analysis (EA), which was part of the REMEDE toolkit and already frequently used in the US and to support UN compensation claims, could, according to Fejes et al., function as a method for assessing non-market costs.[48]

While related to *ex ante* policy for the prevention of environmental damage, still valuable to mention are, firstly, the 2021 working paper from De Nederlandsche Bank on monetizing the environmental externalities of the Dutch economy and its supply chain. In it, the authors considered the effects an enactment of a Pigouvian tax, in line with the European Commission's

[40] IPBES 2019
[41] IPBES 2022
[42] https://www.esvd.info/ accessed 7 February 2023
[43] https://seea.un.org/ accessed 29 September 2022
[44] Sands & Stewart 1996
[45] Carette 1997
[46] Roomberg 2000
[47] Brans 2001
[48] Fejes et al. 2011, p. 14

European Green Deal, would have on the Dutch economy. They found that environmental damage costs associated with the Dutch economy amount to 7,3% of the Dutch GDP (or €50 billion euros) and that some sectors (energy production, waste and sewage management, manufacturing, transport and agriculture) do not generate sufficient profit to cover their natural resource use and pollution costs.[49] Secondly, McKinsey's December 2022 report on the state of the Earth's natural capital is of interest, which finds: "*natural capital is in decline across multiple dimensions. By one estimate, current demands require resources at least 1.8 times greater than what the Earth appears to be able to sustain at this point. Yet fatalism would be misplaced. One of our key findings is that while a range of economic sectors contribute to this depletion of natural capital, specific actions taken by companies using current technologies—and supported by broader enabling actions of the whole of society—could not only reverse the trend but also generate positive return on investment (ROI) in a substantial number of cases.*"[50] Finally, the Bioval project of the European union Forum of Judges for the Environment should be mentioned, which "*intends to create a non-binding, practical instrument to value ecological damages in court*", with a focus on financial restoration, rather than sanctioning.[51]

2.7 Compensation methods

Some jurists have also speculated on the question of what constitutes accurate compensation or an accurate compensation method in the case of ecological damage, i.e. damage to property that is not appropriated. Again, Bocken's 1979 publication is relevant in this regard, in as far it suggests judicial procedures as a method for the protection of the environment.[52] In 1996, Faure & Hartlief wrote about the various forms of compensation funds that exist and compared their functionality to the more "traditional" approach to compensation for environmental harm through insurance and liability.[53] They found that "*traditional liability and insurance ought to be used as far as possible and funds only in cases where insurance markets fail and there is reason to believe that funds would be able to provide adequate compensation*". Bierbooms' 1997 work examined, among other things, the civil law possibilities for governments to recover costs from private parties (read: polluters) for services rendered in the public interest, such as clean-up of soil pollution.[54] Also, Bergkamp's 2001 work comes to mind in which he critically considers the role of the law, with a particular focus on civil liability, in addressing environmental harms, whilst also considering other tools than liability rules, such as first party insurance, other public law regimes, and state liability.[55] In a 2001 publication, Cane questioned whether environmental harms are in fact special. Meaning, should "*compensation for environmental harms be treated separately from other areas of compensation law because of the importance of environmental protection to the future well-being of the planet and its inhabitants?*" He concluded that environmental harms are no different than other types of harm. That harm to the environment should be viewed as non-economic harm to people, so as to avoid legal confusion, and that – if we treat harm to the environment as harm to natural resources –

[49] DNB Working Paper No. 719/July 2021
[50] See McKinsey 2022 at https://www.mckinsey.com/capabilities/sustainability/our-insights/nature-in-the-balance-what-companies-can-do-to-restore-natural-capital accessed 3 February 2023
[51] https://www.eufje.org/index.php?option=com_content&view=article&id=66&Itemid=257&lang=en accessed 29 January 2023
[52] Bocken 1979
[53] Faure & Hartlief 1996a
[54] Bierbooms 1997
[55] Bergkamp 2001

we are better off using tax law and criminal law to combat this, rather than compensation law.[56] In their 2007 publication, Faure & Verheij explored shifts in the compensation of environmental damage between private and public systems.[57] In her 2013 publication, Liu examined a great variety of available compensation mechanisms, ranging from liability insurance, first-party and direct insurance, risk-sharing agreements, environmental funds, security mechanisms, the use of the capital market to provide coverage, as well as reviewing compensation systems under EU and US law.[58] In 2017, Fasoli wrote on the approaches environmental NGO's (or ENGOs) can take to claim damages in relation to the environment in France, Italy, the Netherlands and Portugal. She noted that while the ELD does not allow ENGOs to bring actions directly against liable operators, a trend can be noticed in the aforementioned countries of ENGOs using traditional civil law mechanisms to sue liable operators before national courts. She concluded that "*[…] civil law remedies constitute the most useful tool to repair the material and moral damages suffered by the ENGOs. They seem to be ill-suited, however, to the specificity of the damage to the environment in itself (i.e. purely ecological damage) as it is difficult for ENGOs to demonstrate direct and personal damage in court. This is due to the fact that civil law remedies typically protect private interests rather than public ones, such as the protection of the environment.*"[59]

2.8 Ecosystem services and the law

Some scholars have focused on the concept of ecosystems and/or ecosystem services in the law. These publications usually are geared at *ex ante* considerations of and approaches to the law and are therefore more removed from the topic of this research which concerns *ex post* considerations of damage valuation. Nevertheless, a few publications shall be mentioned here.

In 2012, Mertens et al. wrote about the relevance of the concept of ecosystem services for those practicing the law, emphasizing the importance of finding a legal definition of "ecosystem services" and offering the ideas of building an "ecosystem services check" into legislation.[60] McGillivray wrote about the EU Commission's approach to the obligation to provide compensatory habitat under Article 6(4) of the EU Habitats Directive.[61] McIntyre considered the possibly far-reaching implications of states adopting, or of general international law imposing, a meaningful 'ecosystems approach' to the protection and management of shared international water resources, pointing out that such an approach "*could spell the end for international water law as a discrete body of rules and practises as it would be subsumed into a broader corpus of international ecosystems law that would facilitate the integrated sustainable management of the various constituent components of the broader ecosystem […]*"[62] De Lucia wrote about the relationship between the ecosystem approach as a normative and regulatory concept - *"[…] increasingly deployed in a variety of normative and regulatory contexts (biodiversity protection, water and ocean management, fisheries management, climate change adaptation, etc.) […]*" - and the concept of ecosystem services, finding that their relationship is reciprocal in nature. While ecosystem services offer crucial knowledge for the

[56] Cane 2001, p. 17
[57] Faure & Verheij 2007
[58] Liu 2013
[59] Fasoli 2017, p. 37
[60] Mertens et al. 2012
[61] McGillivray 2012
[62] McIntyre 2014

further development and rational implementation of the ecosystem approach, the ecosystem approach increasingly adopts as its goal the maintenance of a stable provision of ecosystem goods and services.[63] In an earlier, 2015 publication, De Lucia examined the genealogy of what he dubbed the ecosystem approach (EA) in international environmental law, finding that EA is born out of opposing ideologies, namely ecocentric and anthropocentric ones.[64] In 2019, James-Bell wrote about the significance of implementing the ecosystem services paradigm in environmental law, testing this approach to the case of mangroves and their protection under Australian law. She identifies "*major deficiencies in the recognition of mangrove ecosystem services in existing laws [and calls] for reform in this area*".[65]

2.9 Ecological restoration law

In recent years, some interesting publications have been made about ecological restoration law. In his 2016 publication, Richardson advocated for ecological restoration law, rather than environmental restoration. Ecological restoration differing from environmental restoration in its ambition to achieve systemic improvements to entire ecosystems and landscapes, rather than rehabilitating, for example, a former mining site.[66] In their 2021 publication, Trouwborst & Svenning examined from the perspective of restoring functional ecosystems in Europe, the question "*to what degrees international legal instruments support or require megafauna rewilding efforts*", finding that "*[…]Article 8(f) of the Convention on Biological Diversity requires restoring the diversity and densities of Europe's megafauna as far as possible […]*".[67] In Mendes et al. 2022, the authors advocated for ecological restoration "*to mitigate the impact of human activity on the environment and preserve biodiversity and ecosystem services*", through the examination of international and European case law. They found that there are still "*wide discrepancies in the use of the term restoration by the judiciary, in particular with regard to objectives, baselines and reference conditions*", and urged the adoption of a legal definition of restoration.[68]

2.10 Case law

Some scholars have published on case law that figured, among other environmental matters, the issue of valuation of pure ecological harm.

Following the Canadian Supreme Court's ruling in British Columbia v. Canadian Forest Products Ltd. (Canfor), in which the Court emphasized that claims for environmental loss must be based on a coherent theory of damages, a methodology suitable for their assessment, and supporting evidence, Olszynski explored the concept of value from an economic, philosophical, and ecological perspective and discussed various existing valuation methodologies. Finally suggesting a two-stage approach to the assessment of environmental loss; assessing ecological

[63] De Luca 2018, p. 104, 114
[64] De Luca 2015
[65] Bell-James 2019, p. 291
[66] Richardson 2016, p. 277
[67] Trouwborst & Svenning 2022
[68] Mendes et al. 2022, p. 1

loss through a *prima facie* presumption in favour of restoration costs, followed by an assessment of the use/passive use/inherent value of the affected environment through contingent valuation methodologies.[69] In 2009, Knudsen revisited the *Exxon Valdez* oil spill. Through an analysis of the Pacific Herring - a keystone species which 20 years after the oil spill showed no sign of recovery, but for whose loss a limited amount of damages had already had been awarded 20 years earlier - Knudsen pointed out the existence of a disconnect between the dynamic complex, and uncertain nature of ecological injuries and our existing damages paradigm, which requires quick and static opportunities for identification and valuation. This disconnect, she argues, could be addressed through burden-shifting attributes of the precautionary principle to transfer the risk of long term, unknown ecological harm to those who have caused the injury, and by letting defendants choose either a multiplier of the compensatory damage award or paying for later-discovered damages on an ongoing basis through a case-specific Superfund.[70] In 2011, Kopela discussed the judgements of the Tribunal de Grande Instance de Paris and the Cour d'Appel de Paris in the *Erika* case in light of "*criticisms against the international system for the prevention of oil marine pollution*". Furthermore, she analysed the approach taken by the courts as regards criminal liability for oil marine pollution, the channelling of civil liability and claims for pure ecological harm.[71] In 2018, Adshead published on the application and development of the polluter pays principle (PPP) across jurisdictions in liability for marine oil pollution, paying special attention to the cases of the *Erika* and the *Prestige*. She found that the PPP could not be perceived as a high level transnational norm, that courts play a role in the creation of a history for the PPP as well as the formation of its identity, and that "*cross-fertilisation between jurisdictions and levels of governance [can be identified] as the PPP develops in discrete legal settings*".[72] In 2018, Harrison wrote about the latest developments in compensation for transboundary environmental harm, addressing the then newly adjudicated *Costa Rica v. Nicaragua* case. He emphasized the significance of the ICJ having heard a case for environmental harm, and of accepting a claim for biodiversity loss, which would potentially open the door to claims for 'pure environmental harm'. Harrison observed, however, that the "*Court's method of dealing with the claims is rather ambiguous […] On the one hand, [the Court] refuses to follow any of the detailed valuations proposed by either party to the litigation, identifying particular challenges with assumptions that were made. […] On the other hand, the Court reserved itself a large degree of discretion by emphasising that it was not necessary to determine the extent of damage with absolute certainty and an approximation would suffice.*"[73] In 2019, Long discussed the potential impact of the *Costa Rica v. Nicaragua* case on the provisions on responsibility and liability in the putative international legally binding instrument under the United Nations Convention on the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction, as well as how the case could "*shape the views of negotiators concerning the scope and substance of treaty provisions that aim to ensure that damage to the marine environment and the consequent impairment of ocean biodiversity to provide goods and services is compensable under international law*".[74] In their 2021 publication, Mohan & Kini addressed valuation methods used across civil law and common law jurisdictions through an analysis of the litigation following the oil spills caused by the foundering of the *Erika* and the explosion of the BP horizon oil platform. In a subsequent analysis of the *Costa Rica v. Nicaragua* case, they critiqued the absence of transparency in the ICJs judgement on the valuation method it applied and the 'paltry sum' which was ultimately

[69] Olszynski 2005
[70] Knudsen 2009
[71] Kopela 2011, p. 313
[72] Adshead 2018, p. 451
[73] Harrison 2018b, p. 529
[74] Long 2019, p. 245, 257

owed by Nicaragua to Costa Rica. Furthermore, they addressed the relevance of punitive damages in environmental litigation and the necessity for the ICJ to use independent experts for the purpose of environmental damage valuation.[75] In 2022, Harrison published once more on the ICJs method of dealing with natural resource damage valuation in *Democratic Republic of Congo v. Uganda* .[76] Here, the ICJ found that Uganda had breached international law through its military intervention on the territory of the DRC. One of the violations identified by the Court concerned Uganda's failure to comply with its "*obligations as an occupying Power in Ituri district to prevent acts of looting, plundering and exploitation of Congolese natural resources*". Harrison pointed out that, contrary to the *Costa Rica v. Nicaragua* case, the ICJ did appoint a valuation expert, however, that the Court "*made clear that it would take account of the reports of the court appointed experts […] but they would not be treated as determinative. […] these reports were simply another form of evidence that must be weighed and balanced against other sources of evidence.*" Harrison further pointed out that with the ICJ assigning a global sum for all natural resource damage and the criticism in the separate opinions of the judges (read: that the court arrived at the damage figures by way of *ex aequo et bono* and not on the basis of law and evidence), a legitimate question to ask was whether the Court "*could have been more structured and transparent in its final assessment of the compensation due*".[77]

The aforementioned publications mainly describe the law on the books and/or consider from a theoretical perspective how one should valuate ecological damage. While providing very insightful overviews of existing law, desirable developments in the law, compensation mechanisms, and valuation techniques, these works do not examine in detail how courts *de facto* valuate ecological damage.[78] Neither do they answer concretely the question of how *exactly* to stick a dollar value on certain types of ecological damage, e.g. for the purpose of filing a legal claim.

3. Added value

This research shall attempt to add value to the already existing body of work on environmental damages compensation by addressing some of the abovementioned apparent caveats.

Both during and since the publications of the works mentioned above, a small body of important case law has developed in the area of claims for pure ecological harm. This research shall examine three cases from this body of case law, namely the *Exxon Valdez* case(s) in the U.S., the *Erika* case in France, and the *Costa Rica v. Nicaragua* case before the ICJ. While each of these cases has already been written about extensively in the (academic) literature, I nevertheless believe to be able to add value to the existing canon through the level of detail of the analysis of each case, particularly as it pertains to the valuation methods and estimations brought forward by the parties, the courts' assessments of these, the underlying rationales, and final decision making on damages. This research, then, aims to add value by providing a

[75] Mohan & Kini 2021

[76] *Case Concerning Armed Activities on the Territory of the Congo*, Judgment, 9 February 2022. Hereinafter, *Democratic Republic of Congo v. Uganda*

[77] Harrison 2022, p. 4

[78] Indirectly related, but nevertheless very interesting against this background, is the 2014 publication by Chief Judge of the Land and Environment Court of New South Wales, Australia, Brian J. Preston, who describes the characteristics that denote successful environmental courts and tribunals, see Preston 2014

particularly in-depth, comparative analysis of these cases in an attempt to pinpoint exactly how judges, when presented with parties' opposing ecological damage valuations, ultimately reach a decision on an award for pure ecological damages.

The three cases under review lend themselves particularly well for such a detailed analysis as they are widely considered to be exceptionally emblematic of how the issue of valuation of ecological harm is dealt with by the courts.[79] However, it should be noted that, because only three cases are examined here, any conclusions drawn cannot be said to be empirical in nature. Meaning, one cannot make general inferences for the entire field of ecological damage valuation from looking at just these three cases the way one could if a much larger number of cases had been researched and compared. Having said that, because in each of the three cases under review the issues of applicable valuation methodologies and final damage assessments made by the courts figured so distinctively, they each do provide a large enough "biopsy" to draw substantive conclusions from as to how the respective courts reached their final decisions in the specific cases under review. Any conclusions drawn from this may, in turn, inspire ideas for future academic research that *is* aimed at examining a wider selection of case law. Noteworthy is that important work has already been done in this area, which has also been consulted for this research. Hay & Thébaud 2006 is very instructive, who examined the role of ecological damage in the monetary assessment of oil spills, covering twelve oil spills that occurred over a period of 35 years. Also Thébaud et al. 2004 is most informative, who examined six major oil spills that took place within the IOPC Funds system in Europe, comparing damages estimated by experts, to those claimed by parties, to those finally awarded by the court.[80]

By examining these three cases, I aim to uncover what type of harm was exactly suffered and what kind of problems the respective courts ran into when having to attach a monetary value to that harm.

Because the concept of 'harm' figures so significantly, this research shall also address the normative philosophical question of what ultimately constitutes harm. Moreover, the justifiability of the anthropocentric nature of our current harm-concept shall be questioned, as well as the desirability of a more ecocentric harm-concept.

Finally, this research shall endeavour to translate the well-known concept of (payments for) ecosystem services into possibilities of using it as an in-court approach to valuation of ecological damages.

4. Research questions and methodology

Concretely, this research shall aim to answer the question: What is the optimal way for courts to deal with pure ecological damage assessment?

To this end, several subsidiary research questions are posed, namely:

[79] Kindji & Faure 2019, Harrison 2018a, Duffield 1997, Duffield 2014, Hay & Thébaud 2006

[80] Hay & Thébaud 2006; see also Thébaud et al. 2004 in which an analysis is made of the i) estimates by experts; (ii) compensation claims; and (iii) compensation eventually paid to claimants in several important oil spills that occurred under the IOPCF.

1. Which frameworks have courts established for the valuation of pure ecological harm, meaning legal damages for those parts of the natural environment that, by nature, cannot have property rights vested in them?
2. Is it possible to fit pure ecological harm into our existing legal framework? And, if so, how?
3. Does an ecosystem services approach aid in formulating pure ecological harm claims and adjudicating those claims in the courtroom?

In order to examine the three subsidiary research questions, several research methods shall be employed. Question 1 shall be addressed by way of case law analysis of the three cases mentioned above. Question 2 shall be addressed through a normative philosophical analysis of the law, using Immanuel Kant's Rechtslehre, also called his Doctrine of Right, which forms the first part of The Metaphysics of Morals. Question 3 shall be addressed using economic analysis of the concepts of ecosystem services and payments for ecosystem services. This way, both empirical (read: the case law) and theoretical (read: the philosophical and economic analyses) methods will be brought to bear on the topic of pure ecological harm.

5. Research scope

This research is concerned with a niche topic within a much broader existing debate. It is concerned specifically with *ex post* valuation of pure ecological harm for the purposes of formulation and adjudication of legal claims in the courtroom. The chosen avenue for exploration in the direction of an ecosystem services approach is motivated by the fact that, intuitively, it would appear to provide a possibility for concrete quantification of nonmaterial damages. The choice for the exploration of this approach does not entail an argument or plea *for* this approach, nor does it aim to idealize this method. It merely is tested as to its ability to meet the necessity of quantification of nonmaterial harm in the courtroom.

To date, more than fifty methods for the assessment of nature's value have been developed in diverse social-ecological contexts around the world, stemming from various disciplines such as anthropology, biology, economics, and various indigenous and local traditions.[81] While acknowledging the existence of the ever broadening portfolio of valuation methods, this research shall focus on the practicability for the courtroom of *economic* valuation methodologies.

The issues of ecosystem services, biodiversity loss, extinction of species, valuation of nature etc., have become particularly topical in recent years. This means that a great amount is published on these topics in quick succession, ranging from academic literature to policy recommendations and reports. This research aims to be as complete and holistic as possible in its referencing, but acknowledges at the same time that it is impossible to cover all sources out there. The literature has to the extent possible been incorporated until 1 November 2022. However, the idea was not to discuss every article that potentially has addressed environmental damage assessment. I chose to rather focus on the main trends in the literature without claiming to be comprehensive.

[81] IPBES 2022, p. 13

The choice of case law is limited to three cases; the *Exxon Valdez* case(s) before the state and federal courts of the United States, the *Erika* case before the French Supreme Court (Court de Cassation), and the *Costa Rica v. Nicaragua* case before the International Court of Justice. It is important to note that the body of case law in which valuation of pure ecological harm plays an important part is broader than the three cases under examination here, and continues to grow. Case law following the *Amoco Cadiz*, *Patmos*, *Antonio Gramsci*, and *Prestige* incidents comes to mind, for example.[82] As well as the recently adjudicated ICJ-case *Democratic Republic of Congo v. Uganda*, which was adjudicated after the case law analysis for this research was completed.[83] Here, the choice has been made to limit the research to the selected three cases as they are widely considered to be particularly emblematic of how the issue of valuation of environmental harm is dealt with by the courts.[84]

The *Exxon Valdez* oil spill occurred in 1989; *Costa Rica v. Nicaragua* was adjudicated in 2018. Hence, the case law analysis covers a time span of the last 30 years.

In Chapter 3, the normative philosophical analysis of the concept of 'harm' is based mainly on the work of Immanuel Kant and contemporary Kantian, Prof. Christine Korsgaard. A juxtaposition shall be made between the law and the philosophy that grounds it. The choice for Kant as a main resource is founded on the acceptance among jurists of Kant's *Doctrine of Right* as offering a plausible normative philosophical explanation of our legal system.[85] This does not alter the fact that an analysis of the topic of harm can be approached from many different angles. Likewise, reference could be made to other philosophers and their work for an analysis of this subject matter. However, for the purposes of this research, and for the reason mentioned above, the choice is made to limit the analysis to the work of Immanuel Kant.

Finally, it should be said that this research is not concerned with the topics of rights of nature, legal personality of (parts of nature) nature, the permissibility of humans harming nature and / or eating other species. Also, this research leaves untouched the existing, much broader, ethical debate surrounding valuation of nature as such, meaning the question *is it appropriate, permissible and / or justifiable to valuate nature?* Instead, it departs from the conviction that valuation of nonmaterial harms in monetary terms inherently brings about legitimate ethical concerns and practical difficulties. It also takes for granted, however, that for day to day environmental legal practice it is unavoidable to ask the (amoral) question: how many dollars is nature worth?

6. Research structure

The structure of the thesis shall follow the abovementioned research questions. Chapter 2 is dedicated to answering research question 1. This question shall be approached through a case

[82] See Harrison 2018a. Hay & Thébaud 2006 provide a list of oil spill related case law figuring pure ecological harm which dates back to 1969.
[83] *Case Concerning Armed Activities on the Territory of the Congo*, Judgment, 9 February 2022.
[84] Kindji & Faure 2019, Harrison 2018a, Duffield 1997, Duffield 2014, Hay & Thébaud 2006
[85] See, for example, Wright 1997, p. 159, where it states: "*The two principal monistic theories of law are the utilitarian efficiency theory and the Kantian-Aristotelian theory of right or justice, based on the foundational norm of equal individual freedom, which asserts that the purpose of tort law is and should be just compensation and deterrence. It is clear that the equal freedom theory, rather than the utilitarian efficiency theory, provides the foundation for morality and law in general and for tort law in particular.*"

law analysis of, consecutively, the *Exxon Valdez* case(s), the *Erika* case, and the *Costa Rica v. Nicaragua* case. Chapter 3 is dedicated to answering research question 2 and shall provide a juxtaposition between the law and Kant's Rechtslehre. Chapter 4 is dedicated to answering research question 3, through an economic analysis of the concepts of ecosystem services and payments for ecosystem services. Each chapter contains a separate discussion paragraph and an interim conclusion on the specific research question. Chapter 5 shall form the conclusion and shall definitively answer the three subsidiary research questions, as well as the overall research question.

Chapter 2

Valuation of pure ecological harm in case law

1. Introduction

This chapter intends to examine which frameworks courts have established for the valuation of pure ecological harm.

In order to get a clear grasp of the thematic, the chapter begins with a brief outline of the most important legal frameworks commonly used to evaluate environmental damage. Then, using the terminology provided in the aforementioned frameworks, supplemented by terminology and definitions developed in the academic literature and case law, a definition of 'pure ecological harm' will be chosen for the purposes of this research. Also, choices on the use of other terminology pertinent to the thematic of pure ecological harm and damage assessment will be made. Following this, attention will be paid to case law that has formed the landscape of ecological damage assessment. The focus will particularly be on how *pure ecological harm* has been valuated by the Courts. Because this concerns a very particular category of environmental harm, and in most cases a multiplicity of heads of environmental damages is at stake, the case law under review will be examined as much as possible as it directly relates to pure ecological harm. A general overview of the relevant facts of the case is always given, but the legal analysis will focus as much as possible on the Courts' dealings with valuation of pure ecological harm. The selection of case law under review is not novel. It concerns cases that have been analysed extensively in the legal literature. The added value of this chapter lies in the depth of the analysis of the valuation methodologies presented in court, as well as the rationales of the respective courts that formed the basis for their ultimate decisions. A (comparative) analysis of these cases with this level of detail has so far not been undertaken in the academic literature. Through this in-depth analysis an attempt will be made at pinpointing exactly how judges, when presented with parties' opposing ecological damage valuations, ultimately reach a decision on an award for pure ecological damages .

2. Frameworks for natural resource damage assessment and definitions

2.1 Frameworks for natural resource damage assessment

Before turning to the examination of the selected case law, a brief overview will be given of the most important legal frameworks that have been developed for the purpose of evaluating environmental damage. The practice of evaluating environmental damage is referred to as 'natural resource damage assessment' (NRDA). The National oceanic and Atmospheric Association (NOAA) defines NRDA as: "*A Natural Resource Damage Assessment is a process to determine the appropriate type and amount of restoration needed to offset impacts to fisheries, wildlife, habitats, and human uses impacted by oil spills, hazardous waste sites, and vessel groundings.*"[86] As already becomes clear from this definition, the concept of NRDA is closely linked to oil pollution. This is explained by the fact that most international legislation in the field of environmental damage focuses on oil pollution.[87] Because these NRDA frameworks do not deal exclusively (or sometimes not at all) with 'pure ecological harm', and because they do not figure centrally in the case law under examination in this chapter, they will only be touched upon very briefly for the purposes of delineating the broader legislative context.

[86] https://oceanservice.noaa.gov/facts/nrda.html accessed 24 October 2021
[87] As demonstrated through Faure's extensive body of work on environmental damage(s); see e.g. Faure & Hu 2006, Faure et al. 2010b, Faure 2017

Providing an overview of the broader legislative context will also aid in determining which terminology and definitions are relevant to this research, with the notion of 'pure ecological harm' figuring centrally.

Over the past 30 years, several national and international NRDA frameworks have been developed that aim to provide guidance for assessing injuries to natural resources and the associated (monetary) damages.[88] Work in this field accelerated following the 1989 *Exxon Valdez* oil spill[89], which will be discussed below. The most prolific frameworks to date were developed at the international level, the regional, EU level and nationally in the United States of America. They each serve to address compensation for distinct types of environmental harm, set geographical boundaries to the harm under review, and recommend use of different valuation methods.[90]

2.2 International frameworks: CLC and IOPCF

At the international level, the most important frameworks are the International Oil Pollution Fund Compensation Funds (IOPCF) which flow from the 1992 Convention on Civil Liability for oil Pollution Damage (CLC).

The CLC, originally adopted in 1969 and accompanied by the 1971 Fund Convention, focuses on oil pollution originating from ships.[91] The conventions were initially drafted in response to the Torrey Canyon spill in 1967.[92] The CLC was amended in 1992 by two Protocols, increasing the scope and amount of compensation.[93] The amended Conventions are known as the 1992 Civil Liability Convention and the 1992 Fund Convention.[94] Also established in 1992, was the International Oil Pollution Compensation Fund 1992 which provides compensation for victims who do not obtain full compensation under the 1992 Civil Liability Convention.[95] A supplementary fund was established in 2005 which provides a third tier of compensation.[96] The three funds are administered by the International Maritime Organization (IMO), a specialized UN agency.[97]

The CLC has been adopted by the vast majority of maritime nations other than the United States and ensures shipowner liability - and channelling of liability of individuals or entities affiliated

[88] Huguenin et al. 2011, p. 70; Jones & DiPinto 2018; see also Boyd 2006
[89] Huguenin et al. 2011, p. 68; see also Liu 2014; Boyd 2006, p. 155
[90] Huguenin et al. 2011, p. 70
[91] Wang 2010, p. 29
[92] Liu et al. 2014, p. 137
[93] Wang 2010, p. 29
[94] https://iopcfunds.org/wp-content/uploads/2018/06/Text-of-Conventions_e.pdf accessed 8 May 2021; See also where it states: "*The 1971 Fund Convention ceased to be in force on 24 May 2002, when the number of 1971 Fund Member States fell below 25.*"
[95] https://iopcfunds.org/wp-content/uploads/2018/06/Text-of-Conventions_e.pdf accessed 8 May 2021
[96] "*Membership of the Supplementary Fund is optional and is open to any State which is a Member of 1992 Fund.*" See https://iopcfunds.org/wp-content/uploads/2018/06/Text-of-Conventions_e.pdf accessed 8 May 2021. Irrespective of these successive amendments, "*the basic principles established in the CLC 1969 and Fund Convention 1971 remain the same, being strict liability, channelling of liability and compulsory insurance*", points out Wang 2010, p. 29.
[97] For a more in-depth overview of the CLC and IOPCF, see Faure et al. 2017, p. 70-79 as well as Tan 2006, p. 286-309, Liu et al. 2014, p. 136-157

to the shipowner – for "pollution damage".[98] Shipowners are held strictly liable and have to comply with a compulsory liability insurance.[99] An owner of a tanker carrying more than 2,000 tonnes of persistent oil is obliged to maintain liability insurance and victims can bring legal action directly against the insurer.[100] The shipowner's liability is limited to an amount linked to the tonnage of the ship.[101]

As Liu et al. point out: "*The CLC and Fund Convention apply only to ships carrying persistent oils as bulk cargo. Thus, the conventions exclude all liability for spills of refined products such as gasoline, kerosene, and light diesel oils that are covered by OPA.*"[102] (see below). Likewise not eligible for compensation under the IOPCF are non-tanker spills and nonmarket loss claims based on the use of valuation techniques, like stated preference methods or benefits transfer methods. [103]

Pollution damage is defined as "*loss or damage caused outside the ship by contamination resulting from the escape or discharge of oil from the ship, wherever such escape or discharge may occur, provided that compensation for impairment of the environment other than loss of profit from such impairment shall be limited to costs of reasonable measures of reinstatement actually undertaken or to be undertaken*", and "*the costs of preventive measures and further loss or damage caused by preventive measures.*"[104] While "*impairment of the environment*" is not defined, Brans points out that in the context of the CLC "*it is generally understood to mean an adverse alteration to the environment leading to a deterioration or weakening of its functioning*" and, interpreting the text of the CLC 1992, differentiates between three eligible heads of damage, namely a. claims for loss of profit; b. claims for the costs of post-incident studies; and c. claims for the costs of reinstatement measures.[105] Huguenin et al. point out, "*for the purposes of IOPCF compensation, "environmental damage" is considered to include "reasonable reinstatement measures aimed at accelerating natural recovery of environmental damage," but does not include compensation for interim losses. Other noncompensable environmental damages include nonmarket loss claims based on the use of valuation techniques*

[98] Foley & Nolan 2008, p. 49-51. See Tan 2006, who explains that originally, under the CLC 69, "*[…] liability was 'channelled' solely to the shipowner (or his insurer) in order to simplify the claimant's task of identifying appropriate defendants to sue. Thus, only the owner need take out compulsory insurance, with all claims against other parties for the same damage being unavailable under CLC. Of course, this did not affect the owner's (or his insurer's) right to obtain indemnification from other parties whose wrongful conduct may have caused the pollution incident. [ref] Neither did it preclude pollution victims from pursuing claims against non-owner parties under national laws outside the CLC regime.*" The exclusivity of channelling of liability to ship owners became an issue of contention in the *Erika* case, see below.

[99] https://iopcfunds.org/wp-content/uploads/2018/06/Text-of-Conventions_e.pdf accessed 8 May 2021

[100] Faure & Wang 2006, p. 319

[101] https://iopcfunds.org/wp-content/uploads/2018/06/Text-of-Conventions_e.pdf accessed 8 May 2021

[102] Liu et al. 2014, p. 187. Noteworthy are also the Hazardous and Noxious Substances Convention (HNS), which covers the cost of clean-up and economic losses resulting from the maritime transport of hazardous and noxious substances, and the International Convention on Civil Liability for Bunker Oil Pollution Damage (BUNKER), which aims at making compensation available to persons who suffer damage caused by spills of oil, when carried as fuel in ships' bunkers. See: https://www.hnsconvention.org/ accessed 26 October 2021, and https://www.imo.org/en/About/Conventions/Pages/International-Convention-on-Civil-Liability-for-Bunker-Oil-Pollution-Damage-(BUNKER).aspx accessed 26 October 2021, respectively.

[103] Huguenin et al. 2011, p. 70; See Faure et al. 2017, p. 76

[104] Article 1 sub 6a and b CLC 1992

[105] Brans 2018, p. 4; see also https://iopcfunds.org/compensation/ accessed 10 May 2021, where it states; "*An oil pollution incident can generally give rise to claims for five types of pollution damage: property damage, costs of clean-up operations at sea and on shore, economic losses by fishermen or those engaged in mariculture, economic losses in the tourism sector, costs for reinstatement of the environment.*"

(e.g., stated preference methods such as contingent valuation, travel cost, habitat/resource equivalency analysis, hedonic, or benefits transfer methods); none of these is eligible for IOPCF compensation. […Eligible for compensation under the IOPCF are costs for] cleanup operations on shore and at sea, property damage, consequential loss […], pure economic loss […], and environmental damage".[106]

2.3 United States national frameworks: CERCLA and OPA

2.3.1 CERCLA

In the United States, the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)[107] and the Oil Pollution Act of 1990 (OPA) are the most prolific natural resource liability statutes.[108] All U.S. natural resource liability statutes call on public officials, such as the president, state governors, and sovereign tribal nations to designate officials from particular natural resource management agencies to act as trustees for natural resources on behalf of the public.[109]

CERCLA, more commonly known as Superfund, applies to United States territory.[110] In the case of CERCLA, the U.S. department of the Interior (DOI) has been designated as the trustee

[106] Huguenin et al. 2011, p. 70. Compare this to Faure et al. 2017, p. 75-76, where it reads : "*[The 1992 CLC's definition of 'pollution damage'] is constricted by the word 'contamination', which means that damage caused by fire or explosion following a discharge is not covered.[ref] It is very likely that complex issues as to causation would arise where contamination by oil is followed by contamination by fire.[ref] The definition is still vague, and its concrete scope only became clear over the years. Personal injury is eligible for compensation, but not including exposure to health risks, anxiety and upset. Damage to property should be 'real' and not speculative. Pure economic loss is eligible if the loss is quantifiable in economic terms.[ref] 'Preventive measures' contain clean-up and restoration. They are compensable if they are reasonable and the loss is quantifiable in economic terms. Claims based on abstract methods of calculation are not admissible.[ref].*"

[107] 42 U.S.C. §9601 et seq. (1980); for full text see https://www.govinfo.gov/content/pkg/USCODE-2011-title42/html/USCODE-2011-title42-chap103.htm accessed 7 May 2021

[108] But see also the federal Clean Water Act Amendments of 1977, the National Marine Sanctuaries Act 1988, and the Park System Resource Protection Act 1990. Boyd points out that before CERCLA, the Deepwater Port Act of 1974 and the Clean Water Act amendments of 1977 introduced liability for natural resource damages to U.S. federal law, see Boyd 2010, p. 57. Huguenin et al. 2011 explain how "*[e]arly NRDA efforts in the United States generally used methods drawn from environmental economics to estimate damages. These methods (e.g. hedonic property value models, travel cost models, averted cost calculations, stated preference survey methods) aimed to calculate the public's willingness to pay (WTP) to avoid the injury to the harmed resource as a proxy for a market value. […] [C]ritics objected that the public often would not choose to "sell" natural resources at market prices if given the choice prior to the injury. This concern, combined with the technical difficulty and expense of using WTP methods to value natural resource injuries, resulted in the movement away from WTP methods toward using restoration costs as the primary measure of damages. Using "primary" restoration efforts to speed the return of injured natural resources to their condition prior to the injury (the so-called "baseline" condition "but for" the injury) and "compensatory" restoration projects to offset any "interim" losses suffered until injured resources are returned to baseline condition is conceptually straightforward, fair to the public, and has become the preferred approach in most NRDAs conducted in the United States. Thus the costs of primary and compensatory restoration efforts become the measure of damages, rather than (or in some case supplemented by) the public's WTP for the resource*", Huguenin et al. 2011, p. 69

[109] Jones & DiPinto 2018, p. 335

[110] See 42 U.S. Code § 9601 – Definitions (8) where the term "environment" is defined; see https://epa.maps.arcgis.com/apps/webappviewer/index.html?id=33cebcdfdd1b4c3a8b51d416956c41f1 accessed 7 May 2021, where a map is provided of all the sites in the U.S. currently on the so-called National Priorities List (NPL), proposed to the NPL and deleted from the NPL

of the public. As such it develops rules governing natural resource damage assessment and deals with claims arising under those rules. [111]

CERCLA imposes strict liability as well as joint and several liabilities, but allows for a limited list of defences that defendants can avail themselves of. For example, if a defendant can prove that even though they only had knowledge of the pollution, they took steps to reduce the likelihood of spills, this can factor into liability attribution.[112]

CERCLA does not define environmental harm, but refers to the term "damages" and defines that as: "*damages for injury or loss of natural resources as set forth in section 9607(a) or 9611(b)*".[113] Natural resources are defined in turn as: "*land, fish, wildlife, biota, air, water, ground water, drinking water supplies, and other such resources belonging to, managed by, held in trust by, appertaining to, or otherwise controlled by the United States (including the resources of the fishery conservation zone established by the Magnuson-Stevens Fishery Conservation and Management Act [16 U.S.C. 1801 et seq.]), any State or local government, any foreign government, any Indian tribe, or, if such resources are subject to a trust restriction on alienation, any member of an Indian tribe.*"[114]

Damages can consist of "*a. all costs of removal or remedial action incurred by the United States Government or a State or an Indian tribe not inconsistent with the national contingency plan; b. any other necessary costs of response incurred by any other person consistent with the national contingency plan; c. damages for injury to, destruction of, or loss of natural resources, including the reasonable costs of assessing such injury, destruction, or loss resulting from such a release; and d. the costs of any health assessment or health effects study […]*".[115]

The original 1986 DOI rules took a relatively narrow view of what constituted compensable injuries, the scope of compensation and valuation methods.[116] It favoured a market-oriented approach and employed a hierarchy of valuation methods, with non-market procedures taking a bottom place on the list. [117] Contingent valuation estimates were only allowed if they were less than the restoration cost of the natural resource (the so-called "lesser of" rule, which is in line with common law tradition) and if use values could not be determined.[118] Non-use values were not compensable at all.[119] Subsequent case law caused the rules to be revised in 1994, eliminating the "lesser of" rule and shifting the orientation towards restoration as the basis for damages rather than monetary estimates.[120] The current rules allow for compensation for non-

[111] Boyd 2006, p. 145; Huguenin et al. 2011, p. 71
[112] https://www.law.cornell.edu/wex/comprehensive_environmental_response_compensation_and_liability_act_(cercla) accessed 14 May 2021
[113] 42 U.S. Code § 9601 – Definitions (6)
[114] 42 U.S. Code § 9601 – Definitions (16)
[115] 42 U.S. Code § 9607(a); see also 42 U.S. Code § 9611(b)
[116] Boyd 2006, p. 145
[117] Boyd 2006, p. 145
[118] Fourcade 2011, p. 1761
[119] Boyd 2006, p. 145. Non-use values or existence values are the utility that individuals derive from "*knowing that environmental resources are preserved even if they will never directly use them*", .e.g. knowing that Antarctica is preserved or whales are protected. See Hanley 2002, p. 27
[120] *Ohio v. Department of the Interior* (880 F.2d 432, 442 (D.C. Cir. 1989); *Colorado v. Department of the Interior* (880 F.2d 481 (1st Cir. 1989); Boyd 2006, p. 145; Fourcade 2011, p. 1761

use values and non-market valuation methods.[121] The DOI is charged as a public trustee to deal with claims arising under CERCLA, acting on behalf of the public for the recovery of damages for injuries to natural resources and for the restoration, rehabilitation, replacement, or the acquisition of equivalents of the injured natural resources and their associated services.[122] The regulations that the DOI has enacted for this purpose focus exclusively on damages related to: (a) the release of hazardous substances including but not limited to oil, and (b) collateral injuries occurring during the course of active remediation of the hazardous substances. Environmental harm resulting from other causes does not qualify for compensation under CERCLA.[123] It allows for the application of a nonexclusive, variety of valuation techniques as long as the methodologies applied comply with four mandatory "acceptance criteria": feasibility and reliability, reasonable cost, avoidance of double counting, and cost-effectiveness.[124]

2.3.2 OPA

The Oil Pollution Act of 1990 is aimed at the maritime industry and addresses, among other things, liability for cleanup, removal costs, and damages in the aftermath of an oil spill in U.S. waters.[125] OPA has designated the U.S. National Oceanic and Atmospheric Administration (NOAA), as a public trustee, to develop rules governing natural resource damage assessment and to deal with claims arising from marine injuries.[126]

OPA prescribes strict, joint and several liability of responsible parties for removal costs plus damages in connection with a discharge of oil into covered waters.[127] The standard of liability adopted is the same one as employed in section 311 of the Clean Water Act and entails strict liability of parties responsible for the discharge of oil or hazardous substances into the waters of the United States.[128] Unlike liability for removal costs, liability for damages is limited under OPA based on the type of vessel or facility involved, and the amount of oil discharged.[129]

OPA allows damages to be claimed for natural resources, real or personal property, subsistence use, revenues, profits and earning capacity, and public services.[130] It uses the same definition of natural resources as CERCLA[131] and accepts two categories of damage: primary restoration

[121] Boyd 2006, p. 145; Fourcade 2011, p. 1761. But compare this to Czarnezki & Zahner 2005, p. 509, who state: "*The regulations of the Department of the Interior, which bind some CERCLA trustees, create unusual barriers to the consideration of non-use values […]*".
[122] Huguenin et al. 2011, p. 71; Boyd 2006, p. 145
[123] Huguenin et al. 2011, p. 71
[124] As set forth in 43 C.F.R. §11.83 (a) (3); Huguenin et al. 2011, p. 71-72, who point out that: "*In selecting restoration alternatives, the DOI NRDA regulations prescribe that authorized officials must consider technical feasibility, expected cost/benefits, the potential for collateral environmental injury, potential effects on human health and safety, and compliance with applicable laws and policies, among other considerations.[ref]*". See also https://www.epa.gov/superfund/key-principles-superfund-remedy-selection accessed 7 May 2021, where the key principles of Superfund Remedy selection are explained through various policy documents.
[125] Foley & Nolan 2008, p. 48; Huguenin et al. 2011, p. 72. For an account of the legislative history of OPA, see Chao 1996, p. 216-230. For an account of the broader political, legal, and insurance concerns that were raised following the enactment of OPA in 1990, see Tan 2006, p. 322-327
[126] Boyd 2006, p. 145; Boyd 2010, p. 58; Faure et al. 2017, p. 140
[127] Nichols 2010, p. 1
[128] Nichols 2010, p. 1
[129] 33 U.S.C. §§ 2704(a) and (b); Nichols 2010, p. 1
[130] 33 U.S. Code § 2702 (2)
[131] Save for the reference to the Magnuson-Stevens Fishery Conservation and Management Act; see 33 U.S.C. §2701 (20)

and compensatory damages for interim losses. Primary restoration includes the cost of restoring, rehabilitating, replacing, or acquiring the equivalent of the damaged natural resources. Compensation for interim losses consist of the diminution in value of those natural resources pending recovery of the resources to baseline, but for the injury.[132] According to the NOAA rules, the goal of the damage assessment is "*to make the environment and public whole…[and is to be] achieved through the return of the injured natural resources and services to baseline and compensation for interim losses of such natural resources and services from the date of the incident until recovery*".[133] Under the NOAA rules, interim losses are calculated based on the cost of "compensatory restoration" actions.[134]

Resource-to-resource and service-to-service scaling approaches must be considered, however, valuation-based scaling approaches may be employed where resource-to-resource and service-to-service scaling are inappropriate.[135] The NOAA rules allow for a broad variety of valuation methodologies and allow for the recovery of lost non-use values.[136]

When deciding between the selection of specific restoration actions that could potentially be applied, OPA regulations require "*that a reasonable range of alternatives be developed, and that they be evaluated based on : (a) cost, (b) the extent to which each alternative is expected to return the environment to baseline condition and compensation for interim losses, (c) the likelihood of success, (d) the extent to which each will prevent future injury and avoid collateral injuries, e) the extent to which each benefits more than one natural resource and /or service, and (f) the effect of each on public health and safety.*"[137]

2.4 European Environmental Liability Directive

In 2004, the European Environmental Liability Directive (ELD) was enacted. It establishes a framework based on the polluter pays principle to prevent and remedy environmental damage.[138] The ELD deals with pure ecological harm and, like CERCLA and OPA, it calls on the powers and duties of public authorities as opposed to establishing a traditional civil liability system for damage to property, economic loss, and personal injury.[139]

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[132] Jones & DiPinto 2018, p. 336; Boyd 2006, p. 147

[133] See 15 CFR 990.10 (the NOAA rules for OPA damages); Boyd 2006, p. 147. Note that OPA itself does not explicitly mention the term 'interim losses', but that these follow from the NOAA rules. OPA does speak of interim *damages*, but this refers to the situation where "*the responsible party shall establish a procedure for the payment or settlement of claims for interim, short-term damages[…]*", while awaiting court order on the full amount of damages due, see 33 U.S. Code § 2705 (a).

[134] See https://www.epa.gov/superfund/natural-resource-damages-frequently-asked-questions#10 accessed 26 October 2021, where it also states: "*Trustees can determine the scale of these actions through methodologies that measure the loss of services over time or through valuation methodologies [15 CFR §990.53(d)]*".

[135] See Faure et al. 2017, p. 140, where it says: "*When determining compensatory restoration, trustees should use a resource-to-resource or service-to-service approach to compensate for the lost natural resources service or value.[ref] If these approaches are not possible, trustees can use other evaluation techniques to estimate the dollar value of the lost services and select the scale of the restoration action that has a cost equivalent to the lost value.[ref] A number of valuation techniques are allowed to calculate the monetary value, including the disputed contingent-valuation technique.[ref]*". See also Huguenin et al. 2011, p. 72

[136] Boyd 2006, p. 147

[137] Huguenin et al. 2011, p. 72-73; see also Jones & DiPinto 2018, p. 339

[138] Article 1 Environmental Liability Directive; https://ec.europa.eu/environment/legal/liability/ accessed 9 May 2021

[139] https://ec.europa.eu/environment/legal/liability/ accessed 9 May 2021

The ELD defines "environmental damage" as "*damage to protected species and natural habitats, which is any damage that has significant adverse effects on reaching or maintaining the favourable conservation status of such habitats or species. The significance of such effects is to be assessed with reference to the baseline condition damage […], water damage, which is any damage that significantly adversely affects […] the ecological, chemical or quantitative status or the ecological potential […]; or the environmental status of the marine waters concerned,[…] land damage, which is any land contamination that creates a significant risk of human health being adversely affected as a result of the direct or indirect introduction, in, on or under land, of substances, preparations, organisms or micro-organisms […]*"[140]

The term "damage" is defined as: "*a measurable adverse change in a natural resource or measurable impairment of a natural resource service which may occur directly or indirectly*"[141]

Annex III to the ELD lists dangerous activities that create a strict liability for operators if these activities result in environmental harm.[142] Operators who carry out other occupational activities than those listed in Annex III can be held liable under a fault-based standard of liability.[143]

The ELD allows for compensation for primary, complementary, and compensatory remediation.[144] Huguenin points out that the ELDs definitions of complementary and compensatory remediation taken together amount to what in the U.S. is known as "compensatory restoration". [145] The ELD voices an explicit preference for resource-to-resource or service-to-service, stating: "*When determining the scale of complementary and compensatory remedial measures, the use of resource-to-resource or service-to-service equivalence approaches shall be considered first.*"[146] If this is not possible then alternative valuation techniques are allowed.[147]

[140] Article 2 (1) Environmental Liability Directive. A separate Guideline was produced to further clarify and create a common understanding of the term "environmental damage", see https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021XC0407%2801%29&qid=1617956961808 accessed 9 May 2021

[141] Article 2 (2) Environmental Liability Directive

[142] See Environmental Liability Directive 2004 Annex III; https://ec.europa.eu/environment/legal/liability/ accessed 9 May 2021

[143] https://ec.europa.eu/environment/legal/liability/ accessed 9 May 2021

[144] See Environmental Liability Directive 2004 Annex II where it states: "*Remedying of environmental damage, in relation to water or protected species or natural habitats, is achieved through the restoration of the environment to its baseline condition by way of primary, complementary and compensatory remediation, where: (a)'Primary' remediation is any remedial measure which returns the damaged natural resources and/or impaired services to, or towards, baseline condition; (b) 'Complementary' remediation is any remedial measure taken in relation to natural resources and/or services to compensate for the fact that primary remediation does not result in fully restoring the damaged natural resources and/or services; (c)'Compensatory' remediation is any action taken to compensate for interim losses of natural resources and/or services that occur from the date of damage occurring until primary remediation has achieved its full effect; (d) 'interim losses' means losses which result from the fact that the damaged natural resources and/or services are not able to perform their ecological functions or provide services to other natural resources or to the public until the primary or complementary measures have taken effect. It does not consist of financial compensation to members of the public.*"

[145] Huguenin et al. 2011, p. 74

[146] Environmental Liability Directive 2004 Annex II, at 1.1.2.

[147] Environmental Liability Directive 2004 Annex II, at 1.1.3.; Huguenin et al. 2011, p. 74

Figure 1. Overview of NRDA frameworks

Treaty/year	Relevant terminology	Targets	Heads of damage	Geographical scope	Valuation methods	Is pure environmental harm eligible for compensation?
CLC / IOPCF	IMO Pollution damage Impairment of the environment Strict liability Compulsory liability insurance Liability channelling	Damages resulting from injuries caused by tanker spills of persistent oil	a. claims for loss of profit; b. claims for the costs of post-incident studies; and c. claims for the costs of reinstatement measures	Based on country membership[1]	Market valuation methods[2]	No
CERCLA	DOI Public trustee Natural resources Damages Strict liability Joint and several liability	Damages resulting from: a. the release of hazardous substances including but not limited to oil, and b. collateral injuries occurring during the course of active remediation of the hazardous substances	a. costs of removal or remedial action b. any other necessary costs of response incurred c. damages for injury to, destruction of, or loss of natural resources, including the reasonable costs of assessing such injury, destruction, or loss resulting from such a release; d. the costs of any health assessment or health effects study	USA	A nonexclusive, variety of valuation techniques as long as the methodologies applied comply with four mandatory "acceptance criteria": feasibility and reliability, reasonable cost, avoidance of double counting, and cost-effectiveness.	Yes
OPA 1990	NOAA Public trustee Natural resources Damages Strict liability Joint and several liability	Damages resulting from oil discharges to natural resources, real or personal property, subsistence use, revenues, profits and earning capacity, and public services	a. Primary restoration b. compensatory damages for interim losses	Navigable waters of the USA, adjoining shorelines, or the Exclusive Economic Zone	Resource-to-resource scaling approach Service-to-service scaling approach Valuation-based scaling approaches if the above two are inappropriate	Yes
ELD	Member States Polluter pays principle Protected species and natural habitats Competent authorities Environmental damage Strict liability Fault-based liability	Enforcing the polluter pays principle to prevent and remedy (in)direct environmental damage to : a. Protected species and natural habitats; b. Water damage c. Land damage	Primary remediation Compensatory restoration; which is subdivided into: a) Compensatory remediation b) Complementary remediation	EU	Explicit preference for resource-to-resource or service-to-service scaling approaches (e.g. habitat equivalency analysis and resource equivalency analysis). If not possible, alternative valuation techniques are allowed.	Yes

[1] See https://iopcfunds.org/about-us/membership/# accessed 14 May 2021 for a map indicating current country memberships to the various funds

[2] *"To be entitled to compensation, the pollution damage must result in an actual and quantifiable economic loss. The claimant must be able to show the amount of his loss or damage by producing accounting records or other appropriate evidence"*, see https://iopcfunds.org/compensation/ accessed 10 May 2021

2.5 Definitions

As already becomes clear from the above, very brief introduction into the mainstream frameworks for natural resource damage assessment, all maintain individual concepts and definitions pertaining to environmental harm, NRDA, and types of compensation and restoration. Sometimes similar terminology is employed, yet different meanings are attached to it.

In addition to the existing legislation, the academic literature has also developed terminology to describe harm to the environment, distinguishing between 'environmental damage' (often used interchangeably with 'pollution damage'), natural resource damage, and ecological damage.[148]

Liu provides a helpful overview of the commonly applied terminology. She explains that environmental damage can be defined in at least two ways; "*in the broader sense, it refers to the damage caused via the environment, including not only damage to public natural resources but also damage to the owned parts of the environment and even consequential losses, such as pure economic loss, cleanup costs and personal injury. […] In the narrower sense, damage to persons or property is excluded.*"[149] Flowing from the concept of environmental damage are several sub-concepts; damage to the environment itself, damage to the environment *per se*, pure environmental damage, and impairment of the environment. These sub-concepts were developed to delineate types of damage that do not concern privately owned environmental components. [150] The notion of 'natural resource damage' is used primarily among American scholars and covers both public natural resources and privately owned ones.[151] The notion of 'ecological damage' is mainly employed in Europe. According to Liu, when it comes to ecological damage, one can generally distinguish between three approaches. Under the first approach, only damage to natural resources not subject to property rights is included. Privately owned natural resources, which may have equally important ecological value, are excluded. Under the second approach, ecological damage only encompasses damage to natural resources that lack market value. Under the third approach, ecological damage refers to damage caused to the environment regardless of the existence of property rights.[152]

On top of legislation and academic literature, case law has also informed the concept of environmental harm. Famously, in the *Erika* case (see below), the Cour d'Appel de Paris expounded on which three categories of environmental harm traditionally existed before the French law, and added a new category. This new category of environmental harm under French law, was coined "*prejudice écologique pur*", or pure ecological harm. It defined this as "*ecological harm resulting from harm to non-marketed environmental assets, which is compensable through monetary reparation. This objective, autonomous harm, is understood to be any non-negligible harm to the natural environment, including air, atmosphere, water, soil, land, landscapes, natural sites, biodiversity and the interaction between these elements, which has no impact on a particular human interest but on a legitimate collective interest.*"[153]

[148] Liu 2013, p. 23-25
[149] Liu 2013, p. 23-24
[150] Liu 2013, p. 23-24
[151] See CERCLA and OPA; Liu 2013, p. 24
[152] Liu 2013, p. 24-25
[153] It should be noted that the criterion of ecological harm having to be compensable through monetary reparation makes this definition difficult to apply. (Pure) ecological harm is inherently difficult to express in monetary terms.

Subsequently, the Cour de Cassation reformulated this definition as: "*an objective and autonomous harm, consisting of any significant harm caused to the natural environment, without repercussions on a particular human interest but affecting a legitimate collective interest"*.[154]. In France, the concept of pure ecological harm thus developed was codified in the 2016 Biodiversity Law[155] which was then transposed into the French Code Civil, articles 1246–1252.[156] Under the new law, any private person can claim remedies for damage caused to nature, such as loss of biodiversity and the destruction of natural habitats, in civil court.[157]

For the purposes of this chapter, settling on a working definition of pure ecological harm is of most importance. Taking into account the definitions formulated in the legislation and literature, as well as the definition of pure ecological harm in the *Erika* case, this chapter shall always refer to the concept of 'pure ecological harm'. Pure ecological harm is understood to mean ecological harm to environmental assets that are not subject to property rights, (including but not limited to air, atmosphere, water, soil, land, landscapes, natural sites, biodiversity and the interaction between these elements), which has no impact on a particular human interest but on a legitimate collective interest.

Finally, it is also important to assign meaning to wording like damage(s), injury, and harm.

The term "injury" will be used interchangeably with the term "harm" and "damage". In U.S. parlance the term "injury" refers to the (environmental) harm or damage done, it is less frequently used in continental legal contexts. However, as this chapter also deals with U.S. case law and legislation, it naturally appears in cited source materials. The terms "damages" and "compensation" are used to refer to the monetary payment necessary to fairly compensate the public for harm suffered.

3. Case law

The case law examined below is considered for the purpose of getting a clear view of how courts valuate pure ecological harm. The case law considered revolves around more than the topic of (the valuation of) pure ecological harm; matters like (in)admissibility, civil and / or criminal liability, causality, etc. are dealt with at length during litigation.

What matters most for this research, however, is what happens after liability has been established and claimants and defendants present valuations of pure ecological harm to the court for its consideration.

The definition, as subsequently reformulated by the Cour de Cassation, is more workable, although, as e.g. Foulon 2019 points out, it stands in need of further specification.

[154] Cour de Cassation, p. 239; Foulon 2019, p. 311-312

[155] Law n. 2016-1087 of 8 August 2016 for the recovery of biodiversity, nature and landscapes; hereafter 'the 2016 Biodiversity Law' [as translated and cited by Foulon 2019, p. 310].

[156] Foulon 2019, p. 310

[157] Foulon 2019, p. 310. See also where it states on p. 310: "*[The new law] empowers private individuals to claim remedies for a* (sic) *damage caused to nature before civil law courts once someone is found liable on the basis of French common tort law rules. The principal remedy must be the restoration of the environment to its baseline condition. But damages can also be awarded if the environment cannot be fully restored. This new regime contributes to preventing situations where such damage is simply ignored and to dissuade polluters as they have to assume the consequences of their actions. However, its implementation raised legal and technical issues related to the question of representation of nature in courts, evaluation of ecological damage, legal personality of nature and so on.*"

For the below case law examination this means that while a summary of the material facts of each case is given, the analysis will focus on the courts' dealing with the concept of pure ecological harm. Attention will be paid to the valuation methods and estimations brought forward by parties, the courts assessments of these, the underlying rationales, and final decision making on damages. The aim being to uncover how exactly courts deal with the assessment of pure ecological damage. Information about other aspects of the cases is given as far at that serves to elucidate adequately the context within which the courts' assessment and adjudication concerning valuation took place.

This chapter will examine three cases, namely the *Exxon Valdez* case(s) before the state and federal courts of the United States, the *Erika* case before the French Supreme Court (Court de Cassation), and the *Costa Rica v. Nicaragua* case before the International Court of Justice. These three cases were selected because they illustrate chronologically the development of the legal notion of pure ecological harm and the valuation of such harm through case law over the past 30 years. While the circumstances leading up to litigation in these cases differ significantly and while these cases were subject to different jurisdictions, they nevertheless lend themselves for comparison. All three cases deal with either a polluting or otherwise environmentally impactful event causing significant pure ecological harm. While the occurrence of pure ecological harm after a polluting or otherwise environmentally impactful event is in and of itself of course not exceptional, what is exceptional and what sets these cases apart from other environmental law case law, is that this time around applicants claimed damages for pure ecological harm. And, this constitutes a legally significant departure from the traditional approach of only claiming damages for environmental harm either done to natural and legal persons or done to property belonging to natural or legal persons.

Each case analysis will consist of a summary of the facts of the case, a description of the procedural history, the issue(s) before the court, parties' valuations, the court's holdings and / or rationale, and final judgement, particularly as they pertain to pure ecological harm. Case analyses are presented in as uniform a manner as possible, however some variations are possible, as each case stems from a different jurisdiction and judgements are written up differently across jurisdictions with some judgements providing more detailed insight into parties' arguments and court rationale than others.

While the *Costa Rica v. Nicaragua* case was only dealt with before the ICJ, both *Exxon Valdez* and *Erika* went through all levels of their respective national court system. For *Exxon Valdez* proceedings were brought before the District Court of Alaska, the Appellate Court and, finally, the Supreme Court of the United States. *Erika* was adjudicated in the Tribunal de Grande Instance de Paris, the Cour d' Appel de Paris, and finally, the French Cour de Cassation. As indicated above, a short description of the procedural history of each case will be given. However, the analysis will focus on the specific court proceeding(s) that dealt (most) with the issue of valuation of ecological harm. For *Exxon Valdez* this concerns the United States' and State of Alaska's cases against Exxon, as well as the consolidated *In re Exxon Valdez* case; for *Erika* this concerns the proceedings before the Cour d' Appel de Paris and the Cour de Cassation; *Costa Rica v. Nicaragua* this concerns the proceedings before the ICJ.

Finally, it is important to note that the body of case law in which valuation of pure ecological harm plays an important part is broader than the three cases under examination here, and continues to grow. Case law following the *Patmos*, *Antonio Gramsci*, and *Prestige* incidents

comes to mind, for example.[158] As well as the more recently adjudicated *Democratic Republic of Congo v. Uganda* case.[159] Here, the choice has been made to limit the research to the selected three cases as they are widely considered to be particularly emblematic of how the issue of valuation of environmental harm is dealt with by the courts.[160]

3.1 Exxon Valdez

Citations:	- *State of Alaska v. Exxon Corp. et al.* (Civ. No. A91-083) - *United States v. Exxon Corp. et al.* (Civ. No. A91-082) - *In re Exxon Valdez*, No. A89–0095–CV (consolidated) - *Alaska Native Class v. Exxon corp. (In re Exxon Valdez)* 104 F.3d 1196
Parties:	- State of Alaska (Applicant); Exxon (Respondent) - United States (Applicant); Exxon (Respondent) - Exxon (Applicants); Baker et al. (Respondents) - Alaska Native Class (Applicants); Exxon corp. (Respondents)
Courts:	District Court of Alaska; District Appellate Court (also known as the Ninth Circuit); Supreme Court of the United States
Date:	25 June 2008

3.1.1 Methodology

For this analysis, I have made every effort to obtain as many primary source materials from the *Exxon Valdez* case that are relevant to the topic of pure ecological damage valuation (or non-economic damage valuation, as it is often referred to in the *Exxon Valdez* court materials) as possible. However, at times, due to the sheer vastness of the case (that primarily focuses on the topic of maritime punitive damages), as well as the fact that these materials pre-date the digital era, I have had to rely on secondary source materials. The secondary source materials that are publicly available mainly concern materials authored by experts for the plaintiff side. For example, parts of the analysis of the public trustees' settlement with Exxon co. is based on a report (Carson et al. 1992) that was commissioned by the State of Alaska for the purpose of its suit against Exxon Shipping co. (*Alaska v. Exxon et al.*).[161]

The analysis of *Exxon Shipping co. v. Baker* – Phase II (see Table 1) is predominantly based on publications by Prof. John Duffield.[162] Prof. Duffield served as the economic expert for the Alaska Native class in their class action against Exxon Shipping Co. at the District Court level. I was unable to retrieve the primary source materials from Phase II of the trial from the District Court of Alaska Library. Consultation with the District Court of Alaska Librarian revealed that the judge in this case (Judge H. Russel Holland) kept the entire case file together, referenced as *In re Exxon Valdez*, No. A89–0095–CV. This consolidated case has over 9000 entries, spanning decades. Locating individual motions, orders, research reports, testimonies, etc. entails scouring

[158] See Harrison 2018a. Hay & Thébaud 2006 provide a list of oil spill related case law figuring pure ecological harm which dates back 1969.
[159] *Case Concerning Armed Activities on the Territory of the Congo*, Judgment, 9 February 2022
[160] Kindji & Faure 2019, Harrison 2018a, Duffield 1997, Duffield 2014, Hay & Thébaud 2006
[161] *Alaska v. Exxon et al.*, Case No. A92-175 Civil (D. Alaska). Originally filed August 15, 1989, in State Superior Court, Third Judicial District
[162] Duffield 1997; Duffield et al. 2014

the 9000-entry hard copy docket by hand. The docket only lists abbreviated references to individual court documents. I was thus unable to locate original valuation reports for either plaintiff's or respondent's side for this phase of the trial. The publications by Prof. Duffield allow for a reconstruction of the arguments made. Later (post-trial) publications by the expert for Exxon Shipping co., Prof. Jerry Hausman, only make limited reference to the *Exxon Valdez* case. References to these publications were, however, included in the analysis as they do reflect Hausman's views on contingent valuation in general.[163]

Furthermore, reference is made to a lecture by Prof. Jeffrey Fisher, who represented the class of 32,000 victims of the oil spill, including land owners, commercial fishermen, and Alaska Natives, before the Supreme Court in *Exxon co v. Baker* on the matter of maritime punitive damages.

In order to prevent an imbalance in viewpoints as much as possible, I have included many impartial academic literary sources. Furthermore, the website of the Exxon Valdez Oil Spill Trustee Council (https://evostc.state.ak.us) proved incredibly helpful in reconstructing timelines, obtaining the settlement agreement between the U.S. and Alaska governments and Exxon, and retrieving information of the total ecological impact of the spill. Lastly, newspaper articles, such as from the New York Times, who followed the developments surrounding the settlement agreement and the *Exxon Valdez* case at the time, have also been consulted and included.

3.1.2 Facts of the case

On March 24th 1989, Captain Joseph Hazelwood, assisted by a third mate and a helmsman, was in command of the Exxon Valdez. Although a skilled Mariner, Captain Hazelwood was also an alcoholic.[164] "*[….B]efore departing Valdez, Alaska, on March 23rd, 1989, he had, more probably than not, consumed sufficient alcohol to incapacitate a non-alcoholic. As the Exxon Valdez exited Valdez Arm, Captain Hazelwood assumed command of the vessel from a harbour pilot and made arrangements to divert the vessel from the normal shipping lanes in order to avoid considerable ice which had calved off Columbia Glacier. That diversion from the standard shipping lanes took the vessel directly toward Bligh Reef. The captain gave the third mate explicit, accurate orders which, if carried out by the 3rd mate, would have returned the vessel to the shipping lanes without danger of grounding on Bligh Reef. The third mate, who had completed the requirements for a captain's licence, was, more probably than not, overworked and excessively tired at the time in question. He neglected to commence a turn of the vessel at the point where, and the time when, he had been directed to do so. At that critical time, Captain Hazelwood had left the bridge to attend to paperwork. When the third mate realised that he had preceded too far in the direction of Bligh Reef, he commenced a turn, but it was too late.*"[165]

[163] See Diamond & Hausman 1994 and Hausman 2012

[164] *In Re the Exxon Valdez*, 296 F. Supp. 2d 1071 (D. Alaska 2004), p. 1076

[165] *In Re the Exxon Valdez*, 296 F. Supp. 2d 1071 (D. Alaska 2004), p. 1076. See also *In Re the Exxon Valdez*, 296 F. Supp. 2d 1071 (D. Alaska 2004), p. 1076-1077 where the Court states: "*Like so many great tragedies, this one occurred when three or more unfortunate acts and/omissions took place in close proximity to one another, and but for anyone of them, the grounding would likely not have occurred.*"[165] The court also states that: "*It has never been established that there was any design, mechanical, or other fault in the Exxon Valdez. It responded to its human*

On the night of March 23-24 1989, after striking Bligh Reef in Prince William Sound, the hull of the tanker vessel Exxon Valdez ruptured, causing the ship to gush oil into the Sound at a rate of 200,000 gallons a minute.[166] At the time, Prince William Sound was regarded as "*one of the most pristine and diverse ecological systems in the world.*"[167] The Exxon Valdez would end up discharging approximately eleven million gallons of North Slope crude oil into the waters of Prince William Sound.[168] "*The oil spread across nearly 1,500 miles of shoreline in the Sound and the Gulf of Alaska in the ensuing months, traveling, with the aid of wind and rough seas, as far as 600 miles to the south and west.*"[169]

In addition to the oiled shorelines and resultant loss of plants and invertebrates inhabiting them, the effect of the spill on natural resources and services included the death of hundreds of thousands of seabirds and ducks, the death of approximately 300 bald eagles, the death of thousands of sea otters and harbor seals, losses to two pods of killer whales, disruption of the Prince William Sound herring and other commercial fisheries, damage to many Native Alaskan archeological sites, disruption to recreational, tourism and subsistence gathering services, and loss of passive uses.[170] A 1992 study conducted by Carson et al. lists the pure ecological harm caused by the spill as the killing thousands of wild animals and the long term (potential) effect on surface water and sediments; land managed by natural resource trustees, including submerged land, wetlands, shoreline, beaches, geological resources, and other features of the land; marine plants and microorganisms; fish, shellfish, and other marine invertebrates; marine mammals, including sea otters and seals; birds, including sea birds, waterfowl, shorebirds, and raptors.[171]

masters as intended and expected. Thus it is entirely clear why the Exxon Valdez grounded on Bligh Reef: the cause was pure and simple human frailty. Defendant Exxon Shipping owned the Exon Valdez. Exxon employed Captain Hazelwood, and kept him employed knowing that he had an alcohol problem."

[166] https://www.justice.gov/enrd/us-v-exxon-corporation-et-al-dalaska accessed 15 February 2021; Jenkins & Kastner 2000, p. 152

[167] Stoll 1995, p. 15

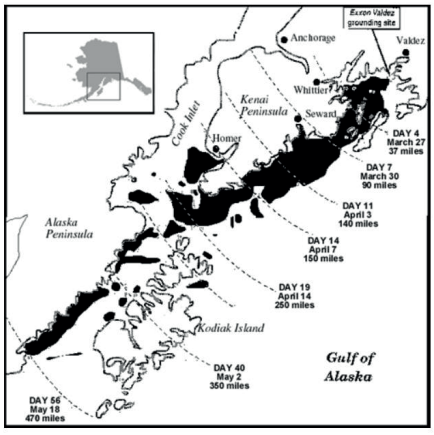
[168] https://www.justice.gov/enrd/us-v-exxon-corporation-et-al-dalaska accessed 15 February 2021

[169] https://www.justice.gov/enrd/us-v-exxon-corporation-et-al-dalaska accessed 15 February 2021

[170] https://www.justice.gov/enrd/us-v-exxon-corporation-et-al-dalaska accessed 15 February 2021

[171] Carson et al. 1992, p. 4

Figure 2. Map of the Exxon Valdez oil spill[172]



Source: 1993 State On-Scene Coordinator's Report

From the *Exxon Valdez* oil spill ensued a myriad of civil and criminal claims at the federal and state government level as well as claims by private parties. The Exxon Valdez litigation is referred to by some as America's "*largest and most complex litigation in history*".[173] It involved thousands of plaintiffs seeking compensation for their losses and punitive damages, hundreds of lawyers, hundreds of claims and years of court battles.[174] Among the plaintiffs were individuals, area businesses, environmental groups, and local, state and the federal governments, who filed both individual claims as well as class actions in both state and federal court.[175] Estimates made specifically regarding the federal class action case brought by commercial fishermen against Exxon (see below) suggested that Exxon spent about $100 million on the science alone and spent $1 million per day during trial.[176]

According to the Exxon Valdez oil Spill Trustee Council, some of the claims filed by private parties "*are still being litigated and remain unresolved*".[177]

[172] https://evostc.state.ak.us/oil-spill-facts/spill-map/ accessed 28 March 2021, which refers to the 1993 State on-scene coordinator's report
[173] Stoll 1995, p. 15
[174] Stoll 1995, p. 15; Jenkins & Kastner 2000, p. 153
[175] Jenkins & Kastner 2000, p. 153
[176] Duffield 1997, p. 100
[177] https://evostc.state.ak.us/oil-spill-facts/settlement/at-a-glance/ accessed 16 February 2021

3.1.3 Procedural history

To say that the Exxon Valdez litigation was a massive endeavor is an understatement.[178] The defendant was, and still is, one of the world's largest economic entities.[179] As already mentioned above, thousands of claimants filed hundreds of claims in federal and state courts.[180] Among the claimants were commercial fishermen and native Alaskans, who had lost their source of income and – as pertains to the latter - their subsistence way of living, as well as municipalities, who had to divert all their city resources to addressing the spill. Ultimately, those cases resulted in approximately $500 million of compensatory damages or settlements that Exxon paid out to claimants.[181]

Separately from these private claims, two federal environmental cases were initiated against Exxon. These concerned governmental actions that were brought by the United States Government and the State of Alaska's government at the federal level against Exxon under the Clean Water Act and CERCLA.[182] These governmental, or, public trustees cases resulted in a settlement between the United States government, the State of Alaska's government and Exxon within the first year of going to trial.[183] "*The settlement among the State of Alaska, the United States government and Exxon was approved by the U.S. District Court on October 9, 1991. It resolved various criminal charges against Exxon as well as civil claims brought by the federal and state governments for recovery of natural resource damages resulting from the oil spill.*"[184]

Because of the massive scale of the litigation and associated out of court proceedings surrounding the *Exxon Valdez* oil spill, it is difficult to provide an all-encompassing overview here. The case consists of various class actions, private claims and out of court settlements, resulting in part of the compensation being paid directly by Exxon to claimants, for example through the TransAlaskan Pipeline Fund (TAPLF), part being awarded through the court system, and part through settlement agreements.

Although a prime example of how courts deal with the valuation of non-marketed goods (as they are referred to in the Exxon litigation), the Exxon Valdez litigation primarily turned on other legal matters, namely criminal and civil liability of Exxon corp. and the captain of the Exxon Valdez and, probably most infamously, the permissibility of maritime punitive damages.

[178] Duffield 1997, p. 99 describes the Exxon litigation as a "*many-sided and massive endeavor*". Consultation with the District Court of Alaska Library revealed that the Exxon case has over 9000 entries, spanning decades, all filed as one case (89-CV-0095). Locating individual motions, orders, research reports, testimonies, etc. entails scouring the 9000-entry hard copy docket by hand. I have made every effort to obtain as many primary source materials from the *Exxon Valdez* case that are relevant to the topic of non-economic damage valuation as possible, but at times – due to the sheer vastness of the case (that primarily focuses on the topic of maritime punitive damages) as well as the fact that these materials pre-date the digital era – I have had to rely on secondary source materials. There where it was impossible to locate the primary source document, I will make reference to the consolidated case as "*In re Exxon Valdez*, No. A89–0095–CV". If known, the type of document (e.g. an order, motion etc.) is indicated.

[179] Duffield et al. 2014, p. 48

[180] "*The Exxon Valdez litigation began with more than 52,000 plaintiffs and 84 law firms filing more than 200 suits in both state and federal court in the first year alone*", see Jenkins & Kastner 2000, p. 155

[181] Fisher 2009

[182] See the Memorandum of Agreement and Consent Decree reached between US vs. Exxon Corp. on August 29, 1991, retrievable from https://evostc.state.ak.us/oil-spill-facts/settlement/ accessed 22 March 2021; Fisher 2009

[183] Fisher 2009

[184] https://evostc.state.ak.us/oil-spill-facts/settlement/ accessed 22 March 2021

Litigation on the latter issue lasted over two decades, exceeding the lifetime of thousands of plaintiffs.[185]

For this research, most important are those (parts of) the proceedings that deal with valuation of non-marketed goods. This issue comes to the fore in three instances: the public trustees' (Unites States of America and State of Alaska) cases against Exxon, which were resolved through a settlement, the class actions of commercial fishermen and the Alaskan Native group against Exxon, collectively known as *Baker v. Exxon Shipping Co*., and finally, a separate suit filed by the Alaska Native Class against Exxon corp., *Alaska Native Class v. Exxon corp*.

Below, these three cases will be analysed further.

3.1.4 State of Alaska v. Exxon Corp. et al. (Civ. No. A91-083) and *United States v. Exxon Corp. et al.* (Civ. No. A91-082)

In December of 1990, before formally filing suit against Exxon, the United States and the State of Alaska entered into negotiations with Exxon directly, with the aim of resolving criminal and civil disputes between the parties.[186] The parties to the negotiation decided not to include other plaintiffs or interested parties in the negotiations and made efforts to keep the latter secret. However, "*on January 28, 1991, the Alaska Natives learned about the negotiations from a radio broadcast and immediately sent letters to relevant state and federal officials requesting that they be allowed to participate.*"[187]

Native Alaskans worried that the state and federal governments' negotiations would prejudice Native property interests or other interests and desired to be directly involved in the negotiations themselves. However, despite many attempts on the Native side, government officials did not respond to any letters or phone calls.[188]

In order for Native Alaskans' right to make claims against Exxon to be preserved in spite of the agreement that the public trustees were looking to make with Exxon, a group of Native villages, known as the Chenega Bay plaintiffs, filed suit in the U.S. District Court in the District of Columbia on March 5, 1991.[189] The state and federal governments responded that Natives' rights would not be affected by the settlement, leading the judge to state that "*he believed that the governments' assurances meant that plaintiffs could recover damages for loss of natural resources and other injuries even if Exxon later claimed that "the same resources and/or lands are covered by the settlement agreement between [the governments] and Exxon.'*"[190]

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[185] See https://www.minnpost.com/environment/2012/01/lawyer-brian-oneill-battling-exxon-more-20-years/ accessed 22 March 2021, where it states: "*In the 20 years it took for the case to be settled, strung out by Exxon lawyers, nearly 8,000 of the original plaintiffs had died.*"
[186] Jenkins & Kastner 2000, p. 181;
[187] Jenkins & Kastner 2000, p. 181-182; Quam 1992, p. 197
[188] Jenkins & Kastner 2000, p. 181 -182
[189] "*The suit also sought injunctive relief against the U.S. and Alaska in order to preserve the Natives' right to recover damages to their own land. Additionally, the Natives argued that they had a right to participate in any aspect of the negotiations that could "potentially compromise or encumber their claims against Exxon.*" See Jenkins & Kastner 2000, p. 182
[190] Jenkins & Kastner 2000, p. 182

On the same day[191], the state and federal government and Exxon reached a settlement agreement (hereinafter the 'consent decree'), which they jointly proposed to the court.[192] The agreement entailed a guilty plea of Exxon to four misdemeanour charges, a criminal penalty of $100 million, which at the time was the highest penalty have ever been imposed for an environmental law violation, and a settlement of all civil cases in the amount of $1 billion. Importantly, it was agreed that the settlement would not affect civil suits filed by private parties.[193]

The consent decree was met with much opposition from various sides.[194] Native Alaskans asserted the decree impacted their rights in violation of the court's previous order. The governments resolved the Native Alaskans' objections by negotiating with Native groups and reaching a separate settlement between the Alaska Natives and the governments. The settlement "*gave the governments the exclusive right to recover for damages to natural resources on public lands, including those used for subsistence living by the Natives. In exchange, the Natives maintained their right to pursue all other private claims against Exxon, including those for damage to tribal lands and harm to Native Alaskan culture and well-being*".[195]

Native Alaskans were not the only ones to object to the deal reached with Exxon. Environmental groups claimed the $1 billion in civil damages was far too low to restore the environment.[196] A summary released by NOAA of 58 scientific studies conducted in Prince William Sound showed that the spill took a much greater toll on wildlife, shorelines, tidal zones and the valuable herring and salmon fisheries than previously suspected. "*The new data upset many Alaskans, who became even more angry when they learned that the complete scientific studies, paid for by Federal and state taxpayers, would remain secret, along with studies of the value of the damage. In interviews, the economists who conducted the studies say the spill caused $3 billion to $5 billion in damage to Prince William Sound.*"[197]

With popular support for the agreement lacking in many Alaskan regions, as well an "irresponsible" statement made by Exxon's chairman at a press conference in regards to the

[191] But see https://www.nytimes.com/1991/05/04/us/alaska-and-exxon-drop-settlement-in-valdez-oil-spill.html accessed 19 March 2021, where it mentions the date as being March 12, 1991.
[192] Jenkins & Kastner 2000, p. 183
[193] Jenkins & Kastner 2000, p. 183
[194] See https://www.nytimes.com/1991/05/04/us/alaska-and-exxon-drop-settlement-in-valdez-oil-spill.html accessed 19 March 2021, where it says: "*The end of the seven-week-old agreement came this evening when Gov. Walter J. Hickel of Alaska and the Exxon Corporation formally withdrew. But the pact began to unravel last month under sharp criticism from Alaskan residents, a Federal judge, lawmakers and environmental groups.*"
[195] Jenkins & Kastner 2000, p. 184. For more on the Native Alaskans' dealings with the United States and State of Alaska's governments as pertains to the consent decree, see Jenkins & Kastner 2000, p. 181-185
[196] Jenkins & Kastner 2000, p. 183
[197] https://www.nytimes.com/1991/04/25/us/judge-rejects-100-million-fine-for-exxon-in-oil-spill-as-too-low.html accessed 29 March 2021. The complete paragraph reads: "*Pressure to undo the agreement increased earlier this month when the National Oceanic and Atmospheric Administration released a summary of 58 scientific studies conducted in Prince William Sound that showed the spill took a much greater toll on wildlife, shorelines, tidal zones and the valuable herring and salmon fisheries than previously suspected. Hundreds of thousands of birds died after the spill, thousands of otters drowned in the oil, and fish fry exhibited abnormally high rates of birth defects. The new data upset many Alaskans, who became even more angry when they learned that the complete scientific studies, paid for by Federal and state taxpayers, would remain secret, along with studies of the value of the damage. In interviews, the economists who conducted the studies say the spill caused $3 billion to $5 billion in damage to Prince William Sound. Public hearings earlier this month in villages around the sound attracted hundreds of opponents.*"

agreement, the Alaska House of Representatives rejected the pact by voting 27 to 13, leading the State Senate to not even consider voting on the matter as it was 'settled'.[198]

On April 24, 1991, Federal District Judge H. Russel Holland rejected the criminal plea agreement that the governments had reached with Exxon, saying he considered the $100 million fine too small.[199] It would send the wrong message, suggesting that spills are a cost of business that can be absorbed.[200] The agreement finally collapsed in May of 1991 after a 7 week period during which it sustained the aforementioned blows.

Already in March of 1991, anticipating this outcome, the United States and the State of Alaska government filed suit against Exxon. The federal and state government sought to recover damages for restoration of the environment as well as for losses sustained by the public regarding the use of natural resources.[201] Citing Black Law Dictionary, Jenkins and Kastner explain that "*[u]nder the doctrine of parens patriae, a state has the "authority to bring actions on behalf of state residents" in cases involving the general public interest*." *Because the interests of the general public include the use of natural resources and protection of the environment, the government can act as a representative for its citizens in order to recover damages for injury to those natural resources and the environment."*[202] Recovered damages can then be used by the public trustees to restore, rehabilitate, replace, or acquire the equivalent of the damaged resources, thereby compensating the public.[203]

Notwithstanding the foundering of the first agreement, and the filing of the suit, the federal and state governments continued informal negotiations with Exxon and reached a new agreement on September 25, 1991. The new agreement only made slight changes to the original agreement, the most significant being an addition of $25 million added to the original $100 million in criminal penalties.[204] This time around the Alaska legislature approved and, despite opposition by certain plaintiffs and environmental groups, so did the Court; on October 8, 1991, Judge Holland approved the settlement and Consent Decree between Exxon and the state and federal governments.[205]

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[198] https://www.nytimes.com/1991/05/04/us/alaska-and-exxon-drop-settlement-in-valdez-oil-spill.html accessed 19 March 2021, where it also says: "*Max Gruenberg, the majority leader of the Alaska House of Representatives, said House members believed they had no choice but to reject the proposed settlement. Mr. Gruenberg headed a special legislative panel that held public hearings around the state this year, and found that popular support for the agreement was weak in many regions. He said Alaskans felt that Exxon was being required to pay too little for damage that would last years and cost billions to repair. Alaskans also considered Exxon's response to the agreement irresponsible, Mr. Gruenberg said. Hours after the pact was signed, Lawrence G. Rawl, Exxon's chairman, told a news conference in Texas that the pact would have absolutely no effect on the company's profits and would not affect its business.*"

[199] https://www.nytimes.com/1991/05/04/us/alaska-and-exxon-drop-settlement-in-valdez-oil-spill.html accessed 19 March 2021; https://www.nytimes.com/1991/04/25/us/judge-rejects-100-million-fine-for-exxon-in-oil-spill-as-too-low.html accessed 29 March 2021

[200] https://www.nytimes.com/1991/04/25/us/judge-rejects-100-million-fine-for-exxon-in-oil-spill-as-too-low.html accessed 29 March 2021 quotes Judge Holland: "*The fines that were proposed to me were simply not adequate," said Judge Holland. "They do not adequately achieve deterrence. I'm afraid these fines send the wrong message, suggesting that spills are a cost of business that can be absorbed.*"

[201] Jenkins & Kastner 2000, p. 181

[202] Jenkins & Kastner 2000, p. 181

[203] Jones & DiPinto 2018, p. 335

[204] Jenkins & Kastner 2000, p. 184

[205] Jenkins & Kastner 2000, p. 184

In the Consent decree Exxon agreed to pay $900 million to the United States and the State of Alaska to resolve the governments' civil claims against it for natural resource damages as well as reimbursement of several other categories of costs.[206] This money was placed into a trust which is administered jointly by the U.S. government and the State of Alaska in their role as public trustees through the Exxon Valdez Oil Spill Trustee Council.[207] Over $700 million was specifically allocated for the restoration, replacement, rehabilitation and acquisition of equivalent natural resources to those harmed by the spill, lost natural resource services, and damaged archaeological artifacts and sites.[208] Settlement payments were to be applied solely for listed purposes.[209] Finally, this new and approved version of the Consent Decree did not prejudice against ongoing or future legal claims of any person or entity not party to the agreement.[210]

3.1.4.1 Valuation method applied

In the years immediately following the oil spill, the U.S. and the Alaska governments funded several studies to evaluate the economic effects of the spill.[211] Most important for this research is a study commissioned by the Attorney General of the State of Alaska which resulted in a contingent valuation study of lost passive uses.[212] At the time, contingent valuation was the only technique available for measurement of lost passive use values.[213] Carson at al. were asked to measure the lost passive use values associated with oiled shorelines, bird and mammal deaths, and effects on fish. Carson et al. explain how: "*These injury estimates were understated for the reason that, in January 1991, when the study went into the fields, some of the crucial science studies were not yet completed. Hence, lower limits of the current estimates of injuries were used in order to avoid litigation issues relating to what might later prove to be overstatements of provable injuries. Similarly, optimistic restoration or recovery periods were used for the same reason.*"[214]

The study commenced with the identification of the injuries suffered in Prince William Sound, the magnitude and severity of each injury and time for natural recovery of the Sound were all considered.[215] Through a series of survey questions which slowly narrowed in on the primary focus of the study, Carson et al. elicited peoples' willingness to pay as a valuation framework

[206] https://evostc.state.ak.us/publications/legal-requirements-for-use-of-funds/ accessed 19 March 2021; an additional $100 million would need to be paid if the clean-up costs exceeded the $900 million, see Jenkins & Kastner 2000, p. 185
[207] Jenkins & Kastner 2000, p. 185; https://evostc.state.ak.us/about-us/ accessed 17 May 2021
[208] https://evostc.state.ak.us/publications/legal-requirements-for-use-of-funds/ accessed 19 March 2021
[209] https://evostc.state.ak.us/publications/legal-requirements-for-use-of-funds/ accessed 19 March 2021
[210] Jenkins & Kastner 2000, p. 185
[211] The five studies funded by the State of Alaska are: 1) A Preliminary Economic Analysis of Recreational Fishing Losses Related to the Exxon Valdez Oil Spill (December 1992); 2) Alaska Sportfishing in the Aftermath of the Exxon Valdez Oil Spill (December 1992); 3) An Assessment of the Impact of the Exxon Valdez Oil Spill on the Alaska Tourism Industry (August 1990); 4) Replacement Costs of Birds and Mammals (December 1992); 5) A Contingent Valuation Study of Lost Passive Use Values Resulting from the Exxon Valdez Oil Spill (November 1992), all retrievable from https://evostc.state.ak.us/oil-spill-facts/economic-impacts/ accessed 17 May 2021
[212] Carson et al. 1992
[213] Carson et al. 1992, p. 5
[214] Carson et al. 1992, p. 5
[215] Carson et al. 1992, p. 8

and found that the average household was willing to pay $31 for the spill prevention plan.[216] In total 1,043 interviews were completed with a response rate of 75%.[217] By multiplying the $31 dollars with an adjusted number of U.S. households, Carson et al. arrived at a total damage estimate of $2.8 billion dollars.[218]

3.1.4.2 Settlement

As regards the Criminal Plea Agreement, Exxon was fined $150 million, but forgiven $125 million by the Court in recognition of its cooperation in cleaning up the spill and paying certain private claims. Of the remaining $25 million, $12 million was allocated to the North American Wetlands Conservation Fund and $13 million to the national Victims of Crime Fund.[219]

As criminal restitution for the injuries caused to the fish, wildlife, and lands of the spill region, Exxon agreed to pay $100 million, which was divided evenly between the federal and state governments.[220]

As regards the civil settlement, Exxon agreed to pay $900 million stretched out over a 10-year period, with the final payment being received in September 2001. The settlement contained a so-called "reopener window" between September 1, 2002 and September 1, 2006. This reopener window meant that the U.S. and Alaska governments could claim an additional sum capped at $100 million for the restoration of "*resources that suffered a substantial loss or decline as a result of the oil spill, the injuries to which could not have been known or anticipated by the six trustees from any information in their possession or reasonably available to any of them at the time of the settlement (September 25, 1991)*".[221] On 31 August 2006, the U.S. Department of Justice and the State of Alaska Department of Law launched a reopener claim against Exxon in the amount of $92 million dollars. This amount was the estimated cost of implementing the *Comprehensive Plan for Habitat Restoration Project Pursuant to Reopener for Unknown Injury* which the governments presented to Exxonmobil in a previous letter dated 31 May, 2006.[222] However, on October 14, 2015, the governments filed a joint status report in federal court relaying that they were not proceeding under the Reopener,[223] as they had become convinced

[216] Carson et al. 1992, p. 7 and p. 80-123; see also p. 7-8 where they explain: "*Theoretically, the choice of willingness to pay or willingness to accept depends on the assignment of property rights. In the case of Prince William Sound and other affected areas, the rights to the services are held in trust for present and future generations of Americans. Since the public holds the rights to the services, the correct measure of the value of the degradation in those services is the minimum amount of money the American people as a whole would voluntarily agree to accept to suffer the loss or disruption of the services. Thus, willingness to accept compensation is the theoretically correct measure in this case. Unfortunately, it is very difficult to design a survey that effectively elicits WTA amounts because respondents tend to regard WTA scenarios as implausible. Therefore, in the current damage assessment, we chose willingness to pay as the valuation framework even though this choice will understate the true value of losses suffered as a result of the spill, other things being equal*".
[217] Carson et al. 1992, p. 10
[218] Carson et al. 1992, p. 11
[219] https://evostc.state.ak.us/oil-spill-facts/settlement/ 22 March 2021
[220] https://evostc.state.ak.us/oil-spill-facts/settlement/ 22 March 2021
[221] https://evostc.state.ak.us/oil-spill-facts/reopener/ accessed 23 May 2021
[222] See https://evostc.state.ak.us/oil-spill-facts/reopener/ accessed 23 May 2021, where a copy of the letter is provided.
[223] https://evostc.state.ak.us/oil-spill-facts/reopener/ accessed 23 May 2021

through monitoring that natural resources which it had previously categorized as "not recovered" were now considered recovered.[224]

3.1.5 Exxon Shipping Co. v. Baker[225]

Arguably the most prolific case that followed from the *Exxon Valdez* oil spill, the federal *Exxon Shipping Co. v. Baker* case started out in the District Court of Alaska, was later appealed at the District Appellate Court (also known as the Ninth Circuit)[226], and finally brought before the Supreme Court of the United States.

After having spent some $2.1 billion in clean-up efforts, pleading guilty to criminal violations occasioning fines, settling a civil action by the United States and Alaska for at least $900 million, and paying another $303 million in voluntary payments to private parties, other civil cases still outstanding against Exxon were consolidated into one case. This case brought together all remaining claimants who depended on Prince William Sound for their livelihoods against Exxon, Captain Hazelwood, and others to recover the economic losses they had suffered[227] and is referred to as *Exxon Shipping Co. v. Baker*. Baker being one of the many claimant parties. The trial was divided into four phases. "*At Phase I of the trial, the jury found Exxon and Hazelwood reckless (and thus potentially liable for punitive damages) under instructions providing that a corporation is responsible for the reckless acts of employees acting in a managerial capacity in the scope of their employment. In Phase II, the jury awarded $287 million in compensatory damages to some of the plaintiffs; others had settled their compensatory claims for $22.6 million. In Phase III, the jury awarded $5,000 in punitive damages against Hazelwood and $5 billion against Exxon. The Ninth Circuit upheld the Phase I jury instruction on corporate liability and ultimately remitted the punitive damages award against Exxon to $2.5 billion.*"[228]

[224] Status Report by the State of Alaska and the United States, p. 3-4,
[225] Exxon Shipping Co. v. Baker - 554 U.S. 471, 128 S. Ct. 2605 (2008).
[226] The United States Court of Appeals for the Ninth Circuit, sometimes referred to as the "Court of Appeals" or the "Ninth Circuit" is a federal court of appeals that has appellate jurisdiction over the district courts in the District of Alaska, Arizona, Central District of California, Eastern District of California, Northern District of California, Southern District of California, District of Hawaii, District of Idaho, District of Montana, District of Nevada, District of Oregon, Eastern District of Washington, and Western District of Washington. It also has appellate jurisdiction over the territorial courts of the District of Guam and the District of the Northern Mariana Islands.
[227] Supreme Court of the United States, p. 1
[228] Supreme Court of the United States, p. 1

Table 1. Exxon Trial Phases – Federal Court[229]

Phase		Number of Days Jury Deliberated	Date Decided	Award/Settlement
I.	Liability	4	June 13, 1994	N/A
II.	Compensatory Damages—Classes			
	A. Commercial Fishing	23	August 11, 1994	$287 million
	B. Native Subsistence	Settled just prior to trial	July 22, 1994[a]	$20 million[b]
III.	Punitive Damages	13	September 16, 1994	$5 billion
IV.	Compensatory—Individual Claimants	Settled	January 17, 1996[a]	$3.5 million

[a]Approximate date.
[b]Additionally, the Native Opt-out group settled for $2.55 million on October 12, 1995.
Source: Court records of *Exxon Valdez* consolidated case.

Exxon proceeded to appeal this decision with the Supreme Court, contending that punitive damages were not available against the owners if they were based solely upon the recklessness of its managerial employee, that the express pollution penalties of the Clean Water Act precluded an additional penalty of punitive damages, and that the punitive award of approximately five times the amount of the compensatory award was excessive.[230] *"While equally divided concerning whether the owners could be held vicariously liable for punitive damages, the U.S. Supreme Court held that the CWA did not preclude the award but a reduction of the amount of the award was warranted. However, punitive damages in the maritime tort case were not warranted in an amount greater than the amount of the compensatory damages award, and thus the punitive damages were excessive."*[231]

3.1.5.1 Holding

The Supreme Court ruled that "*a 1:1 ratio of compensatory-to-punitive damages is a fair upper limit in maritime tort cases*".[232] It found that the "*the punitive-damages award against the owner was excessive as a matter of maritime common law. In the circumstances of the case, the award should be limited to an amount equal to compensatory damages. Furthermore, the prevailing American rule limits punitive damages to cases of "enormity," in which a defendant's conduct is outrageous, owing to gross negligence, willful, wanton, and reckless indifference for others' rights, or even more deplorable behavior. The consensus today is that punitive damages are aimed at retribution and deterring harmful conduct.*"[233]

[229] Taken from Duffield 1997, p. 100
[230] https://www.lexisnexis.com/community/casebrief/p/casebrief-exxon-shipping-co-v-baker accessed 31 March 2021
[231] https://www.lexisnexis.com/community/casebrief/p/casebrief-exxon-shipping-co-v-baker accessed 31 March 2021
[232] https://www.lexisnexis.com/community/casebrief/p/casebrief-exxon-shipping-co-v-baker accessed 31 March 2021
[233] https://www.lexisnexis.com/community/casebrief/p/casebrief-exxon-shipping-co-v-baker accessed 31 March 2021

3.1.5.2 Judgment

Applying the 1:1 ratio *of compensatory-to-punitive damages* to the present case, the Supreme Court took for granted the District Court's calculation of the total relevant compensatory damages at $507.5 million, yielding a maximum punitive damages award in that amount. The Supreme Court then remanded the case for the Court of Appeals to remit the punitive damages award accordingly.[234]

3.1.6 Exxon Shipping Co. v. Baker – Phase II[235]

For the purposes of this research, Phase II of the *Exxon Shipping Co. v. Baker* trial is of most importance. In Phase II, there were two classes of claimants, commercial fishermen and Alaska Natives, who claimed compensatory damages for respectively losses sustained by the commercial fish sector and the subsistence use sector.

The primary economic characteristics of the commercial fish and native subsistence sectors turned out to be very much alike. Duffield explains how "*both groups rely on marine natural resources in Prince William Sound and the Gulf of Alaska. The native subsistence users live in small villages in the sound, on Lower Cook Inlet, on Kodiak, and on the Alaska Peninsula. The path of the oil spill's travel southwest out of Prince William Sound defines the geographic extent of the impacted villages. Commercial fishermen rely on commercial fish species such as salmon and herring. Native subsistence users rely on a broad spectrum of marine and some land resources including the commercial fish species. Based on surveys conducted by the Alaska Division of Subsistence, the prespill subsistence harvest of natives in the oiled villages (measured in usable pounds) was approximately 25% marine mammals (primarily seals), 35% salmon, 22% non-salmon fish (herring, halibut, cod, etc.), 13% land mammals (primarily deer), 3% marine invertebrates (clams and crabs), and 1% each birds, eggs, plants, and berries.*"[236] The commercial fishing sector is characterised by small family-owned businesses. The fishermen have permits based on gear type, geographical location, and species targeted. The technology employed is quite sophisticated and generally includes a good size commercial fishing vessel. Fish is sold on the international market to processors and distributors; Japan being a primary market for Alaska red salmon.[237] Native Alaskans are likewise organized into relatively small family-based groups. Some natives live a subsistence way of life *and* work as commercial fishermen or work on a commercial fishing vessel. The native subsistence

[234] Supreme Court of the United States, p. 42

[235] *Exxon Shipping Co. v. Baker* - 554 U.S. 471, 128 S. Ct. 2605 (2008). This section is predominantly based on publications by Prof. John Duffield (Duffield 1997 and Duffield et al. 2014). Prof. Duffield served as the economic expert for the Alaska Native Class in their class action against Exxon Shipping Co. at the District Court level. I was unable to retrieve the primary source materials from Phase II of the trial from the District Court of Alaska Library. Consultation with the District Court of Alaska Librarian revealed that the judge in this case (Judge H. Russel Holland) kept the entire case file together that is referenced as *In re Exxon Valdez*, No. A89–0095–CV. This consolidated case has over 9000 entries, spanning decades. Locating individual motions, orders, research reports, testimonies, etc. entails scouring the 9000-entry hard copy docket by hand. The docket only lists abbreviated references to individual court documents. I have made every effort to obtain as many primary source materials from the *Exxon Valdez* case that are relevant to the topic of non-economic damage valuation as possible, but at times, due to the sheer vastness of the case (that primarily focuses on the topic of maritime punitive damages), as well as the fact that these materials pre-date the digital era, has had to rely on secondary source materials.

[236] Duffield 1997, p. 100; Duffield et al. 2014, p. 49

[237] Duffield 1997, p. 100-101; Duffield et al. 2014, p. 49

technology typically is small scale and very local. Each village on Lower Cook Inlet, Kodiak and the Alaska Peninsula and each family unit uses well-defined traditional areas to gather specific resources over the course of an annual cycle. Native Alaskans do not sell their subsistence harvest. Instead it is shared, based on traditional relationships, within the economic unit and the village. In the subsistence economy, producers and consumers are essentially the same individual.[238]

Duffield observes that the main differences between the two sectors concern: 1. distribution, 2. the fact that only the commercial fish sector has directly observable market prices for its product, and 3. that the native subsistence sector village level economies are mixed cash-subsistence economies.[239] "*Residents of the mostly native villages divide their time between participation and wage-earning activity and subsistence activity.*"[240]

Below both the commercial fishermen's class action and the native subsistence class action will be examined separately. It is important to note that the cause of action in Phase II, for both classes, was for a public nuisance as opposed to for example an action under CERCLA, OPA or the Clean Water Act.[241]

3.1.6.1 The commercial fishermen's claim

As the claim was for a public nuisance in a maritime setting, the *Robins Dry Dock &Repair Co. v. Flint* standard applied. [242] This is a maritime legal standard that entails that economic recovery is only available in maritime cases if the injured party has suffered direct physical harm. *Union Oil Co. v. Oppen* allowed for an exception to the Dry Dock doctrine specifically for commercial fishermen, which meant that in this case the commercial fishermen's claim could go forward.[243] It meant that other claimants, such as recreational fishermen, cannery workers, processors, and tenderers, who were more removed from the physical injury criterion, could not make use of the Oppen exception and were in fact excluded under the Dry Dock doctrine.[244]

[238] Duffield 1997, p. 100-101; Duffield et al. 2014, p. 50
[239] Duffield 1997, 101; Duffield et al. 2014, p. 50
[240] Duffield 1997, p. 100
[241] Duffield 1997, 101; Duffield et al. 2014, p. 50-51
[242] *Robins Dry Dock & Repair Co. v. Flint*, 275 U.S. 303 (1927). In this context, the Supreme Court refers to *Robins Dry Dock & Repair Co. v. Dahl*, 266 U. S. 449 (1925). But see Opinion of Justice Stevens, footnote 6 in *Exxon v. Baker*, again refers to *Robins Dry Dock & Repair Co. v. Flint*, where it says that "*maritime law precludes recovery for purely "economic losses . . . absent direct physical damage to property or a proprietary interest'*"".
[243] See *Exxon Shipping Co. v. Baker*, 554 U.S. 471 (2008), footnote 21 of the Supreme Court's Opinion, where the Court addresses the dissenting opinion of Justice Stevens, who refers to the Dry Dock doctrine as formulated in *Robins Dry Dock & Repair Co. v. Flint*, and states: "*Indeed, the compensatory remedy sought in this case is itself entirely a judicial creation. The common law traditionally did not compensate purely economic harms, unaccompanied by injury to person or property. See K. Abraham, Forms and Functions of Tort Law 247–248 (3d ed. 2007); see, e.g., Robins Dry Dock & Repair Co. v. Dahl, 266 U. S. 449 (1925) (imposing rule in maritime context). But "[t]he courts have . . . occasionally created exceptions to the rule. Perhaps the most noteworthy involve cases in which there has been natural-resource damage for which no party seems to have a cause of action." Abraham, supra, at 249 (discussing Union Oil Co. v. Oppen, 501 F. 2d 558 (CA9 1974) (recognizing exception for commercial fishermen))*."
[244] Duffield 1997, p. 102

3.1.6.1.1 The parties' claims and valuation method applied

The commercial fishermen relied mainly on salmon and herring found in the fisheries of Prince William sound and the Gulf of Alaska. After the spill they sought damages for three general categories of harm: reduced harvests, diminished prices, and diminished permit values.[245] Duffield explains that "*all three categories fit readily into the federal guidelines for compensable values since all three lead to changes in economic rent*". The first two categories, reduced harvest and diminished prices, could easily be measured by the reduction in past net income. The change in permit values essentially provided a measure of the same thing but for future losses. With these relatively easily measurable values, applying a market price valuation methodology was an obvious choice and this approach was applied by economic experts for both the claimant and respondent side.[246]

While there was no controversy about the valuation methodology applied, the same could not be said for the empirical establishment of the impact of the oil spill on the fisheries. "*A major science issue was interpreting the role of the spill, compared to other factors in changing salmon and herring harvests.*"[247] Duffield recounts plaintiff's and defendant's in court assertions about the "taint effect" of the spill and the properties of red salmon. As to the latter, plaintiff's expert Robert Mendelsohn declared that red salmon is the Japanese "filet mignon", while the defence attorney countered that it was in fact the Japanese "spam".[248] Naturally, the categorization of salmon as either a rather luxurious product instead of a relatively basic product would either drive up or drive down the valuations of the damage suffered. Defendants also asserted that the observed price declines were in large part a function of simple market forces, arguing that increased supplies of farm salmon from Chile and Norway were encroaching on the Alaskan fish market.[249]

A large part of the damages that plaintiffs sought represented the price depreciation in post-spill years.[250] "*For example, plaintiffs estimated the loss from depreciation of salmon prices to be $419 million in 1990 – 1991.*"[251] In totality, the plaintiffs sought $895 million in damages. The defendants offered $99.5 to $113.5 million.[252]

3.1.6.1.2 Judgement

The jury ended up awarding $286.8 million. It awarded zero damages for post spill year price depreciation claims.[253] Duffield notes that "*for the more straight forward claims - those for reduced harvests in the spill year and for permit sale losses - the jury awards often are exact averages of the plaintiff and defendant positions.*"[254]

[245] Duffield 1997, p. 102; Duffield et al. 2014, p. 52
[246] Duffield 1997, p. 102; Duffield et al. 2014, p. 52
[247] Duffield 1997, p. 102; Duffield et al. 2014, p. 52
[248] Duffield 1997, p. 102; Duffield et al. 2014, p. 52
[249] Duffield 1997, p. 102; Duffield et al. 2014, p. 52-53
[250] Duffield 1997, p. 102
[251] Duffield 1997, p. 102
[252] Duffield 1997, p. 102; Duffield et al. 2014, p. 53
[253] Duffield 1997, p. 102
[254] Duffield 1997, p. 102-103

3.1.6.2 The Native Alaskan subsistence claim

3.1.6.2.1 Motion for summary judgement on the grounds that Native Alaskans do not meet the standards of maritime law

Like in the commercial fishing class action, the cause of action for the subsistence claim was a maritime public nuisance. However, in the Native Alaskan case, the plaintiffs were not readily considered to fall within the Oppen exception to the Dry Dock standard. In fact, Exxon filed a motion for summary judgement on two grounds. Firstly, it asserted that the Native Alaskan class did not satisfy the Dry Dock doctrine standards; secondly, it argued that the Native Alaskan class had "*failed and did not intend to provide individualised proof of any loss, but instead intended to rely on the Subsistence Division data*".[255] The Subsistence Division Data refer to an "*ongoing series of subsistence harvest surveys undertaken by the Alaska Division of Subsistence*".[256]"

The Court denied Exxon's motion.[257] As pertains to the first issue, the applicability of the Robins Dry Dock standard, the court concluded that the native subsistence claim fitted within the Oppen exception, stating: "*The court need not expand the Oppen exception to find that native subsistence harvesters fit within that exception. The native subsistence harvesters "lawfully and directly make use of a resource of the sea," Id. at 570, to a greater extent than do commercial fishermen. Native subsistence harvesters are direct, first users of the sea's aquatic life, and their injuries were more directly foreseeable than injuries to commercial fishermen ... . Whereas the spill reduced the commercial fishermen's profits because they could not sell the resource to a third party, it directly reduced the subsistence harvesters' immediate ability to consume that resource. The spill interfered with the subsistence harvesters' ability to "lawfully and directly make use of a resource of the sea ... in the ordinary course of their business," Id. at 570, that business being their very livelihoods. Thus where commercial fishermen survive by catching an aquatic resource and selling it, native subsistence harvesters survive by catching an aquatic resource and eating it. The court concludes that the native subsistence harvesters fit within the Oppen exception.*"[258]

As to the second issue, that of individual proof, the Court was satisfied with plaintiffs' offer to provide individualised proof at the time any award was actually distributed.[259] Moreover, the Court noted that it is up to the jury to consider these factual issues in determining the level of damages awarded, rather than it being resolved in a motion for summary judgement.[260]

[255] Duffield 1997, p. 104. Duffield explains how the anticipated motion had already in part led a number of native class claimants to opt out of the Native Alaskan class action in favour of reaching an individual settlement. Among the native subsistence claimants, about 700 individuals opted out of the class while 3,620 remained, see Duffield 1997, p. 100

[256] Duffield 1997, p. 103

[257] Duffield 1997, p. 104; Duffield et al. 2014, p. 55; *In re Exxon Valdez*, No. A89–0095–CV (Court Order no. 222, filed May 31st, 1994). Court Order No. 222 is irretrievable online. It is cited several times by Duffield 1997 and Duffield et al. 2014 who reference it as: "*Filed May 31, 1994 Exxon Valdez consolidated case*".

[258] Duffield 1997, p. 104; Duffield et al. 2014, p. 55; *In re Exxon Valdez*, No. A89–0095–CV (Court Order no. 222 at 7, filed May 31st, 1994)

[259] Duffield 1997, p. 104 and Duffield 2014, p. 55 quote the Court as stating: "*The bulk of Exxon's motion is devoted to "nitpicking" the Subsistence Division data to support Exxon's argument that the data does not provide a valid class-wide estimate of prespill and postspill average harvest levels. Plaintiffs, naturally, devote much of their brief to rebutting Exxon's argument regarding the sufficiency of the data. (Order No. 222 at 5)*"

[260] Duffield 1997, p. 104; Duffield 2014 et al., p. 55-56

3.1.6.2.2 The parties' claims and valuation methods applied

The Native Alaskan class suffered the same type of injuries as did the commercial fishermen's class; reduced harvests in the spill year and (to a lesser extent) in the years between the injury and the trial.[261] Also harvests in the years after the spill were affected, valuation being diminished due to a fear of contamination. Furthermore, it appeared that future harvests would also be diminished.[262]

As to valuation of harm, the Native Alaskan class' case was less straightforward than the commercial fishermen's case. The reasons for this being threefold.

Firstly, the Native Alaskans could not indicate exact prices to value the diminishment of the harvest, so this category of damages remained unquantified.[263] Secondly, the same problem surfaced with regards to the devaluation of their indigenous fishing rights and rights to gather marine resources in traditional places.[264] This meant that the subsistence damage assessment on a whole was "*essentially limited to observed harvest reductions in 1989- 1992 and extrapolated harvest losses for 1993- 1995*".[265] These harvest reductions could be quantified thanks to an ongoing series of subsistence harvest surveys undertaken by the Alaska Division of Subsistence. The latter measured harvest in terms of usable pounds of all resources (e.g., seals, herring, salmon, etc.) per capita.[266] Pre-spill measures of harvest were used as a baseline and measured against survey results in 1989- 1992. However, data were not available for all villages or all years, so that "*imputing some harvest loss estimates became necessary*".[267]

A third problem that surfaced was placing a unit value on the reduced harvests. This issue could be further subdivided into two issues; namely a) valuing past and future lost use (compensable values) and b) valuing any restoration or replacement chosen to offset future losses.[268] Duffield explains this as follows: "*Because the subsistence resources are not sold, no price exists to reveal the value placed on these resources within the subsistence economy. The prices in external markets, such as Anchorage, are not necessarily relevant measures of lost subsistence use. The supply/demand conditions are unique to the villages, many of which are quite isolated. Native preferences for foods are strongly held and differ from preferences in mainstream society. For example, highly prized foods include seal oil and herring roe on kelp. Additionally, because these are highly vertically integrated economies, substantial value-added* (sic) *may occur before final consumption. In fact, many of the raw resources are processed prior to storage and eventual consumption (e.g., smoked and dried fish an frozen roe on kelp). Contingent valuation could be applied in principle but was not feasible given the timing of the analysis.*"[269]

[261] Duffield 1997, p. 103; Duffield et al. 2014, p. 53
[262] Duffield 1997, p. 103; Duffield et al. 2014, p. 53
[263] Duffield 1997, p. 103; Duffield et al. 2014, p. 54
[264] Duffield 1997, p. 103; Duffield et al. 2014, p. 54
[265] Duffield 1997, p. 103; Duffield et al. 2014, p. 54
[266] Duffield 1997, p. 103; Duffield et al. 2014, p. 54
[267] Duffield 1997, p. 103; Duffield et al. 2014, p. 54
[268] Duffield 1997, p. 103; Duffield et al. 2014, p. 54-55
[269] Duffield 1997, p. 103-104

Entered into court to support the Native Alaskans class claim, was, an affidavit by John Duffield[270], which had already come about in 1993 in the context of a claim made by 411 Native Alaskans under the Trans-Alaska Pipeline Liability Fund.[271] It employed Subsistence Division data to establish harvest loss, and estimated values on the so-called Brown-Burch model and a hedonic estimate. As pertains to the Brown-Burch model; what stands out is that it departed from the idea that subsistence harvest resources have two components of value, namely a product value and an *activity* value. Activity refers to the hunting, fishing, and preparation of the resources (such as smoking salmon) itself that adds and /or constitutes a separate value to the original resource.[272] The Brown-Burch model considers various economic valuation methods – observation of market behaviour, the alternative cost method, the travel cost technique, and contingent valuation - and applies these to the subsistence harvest and indicates limitations encountered.[273] Market replacement cost was used as a proxy for product value and travel cost based recreational fishing was used as a proxy for the activity value of participating in subsistence hunting and fishing.[274] As pertains to the hedonic approach, this valuation technique centred around Natives' choice to engage in a subsistence way of life versus or in combination with a wage paying job. "*Individuals choosing to participate in the subsistence livelihood reveal that it has a greater value to them than the wages foregone in a more market-oriented economy. For this particular application, Wolfe & Walker's 1987 prespill study using Alaska Subsistence Division data on 98 communities provided an estimate of the tradeoff of subsistence harvest (measured in per capita pounds) against income. Their model […] indicated a tradeoff of about $118 per pound of subsistence harvest (1982 dollars).*"[275]

The value estimates based on Brown-Burch and the hedonic approach were developed for the spill year and extrapolated for a 10-year present value. All this resulted in a claim of between $24 - $44 million.[276]

By the time the Exxon trial came about, 3,620 more Native Alaskan plaintiffs joined the original 411 Native Alaskans who had filed a claim under the Trans-Alaska Pipeline Liability Fund. Those 3,620 plaintiffs stayed with the class action through Phase IIB (see Table 1), while the original 411 would end up opting out of participating in the class action together with a number of other Native Alaskan plaintiffs, resulting in a total of about 700 Native Alaskans opting out of Phase IIB.[277] For those who opted out of Phase IIB, both Native Alaskans and commercial fishermen, a fourth phase (Phase IV) to the trial was conceived. In this phase individual claims

[270] After a thorough online search, consultation with the District Court of Alaska Library, and e-mail correspondence with Prof. John Duffield, this primary source document turned out to be irretrievable. I therefore rely on Duffield 1997 and 2014 for explanation on the contents of the document.

[271] "*The Trans-Alaska Pipeline Liability Fund is a nonprofit corporate entity created in 1973 by the Trams-Alaska Pipeline Authorization Act (43 USC. 1663(c)(4)). The TAP Fund is governed by the U.S. Department of the Interior and administered by a Board of Trustees. The Fund was established to pay claims for damages, including cleanup costs, resulting from oil discharges from vessels transporting Trans-Alaska Pipeline System oil loaded at Alaskan terminals to ports under U.S. jurisdiction, a The TAP Fund was initially funded up to $100 million by assessing owners of oil, including the state of Alaska, a fee of 5 cents per barrel of oil loaded at the Trans-Alaska terminal at Valdez, Alaska. The liability of the TAP Fund is generally limited to that increment of damages in excess of $14 million, but not in excess of $100 million, per oil spill incident occurring before August 18, 1990.*" See GAO 1992, p. 1

[272] Duffield 1997, p. 104; Brown & Burch 1992

[273] Brown & Burch 1992, p. 225-238

[274] Duffield 1997, p. 105

[275] Duffield 1997, p. 105; Wolfe & Walker 1987

[276] Duffield 1997, p. 105

[277] Duffield 1997, p. 105; Duffield et al. 2014, p. 48

for compensation were considered.[278] "*This phase was continually delayed but finally settled in January, 1996.*"[279]

Besides Duffield's affidavit, entered into Court for the 3,620 Native Alaskans, was an economic damages report by Robert Lind that used methods of social impact assessment and cultural anthropology that examined the effects of the Exxon oil spill on Alutiiq culture. The report leaned on an injury analysis based on a social and cultural perspective by Braund & Associates and Usher[280] supplemented with a revealed preference – hedonic method to value subsistence losses.[281] The report departed from "estimates of "*minimum per capita damage awards given different probabilities of long-term disruption to the Alutiiq way of life" […]. The lowest two estimates reported correspond (for 3,620 class members) to total claims of $187 million to $336 million and ranged up to around $1 billion. Lind additionally indicated that another component of damages was "for losses to the way of life and losses associated with pain and suffering"[…]. Without providing a specific estimate, he noted that pain and suffering awards often are based on value-per-statistical-life, which tends to be three to four times greater than the present value of expected future disposable income.*"[282]

For the defendant side, a subsistence report was submitted to the Court by Prof. Jerry Hausman of MIT.[283] Hausmann departed from the same source materials, being the Brown-Burch model and the Wolfe & Walker data set, but reached different conclusions, adjusting the value per pound of subsistence harvest down to $33.60 in 1982 or $38.65 in 1989 dollars as compared to the $118 per pound which followed from the Wolfe & Walker study.[284] It was argued that this re-estimation was necessary, because, even though the revealed preference approach as applied by Wolfe & Walker was correct, it could lead to overestimations due to selection biases. Also, it was asserted that the model might be valuing more than just subsistence harvests. Hausman

[278] Duffield 1997, p. 100, 105; Duffield et al. 2014, p. 48
[279] Duffield 1997, p. 100
[280] Irretrievable online
[281] Duffield 1997, p. 105; Duffield et al. 2014, p. 61
[282] Duffield 1997, p. 105-106. The report by Robert Lind was found to be irretrievable. Duffield references it as: Lind, Robert C., "The Computation of the Monetary Value of the Damages Suffered by the Alutiiq People Affected by the Exxon Valdez Oil Spill," presented at the *Exxon Valdez* consolidated court case, February 23, 1993.
[283] The original report by Prof. Jerry Hausman is irretrievable. Duffield references it as Hausman, Jerry A., Report of Professor J. A. Hausman. Presented at the *Exxon Valdez* consolidated court case, November I. 1993. Hausman's views on contingent valuation in general, but at times also applied to the Exxon case, are expounded on in later publications, see Diamond & Hausman 1994 and Hausman 2012. These publications appear to give some insight into Hausman's approach to this case, see Diamond & Hausman 1994, p. 46 where it says: "*Surveys designed to test for consistency between stated willingness-to-pay and economic theory have found that contingent valuation responses are not consistent with economic theory. The main contingent valuation anomaly that we discuss is called the "embedding effect," […]. The embedding effect is the name given to the tendency of willingness-to-pay responses to be highly similar across different surveys, even where theory suggests (and sometimes requires) that the responses be very different. […] In short, we think that the evidence supports the conclusion that to date, contingent valuation surveys do not measure the preferences they attempt to measure. Moreover, we present reasons for thinking that changes in survey methods are not likely to change this conclusion. Viewed alternatively as opinion polls on possible government actions, we think that these surveys do not have much information to contribute to informed policy-making. Thus, we conclude that reliance on contingent valuation surveys in either damage assessments or in government decision making is basically misguided.*" Compare this to the introductory paragraph in Hausman 2012, which provocatively opens with: "*Approximately 20 years ago, Peter Diamond and I wrote an article for this journal analyzing contingent valuation methods […] . At that time Peter's view was that contingent valuation is hopeless, while I was dubious but somewhat more optimistic. But 20 years later, after millions of dollars of largely government-funded research, I have concluded that Peter's earlier position was correct and that contingent valuation is hopeless.*"
[284] Duffield 1997, p. 106; Duffield et al. 2014, p. 61

also assumed that harvests would be completely recovered by the year 1991.[285] "*His aggregate claim estimates (apparently only applied to the 411 native claimants from Duffield, 1991) were for $2.8 million before adjustments. He adjusted these figures by subtracting $7.6 million estimated income resulting from working on the oil spill cleanup. He concluded that net damages were minus $4.7 million based on the hedonic approach. Hausman also partially implemented the Brown-Burch model. For the "product value" he chose to use replacement cost. He concluded that since Exxon provided food for native villagers in 1989, "product value losses in 1989 are approximately zero since the lost food was replaced" (Hausman, 1993, at 17). He noted that since the food provided was not an exact substitute, some remaining small losses may have occurred.*"[286]

3.1.6.2.3 Motion for summary judgement on all Native Alaskan claims for compensatory damages for injury to "culture" or "subsistence way of life"

In early 1994, Exxon moved for another motion for summary judgement based on the Robins Dry Dock standard against the Native Alaskan class. This time the motion was not geared at the question of whether Native Alaskans' economic injuries fell within the parameters of maritime law, but specifically whether the non-economic injury asserted by the class, consisting of damages for loss of subsistence way of life, met the Dry Dock standard.[287] On March 23, 1994, the Court granted this motion, which made the abovementioned Braund report and the economic analysis based on it inadmissible.[288] The Court found that appellants could not have recovered for damage to their subsistence way of life, as private litigants, because the injury was not different in kind from that suffered by the general public. The Native Alaskans may have been affected by the oil spill more severely than other members of the public, but their loss was shared by all Alaskans. On appeal, the United States Court of Appeals for the Ninth Circuit affirmed the grant of summary judgement by the District Court of Alaska.[289] Three holdings followed from this case: 1) A private litigant cannot recover damages for a public nuisance unless he or she can show a special injury different in kind from that suffered by the general public; 2) The right to lead subsistence lifestyles is not limited to Alaska natives. The right to obtain and share wild food, enjoy uncontaminated nature, and cultivate traditional, cultural, spiritual, and psychological benefits in pristine natural surroundings is shared by all Alaskans; 3) The strict liability provisions of the Alaska Environmental Conservation Act, only permit recovery for loss of benefit measurable in economic terms.[290]

Following the Court's granting of Exxon's motion to exclude any claims for subsistence way of life, the Native Alaskan class engaged Prof. Duffield to develop alternative economic estimates of subsistence harvest loss. This resulted in the Native class filing new exhibits "*that provided implicit price and replacement cost estimates of the value of lost subsistence harvest*".[291] Using the Wolfe-Walker data base, the implicit price valuation added up to a claim

[285] Duffield 1997, p. 106
[286] Duffield 1997, p. 106; Duffield et al. 2014, p. 61-62
[287] *In re Exxon Valdez*, No. A89–0095–CV; Duffield 1997, p. 106; Duffield et al. 2014, p. 62
[288] Duffield 1997, p. 106; Duffield et al. 2014, p. 62
[289] *Alaska Native Class v. Exxon corp. (In re Exxon Valdez)* 104 F.3d 1196
[290] *Alaska Native Class v. Exxon corp. (In re Exxon Valdez)* 104 F.3d 1196, referencing Alaska Const. art. VIII, § § 3, 15, 17; Alaska Stat. § 46.03.822 et. seq.; Alaska Stat. § 46.03.826(2)
[291] Duffield 1997, p. 107; Duffield et al. 2014, p. 63. Subsistence harvest rights are the rights of Indigenous Peoples to hunt, gather, fish, and trap for food or traditional purposes. See for example: https://yukon.ca/en/outdoor-

for the Native class of between $80-$100 million. The replacement cost claim totalled around $20 million.[292]

Exxon filed a new motion in response to the new exhibits presented by the Native Alaskan class. The motion aimed at precluding evidence, witnesses, and exhibits. The Court granted this motion stating: "*According to plaintiffs, merely compensating natives (sic) for lost subsistence harvests "does not take account of the value placed by the Natives on their subsistence harvest activities, as revealed by their choice to engage in these activities, and is therefore wholly inadequate in assessing the actual economic injury to Alaska Natives resulting from lost subsistence harvests.*"[293] […] *The court grants Exxon's motion regarding* [the exclusion of the testimonies of] *Lind and Duffield. The value Alaska Natives place on their choice to engage in subsistence activities is a non-economic "way of life" claim which this court has already rejected. In the case of subsistence harvests, to place a value on anything other than the lost harvest itself is to place a value on lifestyle. The court recognizes that lifestyle has a value, but that value is non-economic. Quite simply, the choice to "engage in [subsistence] activities" is a lifestyle choice, and damages to lifestyle were rejected in Order No. 190. The lifestyle choice was made before the spill and was not caused by the spill.*"[294]

The Court explicitly noted: "*Lest there be any doubt, the claims of the native subsistence harvesters are limited to the economic value of the lost subsistence harvest.*" […] "*The court does not see any great difficulty in placing a value on a pound of bear meat, herring roe, or other such foods not normally available in stores. The cost of equivalent foods may be employed.*[295]

Following court Order no. 237, which excluded implicit price estimates, both plaintiffs and defendants had to develop new damage estimates solely for the replacement costs of the lost harvest. Exxon estimated the Native damages to tally up to $8.6 million. The Native Alaskan class estimated the damage to be between $19 million and $27,5 million. The difference in the estimates can be explained by the fact that plaintiffs and defendants estimated differently the total pounds of lost harvest.[296] This was caused by existing "*ambiguity about per capita harvest levels in villages that were seldom if ever surveyed*".[297] Other than this, both plaintiffs and defendants based their estimates on Anchorage prices plus delivery to villages for marketed commodities. Estimates for rare commodities, like seal and deer, for which retail markets provide no equivalent foods, were based on price delivery of fresh whole carcasses from a broker.[298]

recreation-and-wildlife/hunting-and-trapping/learn-about-subsistence-harvest-rights-yukon accessed 26 october 2021, and https://www.adfg.alaska.gov/index.cfm?adfg=huntlicense.cultural accessed 26 October 2021

[292] Duffield 1997, p. 107; Duffield et al. 2014, p. 63

[293] Duffield 1997, p. 107; Duffield et al. 2014, p. 64 who references Order no. 237 at 2-3; which is irretrievable but forms an integral part of *In re Exxon Valdez*, No. A89–0095–CV

[294] Duffield 1997, p. 107; Duffield et al. 2014, p. 64 who references Order no. 237 at 2-3; which is irretrievable but forms an integral part of *In re Exxon Valdez*, No. A89–0095–CV.

[295] Duffield 1997, p. 108 who references Order no. 237 at 4; which is irretrievable but forms an integral part of *In re Exxon Valdez*, No. A89–0095–CV

[296] Duffield 1997, p. 109

[297] Duffield 1997, p. 109

[298] Duffield 1997, p. 109

3.1.6.2.4 Settlement

The Native subsistence case was eventually settled out of court on July 22, 1994 just prior to trial. Exxon paid the Phase IIB Native claimants $20 million. The group of Native subsistence claimants that opted out of Phase IIB also settled with Exxon for $2.55 million on October 12, 1995.[299]

3.1.7 Discussion

Above, a detailed factual account was given of Exxon's settlement agreement with the United States and Alaska governments and the Exxon Valdez case law. Below, a more normative discussion will follow specifically aimed at recounting and critically assessing the steps taken by the public trustees and the Court in reaching, respectively, the settlement agreement and the final damage assignment.

3.1.7.1 Settlement agreement between the U.S. and Alaska governments and Exxon

The *Exxon Valdez* oil spill happened before some of the legal frameworks discussed above were developed (or were as developed as they are today). In fact, as already pointed out above, this case caused the development of said frameworks to be accelerated.[300] Case in point is OPA, which, spectacularly, was enacted only one year after the *Exxon Valdez* oil spill.[301]

In spite of its age, the Exxon Valdez case law and settlements give a glimpse into the difficulties of assessing valuations of "non-marketed goods" (as they are referred to in the Exxon litigation) for the purposes of formulating a compensatory damage claim.

As regards the settlement reached between Exxon corp. and the United States and Alaska governments, it makes sense that, in the absence of legal frameworks targeting this kind of environmental disaster, the governments initially engaged in settlement negotiations with Exxon. At the time, the environmental impact studies commissioned by the federal and state governments were kept confidential. They were only published later, in 1992, after the settlement agreement was already reached.[302] It is therefore not exactly clear when the governments received the results of the environmental impact studies conducted and in how far those figured into reaching the final sum agreed upon. The decision to keep the studies confidential was problematic as it obscured how the valuation studies that had been conducted impacted the settlement agreement, and so, what the final settlement number was based on. Not surprisingly, the decision was heavily criticized at the time. After all, the federal and state governments were acting as public trustees in their negotiations with Exxon and their negotiations were informed by studies paid for by federal and state taxpayers. The governments

[299] Duffield 1997, p. 100 and 109; *In re Exxon Valdez*, No. A89–0095–CV

[300] Huguenin et al. 2011, p. 68; See Tan 2006, p. 320, where it states; "*In the months following the Exxon Valdez, several other oil spills occurred, triggering further public and media reaction.[ref] The US Congress was subsequently galvanised into action to consider a new comprehensive law - the oil pollution act of 1990 (OPA-90).*"

[301] Liu et al. 2014, p. 125

[302] The "Assessment of the Impact of the Exxon Valdez Oil Spill on The Alaska Tourism Industry", which was commissioned by a law firm was published in 1991, see https://evostc.state.ak.us/oil-spill-facts/economic-impacts/ accessed 17 May 2021

also failed to include Native Alaskan representatives in the negotiations with Exxon corp., even though Native Alaskans formed a major and distinctive stakeholder group, and therefore a separate class for the purposes of litigation, making it necessary to reach another settlement agreement on rights to recover damages between the governments and the Native Alaskans.

The valuation study commissioned by the State of Alaska, conducted by Carson et al., estimated the pure ecological damage to be $2.8 billion dollars.[303] Carson et al. explain how the latter number is an underestimation as the injury studies regarding the amount of animal killings and the volume of the oiled shorelines were not yet completed at the time. To avoid having to readjust downward the damage estimates in a court procedure, which at the time was still being anticipated and, in fact, was the reason for the commission of the study,[304] Carson et al. chose to underestimate the injury numbers and thereby the final valuation of passive use values. This means that the pure ecological harm can be estimated at *at least* $ 2.8 billion dollars. The economists who conducted the spill-studies estimated the total damage to Prince William Sound to be in the vicinity of $3 billion to $5 billion. Knowing these numbers, it is surprising to see that the final civil settlement only awarded $900 million dollars with a reopener clause making $100 million dollars extra available for losses or harm to resources which could not have been foreseen at the time of the settlement. The pure ecological harm alone, conservatively estimated, was more than three times that amount.

It is also interesting to note that after the first settlement agreement was met with so much opposition, the only material difference between the first and the second version was an added $25 million dollars in criminal penalties. Moreover, the civil settlement appears to have been reduced from $1 billion to $900 million; granted the latter was supplemented with a reopener clause allowing for an extra $100 million to be assigned. As seen above, however, the governments eventually decided to forego the option of the reopener.

The above, somewhat odd course of events, can possibly be explained by the circumstances under which the settlement agreement was reached. In a 2009 lecture at Duke University, Prof. Jeffrey Fisher, attorney for the 32.000 victims of the *Exxon Valdez* oil spill who claimed punitive damages before the Supreme Court 20 years after the spill took place[305], explains the outcome of the settlement agreement that was reached in 1991 as having its roots in the relatively weak position the governments found themselves in compared to Exxon.[306] In his lecture, held one year after the 2008 Supreme Court's judgement in *Exxon Shipping Co. v. Baker*[307], Fisher recounts a transcript from a 1991 plea hearing for the second, and ultimately agreed upon, settlement between the U.S. and Alaska governments where District Court Judge Holland asks both parties why they consider this agreement a "good deal". When asked, the U.S. Attorney General answers that while the governments think they can prove a lot more and get a higher amount of damages out of Exxon, the governments find themselves confronted

[303] Recall, under 3.1.4.1, where it was explained how Carson et al. came to this amount: "*The study commenced with the identification of the injuries suffered in Prince William Sound, the magnitude and severity of each injury and time for natural recovery of the Sound were all considered. Through a series of survey questions which slowly narrowed in on the primary focus of the study, Carson et al. elicited peoples' willingness to pay as a valuation framework and found that the average household was willing to pay $31 for the spill prevention plan. In total 1,043 interviews were completed with a response rate of 75%. By multiplying the $31 dollars with an adjusted number of U.S. households, Carson et al. arrived at a total damage estimate of $2.8 billion dollars.*"
[304] See Carson et al. 1992, p. 1
[305] Or Phase III of *In re Exxon Valdez*, No. A89–0095–CV
[306] See Fisher 2009
[307] *Exxon Shipping Co. v. Baker,* 554 U.S. 471, 128 S. Ct. 2605 (2008)

with two problems: 1. The oil in the waters of Prince William Sound is causing more damage every day and the governments simply need money - any amount of money - as fast as possible. Even if in 10 years' time the governments would get twice as much damages as provided for in the current settlement agreement, it would not do them any good. They need whatever they can get right now. 2. The governments are unsure about whether they can fight Exxon to the degree that it needs to be fought in order to be forced to do better. At this point the Attorney General refers to a case involving an oil spill in France that after 15 years is still in litigation.[308] According to the Attorney General, knowing how Exxon is, the governments could still be here in 15 years with no solution. So, in the interest of time they have to get something now.[309]

The aforementioned shows the enormously strong bargaining position Exxon found itself in compared to the U.S. and Alaska governments and provides a plausible explanation for the settlement number reached. Due to the confidentiality of the negotiations, it remains unknown what settlement number the United States and Alaska governments had in mind when entering negotiations with Exxon. What is known, is that the 1992 study by Carson et al. conservatively estimated the ecological damage alone to be $2.8 billion. What is also known is that the final settlement agreement, covering all damages including ecological damage, was around $1,025 billion, making the settlement number for all damages to be 34% of the ecological damages estimated.[310]

As mentioned above, what also remains unclear due to the confidential nature of the negotiations is how the Carson et al. 1992 contingent valuation study figured into the final amount of damages. If we are to believe Fisher's account of Exxon's clean-up efforts following the oil spill, the fact that Exxon was fined $150 million but forgiven $125 million by the Court in recognition of its cooperation in cleaning up the spill and paying certain private claims, can be viewed as problematic. Fisher explains how, according to environmental experts, many clean-up efforts done by Exxon were actually detrimental to the environment. For example, hosing down the affected beaches caused oil to be driven deeper into the ground, killing all organisms that lived on the beach.[311]

3.1.7.2 Exxon Shipping Co. v. Baker

The largest and most prolific part of the *Exxon Shipping Co. v. Baker* case concerned Phase III in which punitive damages were awarded.

For the purposes of this research, however, Phase II on compensatory damages for the commercial fishermen and Native Alaskan classes is most interesting. At this point it must be acknowledged explicitly that this part of the case does not involve a classic claim for pure ecological harm in the sense of lost passive use value. Rather, it can be classified as a claim for lost ecosystem services (read: provisioning services), albeit that at the time this terminology was not employed, nor the concept acknowledged legally speaking. The relevance of Phase II of the trial for this research is found in the fact that it presents an in-court exercise in valuation

[308] Presumably the case referred to is the one following from the oil spill caused by the *Amoco Cadiz* off the coast of Brittany in 1978
[309] Cited and paraphrased from Fisher 2009
[310] See Table 2 below, which indicates that, should the ecological damages have indeed been higher than 2.8 billion, namely between $3-5 billion as was claimed, then this impacts the percentage and brings it down to 20,5%.
[311] See Fisher 2009

of noneconomic harm in the form of loss of subsistence use. The latter is valuated from both a cost-based approach as well as a use value approach.[312]

As a result of the *Exxon Valdez* oil spill, both commercial fishermen and Native Alaskans suffered lost provisioning services in terms of lost salmon and herring harvest, as well as some other animal and plant species as far as the Native class was concerned. Native Alaskans suffered direct damage as they consume harvested goods immediately. Commercial fishermen suffered more indirectly as the lost harvests reduced the commercial fishermen's profits because they could not sell the resource to a third party.

Particularly intriguing about Phase II is the comparison between the treatment of the Court of what essentially constitutes the same claim - namely one for loss or damage to harvests - made on the one hand by a commercial party and on the other hand by a non-commercial, subsistence use party. In the commercial fishermen's case salmon and herring were categorized as marketed goods that therefore have market prices. Valuation of losses sustained was pretty straightforward and the only dispute that arose concerned the volume of the damage sustained.[313] The Native Alaskan case, which claimed loss and damage to the very same salmon and herring in Prince William Sound, only categorized as a non-marketed good due to the fact that these goods are either directly consumed or traded, was however wrought with motions to dismiss by Exxon, which on crucial points were granted by the Court.

No claim for pure ecological harm was made by either class. Particularly for the Native Alaskan class one can imagine the construction of such a claim. Even though American law appears to only allow public trustees to make a claim for pure ecological harm (or natural resource damage as it is referred to under CERCLA and OPA), it would appear that Native Alaskans could, as Native inhabitants of the area, also act as (public) trustees for the conservation of the local ecosystem. After all, Native Americans, and also specifically Alaska Natives, do enjoy some amount of tribal sovereignty and government.[314] However, the settlement agreement (or consent decree) reached between the Alaska Natives and the U.S. and Alaska governments "*provided that the governments shall have the exclusive right to recover natural resource damages on public lands, including those natural resources used for subsistence. [ref] The Native villages reserved the right to pursue private claims, other than for natural resources damages, against any entity other than the governments "for all private harms to Native subsistence well being, community, culture, tradition and way of life resulting from the [o]il [s]pill. These claims include private harms resulting from the impairment, destruction, injury or loss of natural resources caused by the [o]il [s]pill.*"[315]

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[312] Duffield et al. 2014, p. 42

[313] What is striking about the damages award in the commercial fishermen's claim, is that the jury in many instances awarded exact averages of the plaintiff and defendant positions (see Duffield 1997, p. 104 and 3.1.6.1.2.). Considering this against the background of the enormous complexity of the valuation methodologies presented in court, one could interpret this as a sign that the jury was in fact overwhelmed with the economic valuations (and methodologies) presented to it and opted for the easiest 'way out', namely splitting the difference.

[314] See the Indian Affairs website of the U.S. Department of the Interior https://www.bia.gov/ and https://www.bia.gov/frequently-asked-questions accessed 1 June 2021. Legislation enacted subsequently to the *Exxon Valdez* oil spill explicitly positions Indian tribes as public trustees eligible to make a claim for natural resource damages. The Oil Pollution Act is an example, see 33 U.S. Code § 2702 (2)(A), where damages to natural resources are defined as: "*Damages for injury to, destruction of, loss of, or loss of use of, natural resources, including the reasonable costs of assessing the damage, which shall be recoverable by a United States trustee, a State trustee, an Indian tribe trustee, or a foreign trustee.*"

[315] Quam 1992, p. 184

One of the elements that stands out most about Phase II of the trial is the fickleness that the Court displayed in the merit it attached to the Natives' subsistence way of life. In Exxon's first motion, in which Exxon asserted that the Native Alaskan class fell outside the *Oppen* exception, the Court rigorously refuted this assertion, emphasizing how the Native class was in fact more directly affected than the commercial fishermen's class as their losses did not just include loss of profit but rather loss of "*their very livelihood*".[316] At this point in the case it appears that the Court had a thorough grasp of the kind of noneconomic losses sustained by the Native class and that it acknowledged this type of harm as legally relevant.

As the case proceeded, Exxon filed another motion under the *Dry Dock* doctrine, but this time for summary judgement on *all* Native Alaskan claims for compensatory damages for injury to "culture" or "subsistence way of life", or in short, noneconomic claims. This appears to be a turning point in the litigation, as the Court unexpectedly found that Native Alaskans could not recover for damage to their subsistence way of life, as private litigants, because their injury was not different in kind from that suffered by the general public. Besides it being a stark deviation from the Courts earlier assessments of the merits of the Native class' case, it also appears to be in violation of the consent decree reached between Exxon and the U.S. and Alaska governments. The latter reads: "*[…] that nothing in this Agreement shall affect or impair the following: […] exclusively private claims, if any, by Alaska Native Villages and individual Alaska Natives, other than claims for Natural Resource Damages, seeking damages for private harms to Native subsistence well being, community, culture, tradition and way of life resulting from the Oil Spill, including private claims for private harms to Alaska Native Villages and individual Alaska Natives resulting from the impairment, destruction, injury or loss of Natural Resources caused by the oil Spill and any other exclusively private claims that are available to Alaska Native Villages and individual Alaska Natives; […]*"[317]

It would seem that, in the end, in spite of the consent decree, the Native class' reserved rights faltered following Exxon's second *Dry Dock* motion. It is difficult to understand how the same Court that signed off on the consent decree, and formulated the abovementioned refutation to the first Dry Dock motion, ended up coming to this conclusion. The Court specifically held that: "*A private litigant cannot recover damages for a public nuisance unless he or she can show a special injury different in kind from that suffered by the general public*", and: "*The right to lead subsistence lifestyles is not limited to Alaska natives […] The right to obtain and share wild food, enjoy uncontaminated nature, and cultivate traditional, cultural, spiritual, and psychological benefits in pristine natural surroundings is shared by all Alaskans*".[318] The Court's rationale is that the losses suffered by the Native Alaskan class are no different from those suffered by the wider public, and that therefor they do not qualify under Dry Dock. According to Panoff, generally speaking, the special injury rule contained in Dry Dock "*provides that if an entire community has been harmed in the same manner by a public nuisance, public officials are the only proper parties to seek redress*".[319] Whether all Alaskans,

[316] Duffield 1997 and Duffield 2014; *In re Exxon Valdez*, No. A89–0095–CV (Court Order no. 222 at 7, filed May 31st, 1994)
[317] Consent Decree, p. 14-15
[318] *Alaska Native Class v. Exxon corp. (In re Exxon Valdez)* 104 F.3d 1196
[319] Panoff 1998, p. 716. Panoff provides an in-depth look at and critique of the Court's decision as well as on the special injury rule in general. See also Panoff 1998, p. 727 where it states: "*The Ninth Circuit in In re the Exxon Valdez passed on a golden opportunity either to abandon the special injury rule or expand the special injury rule's fishermen exemption to include similarly foreseeable damage to Alaskan Natives practicing a subsistence way of life*".

having the right to live a subsistence way of life, actually do live a subsistence way of life and depend on that way of life seems debatable.

The third holding reads: "*The strict liability provisions of the Alaska Environmental Conservation Act […] only permit recovery for loss of benefit measurable in economic terms […]*",[320] which, when taking note of the Court's rationale, appears to doubt the possibility of measuring noneconomic losses, or subsistence life and culture in economic terms. The Court's rationale reads: "*[…The Alaska Natives…] assert that theirs is a non-market economy, and that their damages should not be measured by market economy standards.*" According to Duffield, a footnote to this sentence reads: "*The Alaska Natives tacitly recognize that their cultural damage claim must in the end be converted to dollars. How, they do not say.*" This motion, and therefore rationale by the Court came after the economic experts for the plaintiffs had presented their converted-to-dollars non market valuations of harvest losses, and damage and losses to disruption to the Alutiiq way of life to the Court. It appears that while plaintiffs and defendants were engaged in a thorough economic debate about the valuation of subsistence way of life, this went over the head of the Court, with the latter concluding that noneconomic damages simply did not qualify for compensation. Duffield points out aptly that the question that was actually placed before the Court, namely "how does one value lost subsistence use?" was turned into "what is an admissible claim?".[321]

The Court's granting of the motion let to the setting aside of the economic analyses of plaintiffs' experts, Duffield and Lind. Duffield's original analysis which calculated the value of lost harvests in the spill year and 10 years down the line, resulted in a damage estimate of $24 - $44 million.[322] This number was supplemented by Lind's analysis that examined disruption to the Alutiiq way of life and estimated damages to be between at least $187 - $336 million to $1 billion as well as indicating owed damages for pain and suffering based on value-per-statistical-life, which tends to be three to four times greater than the present value of expected future disposable income.[323] After the abovementioned motion was granted and any claims for "subsistence way of life" wholly set aside, the alternative economic estimates based on implicit price and replacement cost of the value of the lost subsistence harvest added up to between $80-$100 million.[324]

However, Exxon filed yet another motion, this time to preclude evidence. In its granting of this motion the Court strikingly states: "*The value Alaska Natives place on their choice to engage in subsistence activities is a non-economic "way of life" claim which this court has already rejected. In the case of subsistence harvests, to place a value on anything other than the lost harvest itself is to place a value on lifestyle. The court recognizes that lifestyle has a value, but that value is non-economic. Quite simply, the choice to "engage in [subsistence] activities" is a lifestyle choice, and damages to lifestyle were rejected in Order No. 190. The lifestyle choice was made before the spill and was not caused by the spill.*"[325]

[320] *Alaska Native Class v. Exxon corp. (In re Exxon Valdez)* 104 F.3d 1196
[321] Duffield 1997, p. 106-107
[322] Duffield 1997, p. 105
[323] Duffield 1997, p. 105-106. The report by Robert Lind was found to be irretrievable. Duffield references it as: Lind, Robert C., "The Computation of the Monetary Value of the Damages Suffered by the Alutiiq People Affected by the Exxon Valdez Oil Spill," presented at the *Exxon Valdez* consolidated court case, February 23, 1993.
[324] Duffield 1997, p. 107
[325] Duffield 1997, p. 107 citing *In re Exxon Valdez*, No. A89–0095–CV (consolidated)

This once more confirms that the Court has little notion of what type of harm it is asked to assess, let alone the valuation methodologies presented to it. Duffield rightly critiques the Court's rationale, pointing out: *"[…] that lost harvest "in itself" has no value. The only value associated with the lost harvest is its use through harvest and consumption"* and *"[…]real economic choices natives make about this "livelihood" and "their business'' reveal the value they place on subsistence harvests"* and *"The court's view of economics is quite at odds with the fundamental valuation principles discussed above, The court apparently believes that commodities have some inherent and knowable value independent of human use."*[326]

Through its many motions, Exxon was able to successfully erode the Native class' case, step by step stripping away admissible heads of damage and valuation methods. The Court also allowed for the extrapolation of subsistence damages to be brought back to three years from the original ten.[327] Needless to say, the final settlement of $20 million falls dramatically short of the economic expertise provided for the sum of the originally listed types of harm suffered (see Table 2 below). Recall that the Native Alaskan class claimed damage for loss of subsistence harvest, devaluation of subsistence harvest rights, disruption of a subsistence way of life, and pain and suffering. In the end, after the many motions Exxon pursued, only the first head of damage was acknowledged by the Court. Even though the settlement negotiations were confidential, the Court only acknowledging this one head of damage reasonably must have had an impact on the final settlement amount.

More generally speaking, there are some matters that stand out about the case. Firstly, it is surprising that the Court appeared to be so unfamiliar with the concept of noneconomic harms as, for example, CERCLA, OPA, the Clean Water Act all deal with this thematic through their protection of natural resource damages. We also know that the very same Court approved the consent decree that was signed between Exxon and the U.S. and Alaska governments. In order for this consent decree to come about, research was specifically done into loss passive use values by Carson et al. The Court must have taken note of this evidence and, at the latest then, become aware of this type of harm.

Secondly, in 1994 when verdict was delivered in Phase III of the *Exxon Shipping Co. v. Baker* trial, the jury awarded $5 billion in punitive damages. We have seen above that the punitive damages award was eventually brought back to a 1:1 ratio with the compensatory damages award resulting in a $500 million punitive damages award. Combined with the settlement reached with the U.S. and Alaska governments (approximately $1,025 billion), Exxon paid roughly $1,5 billion. Exxon is said to have spent about $2 billion in oil spill response and restoration.[328] When juxtaposed with the abovementioned economic valuations conducted for the purposes of the consent decree and the *Exxon Shipping Co. v. Baker* case, which roughly add up to $5,5 - $6 billion[329], this appears to be a skewed outcome.

Also from the perspective of deterrence and punishment the financial repercussions for Exxon seem small. According to Fisher, at the time of the original punitive damages verdict in 1994, the $5 billion awarded equalled one year worth of profits for Exxon. In 2018, before the

[326] Duffield 1997, p. 108
[327] Duffield et al. 2014, p. 40
[328] Carson et al. 2003, p. 278
[329] But we know that Carson et al. 1992 made a conservative estimate. Compare for example Carson et al. 2003, p. 278 who mention alternative estimates of $4.78-7.19 billion.

COVID-19 pandemic hit, ExxonMobil's earnings were $21 billion and its total revenue $290,212 million.[330]

This conclusion is all the more troubling when taking into account the lingering effects the spill has had on Prince William Sound and its animal and plant inhabitants far beyond the three-year extrapolation limit placed on the damage valuations. Commemorating 25 years since the oil spill, the Exxon Valdez Oil Spill Trustee Council provided an update on species' recovery in 2014. It lists several species as recovered. However, their recovery took far longer than the three years expected by the Court. Other species, namely herring, killer whale pod AT1, Marbeled Murrelets, and Pigeon Guillemots were concluded to not be recovering from the oil spill.[331]

3.2 Erika 1999, France

Citation:	*Cour de Cassation*, Crim., 25 septembre 2012, n. 10-82.938 (hereinafter "Cour de Cassation")
Parties:	L'Office français de la fondation pour l'éducation à l'environnement en Europe, L'association Ligue de la protection des oiseaux, Le Syndicat mixte de protection du littoral breton, L'association Robin des Bois, Le Syndicat de la confédération maritime, L'Union fédérale des consommateurs de Quimper, and several (representatives of) local communities (Applicants); Mr. Savarese, Mr. Pollara[332], La société Rina, La société Total, (Respondents)
Court:	Cour de Casssation (French Supreme Court)
Date:	25 September 2012

This analysis is mostly based on the decisions delivered in the *Erika* case by the Tribunal de Grande Instance de Paris, the Cour d'Appel de Paris, and the Cour de Cassation. Secondary academic literary sources that provide a deeper insight into the wider legal context of the *Erika* case have also been consulted, such as publications by Faure and Rebeyrol. Furthermore, policy documents from e.g. the Institut français de l'environnement, and the Conference des Regions Peripheriques Maritimes d'Europe were consulted for numbers on ecological harm suffered and the amount of money paid out under the CLC and the IOPC Funds.

3.2.1 Facts of the case

The issues before the Court in this case had their origin in the breaking down of the *Erika* oil tanker off the coast of Brittany on December 11, 1999. The oil pollution that followed from the

[330] ExxonMobil 2018 Financial and Operating Review, p. 1 and 91
[331] https://evostc.state.ak.us/status-of-restoration/ accessed 6 June 2021
[332] In the Cour de Cassation's judgment, the (sur)names of the respondents are not given. They are simply referred to as MX and MY (meaning, Monsieur X and Monsieur Y). However, in the judgement of the tribunal de grande Instance de Paris and in articles on the case, the full names of the respondents are mentioned. For reasons of clarity, the respondents' surnames are also used here, instead of referring to MX and MY.

sinking of the ship caused substantial damage to the coast of the French *département* of Brittany as well as to many victims, enterprises, local communities and the environment.[333]

The *Erika* was an old single-hull oil tanker built in 1975.[334] It sailed under the flag of Malta and belonged to a Maltese company, the Tevere Shipping Company. The Tevere Shipping Company's capital was in turn held by two Liberian companies, which were owned by Mr. Giuseppe Savarese.[335] Tasked with the technical management of the ship was a company called Panship management, owned by Mr. Antonio Pollara.[336] The technical management of the ship consisted of supervising repairs of the oil tanker and ensuring its safety.[337]

In 1997, Bureau Veritas, a classification society, inspected the *Erika*. It concluded that its general condition was not satisfactory and a long list of essential work was drawn up. In 1998, the necessary repairs were supposed to have been carried out at the Bijela, Montenegro, shipyard. However, as it later turned out, the shipyard had received an order for minimum repair work in the amount of $160,000 instead of the initially planned amount of $590,000. This request was made by Mr. Pollara, with Mr. Savarese's consent.[338]

The inspector of a new classification society Registro Navale Italiano, delivered a provisional certificate allowing the *Erika* to sail. Registro Navale Italiano, an Italian public entity, which became the Rina company in August 1999, was appointed by the owner and manager of the ship. Rina subsequently renewed the certificate several times. Importantly, when Rina carried out a summary inspection of the *Erika* in November 1999, and it was revealed that there was considerable corrosion in various key parts of the ship, it let the *Erika* take to sea without any further investigation.[339]

In 1999, Total oil company chartered the *Erika*. Contrary to its own internal rules, it did not have the ship inspected for over a year by its own oil tanker vetting service. The last inspection by Total's vetting service had taken place in November 1998 and had shown the ship to be in poor general condition.[340]

Chartered by Total, the *Erika* set sail to Dunkerque, France, to load approximately 30,800[341] tons of heavy fuel bound for Milazzo, Italy. On December 10th, 1999, the *Erika* was caught in rough seas off the coast of France, launching an initial distress signal around 2 p.m. The ship struggled for several hours, subsequently broke in half and sank a 120 meters deep on December 12, 1999 at around 6 p.m. near Penmarc'h (Finistère, France) after the ship had sustained

[333] Faure 2010, p. 183
[334] Rebeyrol 2013, p. 33-34, who also states: "*This was before the entry into force of the preventive rules arising from the Marpol International Convention [ref] and its additional protocols, which more specifically required that oil tankers be built with double hulls.*"
[335] Tribunal de Grande Instance de Paris, p. 58; Rebeyrol 2013, p. 33
[336] Tribunal de Grande Instance de Paris, p. 59; Court de Cassation, p. 5
[337] Rebeyrol 2013, p. 33-34
[338] Rebeyrol 2013, p. 34
[339] Rebeyrol 2013, p. 34
[340] Rebeyrol 2013, p. 34
[341] Sources cite different numbers, however these all remain around the 30 000-31 000 mark.

damage two days earlier.[342] Approximately 19,589 tonnes of fuel leaked from the ship, pouring out across 450 kilometres of coastal area.[343]

"*According to unanimous opinion of specialists, the sinking of the Erika and the resulting spillage of thousands of tons of heavy fuel off the coast of France, followed by the arrival of innumerable layers of this hydrocarbon on more than 400 km of coastline, caused an ecological disaster which had never been experienced in France, comparable for example to that of Exxon Valdez in Alaska (unfortunately, the shipwreck of the Prestige followed shortly thereafter).*"[344]

Following the sinking of the *Erika*, a large proportion of the vessel's cargo and bunkers spilled into the sea. This pollution proved difficult to contain because of the quality of the cargo and the severe weather conditions. Eventually, several hundred kilometers of coastline from Brittany down to the Ile de Ré were soiled.[345]

ITOPF (the International Tanker Owners Pollution Federation) reports that *"the degree of oiling of shores was very patchy through the affected area. The most heavily contaminated areas were located in Loire Atlantique, the northern Vendée and on offshore islands, notably Belle Ile. These areas required the mobilisation of considerable cleanup resources to carry out a programme of initial bulk oil removal, followed by prolonged and difficult secondary cleaning. […] During the cleanup operation, between 190,000 and 200,000 tonnes[346] of oily waste was collected from shorelines and temporarily stockpiled. Temporary reception facilities were established in car parks and stretches of land close to beaches, mainly by building earth or sand bunds or digging holes and lining them with plastic. Ultimately, the French oil company Total agreed to receive all the wastes at their Donges refinery, where adequate storage sites were available or built within and close to the refinery. Little attention was paid to segregation of wastes, however. The result was a mixture of oil, sand, debris, seaweed, protective clothing, damaged booms and other response equipment like scrapers, buckets and spades, which needed sorting before disposal could proceed."*[347]

In June 2000, once the weather had improved, a three month operation started to pump out the remaining oil from the sunken sections of the vessel. Approximately 10,000 tonnes of oil were recovered during the main pumping operations with fine cleaning adding a further 1,200 tonnes.[348]

Hardest hit by the oil spill were sea birds, specifically the *Guillemot de Troïl*. ITOPF noted that "*almost 74,000 oiled birds were recorded ashore along the coast of the Bay of Biscay, of which almost 42,000 were dead.*"[349] IFEN stated that by September 2000, 63,606 oiled birds were

[342] Rebeyrol 2013, p. 34; Cour de Cassation, p. 4. See also IFEN 2001, p. 1; CPEM 2000, p. 7. Many sources mention the 12 of December 1999 as the day the *Erika* sunk, however IFEN 2001, p. 1 and CPEM 2000, p. 52 mention the 14th of December 1999.
[343] IFEN 2001, p. 1. This number is cited in the literature ranging from 400-450 kilometers.
[344] Rebeyrol 2013, p. 34
[345] Court de Cassation, p. 4; CPEM 2000, p. 7
[346] But see also the document presented by the Brittany Region to the IOPC Funds meeting on 28 March 2013 summarising the proceedings and findings of the judgement that states that at least 250,000 tonnes of oily waste was collected and stockpiled, see CMPR, p. 4
[347] https://www.itopf.org/in-action/case-studies/case-study/erika-west-of-france-1999/ accessed 18 October 2019
[348] https://www.itopf.org/in-action/case-studies/case-study/erika-west-of-france-1999/ accessed 18 October 2019
[349] https://www.itopf.org/in-action/case-studies/case-study/erika-west-of-france-1999/ accessed 18 October 2019; IFEN 2001, p. 1

recorded of which 61,403 were already deceased.[350] More recent information, indicates that this number is much higher, namely between 150,000 and 300,000.[351]

The Conférence des Régions Périphériques Maritimes d'Europe estimated the total amount of damages to be around €850 million.[352]

Figure 3. Map of the Erika oil spill[353]

As the spill covered such a great length of the coastal area (see Figure 3), many parties were affected and subsequently made claims for damages. Among these were coastal fisheries, mariculture (oysters and mussels) and tourism resources throughout southern Brittany and the Vendée, as well as salt production areas.[354]

Both civil and criminal proceedings were brought before the French courts against the main players, Mr. Savarese, of the Tevere Shipping Company, Mr. Pollara, of Panship management, the Rina classification company, and Total.[355] They were charged with endangerment of others through a manifest and deliberate breach of a binding safety or cautionary obligation, pollution of French waters, waterways, and EEZ due to a polluting accident at sea by a foreign tanker of one tonnage gross equal to or greater than 150 barrels.[356]

[350] IFEN 2001, p. 1
[351] https://www.lemonde.fr/planete/article/2019/12/12/il-y-a-vingt-ans-le-naufrage-du-petrolier-erika-provoquait-la-catastrophe_6022671_3244.html accessed 11 August 2021
[352] CPMR, p. 4. From the CPMR document available it is not clear how the Conférence des Régions Périphériques Maritimes d'Europe came to this number. It is not unlikely, however, that it is based on the findings of Cabinet Mazars et Guérard (2001) who conducted research into the total economic damages suffered as a result of the Erika oil spill, arriving at the sum of €1 billion (see below).
[353] Source: https://studentclimates.wordpress.com/2018/06/21/the-erika-case/ accessed 9 January 2021
[354] https://www.itopf.org/in-action/case-studies/case-study/erika-west-of-france-1999/ accessed 18 October 2019
[355] Rebeyrol 2013, p. 34
[356] Tribunal de Grande Instance de Paris, p. 3-12

The primary focus in the *Erika* case was the matter of criminal and civil liability. The latter, specifically, as it pertained to Total. For the purpose of this chapter, the criminal law aspects of the case are only marginally considered and the course of the civil law proceedings is described in general. [357] Specific attention is only paid to those parts of the case that concern pure ecological harm.

3.2.2 Procedural history

Following the oil spill, proceedings were commenced at both the international level under the CLC and IOPC Fund conventions, and the national level, the latter being of most relevance to this research.

3.2.2.1 CLC and IOPC Fund conventions proceedings

At international level, compensation proceedings were started under the 1992 CLC and the 1992 Fund Convention.[358] These provide two mechanisms. As regards the CLC, under the 1992 CLC a shipowner is strictly liable for any damage due to oil pollution, meaning the shipowner is liable even if the ship was not defective or no fault was committed by the members of the crew. Liability is limited to an amount determined by the capacity of the ship, and is guaranteed by an insurer. In the *Erika* case, the maximum amount was fixed at €12,843,484 million.[359] As the CLC is implemented in French law, victims of oil pollution can make a claim under French law up to the liability limit set by the CLC. If their claim exceeds that of the liability limit, the victim can recover the rest of their damages by turning to the IOPC funds under the 1992 Fund Convention. [360] The latter are funded by the oil industry itself.[361] Like the CLC, the Fund Convention can be activated without fault having been demonstrated.[362] The compensation paid is subject to capping at certain maximum levels. In order to be eligible for compensation, the pollution damage must involve a real and quantifiable economic loss and claimants must

[357] For a criminal law perspective on this case, see Faure 2010, p. 183-184
[358] CRPM 2013, p. 4. See also CRPM 2013, Annex I, IOPC/APR13/3/3/2, p. 2
[359] In € 2012; CRPM 2013, p. 4
[360] See Liu et al. (2014), p 137. See also Liu et al. (2014), p. 137-138, where it states: "*The CLC of 1969 imposes strict liability exclusively on the registered shipowner up to a certain amount. It also requires compulsory insurance or a financial guarantee for pollution liability. The Fund Convention of 1971 was later adopted to provide a second tier of compensation, given that the strict liability of the CLC of 1969 was considered harsh. With the contribution of oil cargo owners to the Fund, it was believed that the harsh burden on the shipping industry could be alleviated to a certain extent. Since then, an international regime on marine oil pollution compensation has been established.*
Later catastrophic oil pollution incidents illustrated the insufficiency of the international regime (e.g., the Amoco Cadiz in 1978, Tanio in 1980, and Exxon Valdez in 1989). As a result, the international conventions were revised in 1992, whereby the amount of compensation was substantially increased and the scope of compensation was expanded. Despite the changes, the general principles of liability sharing between the shipping and oil industry, including strict liability, limitation of liability, compulsory insurance, and channeling of liability remain. Again, later incidents, Erika in 1999 and Prestige in 2002, triggered further changes to the international conventions. The amount of compensation was increased by approximately fifty percent in 2000. Later in 2003, a Supplementary Fund Protocol was adopted to establish a so-called Supplementary Fund to provide a third tier of compensation. Membership in the Supplementary Fund is optional, and any state that is a member of the 1992 Fund may join the Supplementary Fund."
[361] See Liu et al. (2014), p. 137
[362] CRPM 2013, p. 4

provide proof of the amount of their loss or damage by means of accounting documents. Pure ecological harm is not compensated under the IOPC Funds; claims for loss of profit, costs of post-incident studies, and reinstatement measures are all eligible for compensation.[363]

In the *Erika* case, the damages exceeded the amount provided for under the CLC and thus claimants sought relief under the 1992 Fund. In its report to the IOPC Fund meeting on 28 March 2013, the Conférence des Régions Périphériques Maritimes d'Europe stated that by October 2012, 7331 claims for compensation had been lodged for a total amount of €388 million.[364] "*At that date, compensation had been paid totalling €129.7 million of which €12.8 million were covered by the insurer under the limitation of liability procedure*".[365]

3.2.2.2 National proceedings

Parallel to the proceedings commenced at the international level, at the national level, criminal proceedings were initiated against the shipowner, Mr. Savarese, the owner of the technical management company Panship, Mr. Pollara, the Rina classification company, and Total.[366] Initially there were separate procedures by on the one hand 114 claimants acting as civil parties and on the other hand 34 other claimants (more particularly, the French government, local authorities, environmental protection authorities and individuals). During the procedure before the Cour de Cassation, these separate procedures were joint together to one.[367] The respondents were charged with endangerment of others through a manifest and deliberate breach of a binding safety or cautionary obligation, pollution of French waters, waterways, and EEZ due to a polluting accident at sea by a foreign tanker of one tonnage gross equal to or greater than 150 barrels.[368]

As seen above, among the claimants was a host of environmental protection organizations, among which L'Office français de la fondation pour l'éducation à l'environnement en Europe, L'association Ligue de la protection des oiseaux, L'association Greenpeace France, Le Syndicat mixte de protection du littoral breton, L'association Robin des Bois, Le Syndicat de la confédération maritime, L'Union fédérale des consommateurs de Quimper, and many local communities that had been affected by the pollution.[369]

Civil and criminal legal aspects were dealt with in one and the same proceeding, as French law allows victims to constitute themselves as civil parties and claim compensation within the criminal court. The French Code of Criminal Procedure authorizes criminal courts to rule on such civil claims by victims by allowing the courts to apply civil law rules to those parts of the case concerning compensation.[370] Cabinet Mazars et Guérard (2001) conducted research into

[363] IOPC/APR13/3/3/2, p. 2
[364] CRPM 2013, p. 4
[365] IOPC/APR13/3/3/2, p. 2
[366] Tribunal de Grande Instance de Paris; Rebeyrol 2013, p. 34; IOPC/APR13/3/3/2, p. 2
[367] Cour de Cassation, p. 3; IOPC/APR13/3/3/2, p. 2
[368] Tribunal de Grande Instance de Paris, p. 3-12; Compare this to IOPC/APR13/3/3/2, p. 2, where the Conference of Peripheral Maritime Regions of Europe (CPMR) simply states that respondents were charged with "unintentional oil pollution of navigable waters and waterways".
[369] For a complete overview, see Tribunal de Grande Instance de Paris, p. 21-50; CRPM 2013, p. 4
[370] Rebeyrol 2013, p. 34; Faure 2010, p. 183

the total economic damages suffered as a result of the *Erika* oil spill. It arrived at a sum of €1 billion.[371] The combined claims of civil parties indeed added up to €1 billion.[372]

The Tribunal de Grande Instance de Paris found that all parties had in some way or another contributed to the *Erika* disaster.[373] Faure sums up how Savarese obtained certificates concerning the *Erika* that did not correspond with the actual quality of the ship and ordered changes that caused difficulties for an older ship like the *Erika* that was already heavily rusted. Even though aware that the sip needed reparation, Savarese used it. Pollara was held liable for allowing the *Erika* to set sail even though it was in poor condition, albeit that the Court acknowledged that without Pollara's action, this would likely not have impacted Savarese's actions. Rina was held liable for issuing an International Safety Management certificate in spite of the ship was known to have technical shortcomings. Total was criticized for chartering a ship of such bad quality to transport its cargo, especially in light of the fact that Total had an internal vetting service that could have verified the ship's condition.[374] The Court rendered its decision on January 16, 2008, holding all respondents criminally and civilly liable and ordering a total amount of more than €192 million in damages to the various applicants.[375]

An appeal was lodged by the respondents with the Cour d'Appel de Paris (the Paris Appellate Court), which rendered its decision on March 30, 2010.[376] The Cour d'Appel de Paris increased the amount of damages which Mr. Savarese, Mr. Pollara and Rina had been held liable to pay by nearly €8 million, but exempted Total from any civil liability, reasoning that the rules laid down by the CLC did not allow for imputation of civil liability of Total.[377] Indeed, the CLC channels all civil liability to the ship owner.[378]

In its decision, when considering the vastness of the ecological impact of the oil spill the likes of which France had never before experienced[379], the cancerous nature of the spilled product and critiquing the argument put forward by Total and its subsidiaries to the effect that only the French State is endowed with the task of protecting the environment to the exclusion of the environmental organizations who act as claimants in these proceedings[380], the Cour d'Appel de

[371] The report of Cabinet Mazars et Guérard (2001) is irretrievable online, but referenced in many secondary sources. See, for example, Hay & Thébaud 2006, p. 305 and https://www.lemonde.fr/planete/article/2019/12/12/il-y-a-vingt-ans-le-naufrage-du-petrolier-erika-provoquait-la-catastrophe_6022671_3244.html accessed 11 August 2021

[372] Unlike *Exxon Shipping Co. v. Baker*, the *Erika* case is not a class action, where one amount of damages is claimed on behalf of a group of claimants. Instead, the *Erika* case is characterized by an enormous amount of individual claimants that each presented individual monetary claims under various headings. Therefore, there is no single claims number available from the text of the judgement. From secondary sources it is clear that the combined claims of civil parties in the *Erika* case added up to €1 billion, in line with the results of the research conducted by Cabinet Mazars et Guérard (2001) that estimated the total economic damages to be at €1 billion.

[373] Faure 2010, p. 183

[374] Faure 2010, p. 183-184

[375] Tribunal de Grande Instance de Paris, p.344-357; Rebeyrol 2013, p. 34

[376] *Cour d' Appel de Paris*, 30 mars 2010, n. RG 08/02278 (hereinafter Cour d'Appel de Paris)

[377] Rebeyrol 2013, p. 34

[378] Foley & Nolan 2008, p. 49-51; https://studentclimates.wordpress.com/2018/06/21/the-erika-case/ Accessed 1 February 2021

[379] The Court states: "*Le naufrage de l'Erika […] causé une catastrophe écologique comme la France n'en avait jamais connue*", see Cour d'Appel de Paris, p. 427

[380] See Cour d'Appel de Paris, p. 427, where it says: "*Les prévenus, telles la société TOTAL et ses filiales, stigmatisent les demandes des parties civiles au titre de la réparation du préjudice écologique et évoquent tout à la fois "une avalanche de demandes d'une multitude de parties civiles revendiquant pour chacune d'entre elles l'existence d'un rôle en matière de protection de l'environnement", le fait que la France a confié à l'Etat et à nulle*

Paris distinguished three commonly accepted types of environmental harm and added a fourth category of harm, that of pure ecological harm. It distinguishes between:

1) Material harm, caused by pollution control activities, defined as restoration costs, such as site clean-up costs, wildlife rescue, restoring infrastructures and even damage caused to work tools;
2) Economic harm caused by pollution, which is understood to mean all revenue losses and missed gains, such as losses of markets, loss of earnings or loss of turnover;
3) Moral harm (pain and suffering) resulting from the pollution, which covers both the disturbance of pleasure, as well as damage to reputation, brand image and the values that underlie the identity of the victim; and
4) Ecological harm resulting from harm to non-marketed environmental assets, which is compensable through monetary reparation. This objective, autonomous harm, is understood to be any non-negligible harm to the natural environment, including air, atmosphere, water, soil, land, landscapes, natural sites, biodiversity and the interaction between these elements, which has no impact on a particular human interest but on a legitimate collective interest.[381]

After having established a fourth category of environmental harm, the Cour d'Appel de Paris henceforth referred to this category as "*prejudice écologique <<pur>>*", or pure ecological harm, to emphasize that it concerns harm done to (parts of) nature which do not serve a particular individual legal claimant's interest, but serve the collective interest. According to the Court, a claim for pure ecological harm could be invoked by the state, but also by local communities and associations for the protection of the environment.[382]

The court backed this newly formulated notion of a category of pure ecological harm by citing several sources, namely a case before the European Court of Human Rights (ECHR), the European Convention on Human Rights, the European Landscape Convention, and, at the time recently enacted French legislation that all acknowledged the notion of prevention of pure ecological harm or indeed demanded the protection of the environment as a human right or a collective interest/right.[383]

Unfortunately the French legislation cited only applied to harmful events that had taken place after 30 April 2007, and so did not directly aid in the adjudication of the case before the Court,

autre collectivité publique le rôle de gardien de la nature, le fait que la lésion des intérêts collectifs qu'une personne a pour charge de défendre constitue un préjudice moral, ou encore les risques patents de dérives prétoriennes ou de double indemnisation à la faveur de méthodes "pseudoscientifiques"." As well as p. 428 where it states: "*Ce faisant, ils opèrent une confusion entre ce qui ressort du fondement même de l'action de ces parties civiles dans le contexte particulier d'une atteinte à l'environnement, de la recevabilité de leur action en regard des préjudices invoqués et de l'évaluation de ces préjudices."*

[381] Cour d'Appel de Paris, p. 427; freely translated

[382] See Cour d'Appel de Paris, p. 428 where it states: "*S'agissant, en deuxième lieu, de l'intérêt personnel à agir dénié par les prévenus aux parties civiles, aux termes de l'article 2 du Code de procédure civile, « l'action civile en réparation du dommage causé par (...) un délit (...) appartient à tous ceux qui ont personnellement souffert du dommage direct causé par l'infraction».*" and p. 429 where it states: "*Le jugement déféré, qui a admis la recevabilité de l'action des parties civiles constituées au titre des trois postes de préjudice tels qu'évoqués ci-avant (matériel, économique, moral) sera, sur ce point, confirmé.*"; See Steinmetz 2010, p. 236

[383] Cour d'Appel de Paris, p. 427-428

but, as the Court stated: "*it does illustrate this recognition of pure ecological harm in French law*".[384]

It went on to find that this 'legislative evolution'[385] demonstrates a habit of simplifying the premises of reasoning to facilitate the reasoning itself, which has led to consider man in isolation from his natural environment, to neglect interaction with nature and to forget that nature is part of man as man is part of it. It follows from this interdependence that any non-negligible infringement of the natural environment constitutes an aggression to the community of men who live in interaction with nature and that this aggression must be repaired. Thus, the spill of the *Erika*'s cargo on the 23 December, 1999 directly or indirectly undermined a major international collective interest.[386]

Following the Cour d'Appel de Paris' decision, the defendants and 34 civil parties (namely, the French government, local authorities, environmental protection associations and individuals) lodged an appeal with the Cour de Cassation (the French Supreme Court).[387] Total, having avoided civil liability, now sought to contest its criminal liability. [388]

In the course of the proceedings before the Cour de Cassation, the pleadings of the advocate-general, Mr. Didier Boccon-Gibod, were disclosed in the press. In his pleadings, the advocate-general argued that the French courts lacked jurisdiction over the case and that therefore all proceedings ought to be abandoned. This caused public outrage, all the more so as Total had already been exonerated from all civil liability by the Cour d'Appel.[389] Rebeyrol notes: "*At a political level, the Court de Cassation had therefore little room for manoeuvre [ref] as it risked turning the populations affected by the oil spill against its judges. In a decision issued on September 25, 2012, [ref] the Court of Cassation chose to satisfy the public opinion rather than the legal orthodoxy proposed to it by its advocate-general.*"[390] In its decision, the Court confirmed the amount of compensation which the defendants had been held liable to pay to the various environmental organizations and local communities and quashed that part of the decision that exonerated Total from all civil liability. It ruled that Total was liable on the basis of the CLC and ordered it to pay, jointly and severally with the other defendants, the damages awarded.[391]

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[384] Cour d'Appel de Paris, p. 428; freely translated

[385] Which I take to mean the chronological development of environmental law in the international arena, but also particularly in France, through legislation and case law.

[386] Cour d'appel de Paris, p. 428; freely translated

[387] Rebeyrol 2013, p. 34; CRPM 2013, p. 4

[388] https://studentclimates.wordpress.com/2018/06/21/the-erika-case/ Accessed 1 February 2021

[389] Rebeyrol 2013, p. 34; see also Liberation, 24 May 2012, where Boccon-Gibod is quoted and it states: "*"Je comprends que cet avis heurte les consciences, qu'il fasse scandale", a ajouté Didier Boccon-Gibod. Il "ne tend nullement à laisser croire que le naufrage de l'Erika est un événement acceptable", a-t-il dit. Mais "pour que les fautes soient sanctionnées, il faut un texte applicable et c'est là que le bât blesse", a-t-il estimé, jugeant qu' "en termes de droit, cette procédure soulève des problèmes insoluble."* https://www.liberation.fr/societe/2012/05/24/erika-decision-de-la-cour-de-cassation-le-25-septembre_821096/ accessed 13 June 2021

[390] Rebeyrol 2013, p. 34

[391] Rebeyrol 2013, p. 34-35. As already becomes clear from the summary of the court proceedings, this case, besides ecological harm, revolved around the important issue of imputation of liability, and specifically who could be found liable following the CLC versus French national law. As the issue of liability assignment falls outside the scope of this research, this part of the case is not expounded on further. For more information about civil liability imputation, please see Rebeyrol 2013.

Unfortunately, the awarded damages were not connected to specific environmental criteria to be met nor restoration work necessary.[392] This meant that parties received large compensatory sums with no strings attached.

As regards the notion of pure ecological harm as established by the Cour d'Appel de Paris, the Cour de Cassation confirmed this new category of environmental harm and condensed its definition to: *'an objective and autonomous harm, consisting of any significant harm caused to the natural environment, without repercussions on a particular human interest but affecting a legitimate collective interest'*.[393]

3.2.3 Valuation method applied

Before deciding on a valuation approach to the ecological harm suffered following the *Erika* oil spill, the Cour d'Appel de Paris listed the various valuation approaches proposed to it by claimant parties. According to the Court, Robin de Bois, one of the environmental protection associations party to the case, referred in its conclusions to the case of the Amoco Cadiz oil spill, for which professor Claude Chasse had carried out a statistical assessment of the loss of biomass caused by the spill. Taking the auction prices of fish, shellfish and crustaceans, Chasse had estimated the cost of the spill to be 1.5 billion francs. However, Robin de Bois also pointed out that this approach left out the value of the services rendered to humanity by the affected oceanic ecosystems. It recalled that professor Costanza of the University of Vermont, had tried to integrate the costs of these services and had carried out an evaluation per hectare of the various ecosystems in existence, but that the latter approach in turn left out the value that humans render to nature. Albeit that the latter are in no way equivalent to the services rendered by nature to humans. According to the Court, Robin de Bois proposed to multiply the average, per ton spilled, of the damages awarded by the courts to civil parties in the event of an oil spill, by the number of tons lost by the *Erika*. The Court, however, concluded that this method only perpetuates the empirical evaluation used in the past, without leading to a better assessment, since after a certain threshold of pollution is reached, and thus a certain quantity of pollutant is in the same space, the ecological damage, having reached its maximum, can no longer worsen.[394]

It then moved on to the proposition made by the council of the department of Vendée, another claimant party, which proposed to evaluate the damage by the "loss of amenity" of its inhabitants, following a valuation proposal used in the United States for the Exxon Valdez, and consisting of an assessment of beneficiaries of the coastline's willing to pay for the preservation of the polluted coastline. The Court also rejected this approach, arguing that this process is based on an eminently subjective assessment which decreases with the attenuation of the feeling of the trauma suffered. It then noted the great difficulty of assessing "pure" ecological damage in general, and the fact that nature had not been the subject of an inventory prior to the *Erika* disaster and that the necessary elements of comparison were therefore partly lacking. At the same time it noted that compensating ecological harm is not much different from compensating

[392] Rebeyrol 2013, p. 41
[393] Cour de Cassation, p. 239; Foulon 2019, p. 311-312
[394] Cour d'Appel de Paris, p. 431

bodily harm, stating that the destruction of an ecosystem can be compared to a kind of amputation of a part of oneself.[395]

The Court then argues that, taking into account the multiple approaches proposed and the elements submitted to its assessment in the particular context of this polluting event, characterized by particularly harmful hydrocarbons, it will take various parameters into account in order to arrive at a fair monetary evaluation of the environmental damage suffered by each of the civil parties. The Court states that in order to arrive at a fair monetary evaluation of the environmental damage suffered by each of the civil parties, it will retain various parameters relevant to 1) communities and, when available the area of the tidal shoreline affected, the scale of the effect of the oil spill on the sites, as shown in the report, their maritime vocation and their population. For other communities it undertook a comparison with those for which it possessed information; 2) for other local authorities, the scale of the pollution of their shorelines, the degree to which they engage in maritime activities and their population and, 3) for associations, the number of members when available, the public profile and specific nature of their work, and an assessment of the violation of their organization's mission, and the inherent reason for their existence.[396]

No further explanation for this approach is provided.

The Cour de Cassation implicitly sided with this valuation approach by confirming the Cour d'Appel de Paris' compensatory awards.[397]

3.2.4 Judgement

The ruling on 25 September 2012 by the French Court de Cassation brought to a close the national proceedings brought before the French courts. In addition to the €12,843,484 million in compensation awarded under the CLC convention, the €129.7 million awarded under the IOPC Funds, the Court de Cassation confirmed the order of compensation issued by the Cour d'Appel de Paris and ordered compensation in the amount of €203.8 million. The latter number was composed of €165.4 million for material damages, €34.1 million for moral damages, and €4.3 million for pure environmental damage.[398] The latter number consists of various individual sums awarded to individual civil parties.

3.2.5 Discussion

The *Erika* case predominantly revolved around jurisdictional issues and the establishment of criminal and civil liability of the various defendants, with establishment of Total's civil liability under the CLC figuring most prolifically in the court of public opinion. The latter matter in essence questioned the tenableness of the exclusivity of channelling liability to the ship owner under the CLC. After all, Total was not the ship owner, but the charterer of the *Erika*. In the course of the proceedings, the competence of the French criminal judge to render judgment on civil interests was questioned, on the grounds that the 1992 CLC already established a specific

[395] Cour d'Appel de Paris, p. 431-432
[396] Cour d'Appel de Paris, p. 432; translation largely borrowed from CRPM 2013, p. 8
[397] Cour de Cassation, p. 255
[398] Cour de Cassation ; CRPM 2013, p. 1

liability regime offering victims the possibility of taking legal action, but any fault recognised in this context could not be likened to a criminal offence.[399] The question of whether parties, other than the shipowner, could also be held liable and ordered to pay compensation was of great importance to victims, who had suffered more damage than the CLC could recover from the ship owner.[400] The idea behind stretching the scope of liability to other actors than the ship owner was that "*it prevents any dilution of liability and recognises that a group of parties other than the shipowner (in this case, the charterer, shipowner, classification society and shipping management company) also have power to exercise control and authority over the ship and are also liable for the consequences of the incident*".[401] The Court de Cassation found that channelling of liability to the shipowner did not preclude that other operators can be recognised as criminally liable for the pollution to be ordered to pay compensation to victims.[402]

Of most interest to this research, however, is the courts' development of the notion of pure ecological harm. This notion was more or less developed 'along the way' in the Courts' rationale, but it is one of the most salient points made by the Courts in this case and arguably the most innovative.[403]

Before the *Erika* case came along, the notion of pure ecological harm was not recognized under French law, which thus far had only recognized damage cause to a (legal) person's rights and / or property.[404] Thanks to the *Erika* case, for the first time under French law, the harm caused to the environment was considered independently of that harm having an effect on specific legal persons, entities or their assets. Nature itself, with all its components, was found to be harmed and was owed compensation.

In deciding this, the Court took a rather liberal attitude towards the law as it based its findings on a French law which explicitly applied to environmentally harmful events that occurred after 2007 (long after the foundering of the *Erika*), thereby effectively broadening the temporal scope of the law as set by the legislator. This is a departure from a traditional notion of the role of the judge where '*le juge est la bouche de la loi'*. In the *Erika* case, the Court d'Appel de Paris at times explicitly 'makes the case' for the idea of pure ecological harm as well as for the ability of environmental protection organizations to claim dagames for this particular harm by citing

[399] IOPC/APR13/3/3/2, p. 3
[400] IOPC/APR13/3/3/2, p. 2 and 4
[401] IOPC/APR13/3/3/2, p. 4
[402] IOPC/APR13/3/3/2, p. 4; Huybrechts 2010, p. 227-228. See also IOPC/APR13/3/3/2, p. 3, where it states that the Court de Cassation "*considered that the competence of the criminal judge was only excluded in cases where the parties concerned enjoyed the benefit of the channelling of liability to the ship owner via the 1992 CLC. Consequently, those persons who cannot benefit from the channelling of liability set out in the 1992 CLC [as was the case for the parties involved in the Erica case] may be ordered to pay compensation in the context of criminal proceedings*".
[403] See CPRM 2013, p. 1 where the three most important holdings of the Court are summed up as being: "*The competence of the French courts to judge the consequences of an incident which took place outside France's territorial waters but within its Exclusive Economic Zone. The 'Erika' judgement thus overrules the principle of the competence of the vessel's flag state […;] The criminal liability of a group of parties in the shipping chain (the charterer [Total], the shipowner [Tevere Shipping], the classification society [RINA] and the ship management company [Panship]). Under this point, the judgement finds the existence of a fault of recklessness, as defined by the CLC convention, meaning that the parties cannot benefit from the channelling of liability to the shipowner, which is the principle of this convention […;] The existence of, and possibility of obtaining compensation for, pure environmental damage in addition to other kinds of damage for which compensation has been awarded at international level and in France. This is the first time that pure environmental damage has been recognised in France.*"
[404] Foulon 2019, page numbers not available; Rebeyrol 2013, p. 40

ECHR case law, the ECHR, the European Landscape Convention, as well as the French legislation mentioned above.

Foulon explains how the Court essentially redefined traditional legal classifications of damage existing in French civil liability law, by distinguishing between subjective damage and objective damage. Subjective damage encompasses all types of (traditional) damage suffered by a subject having legal personality in French law, like material and/or psychological damage caused by harm to the rights and / or property of legal or natural persons. The newly created 'objective damage' includes any damage caused to environment, an 'entity' lacking legal personality under French law.[405] Foulon criticizes, however, that the definition provided by the Cour de Cassation of pure ecological harm as: "*an objective and autonomous harm, consisting of any significant harm caused to natural environment, without repercussions on a particular human interest but affecting a legitimate collective interest*" lacks clarity, and that subsequent amendments to the French Code Civil have also failed to further specify the matter, leaving it up to the legal doctrine to crystallize the matter.[406]

Another matter that stands out about this case is the very liberal attitude the Court de Cassation adopted toward the CLC when it came to Total's liability. As seen above, generally speaking, only shipowners can incur liability under the CLC. Total, which was a 'mere' charterer in this case, could only be held liable under the CLC in case of "recklessness". In disregard of the Cour d'Appel de Paris' judgment, and compelled by the public outcry for environmental justice, the Court de Cassation boldly decided to interpret the CLC's standard of recklessness broadly by arguing that Total had acted recklessly, because *"when Total's representative had omitted a new control of the Erika by the vetting service, he was "probably aware that damage by pollution would probably follow""*.[407] Taking into account that Total's vetting service was a voluntary service which it was in no way required by law to have, the Court's argumentation appears to be somewhat of a legal stretch. Rebeyrol points out how Total's voluntary vetting action ironically ended up making it vulnerable to be accused of negligence. By arguing in this manner, the Court in effect created a presumption of recklessness.[408] As liability establishment is not the focus of this research, this matter will not be expounded on much further other than to establish that it appears that the Court de Cassation did not judge the *Erika* case strictly legally, by the law on the books, but was normatively motivated when it established and practically argued in favour of a new head of damages of pure ecological harm, as well as when it judged Total's liability. The Court filled gaps in the law where it found those to exist and where they stood to create unacceptable outcomes. It assessed the factual situation at hand, which consisted of a catastrophic environmental disaster caused by reckless actions by the defendants from which flowed a myriad of types of harm, and held this up against the limitations set by the law, consisting of the absence of legal acknowledgment of pure ecological harm under French law and the inequitableness of exclusive channelling of liability to ship owners under the CLC. It pinpointed unacceptable limitations set by the law on the books and maximally used its discretion to create a legal result that more closely approximated environmental justice. The Court thereby catered not only to its own reflections on the case, but also to the wider public's violated sense of justice, as stirred up by the Advocate-General's

[405] Foulon 2019, page number not available
[406] Foulon 2019, page number not available
[407] Rebeyrol 2013, p. 37.
[408] Rebeyrol 2013, p. 37

conclusions which became public. Arguably, the Court also safeguarded the public's trust in its legal institutions down the line. Besides taking a liberal approach with the law, the Court also took a liberal approach to its own traditional role. Instead of applying the law on the books and acting as *la bouche de la loi*, it effectively acted as a changemaker. This much is also confirmed by the aftermath of the *Erika* judgement. Following the judgement, the IMO adopted amendments to the CLC and IOPC treaties which raised the limits of liability and compensation. It also adopted a Supplementary Fund Protocol in 2003, which entered into force in 2005. The European Union adopted three legislative packages, *Erika* I, II, and III which aim at increasing maritime safety through monitoring maritime traffic, port state control and phasing out single hull tankers, amongst others.[409]

The Court de Cassation's actions regarding valuation leave much to be desired, though. In its decision, the Court runs through various, very viable, valuation methods proposed to it by two of the claimant parties. Without much explanation, it proceeds to rejects the proposed valuation approaches. Or, at least, the explanation given often does not seem to correspond with the proposals made. Point in case is claimant party Robin de Bois, who propose a combination of valuation approaches consisting of a statistical assessment of the loss of biomass based on market price valuation of lost species, supplemented with a value transfer approach using Costanza's assessment of the value of the world's marine ecosystems (see also chapter 4, Figure 3). The average value per ton spilled could then be multiplied by the number of tons spilled by the *Erika*. The Court rejects this approach without engaging with it on a content level, but by postulating in general that the proposed method perpetuates the empirical evaluation used in the past, without leading to a better assessment, and that after a certain threshold of pollution is reached, and thus a certain quantity of pollutant is in the same space, the ecological damage, having reached its maximum, can no longer worsen.[410]

A similar thing happens when the Court considers a second valuation method proposed by another claimant party, the council of the department of Vendée, who propose to apply a contingent valuation of lost passive use value to determine the "loss of amenity" of the affected areas' inhabitants. It even refers to this method being used in the Exxon Valdez case (as seen above it was employed in the proceedings of the U.S. and Alaska governments versus Exxon). The Court also rejects this approach, arguing that it is too subjective and that any value assessment would decreases with the diminution of the feeling of the trauma suffered. Also here, the Court does not reject the proposal based on any (scientific), content -related reasoning, but appears to base its decision on conjecture. The Court points out that the difficulty of assessing value lost also lies in the fact that there is no baseline condition known for the area affected by the *Erika* oil spill. Ironically, the proposal by Robin de Bois to apply Costanza's valuation of marine ecosystems enabling a value transfer method would have met this need. The Court finally stresses how catastrophic the pure ecological harm suffered is by comparing

[409] Wang 2006, p. 6; Adshead 2018, page number not available. For more on the (sequence of the) post-*Erika* development of the international oil pollution compensation regime, see Wang 2011, p. 173, where it states: "*It is probably due to the fact that so many serious oil spills occurred in European waters that the European Union has played an important role in the most recent evolvement of the international regime on marine oil pollution compensation. It is probably thanks to the activism of the European Union that the IMO Legal Committee has agreed in October 2002 to a 50% increase of the compensation amounts available under the CLC and the Fund Convention. […] Moreover, under the pressure from a regional compensation fund of the EU, the IMO has adopted a Supplementary Fund Protocol in 2003. It is also thanks to the efforts of the EU countries that this 2003 Protocol could come in force in March 2005.*"

[410] Cour d'Appel de Paris, p. 431

it to the amputation of a limb. The Court zigzags between what appears to be a thorough understanding of (and outrage about) the incomparable gravity of the harm inflicted and ignorance of basic economic valuation methods to translate this harm to a damage award. It ends up formulating a rather random list of criteria by which it assigns damage awards to the various claimants. The criteria listed are no less subjective than a contingent valuation method would have been and it in no way takes into account matters pertaining to pure ecological harm, such as which species were harmed or lost altogether and what the cost would be of reintroducing those. Rebeyrol points out how: *"[…] the judges in fact largely confused environmental harm with moral prejudice [read: damage to the reputation, public image, and values on which the identity of the victim is founded], which loss they remedied twice"*.[411] A final tragic fact of the *Erika* case is that the damages awarded to the various claimants were not connected to specific environmental criteria to be met, restoration work necessary in order to attain these criteria,[412] or timeframes within which this had to be accomplished. This meant that parties received large sums of money with no strings attached.

It is regrettable that the very insightful thought process that laid ground for the notion of pure ecological harm, failed to be carried through to the verdict. However, the *Erika* case does appear to have acted as a gateway for new developments in the law (as seen above), but also in case law. This is illustrated by Cour de Cassation, Crim., 22 March 2016, n. 13-87.650, where the Court decided that "*judges have the obligation to determine the pecuniary cost of ecological damage they recognise in their decisions, by requiring a scientific expertise if it is necessary*"*[…] and that judges cannot refuse compensation for ecological damage on the ground that the evaluation method proposed by the environmental NGO was not appropriate. Neither the difficulties of evaluation nor the inadequacy of pecuniary compensation for ecological damage are justifications for refusing any reparation. To achieve their duty, the Court recognised the possibility for judges to require scientific expertise.*"[413]

[411] Rebeyrol 2013, p. 41
[412] Rebeyrol 2013, p. 41, where he explains that, under French law, victims are allowed to freely dispose of damages awarded to them.
[413] Foulon 2019, p. 315

3.3 Costa Rica v. Nicaragua

Citation:	*Certain Activities Carried Out by Nicaragua in the Border Area* (Costa Rica v Nicaragua) *Compensation owed by the Republic of Nicaragua to the Republic of Costa Rica* (Judgment) [2018] ICJ Rep 4 (hereinafter "Judgement on Compensation")
Parties:	Costa Rica (Applicant); Nicaragua (Respondent)
Court:	International Court of Justice
Date:	2 February 2018

3.3.1 Facts of the case

The issues before the Court had their origin in a territorial dispute between Costa Rica and Nicaragua over Isla Portillos, a small parcel of territory located on the border of Costa Rica and Nicaragua. [414] This area is covered by rainforest and hosts a freshwater wetland that has been designated under the Ramsar Convention on Wetlands of International Importance.[415]

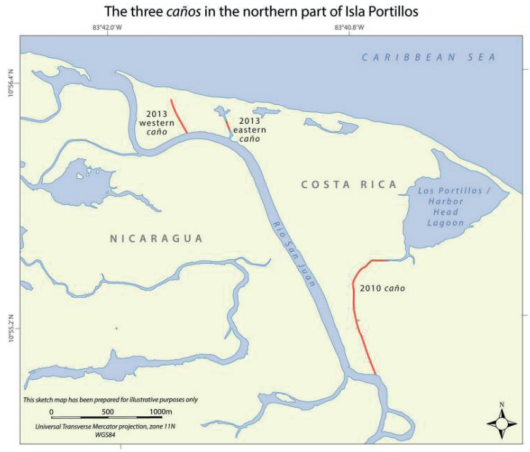
On 18 October 2010, Nicaragua started dredging work on the San Juan River in order to improve the river's navigability. It also carried out work on the northern part of Isla Portillos, which consisted of the excavation of a canal (caño) on the disputed territory between the San Juan River and Harbor Head Lagoon. Moreover, it sent military units and other personnel to the area.[416]

In excavating the 2010 and the 2013 eastern canals, Nicaragua removed close to 300 trees, of which the majority ranged between the ages of 50 to 100 years[417], and cleared 6.19 hectares of vegetation.[418] These activities caused serious damage to Costa Rica's protected rainforests and wetlands and significantly affected the ability of the two impacted sites to provide environmental goods and services.[419]

Costa Rica identified 22 categories of goods and services that could have been impaired following Nicaragua's actions. It claimed compensation in respect of six of them, respectively: (1) standing timber; (2) other raw materials (fibre and energy); (3) gas regulation and air quality; (4) natural hazards mitigation; (5) soil formation and erosion control; and (6) biodiversity in terms of habitat and nursery.[420]

[414] ICJ; Overview of the case https://www.icj-cij.org/en/case/150 accessed 8 June 2020
[415] https://www.informea.org/en/court-decision/costa-rica-v-nicaragua accessed 8 June 2020; Kindji & Faure 2019, p. 5
[416] *Costa Rica v. Nicaragua*, para 23
[417] Separate Opinion of Judge Donoghue to the Judgement for Compensation, para 9 and 11, but compare this to the Memorial of Costa Rica on Compensation 3 April 2017, p. 33 where it says: "*Some of the trees that were cut down by Nicaragua were over 200 years old (and the average age was 115 years)*".
[418] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 75
[419] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 1 and 75
[420] *Costa Rica v. Nicaragua* Judgement on Compensation, para 55

Figure 4. Map of the disputed area[421]



3.3.2 Procedural history

On 18 November 2010, Costa Rica brought proceedings to the International Court of Justice (ICJ) against Nicaragua. It claimed that the occupation of the territory by Nicaragua was a violation of its rights of sovereignty and that the construction of a canal and associated work on the occupied territory were having a detrimental effect on the environment in violation of international law.[422] In a 2011 order, the Court indicated several provisional measures aimed at preventing further damage to the area, as well as further aggravation of the conflict laid out before the Court.[423]

On 22 December 2011, Nicaragua submitted counterclaims relating to the construction of a road by Costa Rica along the San Juan River.[424]

In an order issued on 17 April 2013, the Court decided that it was appropriate, in conformity with the principle of the sound administration of justice and with the need for judicial economy, to join the proceedings that Costa Rica had initiated against Nicaragua with those that Nicaragua had issued against Costa Rica in the case concerning *Construction of a Road in Costa Rica along the San Juan River*.[425]

[421] Taken from *Costa Rica v. Nicaragua*; Judgement on Compensation, para 28
[422] https://www.informea.org/en/court-decision/costa-rica-v-nicaragua accessed 8 June 2020
[423] *Costa Rica v. Nicaragua* Order of 8 March 2011, para 86, which reads: "*1) Each Party shall refrain from sending to, or maintaining in the disputed territory, including the caño, any personnel, whether civilian, police or security;(2) Notwithstanding point (1) above, Costa Rica may dispatch civil-ian personnel charged with the protection of the environment to the disputed territory, including the caño, but only in so far as it is necessary to avoid irreparable prejudice being caused to the part of the wetland where that territory is situated; Costa Rica shall consult with the Secretariat of the Ramsar Convention in regard to these actions, give Nicaragua prior notice of them and use its best endeavours to find common solutions with Nicaragua in this respect;(3) Each Party shall refrain from any action which might aggravate or extend the dispute before the Court or make it more difficult to resolve;(4) Each Party shall inform the Court as to its compliance with the above provisional measures.*"
[424] ICJ; Overview of the case https://www.icj-cij.org/en/case/150 accessed 8 June 2020
[425] ICJ; Overview of the case https://www.icj-cij.org/en/case/150 accessed 8 June 2020; *Costa Rica v. Nicaragua* Order of 17 April 2013

On December 16, 2015, the ICJ handed down its judgment in the joined cases of *Certain Activities carried out by Nicaragua in the Border Area*, featuring Costa Rica v. Nicaragua (hereinafter *Costa Rica v. Nicaragua*), and *Construction of a Road in Costa Rica along the San Juan River*, featuring Nicaragua v. Costa Rica.[426]

In the *Certain Activities carried out by Nicaragua in the Border Area* case, the Court found that Costa Rica indeed had sovereignty over the disputed territory and that Nicaragua had violated Costa Rica's sovereignty by excavating three canals and establishing a military presence in the territory. Moreover, it found that Nicaragua had breached Costa Rica's rights of navigation on the river. In the second case, *Construction of a Road in Costa Rica along the San Juan River*, the Court found that Costa Rica had violated an obligation under general international law by not carrying out an environmental impact assessment (EIA) before commencing construction of the road.[427] However, it rejected Nicaragua's contentions as the construction had not caused significant harm.[428] In sum, Costa Rica was exonerated from any violation of international law, while Nicaragua was found to have breached its international obligations by, *inter alia*, excavating the three canals, which had negatively impacted the rich biodiversity of the disputed area.[429]

Nicaragua was ordered to compensate Costa Rica for material damages caused by its unlawful activities. The Court gave the parties an opportunity to come to an agreement among themselves on the amount of compensation due.[430] In case the parties would fail to reach an agreement on compensation within 12 months from the date of the judgement, the Court would, at the request of one of the parties, settle this question.[431] As it turned out, the parties indeed failed to reach an agreement, and in January 2017, Costa Rica seized the Court to determine the damages.[432] This resulted in the Judgement on Compensation of 2 February 2018[433], under review here. But not before the President of the Court held a meeting with the representatives of the parties in which it was decided that the latter would prepare written memorials on the question of compensation.[434] In April and June, parties submitted their Memorial and Counter-Memorial, respectively. By a letter dated 20 June 2017, Costa Rica indicated that, in its Counter-Memorial, Nicaragua had introduced new evidence and arguments countering Costa Rica's expert evidence, which it had not yet had the opportunity to address and wished to still do so.[435] Nicaragua contested this request. However, the Court found that parties held such different views as to the methodology for the assessment of environmental harm, that it ordered a second round of written pleadings. Costa Rica submitted a Reply and Nicaragua a Rejoinder on compensation.

Costa Rica estimated that damages amounted to approximately $6.711 million, of which it claimed $2,880,745.82 for environmental damage sustained as the result of Nicaragua's actions.

[426] Katz Cogan 2016, p. 320
[427] Katz Cogan 2016, p. 320
[428] Katz Cogan, p. 324-325
[429] Harrison 2018b, p. 528-529
[430] Harrison 2018b, p. 528-529
[431] *Costa Rica v. Nicaragua*; Judgement, para 229
[432] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 11; Kindji & Faure 2019, p. 6; Harrison 2018b, p. 527
[433] Kindji & Faure 2019, p. 6
[434] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 12
[435] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 15

Nicaragua arrived at an amount of $188,504, of which it estimated $27,034 to $34,987 was due for environmental damages.[436]

Below, attention will first be paid to the written proceedings on compensation. Both parties submitted their pleadings annexed with expert reports on the valuation of the environmental harm. Because parties' pleadings and claims are directly based on the expert reports, the latter will be discussed firstly, whereafter parties' claims will be elaborated on. Finally, the Court's rationale and judgement will be discussed.

3.3.3 Valuation method applied

Leading up to the judgement, parties engaged in two rounds of written proceedings regarding the appropriate methodology for calculating damages for environmental harm in general, and specifically as pertaining to the harm inflicted by Nicaragua.[437] Both parties enlisted the help of experts to quantify the damages.

3.3.3.1 First round of written memorials

Costa Rica commissioned an independent expert report from Fundación Neotrópica, a Costa Rican non-governmental organization with expertise in sustainable development and valuation of ecosystems functions and services.[438]

For its assessments, Fundación Neotrópica departed from the Millenium Ecosystem Assessment's (MEA) definition of ecosystem services as a framework to categorize and assess the different services that may be lost due to environmental damage.[439] As is shown in chapter 4, MEA categorizes ecosystem services into provisioning services, regulating services, cultural services, and supporting services.[440] Fundación Neotrópica valuated the lost services using the TEEB (The Economics of Ecosystems and Biodiversity) "total value equation", which allows for "*the assessment of direct use values (such as commercial, or consumptive values) and indirect values (such as natural or cultural capital services) [and] has been endorsed by the Ramsar Secretariat, as an appropriate methodology for valuing wetlands.*"[441]

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[436] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 20, 57, 58

[437] See https://www.icj-cij.org/en/case/150/written-proceedings accessed 9 July 2021, where the Memorial of Costa Rica on Compensation 3 April 2017, the Counter-Memorial of Nicaragua on Compensation 2 June 2017, the Reply of Costa Rica on Compensation 8 August 2017, and the Rejoinder of Nicaragua on Compensation 29 August 2017 can be found.

[438] Reply of Costa Rica on Compensation 8 August 2017; *Costa Rica v. Nicaragua*; Judgement on Compensation, para 45. In the Reply of Costa Rica on Compensation 8 August 2017, para 3.7, Fundación Neotrópica is described as follows: "*Fundación Neotrópica has over thirty years of experience in fieldwork in Costa Rican protected areas and ecosystems . The authors of the report are professionals in environmental science, and they consulted with technical personnel of the Tortuguero Conservation Area and the unit in charge of the Northeast Caribbean Wetland (protected under the Ramsar Convention). Their reports are the result of extensive work, including review of the extensive evidence, consultation with experienced personnel, and an aerial inspection of the relevant territory by means of overflight.*"

[439] Reply of Costa Rica on Compensation 8 August 2017, para 3.8

[440] Reply of Costa Rica on Compensation 8 August 2017, para 3.8

[441] Reply of Costa Rica on Compensation 8 August 2017, para 3.9. For more on TEEB, see Chapter 4

Fundación Neotrópica identified 22 categories of ecosystem goods and services that were affected by the damage caused by Nicaragua.[442] It also identified the data which would be required to ascribe a monetary value to the loss to these ecosystem goods and services. This resulted in Fundación Neotrópica identifying, for each category of goods and services, recent studies on similar ecosystems (i.e. tropical coastal wetlands) which made possible a value transfer method to value the losses suffered in this particular case.[443] In this process, Fundación Neotrópica narrowed down the categories of ecosystem goods and services to be valuated to six, namely (1) standing timber; (2) other raw materials (fibre and energy); (3) gas regulation and air quality; (4) natural hazards mitigation; (5) soil formation and erosion control; and (6) biodiversity in terms of habitat and nursery.[444]

It calculated the total loss over a period of 50 years, with a discount rate of 4 per cent. The latter represented the rate at which the ecosystem would recover.[445] It reasoned that: "*Both of these factors are conservative, for the following reasons : (a) Some of the trees that were cut down by Nicaragua were over 200 years old (and the average age was 115 years [ref]). Thus, adopting a time period for the valuation of 50 years is conservative. [ref] This approach is also consistent with recent jurisprudence of the Costa Rican courts, adopting a period of 50 years, in circumstances where the average age of the relevant trees in the two areas cleared were 112 and 83 years.[ref] (b) A discount rate of 4% is higher than the rates used in recent jurisprudence of the Costa Rican courts;[ref] and notably higher than the rates suggested by leading studies (for example, TEEB suggests the use of a zero discount rate). [ref] A higher discount rate results in a lower compensation claim because the discount rate reduces the present value of the claim.*"[446]

It valued the net present value of the loss of environmental goods and services at $2,148,820.82 in respect of the 2010 canal and $674,290.92 in respect of the 2013 eastern canal. Resulting in a total figure of US$2,880,745.82.[447]

Nicaragua commissioned an expert report by Professor C. Payne of Rutgers University and Robert Unsworth, Principal and Director with Cambridge, Massachusetts based Industrial Economics, Incorporated. Both served as advisors to the environmental claims panel of the United Nations Compensation Commission (UNCC). Also, a report by Professor Kondolf, of the University of California, Berkeley, was commissioned.[448]

Both expert reports set out to correct flaws contained in Fundación Neotrópica's report combined with offering a better methodological approach to valuation.[449] They held that the methodological approach used by Fundación Neotrópica was not appropriate for valuing

[442] See Memorial of Costa Rica on Compensation 3 April 2017, Annex I, p. 40
[443] Memorial of Costa Rica on Compensation 3 April 2017, para 3.16
[444] *Costa Rica v. Nicaragua* Judgement on Compensation, para 55
[445] See *Costa Rica v. Nicaragua* Judgement on Compensation, para 56, where it says: "*Costa Rica claims that it is appropriate to calculate the total loss sustained as the result of Nicaragua's actions over a period of 50 years, which it considers to be a conservative estimate of the time required for the affected area to recover. Consequently, it provides a net present value for the total loss on the basis of a recovery period of 50 years with a discount rate of 4 per cent. According to Fundación Neotrópica, the discount rate is representative of the rate at which the ecosystem will recover. In its view, as the ecosystem goods and services recover, the yearly value of the environmental damage caused will gradually decrease*."
[446] Memorial of Costa Rica on Compensation 3 April 2017, para 3.18
[447] Memorial of Costa Rica on Compensation 3 April 2017, para 3.19
[448] Counter-Memorial of Nicaragua on Compensation 2 June 2017, para 1.13
[449] Counter-Memorial of Nicaragua on Compensation 2 June 2017, para 1.12

environmental harm, rather it was meant for policy making, and therefor did not constitute a reliable basis to valuate the environmental impacts caused by Nicaragua.[450] Payne & Unsworth found most troubling about the report that 1) services were valued that were not lost (e.g. soil formation and natural hazards mitigation); 2) capitalized value estimates were treated as annual values, and thus these values were counted multiple times over the analysis period (e.g. the value of timber that was cut was included for each of the 50 years of the analysis); 3) no recovery of services was assumed for 50 years; 4) values from the literature addressing very dissimilar circumstances were used to represent values in this case; 5) mistakes were made in how the stock values of environmental services were combined with flow values.[451]

Running down the six ecosystem services for which Costa Rica claims damages, Payne & Unsworth set aside a number of them, arguing that they were not present in the area to begin with, and critiqued and corrected the valuation calculations for the rest of the ecosystem services.[452] Doing so, Payne & Unsworth ended up at a valuation of $84,000. In the alternative, and using what they stated is a more appropriate monetization technique, which involves calculating conservation action costs to off-set the harm as described by Costa Rica, Payne & Unsworth settled on an amount of between $27,034 and $34,987, "*which reflects the funds required to support a 20- to 30-year replacement program based on the cost of purchasing conservation credits*".[453] Nicaragua, in its Counter-Memorial departed from the latter estimate.

3.3.3.2 Second round of written memorials

In an order dated 18 July 2017, the Court noted that the parties held different views as to the methodology for the assessment of environmental harm and found it necessary for them to address this issue in a brief second round of written pleadings. It authorized the submission of a Reply by Costa Rica and a Rejoinder by Nicaragua on the sole question of the methodology adopted in the expert reports presented by the Parties in the Memorial and Counter-Memorial, respectively, on the question of compensation due in the present case.[454]

In the second round of written proceedings, parties continued the debate on which was the appropriate valuation methodology; the 'ecosystem services approach' as proposed by Costa Rica, or the 'ecosystem service replacement cost' approach, based on the work of the UNCC claims panel, as proposed by Nicaragua.

Costa Rica reiterated that their 'ecosystem services approach' was internationally recognised, up to date and appropriate for the Ramsar protected wetland that Nicaragua had damaged.[455] By contrast, the 'ecosystem service replacement cost' method proposed by Nicaragua formed an inappropriate valuation method as it was 1) based on the approach used by the UNCC environmental claims panel with respect to claims arising from the first Gulf War; an

[450] Counter-Memorial of Nicaragua on Compensation 2 June 2017, para 4.9, 4.14 and 4.15.
[451] Counter-Memorial of Nicaragua on Compensation 2 June 2017, Annex 1, p. 102
[452] Counter-Memorial of Nicaragua on Compensation 2 June 2017, para 4.17-4.32
[453] Counter-Memorial of Nicaragua on Compensation 2 June 2017, Annex 1, p. 103
[454] *Costa Rica v. Nicaragua*; Order of 18 July 2017. In rendering an account of the second round of written proceedings, I have chosen to focus on the statements and arguments parties brought to the fore regarding the (appropriateness of the) methodologies proposed. Qualifying statements made by experts that, on a more personal level, negatively characterize the expertise of the opposing party's expert have been omitted.
[455] See Reply of Costa Rica on Compensation 8 August 2017, p. 5

environment wholly incomparable to the wetland under consideration here, and 2) the UNCC claims panel concluded its claims processing in 2005, the same year that the Millennium Ecosystem Assessment was published bringing the 'ecosystem services' approach and terminology into the mainstream. Therefore, the UNCC approach was not state of the art.

Costa Rica also called in the support of experts upon whose work Neotrópica had based its analysis. Among others, Professor Robert Costanza and Professor Rudolf de Groot,[456] provided statements countering the explanations and critique provided by Payne & Unsworth of their work.[457] See, for example, the letter provided by Professor Robert Costanza, where it reads: "*This letter is to clear up a few misrepresentations and errors concerning my research contained in the report by [Payne & Unsworth]*".[458] It goes on to counter two notions, as presented in the report, namely that 1) the research of Costanza et al. (1997 and 2014) is not suitable for damage valuation, and 2) that Costanza et al.'s research is widely criticized and "*inconsistent with sound economic principles and practises*".[459] As to the former, Costanza explains how the list of applications as provided in Costanza's et al.'s work is not exhaustive, and moreover, that damage valuation can be thought of as a type of policy making (an item that is listed). As to the latter, Costanza submits that, indeed, there were early critiques of the paper, however that all of these have since been refuted "*as either wrong or simple misrepresentations of our results*" and that the paper has 17,000 citations on google scholar, making it the second most highly cited paper in the area of ecology/environment according to the ISI Web of Science.[460]

In addition to the supporting notes provided by a variety of experts, Costa Rica also submitted an expert review by Professor C. Thorne of the University of Nottingham of the expert report provided by Nicaragua's expert Professor Kondolf, that was highly critical of the methodology applied and the concordance of the report with relevant literature.[461] Concerns were raised, for example, about the 'over-reliance' on qualitative interpretation of satellite images, which was said to have resulted in a lack of estimates on some basic properties of regrowth in the cleared areas, like tree height. [462]

In response to Costa Rica's counter memorial, Nicaragua submitted a rejoinder on compensation, which included two rebuttal expert reports by the experts who lent their expertise in the first round of written proceedings.[463]

Nicaragua stressed that, contrary to Costa Rica's assertion, the UNCC, at the time, was aware of the methodology that is now favoured by Costa Rica, which amounts to a 'benefits transfer' approach, but "*chose not to apply it in light of its propensity to generate inaccurate results*".[464] Consequently, the UNCC methodology "*continues to be accepted as international best*

[456] See also chapter 4, which expounds on the work of these authors in the field of ecosystem services valuation.
[457] See Reply of Costa Rica on Compensation 8 August 2017, Appendix 1-11 for all supporting notes provided by various experts in the field
[458] Reply of Costa Rica on Compensation 8 August 2017, Appendix 1: Note from Dr. Robert Costanza, p. 49
[459] Reply of Costa Rica on Compensation 8 August 2017, Appendix 1: Note from Dr. Robert Costanza, p. 49
[460] The ISI Web of Science describes itself as "*[t]he world's largest publisher-neutral citation index and research intelligence platform*", see https://login.webofknowledge.com accessed 22 July 2021
[461] Reply of Costa Rica on Compensation 8 August 2017, Annex 2, p. 24
[462] Reply of Costa Rica on Compensation 8 August 2017, Annex 2, p. 24
[463] Rejoinder of Nicaragua on Compensation 29 August 2017
[464] Rejoinder of Nicaragua on Compensation 29 August 2017, p. 1

practises for valuing environmental impacts"[465] and is routinely used by courts and tribunals.[466] It also stated that "*Costa Rica further accepts that this approach reflected the state of the art in valuation as of the UNCC's award of compensation in 2005, only 12 years ago*".[467]

In its rebuttal report, Nicaragua focused on reiterating and elaborating on arguments made in the first round of written proceedings, stating: "*We do not find Neotrópica's response consistent with sound economics in the field of environmental damages assessment where the goal is to make the injured party hole for the harm suffered. The new material and new arguments presented by Neotrópica and their 3 August 2017 report and the comments of their reviewers who were asked to provide supporting statements only serve to reinforce our concerns […] the courts need not rely on a highly uncertain and unreliable valuation technique, but instead can provide compensation sufficient to allow Costa Rica to take actions that will offset the harm caused by Nicaragua. This approach, used by the UNCC and other authorities, reflects best practises in environmental damage assessment.*"[468]

It maintained that Costa Rica was entitled to restoration and replacement costs[469] and critically assessed the supporting notes provided by experts to Costa Rica. See, for example, where Nicaragua critically assesses the letter provided by Professor Costanza, noting: "*Professor Costanza concedes that his paper did not mention damages valuation among the seven different uses that it references, suggesting that it does not number among its most obvious uses. His letter simply notes that the list does not explicitly exclude damage valuation as one of the applications. Professor Costanza conspicuously does not endorse any aspect of Costa Rica's proposed valuation, or otherwise suggest that there are any errors in the approach followed by Nicaragua.*"[470]

In addition, Professor Kondolf provided a response to the review by Professor Thorne, which questioned the assumptions made in the review about the environment of the Río San Juan delta and the geomorphological processes active there, as well as the relationship of certain criticisms made and conclusions drawn by Thorne to the evidence from the location.[471]

3.3.3.3 The parties' claims

Based on the expert reports provided, parties formulated their claims.

Costa Rica claimed compensation for 1) quantifiable environmental damage caused by the excavation of two canals[472] and 2) additional costs and expenses incurred as the result of Nicaragua's unlawful activities related to monitoring and remedying the associated environmental harm.[473] Costa Rica stated that it is settled that environmental damage is

[465] Rejoinder of Nicaragua on Compensation 29 August 2017, p. 2
[466] Rejoinder of Nicaragua on Compensation 29 August 2017, p. 5
[467] Rejoinder of Nicaragua on Compensation 29 August 2017, p. 8
[468] Rejoinder of Nicaragua on Compensation 29 August 2017, Annex 1, p. 3
[469] Rejoinder of Nicaragua on Compensation 29 August 2017, p 5-6
[470] Rejoinder of Nicaragua on Compensation 29 August 2017, p. 18
[471] Rejoinder of Nicaragua on Compensation 29 August 2017, Annex 2, p. 1
[472] It did not claim damages for the Western canal dug in 2013.
[473] *Costa Rica v. Nicaragua;* Judgement on Compensation, para 36. The second head of damage claimed by Costa Rica, concerning costs and expenses incurred as the result of Nicaragua's unlawful activities, including expenses incurred to monitor or remedy the environmental damage caused, will not be elaborated on here further as it does

compensable under international law, including harm to environmental resources that have no commercial value.[474]

It asserted that "*the appropriate method of valuation will depend, inter alia, on the nature, complexity, and homogeneity of the environmental damage sustained*".[475] On the recommendation of Fundación Neotropica, it adopted the 'ecosystem services approach', which departs from the idea that "*the value of an environment is comprised of goods and services that may or may not be traded on the market. Goods that are traded on the market […] have a "direct use value" whereas those that are not have an "indirect use value*". In Costa Rica's view, the valuation of environmental damage had to take into account both the direct and indirect use values of environmental goods and services in order to provide an accurate reflection of the value of the environment. For most of the ecosystem goods and services it employed a value transfer approach to assign a monetary value to them. For those goods and services for which there was data available, it employed direct valuation approaches.[476] Costa Rica contended that an ecosystem services approach, among other more recent methodologies for valuation, "*recognize[s] the full and potentially long lasting extent of harm to the environment*".[477]

It argues that valuation methodologies have evolved since the UNCC methodology, adopted by Nicaragua, was developed and that, moreover, the subject-matter that the UNCC dealt with was radically different from the present case.[478]

It calculated the total loss over a period of 50 years, with a discount rate of 4 per cent. The latter represented the rate at which the ecosystem would recover.[479]

As compensation for the impairment or loss of environmental goods and services, it claimed payment of $2,148,820.82 in respect of the 2010 canal and $674,290.92 in respect of the 2013 eastern canal. It also claimed $57,634.08 for restoration costs, comprising $54,925.69 for the cost of replacement soil in the 2010 and 2013 canals and $2,708.39

not directly relate to the valuation of environmental harm. Costa Rica's claim, Nicaragua's defence and the Courts holdings on this topic can be found in *Costa Rica v. Nicaragua*; Judgement on Compensation, paras 88-147.

[474] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 39

[475] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 44

[476] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 47

[477] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 48

[478] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 48

[479] See Memorial of Costa Rica on Compensation 3 April 2017, para 3.18 where it says: "*Having identified the value of the loss for the first year after the loss was caused, Neotrópica provided a net present value calculation for a period of 50 years, adopting a discount rate of 4% . Both of these factors are conservative, for the following reasons : (a) Some of the trees that were cut down by Nicaragua were over 200 years old (and the average age was 115 years [ref]). Thus, adopting a time period for the valuation of 50 years is conservative. [ref] This approach is also consistent with recent jurisprudence of the Costa Rican courts, adopting a period of 50 years, in circumstances where the average age of the relevant trees in the two areas cleared were 112 and 83 years.[ref] (b) A discount rate of 4% is higher than the rates used in recent jurisprudence of the Costa Rican courts;[ref] and notably higher than the rates suggested by leading studies (for example, TEEB suggests the use of a zero discount rate). [ref] A higher discount rate results in a lower compensation claim because the discount rate reduces the present value of the claim.*" And, *Costa Rica v. Nicaragua*; Judgement on Compensation, para 56, where it says: "*Costa Rica claims that it is appropriate to calculate the total loss sustained as the result of Nicaragua's actions over a period of 50 years, which it considers to be a conservative estimate of the time required for the affected area to recover. Consequently, it provides a net present value for the total loss on the basis of a recovery period of 50 years with a discount rate of 4 per cent. According to Fundación Neotrópica, the discount rate is representative of the rate at which the ecosystem will recover. In its view, as the ecosystem goods and services recover, the yearly value of the environmental damage caused will gradually decrease*."

for the restoration of the wetland. This totalled an amount of compensation of $2,880,745.82 for the environmental damage sustained as the result of Nicaragua's actions.[480]

Nicaragua claimed that Costa Rica could only receive compensation for material damages, limited to "*damage to property or other interests of the State…which is assessable in financial terms*". Referring to the 2015 judgement of the Court in this case, it argued that compensation was limited to losses or expenses caused by the activities that the Court determined were unlawful.[481]

It agreed that environmental damage is compensable under international law. However, it contended that, following the UNCC approach, Costa Rica was only entitled to be compensated for "restoration costs" and "replacement costs".[482] The latter it coined '(ecosystem service) replacement costs', that aimed "*to replace the environmental services that either have been or may be lost prior to recovery of the impacted area*", the price of which is to be calculated by reference to the price that would have to be paid to preserve an equivalent area until the services provided by the impacted area have recovered.[483]

It argued that there was no merit to the claim made by Costa Rica that Nicaragua's methodology had been displaced by more recent methods of valuation of environmental damage.[484] Furthermore, it argued that the methodology adopted by Costa Rica was a "benefits transfer" approach, which it claimed was unreliable and had not been widely used in practice.[485]

Nicaragua claimed that Costa Rica was entitled to replacement costs in the amount of $309 per hectare per year, which was the amount that Costa Rica paid landowners and communities as an incentive to protect habitat under its domestic environmental conservation scheme (adjusted to 2017 prices).[486] Nicaragua estimated a reasonable period for full recovery to be 20 to 30 years. Taking into account a 4 per cent discount rate, it concluded that the present value of the replacement costs amounted to between $27,034 and $34,987.[487]

In the alternative, Nicaragua asserted that, even if the Court would find Costa Rica's ecosystem services approach appropriate, it would need to be adjusted downwards as "*Costa Rica wrongly assumes the presence of environmental services that were not provided by the area impacted by Nicaragua's activities*", specifically gas regulation and air quality, and Costa Rica wrongly assumed that any impact that was made would span 50 years.[488]

After having presented their claims as regards the categories of damage eligible for compensation, parties moved on to quantifying the damage sustained by individual ecosystem services. Below, parties' valuations for the six categories of ecosystem goods and services are discussed individually.

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[480] *Costa Rica v. Nicaragua;* Judgement on Compensation, para 57
[481] *Costa Rica v. Nicaragua;* Judgement on Compensation, para 37
[482] Interestingly, Costa Rica also bases its position on the work of the UNCC, see *Costa Rica v. Nicaragua;* Judgement on Compensation, para 39
[483] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 49
[484] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 50
[485] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 51
[486] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 58
[487] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 58
[488] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 59

3.3.3.3.1 Standing timber[489]

Costa Rica claimed compensation for trees that were felled in the construction of the 2010 and 2013 canals. It based the valuation of the trees on the average price of standing timber for the species that were present at the sites in 2010 and 2013. At the 2010 canal, trees were valued at $64.65 per cubic metre. At the 2013 eastern canal, they were valued at $40.05 per cubic metre. These valuations were based on figures taken from the Costa Rican National Forestry Office.[490] Using figures provided by Fundación Neotropica, "*Costa Rica values the eliminated stock and the growth potential of that stock over 50 years, assuming a volume of standing timber of 211 cubic metres per hectare, a harvest rate of 50 per cent per year, and a growth rate of 6 cubic metres per hectare per year.*"[491]

Nicaragua contested the valuation provided by Costa Rica. Instead, it claimed that the material damage caused by its activities were limited to the felling of the trees in the 2010 canal. It asserted that the 2013 canal had allegedly quickly revegetated, rendering it indistinguishable from surrounding areas. Moreover, it stated that Costa Rica's calculation was wrong. As trees can only be harvested once, a valuation departing from a 50 year period cannot be accepted. It also asserted that Costa Rica's figures did not take into account the costs associated with harvest and transport to market of the trees, "*thus contravening accepted valuation methodology*".[492]

3.3.3.3.2 Other raw materials (namely, fibre and energy)[493]

Costa Rica argued that Nicaragua removed other raw materials when excavating the canals. It based its valuation on studies that quantify the value of raw materials in the ecosystems of Mexico and the Philippines, resulting in a unit price of $175.76 per hectare for the first year after the loss was caused.[494] This unit price was then applied to an area of 5.76 hectares, the

[489] The titles for headings 3.3.3.3.1 – 3.3.3.3.6 are directly taken from those provided in the Court documents, which in turn were directly taken from the Memorial of Costa Rica on Compensation 3 April 2017

[490] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 60

[491] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 60, where it also states that Fundación Neotrópica explains that it does not think that Costa Rica can in fact harvest 50 per cent of the annual growth of the trees each year, but that it applies this number because the asset degradation caused by Nicaragua's unlawful activities will be reflected in Costa Rica's physical, natural, and economic accounts every year as a decrease in the monetary value of the country's natural assets until it has fully recovered.

[492] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 61

[493] The Memorial of Costa Rica on Compensation 3 April 2017 does not provide a definition of 'raw materials (namely fibre and energy)', but does state on p. 103 that raw materials consist of e.g. construction and production, fuel and energy, forage and fertilizers. It explains further that : "*Ecological economy suggests that in development and conservation processes we use various types of capital, proposing a capital system that goes beyond the traditional concepts.[…] Capital is composed of stocks of natural capital, cultural (or social) capital, and manufactured capital. The material and energy flows through these subsystems make possible all natural, social, and economic processes.*", see Memorial of Costa Rica on Compensation 3 April 2017, p. 106, as well as, p. 128, where it reads: "*Similarly, standing timber and fibre-based raw materials, with proven losses, can be recorded as losses in reserves. Although commercial use is restricted, these are national reserves for which there would at least be an option value, given that as its sovereign right the country could decide to use these materials in various situations, including emergencies. Thus, it was decided to account for this aspect both from the perspective of the standing timber lost and the estimation of the raw materials (comprised of fibres, energy and ornamental resources).*"

[494] Adjusted to 2016 prices; *Costa Rica v. Nicaragua;* Judgement on Compensation, para 62

area cleared during excavation of the 2010 canal, and 0.43 hectares, the area damaged in the construction of the 2013 eastern canal.[495]

Also here, Nicaragua contended that the affected area had already recovered and was again able to provide goods and services. In the alternative, even if the unit value assigned by Fundación Neotrópica was correct, Nicaragua asserted that the 50 year time span was a vast overvaluation of the harm inflicted.[496]

3.3.3.3.3 Gas regulation and air quality services

Costa Rica also claimed compensation "*for the impaired ability of the affected area to provide gas regulation and air quality services, such as carbon sequestration[…].*"[497] It based its valuation of the lost services on an academic study that values carbon stocks and flows in Costa Rican wetlands, resulting in an estimate of $14,982.06 per hectare for the first year after the loss was caused.[498] Countering Nicaragua's argumentation that Costa Rica was only entitled to a small share of the value of the lost services (as they may also have benefitted the citizens of other countries), equivalent to its benefit of those services, Costa Rica argued that the fact that some of the lost or impaired gas regulation and air quality services may also have benefitted

[495] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 62

[496] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 63. It is interesting to note that in the entire Judgement no mention is made of "interim losses" even though recovery times (of 50 years) are explicitly addressed. "Interim losses" concern the loss of natural resources and services that occurs between the date of the incident and the date of full recovery. Also the Memorial of Costa Rica on Compensation 3 April 2017 does not mention the term interim losses. It does, however, mention the term "social cost", which it defines as: "*[…] the benefits lost due to the environmental damage caused*". The Memorial draws a connection between social cost and recovery times, stating: "*The estimate of the social cost component of the environmental damage requires two additional elements which are confirmed in the technically relevant facts presented in Table 2. First, the time period is required to calculate the net present value of the flow of ecosystem goods and services lost. In conformity with the methodological specifications of the framework for the valuation of environmental damage adopted, this time period is the time for recovery of the ecosystem to the state prior to the damage caused (Barrantes & Di Mare, Metodología para la evaluación económica de daños ambientales en Costa Rica, 2001). Based on the confirmed technical reports, that time is of 50 years, even though trees that were over 200 years old were cut down […]*", Memorial of Costa Rica on Compensation 3 April 2017, p. 117 and 137 respectively. For more on interim losses, see Kindji & Faure 2019, p. 16, who explain the three stages of environmental restoration from the perspective of the Enviromental Liability Directive: *"[Environmental restoration] is implemented through three phases. As a first step, a primary restoration will be carried out to enable the injured natural resources and services to return to their baseline conditions, either on an accelerated timeframe, or through natural recovery. When this does not occur, a complementary remediation will be necessary to compensate for the loss of resources and/or residual ecological services. Finally, a compensatory remediation provides room to compensate for the interim losses of natural resources and services pending recovery. Restoration actions are based on many factors such as technical feasibility, natural recovery period, or cost-effectiveness. The preferred restoration alternative must be the result of a process that takes into consideration a reasonable range of restoration alternatives provided that each alternative is comprised of primary and/or compensatory restoration components. The latter that must compensate for the interim losses should seek to provide services of the same type and quality, and of comparable value as those injured.*".

[497] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 64. It follows from Table 12 in the Memorial of Costa Rica on Compensation 3 April 2017, p. 136, that Costa Rica found these regulating services to have been harmed as a consequence of the felling of the trees (read: "*elimination of vegetation in deforested and cleared areas*").

[498] Adjusted to 2016 prices.

the citizens of other countries was irrelevant to Nicaragua's liability to provide compensation for the unlawful harm caused to Costa Rica on its own territory.[499]

Besides asserting that Costa Rica could only lay claim to a share of the value of the lost services, Nicaragua questioned the relevance of the study that the figures were based on as well as the fact that Costa Rica did not refer to other studies that assign lower values to the same services. Lastly, it stated that the estimate provided was a stock value, which reflects the total value of all carbon sequestered in the vegetation, soil, leaf litter, and organic debris in one hectare. As this carbon stock can only be released once into the atmosphere, a calculation of loss based on a 50 year period was incorrect.[500]

3.3.3.3.4 Natural hazards mitigation

Costa Rica contended that the affected wetland had been impaired in its ability to mitigate natural hazards, such as coastal flooding, saline intrusion and coastal erosion. It based this claim on a Ramsar report and its valuation of the service, at $2,949.74 per hectare for the first year after the loss was caused[501], on a range of studies from Belize, Thailand and Mexico.[502]

Nicaragua asserted that Costa Rica had not specifically identified natural hazards that were mitigated by the affected area in the past nor how those were impacted by Nicaragua's actions. It also questioned the fact that Costa Rica applied a value transfer approach based on a study about coastal mangroves in Thailand, as it deemed the latter irrelevant.[503]

3.3.3.3.5 Soil formation and erosion control

Costa Rica claimed that the sediment that refilled the 2010 and 2013 canals was of poorer quality than the original sediment and that it was more susceptible to erosion. It claimed costs for replacement soil, valued at US$5.78 per cubic meter.[504]

Nicaragua responded that the canals had already rapidly refilled with sediment and were covered with vegetation. It asserted that Costa Rica did not prove that the new soil was of poorer quality or that it was more vulnerable to erosion as a result of Nicaragua's actions.[505]

3.3.3.3.6 Biodiversity in terms of habitat and nursery

Costa Rica claimed compensation for the loss of biodiversity services in the affected area, both in terms of habitat and nursery services. It based its valuation on studies that valuate biodiversity

[499] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 64
[500] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 65
[501] Adjusted to 2016 prices.
[502] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 66
[503] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 67
[504] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 68
[505] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 69

in other ecosystems, namely Mexico, Thailand, and the Philippines, resulting in a price of $855.13 per hectare for the first year after the loss was caused.[506]

Also here, Nicaragua asserted that the area had already recovered and, in the alternative, that assuming losses over a 50 year period presented a vastly inflated valuation.

3.3.4 The Court's rationale

In the *Costa Rica v. Nicaragua* case; Judgement on Compensation, the Court found itself presented with two main issues, namely: 1) Could, and, if so, to what extent, each of the various heads of damage claimed by Costa Rica be established and was there a sufficiently direct and certain causal nexus between Nicaragua's wrongful act and the injury suffered by Costa Rica?[507] And, 2) What was the value of the environmental goods and services that were impaired or lost, taking into account the length of the period necessary for their recovery?[508] In the context of this research, the second issue is of most importance. However, the Court's more general considerations and holdings will be elaborated on below as well, as these provide insight into the rationale behind the Court's final judgement.

Before ruling on the two issues presented to it, the Court (re)established several international legal principles that formed the framework within which it intended to reach a decision.

It declared that it is a well-established principle of international law that "*the breach of an engagement involves an obligation to make reparation in an adequate form*".[509] And that, "*[…]Reparation must, as far as possible, wipe out all the consequences of the illegal act and re-establish the situation which would, in all probability, have existed if that act had not been committed.*"[510] It stressed that compensation may be an appropriate form of reparation, particularly in those cases where restitution is materially impossible or unduly burdensome,[511] but that compensation should not have a punitive or exemplary character.[512] It also stated that "*[a]s a general rule, it is for the party which alleges a particular fact in support of its claims to prove the existence of the fact*"[513], however, it added that that Court had already recognized in the past that this general rule may be applied flexibly in certain circumstances, where, for example, the respondent may be in a better position to establish certain facts.[514] It stressed that it is for the Court to decide, on a case by case basis, whether there is a sufficient causal nexus between the wrongful act and the injury suffered,[515] and that the absence of adequate evidence

[506] Adjusted to 2016 prices. Costa Rica v. Nicaragua; Judgement on Compensation, para 70
[507] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 73
[508] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 73. It should be noted that enclosed in this issue lies also the sub-issue "What methodology is appropriate for valuating environmental damage?". Although not explicitly pointed out as an issue in itself; the Court does provide a holding on the matter (see under Holdings).
[509] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 20
[510] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 29
[511] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 31
[512] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 31
[513] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 33
[514] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 33
[515] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 34

as to the extent of material damage will not, in all situations, preclude an award of compensation for that damage.[516]

Having laid out the backdrop of legal principles against which it would form its decision, the Court formulated several holdings pertaining directly or indirectly to the valuation methodologies and valuations presented by the parties.[517]

More generally, the Court held that it is consistent with the principles of international law governing the consequences of internationally wrongful acts, including the principle of full reparation, to hold that compensation is due for damage caused to the environment, in and of itself, in addition to expenses incurred by an injured State as a consequence of such damage.[518] It also established that damage to the environment, and the consequent impairment or loss of the ability of the environment to provide goods and services, is compensable under international law. And, that such compensation may include indemnification for the impairment or loss of environmental goods and services in the period prior to recovery and payment for the restoration of the damaged environment.[519] It furthermore noted, that international law does not prescribe any specific method of valuation for the purpose of compensation for environmental damage and that it is necessary to take into account the specific circumstances and characteristics of each case.[520]

More specifically to the abovementioned two issues at hand, as to the first (namely, could, and, if so, to what extent, each of the various heads of damage claimed by Costa Rica be established and was there a sufficiently direct and certain causal nexus between Nicaragua's wrongful act and the injury suffered by Costa Rica?), the Court held that Costa Rica did not demonstrate that the affected area had lost its ability to mitigate natural hazards or that such services had been impaired. It also held that the evidence presented did not demonstrate that the difference in the quality of soil with which the canals were refilled affected erosion control or posed any loss which Costa Rica might have suffered.[521] It found that, by excavating the two canals, 300 trees were felled and this caused the four other categories of environmental goods and services (i.e.

[516] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 35. In this respect the Court points out the necessity of determining compensation based on "equitable considerations", referring to Ahmadou Sadio Diallo (Republic of Guinea v. Democratic Republic of the Congo), Compensation, Judgment, I.C.J. Reports 2012 (I), p. 337, para. 33), as well as the Trail Smelter case (United States, Canada), 16 April 1938 and 11 March 1941, United Nations, Reports of International Arbitral Awards (RIAA), Vol. III, p. 1920.) In the latter case the Tribunal quoted the Supreme Court of the United States of America in *Story Parchment Company v. Paterson Parchment Paper Company* (United States Reports, 1931, Vol. 282, p. 555), stating: "*Where the tort itself is of such a nature as to preclude the ascertainment of the amount of damages with certainty, it would be a perversion of fundamental principles of justice to deny all relief to the injured person, and thereby relieve the wrongdoer from making any amend for his acts. In such case, while the damages may not be determined by mere speculation or guess, it will be enough if the evidence show the extent of the damages as a matter of just and reasonable inference, although the result be only approximate.*"

[517] For the purposes of this analyses, the concept of a "holding" is defined as those "*portion[s] of the legal opinion that are necessary for the result*" in line with Stinson 2011 who states: "*There is no universal agreement on the definitions for these terms, but most typically "holding" is defined as that portion of a legal opinion that is "necessary to the result."*"

[518] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 41

[519] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 42

[520] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 52

[521] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 74

trees, other raw materials, gas regulation and air quality services, and biodiversity) to be impaired or lost as a direct consequence of Nicaragua's activities.[522]

As to the second issue, (namely, what was the value of the environmental goods and services that were impaired or lost, taking into account the length of the period necessary for their recovery?), the Court found the valuations proposed by the parties unacceptable,[523] as valuation, in its opinion, should be approached from the perspective of the ecosystem as a whole, by adopting an overall assessment of the impairment or loss of environmental goods and services prior to recovery, rather than attributing values to specific categories of environmental goods and services and estimating recovery periods for each of them.[524] It offered three reasons for the appropriateness of this holistic approach: 1) the most significant damage to the area, from which other harms to the environment arose, was the removal of the trees by Nicaragua during the excavation of the canals. In its opinion, only an overall valuation could account for the correlation between the removal of the trees and the harm caused to other environmental goods and services (i.e. other raw materials, gas regulation and air quality services, and biodiversity in terms of habitat and nursery).[525] Secondly, an overall valuation approach was dictated by the specific characteristics of the affected area, namely a wetland protected under the Ramsar Convention. On this matter, it specifically held that wetlands are among the most diverse and productive ecosystems in the world, pointing out that the interaction of the physical, biological and chemical components of a wetland enable it to perform many vital functions, including supporting rich biological diversity, regulating water regimes, and acting as a sink for sediments and pollutants.[526] Thirdly, an overall valuation would allow the Court to take into account the capacity of the damaged area for natural regeneration.[527] Finally, as to the recovery period necessary, it held that a single recovery period could not be established for all of the affected environmental goods and services. Despite the close relationship between these goods and services, the period of time for their return to the pre-damage condition necessarily varied.[528]

In rejecting the valuation methodologies put forward by the parties in favour of an 'overall valuation', the Court argued that it was not persuaded by either methodology because, albeit not "*devoid of relevance to the task at hand*", they were not the only methods in use and that these particular methods are generally used for more than just damage valuation, like cost/benefit analyses.[529] Therefore, the Court reasoned, it would not choose between them or use either one to the exclusion of the other, but instead would 'borrow' from each method where that method offered a reasonable basis for valuation.[530] The Court explained that "*this approach is dictated by two factors: first, international law does not prescribe a specific method of valuation for the purposes of compensation for environmental damage; secondly, it is necessary, in the view of the Court, to take into account the specific circumstances and characteristics of each case*".[531]

[522] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 75
[523] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 76-77
[524] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 78
[525] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 79
[526] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 80
[527] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 81
[528] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 82
[529] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 52
[530] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 52
[531] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 52

The Court reasoned that, because of the criticism raised by Nicaragua about Costa Rica's valuation approach, it had "*doubts regarding the reliability of certain aspects of [Costa Rica's] methodology*".[532] Hence it could not accept the valuation proposed by Costa Rica. It also doubted the 50-year period for recovery proposed by Costa Rica based on the absence of a baseline condition of the totality of the environmental goods and services that existed in the area, as a reference point. Secondly, the Court stated that it observed that "*different components of the ecosystem require different periods of recovery and that it would be incorrect to assign a single recovery time […]*".[533]

Notwithstanding the above, the Court also rejected Nicaragua's proposition to base valuation on "*the amount of money that Costa Rica pays landowners and communities as an incentive to protect habitat under its domestic environmental conservation scheme*", in other words the replacement cost approach, as it found that compensation for environmental damage concerned an entirely different matter.[534] Yet, it did consider Nicaragua's "corrected analysis"; the alternative valuation method proposed by Nicaragua that adopted Costa Rica's ecosystem services approach, but excluded natural hazards mitigation and soil formation/erosion control, and made significant negative adjustments to the other four ecosystem services and goods identified.[535] While the Court considered this corrected analysis, it also held that the analysis underestimated the value of the lost and / or impaired ecosystem goods and services and therefore needed to be readjusted 'upward'.[536] It was critical of the fact that for the head of damage of 'other raw materials (fibre and energy)', the corrected analysis assigned a value based on the assumption that there would be no loss in those goods and services after the first year, even though such an assumption was not supported by any evidence before the Court.[537] Secondly, with respect to biodiversity services (in terms of nursery and habitat), the corrected analysis did "*not sufficiently account for the particular importance of such services in an internationally protected wetland where the biodiversity was described to be of high value by the Secretariat of the Ramsar Convention*".[538] In spite of any natural regrowth, it held it to be unlikely "*to match in the near future the pre-existing richness of biodiversity in the area*". Thirdly, in relation to gas regulation and air quality services, the corrected analysis failed to account for the loss of future annual carbon sequestration ("carbon flows"), as it valued them as a one-time loss.[539]

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[532] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 76

[533] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 76

[534] See *Costa Rica v. Nicaragua*; Judgement on Compensation, para 77, where the Court states: "*Compensation for environmental damage in an internationally protected wetland, however, cannot be based on the general incentives paid to particular individuals or groups to manage a habitat. The prices paid under a scheme such as that employed by Costa Rica are designed to offset the opportunity costs of preserving the environment for those individuals and groups, and are not necessarily appropriate to reflect the value of the goods and services provided by the ecosystem.*"

[535] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 84

[536] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 85

[537] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 85

[538] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 85

[539] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 85; See also Dissenting Opinion of Judge Dugard to the Judgement of Compensation, para 14, where it says: "*[…] the Court said that Payne and Unsworth's corrected analysis had erred by assigning a value to raw materials of US$1,200 (in contrast to Neotrópica's valuation of US$17,877) that was based on the assumption that there would be no loss in those goods and services after the first year; second, its valuation of biodiversity services of US$5,144 (in contrast to Neotrópica's valuation of US$40,730) failed to pay sufficient regard to the importance of such services in an internationally protected wetland and regrowth was unlikely to match, in the near future, the pre-existing richness of diversity in the area;*

Finally, the Court then recalled "*[…] that the absence of certainty as to the extent of damage does not necessarily preclude it from awarding an amount that it considers approximately to reflect the value of the impairment or loss of environmental goods and services*".[540] Taking the corrected analysis, and adjusting it following the criticism uttered by the Court, the Court ended up readjusting the amount of compensation proposed by Nicaragua upwards, settling on "*US$120.000 for the impairment or loss to the environmental goods and services of the impacted area in the period prior to recovery*".[541]

3.3.5 Judgement

The Court awarded Costa Rica $120,000 for the impairment or loss of the environmental goods and services of the impacted area in the period prior to recovery.[542]

As far as compensation for restoration was concerned, it rejected Costa Rica's claim of $54,925.69 for replacement soil, but awarded $2,708.39 for the restoration of the wetland.[543]

3.3.6 Discussion

The *Costa Rica v. Nicaragua* case holds significance for several reasons. Firstly, it was the first time that the ICJ adjudicated a claim for compensation for environmental harm.[544] Secondly, the Court specifically acknowledged the value of wetlands[545], underlining: "*the interaction of the physical, biological and chemical components of a wetland enable it to perform many vital functions, including supporting rich biological diversity, regulating water regimes, and acting as a sink for sediments and pollutants*".[546] Thirdly, the Court acknowledged ecosystem services as compensable damage, holding: *"[…] damage to the environment, and the consequent impairment or loss of the ability of the environment to provide goods and services, is compensable under international law [and] such compensation may include indemnification for the impairment or loss of environmental goods and services in the period prior to recovery and payment for the restoration of the damages environment."*[547] The explicit reference made by the Court to ecosystem services and goods is significant as it potentially covers a broad range of environmental harm.[548] Specifically, the fact that the Court accepted Costa Rica making a claim under the head of damage 'biodiversity in terms of habitat and nursery' allows

third, the "corrected analysis" for gas regulation of US$47,778 (in contrast to Neotrópica's valuation of US$937,509) did not take account of the loss of future carbon sequestration as it had incorrectly valued these services as a one-time loss. The Court made no objections to Payne and Unsworth's corrected valuation of felled trees of US$30,175 (in contrast to Neotrópica's valuation of US$462,490)."

[540] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 86

[541] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 86

[542] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 86

[543] *Costa Rica v. Nicaragua;* Judgement on Compensation, para 87. $2,708.39 is also the amount Costa Rica claimed for the restoration of the wetland, which was protected under the 1971 Convention on Wetlands for International Importance especially as Waterfowl Habitat (Ramsar Convention), see Mohan & Kini 2021, p. 638

[544] *Costa Rica v. Nicaragua*; Judgment on Compensation, para. 41; Harrison 2018, p. 528; Kindji & Faure 2019, p. 6

[545] Kindji & Faure 2019, p. 5-6

[546] Judgment on Compensation, para. 80

[547] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 42

[548] Harrison 2018b, p. 528

a range of claims to be made, including those for 'pure environmental damage'.[549] Of course, the 'overall valuation approach' the Court ended up taking meant that this head of damage ended not being considered individually, but its admissibility, and possibility for use in future environmental law cases, nevertheless stands. Taken together, the above means that in its judgement the Court declared itself competent to hear environmental claims and made clear that an ecosystem services approach to the valuation of damages can henceforth be included by litigators in their claims for environmental damages.

The Judgement of Compensation starts out on a promising note, by (re)establishing several legal principles that together form a framework for arriving at a seemingly balanced assessment of the claim for damages presented. Noteworthy, is the Court's citation of the *Chorzów Factory Case*: "*reparation must, as far as possible, wipe out all the consequences of the illegal act and re-establish the situation which would, in all probability, have existed if that act had not been committed*". Also, the special attention the Court pays to the value of wetlands, the very matter-of-fact way in which it holds that compensation is due for damage caused to the environment in and of *itself*, that damage to the environment, and the consequent impairment or loss of the ability of the environment to provide goods and services, is compensable under international law, but also the reference to the possibility of a reversal of the burden of proof for the establishment of certain facts, all seem to bode well for a claim for ecosystem services protection. However, when considered more carefully, the aforementioned legal presumptions and holdings provide a basis for the establishment of *liability* in a case of ecological damage, but give no real grip when it comes to the *valuation* of the damage inflicted. Liability having been established, the compensation due as a consequence of the liability and the manner in which to arrive at the exact amount of the compensation is left open. On the issue of valuation methodology, the Court only notes that international law does not prescribe any specific method of valuation for the purpose of compensation for environmental damage and that it is necessary to take into account the specific circumstances and characteristics of each case.[550] It refers to the *Diallo* case "*as a way of justifying the potential uncertainties in the valuation of environmental damage […;] a case in which "equitable considerations" were drawn upon to determine the amount of compensation*", and cites the Trail Smelter case: "*[w]here the tort itself is of such a nature as to preclude the ascertainment of the amount of damages with certainty, it would be a perversion of fundamental principles of justice to deny all relief to the injured person" and that, as such, "it will be enough if the evidence show the extent of damages as a matter of just and reasonable inference, although the result be only approximate*".[551] This appears to be the full extent of the valuation framework that the Court is operating with.[552]

[549] Harrison 2018b, p. 528; See the Separate Opinion of Judge Donoghue to the Judgement for Compensation, para 3, where it states: "*Damage to the environment can include not only damage to physical goods, such as plants and minerals, but also to the "services" that they provide to other natural resources (for example, habitat) and to society. Reparation is due for such damage, if established, even though the damaged goods and services were not being treated in a market or otherwise place in economic use. Costa Rica is therefore entitled to seek compensation for "pure" environmental damage, which the Court calls "damage cost to the environment, in and of itself*".

[550] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 52

[551] Rudall 2018, p. 290; *Costa Rica v. Nicaragua*; Judgement on Compensation, para 35

[552] Harrison interprets the Court's remarks on the absence of international legal standards for valuation, the necessity to take into account the specific circumstances and characteristics of each case, and the importance of calculating recovery times for ecosystem goods and services on an individual basis, as the Court wishing to preserve "*as much flexibility in this process as possible*". Furthermore, he remarks: "*Yet, perhaps as a result, the Court's method of dealing with the claims is rather ambiguous*", see Harrison 2018b, p. 529

Taking this into account, the Court's subsequent arbitrary approach to valuation is less surprising, albeit no less disappointing.

After the parties present their valuation methodology and valuations of the harm done, the Court simply states that it finds the valuations proposed by the parties unacceptable.[553] At times, the Court appears to mix up the concepts of 'valuation' and 'valuation methodology', as it names the former as the object of its criticism, but subsequently criticizes the latter in, for example, stating that valuation should be approached from the perspective of the ecosystem as a whole, by adopting an overall assessment of the impairment or loss of environmental goods and services prior to recovery, rather than attributing values to specific categories of environmental goods and services and estimating recovery periods for each of them.[554] The Court is furthermore unpersuaded by the valuation methodologies put forward by the parties, as these are not the only methods in use and are generally used for more than just damage valuation, like cost/benefit analyses.[555] Why this would disqualify the methods proposed altogether is not explained.[556] The Court, however, decides that it will not choose between the proposed valuation methods or use either one to the exclusion of the other, but instead will 'borrow' from each method where that method offers a reasonable basis for valuation.[557] On what basis the Court chooses to borrow certain parts from the methods proposed by the parties and how it applies these to the specific circumstances and characteristics of the case, remains unclear. It rejects Costa Rica's methodology because of Nicaragua's criticism of that methodology. Why it finds Nicaragua's criticism so compelling as to take it on board is not explained. Rather, Nicaragua's criticism is simply repeated by the Court.[558] It questions the 50-year period for recovery proposed by Costa Rica based on the absence of a baseline condition as a reference point, and the fact that "*different components of the ecosystem require different periods of recovery and […]it would be incorrect to assign a single recovery time […]*".[559] It is unclear what the factual basis is for the conclusions that the Court draws, other than that it would appear to take (some of) Nicaragua's argumentation on board. Judge ad hoc Dugard aptly remarks in his dissenting opinion: "*[…] the Court gives no indication of what it considers to be the appropriate recovery period for the goods and services in question. Is it 20 to 30 years as accepted by Nicaragua or 10-20 years for biodiversity and 1-5 years for raw materials and gas regulation as suggested by Nicaragua's expert, Professor Kondolf ? The Court's failure to*

[553] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 76-77
[554] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 78
[555] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 52
[556] See also Rudall 2018, p. 290, who, after listing some of the reasons put forward by the Court for taking an overall valuation approach, states; "*[…] the Court is not clear on why the "overall valuation" methodology serves these aims better than the other methodologies considered. We can only assume the Court deemed those other methodologies to be either over- or under-inclusive.*"
[557] *Costa Rica v. Nicaragua;* Judgement on Compensation, para 52
[558] See *Costa Rica v. Nicaragua* Judgement on Compensation, para 76, where the Court simply suffices with: "*In respect of the valuation proposed by Costa Rica, the Court has doubts regarding the reliability of certain aspects of its methodology, particularly in light of the criticism raised by Nicaragua and its experts in the written pleadings. Costa Rica assumes, for instance, that a 50-year period represents the time necessary for recovery of the ecosystem to the state prior to the damage caused. However, in the first instance, there is no clear evidence before the Court of the baseline condition of the totality of the environmental goods and services that existed in the area concerned prior to Nicaragua's activities.*"
[559] *Costa Rica v. Nicaragua;* Judgement on Compensation, para 76

clarify the recovery period which it considered applicable makes it impossible to assess the impact that this factor had on the Court's valuation."[560]

Notwithstanding the aforementioned, the Court also rejects Nicaragua's valuation approach that bases valuation on information about payments made by Costa Rica to landowners and communities under a PES-scheme, as it finds this to concern an entirely different matter than environmental damage.[561] The Court then declares that it will take on board Nicaragua's "corrected analysis", which consists of a range of negative adjustments to Costa Rica's ecosystem services approach, that, as Kindji & Faure point out, "*resulted in a bewildering decrease of the compensation due*".[562] However, the Court finds that the corrected analysis underestimates the value of the lost and / or impaired ecosystem goods and services and sees fit to adjust it back upwards again.[563] It is unclear why the Court favours Nicaragua's "corrected analysis" over Costa Rica's ecosystem services approach as a point of departure for its own analysis, especially considering it subsequently quite vehemently criticizes the corrected analysis and adjusts it upward. According to the Court, the corrected analysis fails to recognize that the inflicted damage will sustain for longer than just one year, does not take into account the particular importance of wetlands to ecosystem services and goods, nor does it recognize that gas regulation an air quality services cannot be valued as a one-time loss.[564] The Court bases its reasoning as pertains to the value of wetlands on the Ramsar convention. It dismisses Nicaragua's assertion that the longevity of the harm will not exceed one year with the simple reasoning that it is not supported by any evidence presented to it. As regards the impairment or loss of gas regulation and air quality, the courts confines itself to: "*The court does not consider that the impairment or loss of gas regulation and air quality services can be valued as a one-time loss.*"[565] As with its rejections of Costa Rica's valuation approach, the Court gives very little insight into any factual or scientific basis upon which its rationale is founded, giving the impression that it is not operating with a factual basis, but arbitrarily assigning timeframes for recovery.

In his highly critical dissenting opinion, Judge ad hoc Dugard expresses considerable concern about the Court's reliance on the corrected analysis. He points out how the corrected analysis attaches a value to each head of damage in isolation, when the Court previously declared that it would explicitly not take this course, but instead would approach valuation of the ecosystem holistically.[566] He also emphasizes how "*certain elements of the "corrected analysis" cannot legitimately be relied upon by the Court as providing a "reasonable basis" for its own valuations. The methodology for the calculation of timber, for example, relies on an assessment of the volume of timber per hectare in the affected area. Nothing in the record before the Court explains why this method of calculation is used. The value transfer studies on which the "corrected analysis" relies have not been assessed by the Court for their reasonableness.*"[567]

The Court also never attaches a value to the felling of the 300 trees, many of which were over 100 years old. This is strange considering that the Court deemed the felling of the trees to be

[560] Dissenting Opinion of Judge Dugard to the Judgement on Compensation, para 15
[561] *Costa Rica v. Nicaragua;* Judgement on Compensation, para 77
[562] Kindji & Faure 2019, p. 23
[563] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 85
[564] *Costa Rica v. Nicaragua;* Judgement on Compensation, para 85
[565] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 85
[566] Dissenting Opinion of Judge Dugard to the Judgement on Compensation, para 15
[567] Dissenting Opinion of Judge Dugard to the Judgement on Compensation, para 15

"[…] the most significant damage to the area, from which other harms to the environment arise[…]".[568]

For the above reasons (and more) Judge ad hoc Dugard emphatically states that the result was "*a grossly inadequate valuation for environmental damage caused to an internationally protected wetland, having regard to the harm caused*".[569] Interestingly, Judge Donoghue was similarly sceptical of the methodology applied by the Court, even though it led her to an opposite conclusion, namely that the Court overestimated the damages. In Judge Donoghue's opinion, the correct damages figure would be between $70,000 and $75,000.[570]

Noteworthy is also the fact that the Court did not make use of the opportunity, under article 50 of the Statute of the ICJ, to enlist the help of its own experts (e.g. to valuate the damage).[571] All the more so, when considering that in another judgment between Costa Rica and Nicaragua handed down on the very same day, the Court did appoint its own experts.[572] Engaging Court appointed experts who could deliver an impartial opinion on the valuation methodology and final valuation might very well have helped the Court to steer away from an approach whereby it essentially took on board bits and pieces of parties' methodologies in spite of finding those methodologies to be insufficiently convincing in the first place.[573] Through the use of independent, Court appointed experts, it would arguably have been enabled to better form its own opinion on the matters at hand and on the merit of parties' claims. Presumably, it could also have specifically tasked those experts to assess valuation from an "overall" perspective.

For the impairment or loss of environmental goods and services as a result of Nicaragua's activities, Costa Rica claimed $2,880,745.82, comprised of $2,148,820.82 in respect of the 2010 canal; $674,290.92 in respect of the 2013 eastern canal, $57,634.08 for restoration costs (in turn comprised of $54,925.69 for the cost of replacement soil in the 2010 canal and the 2013 eastern canal and $2,708.39 for the restoration of the wetland).[574]

Nicaragua estimated that a replacement cost of between $27,034 and $34,987 was due, based on the figure ($309 per hectare per year) which Costa Rica paid landowners and communities as an incentive to protect habitat under its domestic environmental conservation scheme,[575]

[568] *Costa Rica v. Nicaragua;* Judgement on Compensation, para 79; Dissenting Opinion of Judge Dugard to the Judgement on Compensation, para 16
[569] Dissenting Opinion of Judge Dugard to the Judgement on Compensation, para 18; Harrison 2018b, p. 530
[570] Harrison 2018b, p. 530; Separate Opinion of Judge Donoghue to the Judgement for Compensation, para 31. See Separate Opinion of Judge Donoghue to the Judgement for Compensation, para 32, where it states: "*I agree with the Court that valuation of "pure" environmental damage is inevitably an approximation based on just and reasonable inferences. In the present case, however, the alleged damage is to a small area about which the Court has made extensive inquiries over a period of years. In such circumstances, a survey of the evidence regarding the extent of damage to environmental goods and services would assist the court in ensuring both that the compensation that it awards provides reparation to the applicant and that it does not impose punitive or exemplary damages on the respondent. I consider that the reasoning and the Judgement does not provide a sufficient justification of the level of compensation set by the Court. I have voted in favour of the amount set by the Court, but have done so with some misgivings.*".
[571] Rudall 2018, p. 293
[572] Rudall 2018, p. 293; *Maritime Delimitation in the Caribbean Sea and the Pacific Ocean (Costa Rica v. Nicaragua)*
[573] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 52
[574] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 57
[575] Adjusted to 2017 prices

calculated over a recovery period of 20 to 30 years, and taking into account a 4 per cent discount rate.[576]

The Court "*recalls […] that the absence of certainty as to the extent of damage does not necessarily preclude it from awarding an amount that it considers approximately to reflect the value of the impairment or loss of environmental goods and services*".[577] Taking Nicaragua's corrected analysis, and adjusting it upward following its own criticism, the Court ends up settling on "*US$120.000 for the impairment or loss to the environmental goods and services of the impacted area in the period prior to recovery*".[578] How exactly it arrives at this sum, which is $35,704 higher than the one generated by Nicaragua's corrected analysis which valued the damage at $84,296[579], remains unclear.[580] Kindji & Faure advance that this amount "*basically [compensates] the economic value of the trees removed by Nicaragua*".[581] As to Costa Rica's remaining claims; the Court wholly rejected the cost for replacement soil, but did award compensation for restoration of the wetland at $2,708.39.[582]

It is worth recalling how the Court, in its introductory observations, explicitly steered away from punitive or exemplary damages.[583] In his Separate Opinion, Judge Bhandari notes, however: "*the law of international responsibility ought to be developed to include awards of punitive or exemplary damages in cases where it is proven that a state has caused serious harm to the environment*", albeit nuancing this with the notion that restraint is needed to ensure that damages "*should not be completely disproportionate with respect to the financially assessable impact of a State's environmentally harmful activities*".[584] Judge ad hoc Dugard remarks "*without advocating the imposition of punitive damages, it is possible to take account of the gravity of Nicaragua's conduct in seeking to fully restore Costa Rica to the position which it enjoyed prior to Nicaragua's violation*", while Judge Gevorgian urges caution on the topic of

[576] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 58
[577] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 86
[578] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 86. In his dissenting opinion, Judge ad hoc Dugard remarks in para 7 regarding the $120,000 sum: "*While I would have assessed the amount due at considerably less than the amount claimed by Costa Rica I would have awarded Costa Rica considerably more than that awarded by the Court. In my judgment the sum of US$120,000 constitutes a mere token for substantial harm caused to an internationally protected wetland by the egregious conduct of Nicaragua. In this opinion I will critically examine the methodology employed by the Court in arriving at the sum of US$120,000 and comment on its failure to have regard to equitable considerations, such as the character of the affected terrain, the implications of deforestation for climate change and the conduct of Nicaragua.*", see Dissenting Opinion of Judge Dugard to the Judgement on Compensation, para 7
[579] Payne & Unsworth offered two valuations; one was the 'corrected analysis' at $84,296, and the other was the replacement costs analysis, at $27,034 to $34,987, based on the figure ($309 per hectare per year) which Costa Rica paid landowners and communities as an incentive to protect habitat under its domestic environmental conservation scheme. In its pleadings, Nicaragua put forward the latter. The Court, however, chose to rely on the former.
[580] Dissenting Opinion of Judge Dugard to the Judgement on Compensation, para 20
[581] Kindji & Faure 2019, p. 32
[582] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 87
[583] See *Costa Rica v. Nicaragua*; Judgement on Compensation, para 31, where it reads: "*The Court has held that compensation may be an appropriate form of reparation, particularly in those cases where restitution is materially impossible or unduly burdensome (*Pulp Mills on the River Uruguay (Argentina v. Uruguay), Judgment, I.C.J. Reports 2010 (I)*, pp. 103-104, para. 273). Compensation should not, however, have a punitive or exemplary character."*
[584] Separate Opinion of Judge Bhandari to the Judgement on Compensation, para 18; Harrison 2018b, p. 530

punitive damages as it carries within it the risk "*that states will be scared away from litigation, thereby jeopardising the peaceful settlement of environmental disputes*".[585]

In this regard, Kindji & Faure point to the value of assessing compensation in such a way that it fully incorporates the value of the ecological harm caused as an incentive for states to avoid engaging in internationally wrongful acts, even when compensation is not considered 'punitive' *per se*. In relation to the judgement in *Costa Rica v. Nicaragua*, they conclude aptly: "*[o]ne can seriously doubt whether a compensation amount of$120,000 will have this required deterrent effect*".[586]

Undoubtedly, for all the reasons mentioned at the outset of this discussion, the *Costa Rica v. Nicaragua* case is of great significance. However, considering the fact that this was the first time the ICJ ruled on an environmental claim, it is disappointing to see that the Court, unburdened by precedent, did not seize on the opportunity to formulate an appropriate valuation methodology, thereby setting a standard for future claims.[587] It is also disheartening that the Court, after delivering very insightful holdings as to the possibility of compensation due for damage to the environment in and of itself, failed to provide a monetary assessment of the intrinsic value of the environmental resources under review, let alone have this cemented into a final damage award.[588] All in all, the ICJ cannot be said to have provided guidance for other courts and tribunals on methodological approaches for valuating environmental damage in a court of law, and it appears that the law on this topic is far from settled.[589]

4. Takeaways from the cases under review

At the outset of this chapter, the question was posed which frameworks courts have established for the valuation of pure ecological harm, meaning legal damages for those parts of the natural environment that, by nature, cannot have property rights vested in them.

The chapter started out with a brief description of the legal frameworks (i.e. the law on the books) that govern pure ecological harm. The focus, however, was on the examination and analysis of three cases that figured significant damage to nature in the broadest sense of the word (and so included harm to or loss of elements of nature that are free of property rights). By way of these case law analyses an attempt was made at painting an image of the frameworks courts have developed to assess damages for pure ecological harm.

Before delving into the takeaways from the case law under review, it is important to point out the methodological limitations of this analysis. In this chapter, three cases were reviewed. These cases are internationally recognized as having greatly influenced the landscape of

[585] See Harrison 2018b, p. 530, from whom the abovementioned citations on punitive damages, courtesy of the three Separate Opinions, are borrowed; as well as Separate Opinion of Judge ad hoc Dugard to the Judgement on Compensation, para 46; Separate Opinion of Judge Gevorgian to the Judgement on Compensation, para 9.
[586] Kindji & Faure 2019, p. 33
[587] See also Dissenting Opinion of Judge Dugard to the Judgement on Compensation, para 9
[588] Kindji & Faure 2019, p. 32
[589] See Rudall 2018, p. 288 who states: "*Given the increasing number of cases involving the environment, it is unfortunate that international courts and tribunals will garner only limited guidance from the methodology adopted by the ICJ in valuing environmental damage.*" And, Harrison 2018b, p. 531: "[…,] *the judgement demonstrates that the law on this topic may not be completely settled and there is plenty to argue about in future cases*".

environmental damage valuation. Therefore an in-depth analysis of them, as attempted in this chapter, can certainly render substantive takeaways. However, as a group of just three cases, their empirical representativeness is obviously limited. Therefore, it is important to note that any conclusions drawn below, should be viewed as relating specifically to the cases under review and not as general conclusions applicable to the entire field of environmental damage valuation, nor broader body of related case law.

Below, the takeaways from the three case law analyses are summed up.

From the facts of all three cases under review, we can establish that in all cases pure ecological harm, among other types of (environmental) harm, occurred as a result of the environmentally harmful event that took place. The *Exxon Valdez* oil spill claimed the lives of many animal and plant species; the *Erika* oil spill caused damage to 400 km of coastline and the near wipe out of the *Guillemot de Troïl*; and in the *Costa Rica v. Nicaragua* case, biodiversity in terms of habitat and nursery figured as one of the main heads of damage.

In all three cases, the respective Court expresses in its rationale a thorough awareness of the value of nature either in and of itself (especially in *Erika* and *Costa Rica v. Nicaragua*) or, at the very minimum, the value of nature as it relates to humans who depend on it for their survival (all three cases). In fact, taking into consideration the chronology of the cases under review, a development in the awareness of the value of nature can be observed. Whereas in the Exxon Valdez case law, the focus of the Court is on the use values people retain from nature, in the *Erika* case the Court draws attention to the absolute interdependency between humans and nature, and in the *Costa Rica v. Nicaragua* case biodiversity loss, an example of pure ecological harm, is found to be an admissible head of damage, and furthermore, linkages are drawn between humans' harmful actions and the repercussions this has on nature's equilibrium (i.e. climate change), which in turn affects humans again.

We also observe a tremendous amount of debate between claimants and respondents about valuation methodology, resulting in many (re)considerations of the Courts on this topic. Specifically in the *Exxon Valdez* (*Exxon Shipping Co. v. Baker*) and the *Costa Rica v. Nicaragua* case, the back-and-forth between parties on this matter takes on monumental proportions, followed closely by the debate about the volume of the harm done. The latter being a more classical court thematic centring around burden of proof and rules of evidence. The Courts can be seen to struggle greatly with weighing proposed methodologies. At times, they haphazardly pick and combine bits and pieces from parties' proposed methodologies, departing from what would seem to be a rather basic understanding of economic theory. It would also appear that the Courts are unfamiliar with the state of the art in valuation methodology. This is demonstrated by the fact that in all cases the Courts at times resolutely dismiss legitimate and commonly applied (e.g. in environmental economics, law and economics, and policy making) valuation methods based on faulty reasoning. While parties, aided by economic expertise commissioned, appear fully aware of the state of the art in valuation of environmental and ecological harm, and able to engage in a substantive debate with their counterparts in court, the Courts themselves seem to lag behind in knowledge and ability to follow this debate at the level which evidently is necessary to adjudicate a case of this sort. Moreover, this unfamiliarity with the topic of valuation methodology can make Courts vulnerable to efforts of parties to

confuse and convince, whether those efforts be intentional[590] or unintentional. In *Costa Rica v. Nicaragua*, the two rounds of written proceedings on the matter of valuation methodology alone are enough to leave even an expert on the matter dazed and confused. A lack of substantive knowledge can also make the Court susceptible to taking on board blunt, poorly argued reasoning. In *Costa Rica v. Nicaragua*, for example, the ICJ adopts Nicaragua's argumentation that "*different components of the ecosystem require different periods of recovery and […]it would be incorrect to assign a single recovery time […]*"[591] without any explanation or, as reasonably would be expected, an alternative indication of what it does consider to be an appropriate recovery time.

An analysis of the Courts' rationales, leads me to posit that this faulty reasoning does not stem from an unwillingness to engage with certain valuation methods, but rather from a lack of knowledge of available and commonly used economic tools for valuation. The Courts appear overwhelmed with the technicality of valuation that inherently stretches beyond the scope of legal know-how and comprehension. This results in sequences of decisions based on rationales that can be perceived as fickle. This assessment is directly or indirectly echoed by scholars from the field of environmental economics and environmental law, also as regards the specific cases under review here.[592]

Besides an unfamiliarity with valuation methodology, there also appears to be an unfamiliarity on the part of the Courts with the body of environmental case law that has formed over the years. In an attempt to invoke precedent, we see the parties in the cases under review refer to relevant earlier case law and specifically to valuation methodologies that have already been used in a court setting. For example, in the *Erika* case, claimant party Robin de Bois explicitly suggests that the Court apply the valuation methodology that was used in the *Amoco Cadiz* case and refers to the work of Costanza as a source for valuation data on various ecosystem services. Another claimant party, the council of the department of Vendée, refers to the *Exxon Valdez* case and suggests that the Court make use of a contingent valuation methodology. Likewise, we see in the Memorial of Costa Rica on Compensation and the Reply of Costa Rica on Compensation respectively, references to the *Exxon Valdez* case and the *Erika* case.[593] In its

[590] See Duffield 1997, p. 108, where it says: "*On page 1 of their reply brief, defendants state: "Despite plaintiffs' efforts to conceal this issue, this motion presents no dispute about economic methodology. All the economists agree on methodology. They agree that "revealed preference method" - which derive economic values from data about people's choices - are a proper way to value goods. The dispute is not among economists, but among lawyers. It is a legal dispute about the "goods" the economists should be instructed to value. Should the economists be instructed, as plaintiffs are doing, to value "subsistence activities" or the "subsistence way of life"? Or should they be instructed, as defendants contend and as Order 190 held, to value "lost subsistence harvest"? This is a purely legal issue that the Court must resolve. Indeed, from defendants' point of view it is an issue that the Court has already resolved, in Order 190. (Reply Memorandum June 27, 1994 at 1)" This statement contradicts the facts of the situation. The argument is entirely about economic methodology - the methodology to be used to value subsistence harvests. Defendants recognized that economists agree on using "revealed preference" methods, yet they argued vigorously against the only revealed preference method that all three economic experts proposed and actually applied. […] The defendants skillfully used a series of motions that resulted in a very narrow range of admissible economic methods for valuing lost subsistence use. The evaluation of the economic valuation methodology was a jury question that should have met the same fate as the earlier arguments over the use of Subsistence Division data. Instead, defendants successfully presented this issue as a point of law.*"

[591] *Costa Rica v. Nicaragua*; Judgement on Compensation, para 76

[592] See among others, for example, Mohan & Kini 2021, Kindji & Faure 2019, Harrison 2018b, Duffield 1997, Duffield et al. 2014, Foulon 2019, Rebeyrol 2013

[593] Memorial of Costa Rica on Compensation 3 April 2017, p. 123; Reply of Costa Rica on Compensation 8 August 2017, p. 46

Judgement on Compensation, the Court mentions neither case and so appears to take no heed of this.

Because the Courts in the cases under review do not themselves refer to any of the preceding case law mentioned above, nor entertain the explicit suggestions to do so by parties, the impression is created that they may be unaware of the existing broader body of case law on the matter of ecological damage valuation and the value it may present as a source to draw on. Thus, they unwittingly forego the opportunity to learn from other Courts' past experiences, be they mistakes or triumphs, and to continue to build upon them. Instead, each Court in the cases under review here, dedicates itself to reinventing the wheel. In this regard, it should be mentioned that courts that are less familiar with adjudication of environmental law cases, could, besides earlier case law, also draw on the experience of other courts that hold specific expertise in the area of environmental damage valuation and have developed best practices. The Land and Environment Court in New South Wales (Australia), the Indian National Green Tribunal, the Philippines Supreme Court, just to name a few, can serve as good examples.[594]

In all three cases the importance of availability of pre-harm baseline data comes to the fore. In *Exxon Shipping Co. v. Baker* some baseline data for parts of the affected area were known. This was very helpful as these could be imputed for parts of the affected area for which no data were available.[595] Irrespective of the desirability of the final outcome, having these data available allowed the court to, by a rather simple calculation, arrive at a value of the damage done. In the *Erika* and *Costa Rica v. Nicaragua* judgements, we see the Courts explicitly lament the absence of pre-harm baseline condition data. Three things can be said about this. Firstly, for the (legal) protection and preservation of our environment, it is of the utmost importance that it becomes commonplace to measure and keep track of the state of our planet's ecosystems so that, when necessary, objective data are readily available to the Courts and are not subject to debate and conjecture.[596] In all three cases under review, the affected areas concerned pristine areas with

[594] Pring & Pring 2016, p. 29, 34, 47, 52. For an overview of all environmental court and tribunals worldwide, see Pring & Pring 2016, p. 80-89. The publications of Justice Brian Preston, Chief Judge of the Land and Environment Court in New South Wales, on (the role of courts in) environmental litigation, provide state of the art insight in these matters. See, https://papers.ssrn.com/sol3/cf_dev/AbsByAuth.cfm?per_id=1005507 accessed 1 October 2022

[595] See Duffield 1997, p. 103: "*Using prespill measures of harvest as a baseline and survey results in 1989-1992 allowed claimants to compute a change in subsistence harvest. Because these data were not available for all villages or all years, imputing some harvest loss estimates became necessary.*"

[596] On the importance of the availability of data on baseline conditions in general, see e.g. Wunder 2005, who explains the relevance of baseline data for measuring PES effectiveness and UNDP (no year available) where it states: "*A robust baseline and supporting information are basic requirements for economic valuation of ecosystem services.*" As pertains to the relevance of baseline conditions in the law see e.g. Huguenin et al. 2011, p. 69 who point out how in U.S. laws the baseline condition is the point of departure to establish primary and compensatory restoration measures; as well as Foulon 2019, p. 310 who explains that the French Biodiversity Law, now transposed in the French Code Civil, departs from the idea that "*t]he principal remedy must be the restoration of the environment to its baseline condition*". Expectedly, in-court damage estimations will revolve around considerations of the cost of returning the environment to baseline condition. As regards the baseline condition as a concept used in in-court and out of court legal proceedings see, among others, Duffield 1997, p.103, who explains how the availability of data on baseline conditions allowed the Native Alaskan claimants in *Exxon Shipping Co. v Baker* to compute a change in subsistence harvest. This in turn aided the formulation of their claim for damages. Mohan & Kini 2021 state that *"[t]o quantify the injuries, the trustees compared the injured resources and services with baseline conditions—that is, the condition that would have existed if the Deepwater Horizon incident had not occurred.*" They also address the ICJs rejection of Costa Rica's assessment of a fifty-year recovery period, in the absence of a known baseline condition. See also Olszynski 2005, p. 19, who matter-of-factly states *"[…]there are nevertheless several factors for the court to consider before adopting restoration. These include determining the*

complex ecosystems that were directly responsible for the sustenance and sustainability of (human) life in that area. As a matter of fact, in the *Costa Rica v. Nicaragua* case, the cutting down of the 300 trees was directly linked to lost carbon sequestration, the contributory effect of that on climate change, and consequences this entails for all human beings, not just those who happen to live in and around the affected area. It is striking to see that for these areas so little data was available, making what exactly was lost, and this is particularly the case for those parts of nature that were harmed that cannot and do not have property rights vested in them, anyone's guess. Moreover, this absence of data in the court room poses a difficulty in understanding on what basis courts reach a final judgement on valuation. Secondly, until we achieve the aforementioned, it is important that courts are aware of the fact that benefit value transfer methods have been long tried and tested and are widely used and considered acceptable (in e.g. environmental economics, law and economics, and policy making).[597] In the absence of a baseline condition it is therefore unreasonable for a court to close the door on benefit value transfer methodologies altogether (as was done in *Erika* and *Costa Rica v. Nicaragua*). Instead, in the absence of data on baseline conditions, courts could take a page from environmental economists and policy makers, and apply these methods themselves. Or rather, allow parties to apply them for the formulation of their claim, or task court-appointed experts with this. Finally, a more general observation is that the combination of notions that 1. courts can only value damages if a baseline condition is known, 2. baseline conditions are only very rarely known, 3. we are doing very little to measure and thereby extensively catalogue baseline conditions, and that 4. in the absence of a baseline condition a benefits value transfer approach is per definition not acceptable, creates a legal paralysis when it comes to valuating and assigning environmental damages in a court of law.

Another matter that stands out about the three cases is a practically exclusive anthropocentric view of damages. In the Exxon Valdez case law we see damages being claimed and awarded for harm to nature, solely in as far as nature is of some type of use to humans (i.e. marine natural resources for sustenance or commercial use). Only in the settlement agreement between the U.S. and Alaska governments did pure ecological harm play a role (e.g. the loss of sea otters, waterfowl, marine microorganisms, etc). As already pointed out above, it remains unclear how big of a role it played. What is certain, is that it did not play as big a role as to render it a separate

baseline to which resources are to be restored". As well as Mendes et al. 2022, p. 7, who, when addressing the ICJs approach to the *Costa Rica v. Nicaragua* state: "*The absence of a baseline makes it difficult to assess whether the reparation of the environmental damage was in full, considering all the ecosystem goods and services that the ecosystem provided before the damage occurred. This suggests that there is a need for a legal definition of 'restoration', which directs the judges to consider the baseline and the objectives pursued by the restoration actions (reference conditions).*" However, compare the aforementioned to Bertenthal 2021 who cautions *"[…] that the baseline is not a predetermined, objective standard, but instead is the subject of intense contestation and manipulation as people endeavor to manage systemic variability and produce particular forms of desirable environments. The case study described here [read: Owens Valley, California) provides an important opportunity to understand how baselines come to be and how the emplacement of baselines along different scales can sway both efforts to map environmental settings and regulatory efforts to control those settings.*" She also cites Dr. Joseph Lyou, President of Communities for a Better Environment, who explains: *"[If I could fix any single environmental enforcement regulation or policy] I would change the consideration of CEQA [California Environmental Quality Act] baselines. . . [because] if you go into a contaminated community—an environmental justice community—that contamination is considered baseline, and I don't think it should be.*"

[597] See e.g. Costanza et al. 1997, Costanza et al. 2014; Robertson & Wunder 2005. The TEEB valuation database (which has meanwhile been succeeded by ESDV) makes use of benefit transfer, see e.g. TEEB 2010; Van der Ploeg et al. 2010. See also Liu et al. 2010; Huguenin 2011; and De Groot et al. 2012. For comparison, see Simpson 2011, who entertains some of the criticisms from fellow economists that Costanza's benefit transfer approach has received over the years.

head of damages within the broader settlement agreement. In the *Erika* case, in spite of the Court's insistence on the existence and significance of pure ecological harm, the final criteria that the Court formulates in order to determine damages are completely anthropocentric in nature. The criteria look to categories of legal persons (e.g. communities, local authorities, and associations) who, by way of their historically continual use of nature, qualify for damages for lost use. When it comes to assigning damages, the already established pure ecological harm, the importance of which the court so explicitly emphasized in its judgement, is set aside completely. And, finally, in the *Costa Rica v. Nicaragua* case, all but one head of damage (i.e. biodiversity loss in terms of habitat and nursery) concern the use value that humans retain from nature. Even the 100+ year-old felled trees are, in the end, valued only for their market price and not for any intrinsic value they possess, nor the value they present as part of the local ecosystem. And, as far as biodiversity in terms of habitat and nursery is concerned, the one head of damage that would allow the assignment of damages for pure ecological harm; it gets lost in the courts 'overall valuation' approach to damages. It appears that, when it comes down to it, the Courts in the cases under review talked a good game (particularly so in *Erika* and *Costa Rica v. Nicaragua*), but they allowed and sometimes actively caused pure ecological harm to get lost in the fray.[598]

Another notable matter concerns the fact that only in two cases was there an estimate of pure ecological harm available (i.e. the report by Carson et al. for the purpose of the settlement agreement between the U.S. and Alaska governments with Exxon corp, and the Neotrópica report for the purpose of the *Costa Rica v. Nicaragua* case). In the settlement agreement following the *Exxon Valdez* oil spill, the total amount settled for *all* categories of damages (including for pure ecological harm) pales in comparison to the expert estimations of the pure ecological loss suffered alone (see Table 2, below). Neither in the commercial fishermen case, nor in the Native Alaskan case pure ecological damages were claimed, even though, particularly in the latter, such a claim could be imaginable. In *Costa Rica v. Nicaragua*, even though an estimate was available, it is impossible to track if (and if so, in how far) the Court awarded damages for pure ecological harm, due to the Courts 'overall valuation approach'. Considering the numbers that are available on the overall claim for loss or impaired ecosystem services, it can be clearly ascertained that damages awarded were a mere fraction of damages claimed. In the *Erika* case, no estimates for pure ecological damage were available, yet it was awarded. Even in the absence of an estimate, €4.3 million for pure ecological damages seems very low considering the €1 billion overall damages estimate and the factual damage done (i.e. the near wipe out of certain sea birds and the destruction of 400 km of coastline). This further confirms the notion that pure ecological loss gets lost in the fray; either because it is not estimated or claimed to begin with, or because it is not acknowledged through a reasonably justifiable amount of damages awarded or settled. The fact that pure ecological harm estimates are rarely available also means that we cannot pin down more derivative, but informative numbers, such as those on how the pure ecological damages estimate relate to the total damages awarded or to the pure ecological damages awarded (see columns F and G).

[598] Once again, it should be emphasized that there are specialized environmental courts that demonstrate a much more positive track record.

Table 2 Claimed/estimated and awarded damages

n/a = not applicable; u/k: unknown; ES: ecosystem services and goods

Case	A: Total damages estimated/ claimed	B: Pure ecological damages estimated/claimed	C: Total amount of damages awarded/settled ('s')	D: Pure ecological damages awarded	E: Total damages awarded versus claimed (C as a % of A)[599]	F: Total damages awarded versus estimated pure ecological damage(C as a % of B)	G: Pure ecological damages awarded versus estimated (D as a % of B)
Exxon Valdez; settlement agreement	$3-5 billion	At least $2,8 billion	$1,025 billion (s)	u/k	34 % - 20,5%	37%	u/k
Exxon Shipping Co. v. Baker; commercial fishermen's claim	$895 million	n/a	$286.8 million	n/a	32%	n/a	n/a
Exxon Shipping Co. v. Baker; Native Alaskan's claim	$211 million - $1,336 billion*	n/a	$20 million (s)	n/a	10% - 1,5%	n/a	n/a
Erika	€1 billion**	u/k	+/- €347 million***	€4,3 million	34,7%	u/k	u/k
Costa Rica v. Nicaragua	$6,711 million	$1,613.52; ($2,880,745.82 for all ES combined)	$378,890.59	u/k, ($120,000 for impairment/loss of ES)	6%	u/k, (13% for impairment/loss of ES)	u/k, (4 % for impairment/loss of ES)

* These numbers are constructed based on the lowest and highest estimates of Duffield and Lind ($24 million + $187 million; $44 million + $1 billion). They do not take into account owed damages for pain and suffering based on value-per-statistical-life, which tends to be three to four times greater than the present value of expected future disposable income.

** The *Erika* case is not a class action, where one amount of damages is claimed on behalf of a group of claimants. It is characterized by an enormous amount of individual claimants that each presented individual monetary claims under various headings. Therefore, there is no single claims number available from the text of the judgement. However,

[599] Percentages in columns E and F are rounded upward or downward.

the combined claims of civil parties in the *Erika* case added up to €1 billion.[600] Research conducted by Cabinet Mazars et Guérard (2001)[601] also estimated the total economic damages to be at €1 billion.

*** €143 million under the CLC Convention and through the IOPC Funds + €203.8 million awarded by the Cour de Cassation. The latter number was composed of €165.4 million for material damages, €34.1 million for moral damages, and €4.3 million for pure environmental damage. The latter number consists of various individual sums awarded to individual civil parties.

[600] See https://www.reuters.com/article/environment-france-tanker-trial-dc-idUSPAB00375220080116 accessed 12 August 2021

[601] Irretrievable online, but referenced in other sources. See, for example Hay & Thébaud 2006, p. 305 and https://www.lemonde.fr/planete/article/2019/12/12/il-y-a-vingt-ans-le-naufrage-du-petrolier-erika-provoquait-la-catastrophe_6022671_3244.html accessed 11 August 2021

Another observation that can be made is that the time caps that the Courts placed on the duration of the environmental damage after the harmful event has occurred were unrealistic. In *Exxon Shipping Co. v. Baker*, the Court estimated the damage to last three years after the oil spill. Today, we know that 30 years after the fact the affected area was still recovering from the damage caused by the oil spill. In fact, certain species have not recovered altogether and are not expected to recover in the future. In the *Erika* case, damage assignments happened so haphazardly, that duration of the damage appears to not have been taken into consideration at all. In *Costa Rica v. Nicaragua*, the Court was critical of time caps asserted by Costa Rica, but gave no indication of what it considered a reasonable recovery time. An expected duration of the damage appears not to have played a role in the final compensation awarded.

5. Conclusion

Taken together, the cases under examination demonstrate the strides that have been made so far and give indications as to focal points for future developments in the area of pure ecological harm.

Returning to the above question 'which frameworks have courts established for the valuation of pure ecological harm, meaning legal damages for those parts of the natural environment that, by nature, cannot have property rights vested in them?', in the case law under examination, the Courts did not rely on a specific framework for the valuation of pure ecological harm. That is not to say that there were no frameworks available. For example, CERCLA, OPA and the Clean Water Act were already around at the time the *Exxon Valdez* oil spill became subject of the settlement agreement between the United States federal government and Alaska State government, and *Exxon Shipping co. v Baker* was filed. By the time the *Erika* and *Costa Rica v. Nicaragua* cases were brought, more frameworks were available, like the IOPC, as well as valuation frameworks developed in the field of policy and economics. Even though those (legal) frameworks were around, the Courts in the cases under review were found not to apply any specific framework in-court. Certainly, they did not tackle the issue of pure ecological harm in the way that they tackled in-court establishment and assignment of more classical heads of damages such as pure economic damages. In that sense, one could say that, in the case law reviewed, the Courts did not establish a framework for the valuation of pure ecological harm.[602]

In the absence of such a framework, the Courts appeared to make issues of pure ecological harm, which in essence concern ecocentric matters, anthropocentric. By reframing the pure ecological harm suffered (think of the damage assessment criteria the Court developed in *Erika*), or by rejecting non-economic parts of the harm suffered (in *Exxon Shipping Co. v. Baker*'s Native Alaskan's claim), the Courts effectively reshaped the claims into (anthropocentric) terms they found more workable. However, instead of adapting the claim to the court, it may be preferable for the court to adapt to the types of claims it is likely to receive.

Going forward, we may reasonably expect more and more environmental case law to occur that figures pure ecological harm. A recent judgement, *Democratic Republic of Congo v. Uganda*,

[602] Besides the existing legal frameworks as mentioned above, it should also be noted that there are concerted efforts ongoing to create frameworks for the better adjudication of environmental cases in general. See Pring & Pring 2016.

once again required the ICJ to engage in damage valuation of natural resources.[603] This would appear to confirm the unavoidability of the ushering in of a new era in which courts will time and again be tasked with the difficult job of ecological damage valuation.

Considering the above findings, the question becomes relevant of whether we should continue to value nature only for the use value it presents for humans, or also for the value it has in and of itself. From the case law under review, it would appear that there is a willingness and interest among the judiciary to move toward the latter.

It is reassuring to read in the Courts' rationales and (separate) opinions, a deeply felt willingness to push the envelope on pure ecological harm toward a more ecocentric approach. However, as seen above, this willingness needs to be met with knowledge and skilfulness in order for it to produce effective results. A provocative question to ask is: May we reasonably expect courts to be knowledgeable and skilful on these matters? After all, the economic methodology applied in the cases under review presupposes a somewhat thorough understanding of economics and valuation methodology. Therefore, it is not unreasonable to posit that, under the current circumstances, we might be asking too much from judges, who are legal thinkers first; not economists or experts on valuation methodology. At the same time, we cannot get around the fact that, necessarily, it is judges who finally determine damages for pure ecological harm in a court of law. Rather than just critically assess adjudication in cases of pure ecological harm, it might be useful to consider how the matter of pure ecological harm can be made more tangible for judges.

Looking at the three cases under examination here, several ideas spring to mind. These ideas should be read keeping in mind that a lot is already happening and continues to happen in the field of pure ecological damage valuation and that this thematic figures into a broader (environmental) debate. The ideas described below are just ideas that come to mind when examining the three cases under review, here. They have not been further analysed nor will they be further developed in this thesis. I therefore take for granted that they are incompletely formulated and imperfect.

Firstly, it would appear useful for courts to more readily make use of independent, court appointed experts on environmental valuation (methodology), to avoid the risk of getting get caught up in the tug of war between parties, and lost in translation of economic theorems to legal frameworks. As to the latter, the role of economic rhetoric may not be underestimated; court appointed experts could perhaps more clearly communicate, in terms that the court understands, complex methodologies as proposed by parties.[604]

[603] *Case Concerning Armed Activities on the Territory of the Congo*, Judgment, 9 February 2022

[604] Duffield 1997, p 99 and 109-110, makes this point in reference to the Native Alaskans' claim in *Exxon Shipping Co. v. Baker*, stating: "*In a review of several cases, Cummings (1991) concludes that frequently the courts uncritically accept and inappropriately apply economic paradigms. Certainly the court environment is more demanding in terms of whether a given method seems reasonable and is readily communicated […] This case may serve as a warning to practitioners that groundwork needs to be done to communicate to the rest of the world what economists are doing. The court's decisions were consistent with the narrow folk definition of economics as the realm of markets and commodity exchange. […] This case also illustrates the importance of economic rhetoric. While the plaintiffs won the first round in terms of having a claim under Oppen, the defendants successfully labeled some claims as "non-economic," repackaged their economics, changed experts, and won the second round on economic methods.*"

Secondly, it may be useful to look into the possibility of developing a legal 'toolkit' of sorts, specifically for environmental damage valuation, that provides general rules/best practices on valuation methodology that aid in determining admissibility, interpretation, and application in court. Much like rules of evidence that determine, among others, how evidence may be collected, what evidence is admitted or excluded in court, and relevance. The legal frameworks described at the outset of the chapter could possibly provide a good point of departure for this, as they already prescribe specific valuation methods and, in their accompanying guidelines, give guidance on how these need to be interpreted and applied in practise. However, one could also look toward the EU Forum of Judges for the Environment's BIOVAL project as a starting point.[605] The development of such a toolkit could perhaps aid in having environmental damage valuation slowly but surely become part and parcel of courts' judicial arsenal. It speaks for itself that erecting and implementing a toolkit of sorts would require professional training of judges on the use of it by experts from the field (e.g. environmental economists, policy makers, but importantly, also judges who already have experience in this field).[606]

It seems that it is inevitable that the assignment of pure ecological damages will continue to play a major role in our courts. It is therefore of the utmost importance that courts are well informed of the state of the art and skilful in dealing with matters pertaining to environmental damage valuation. If courts are less informed and proficient in matters of valuation than the parties that appear before them, they may risk becoming a plaything for those parties and may jeopardize the quality of their judgements. If they, however, are informed and equipped with the necessary skillset, they will be able to deliver clear and sound judgments that can provide guidance for the future development of environmental damage valuation.[607]

In this chapter, it has been established that, in the cases under review, the Courts continually applied anthropocentric conceptualizations of harm and damages. It appears that the concept of pure ecological harm is not yet part of the judiciary's vernacular or common understanding. The next chapter shall explore the tenableness of the standardly applied anthropocentric approach to the concept of harm (as a precursor to damages). This shall be done through a substantive examination of the concept of harm *sec*, at a more fundamental, normative philosophical level. The aim is to assess the tenableness of the current application of a virtually purely anthropocentric approach to harm and damages, and to answer the question: Can pure ecological harm be fit into our existing legal framework?

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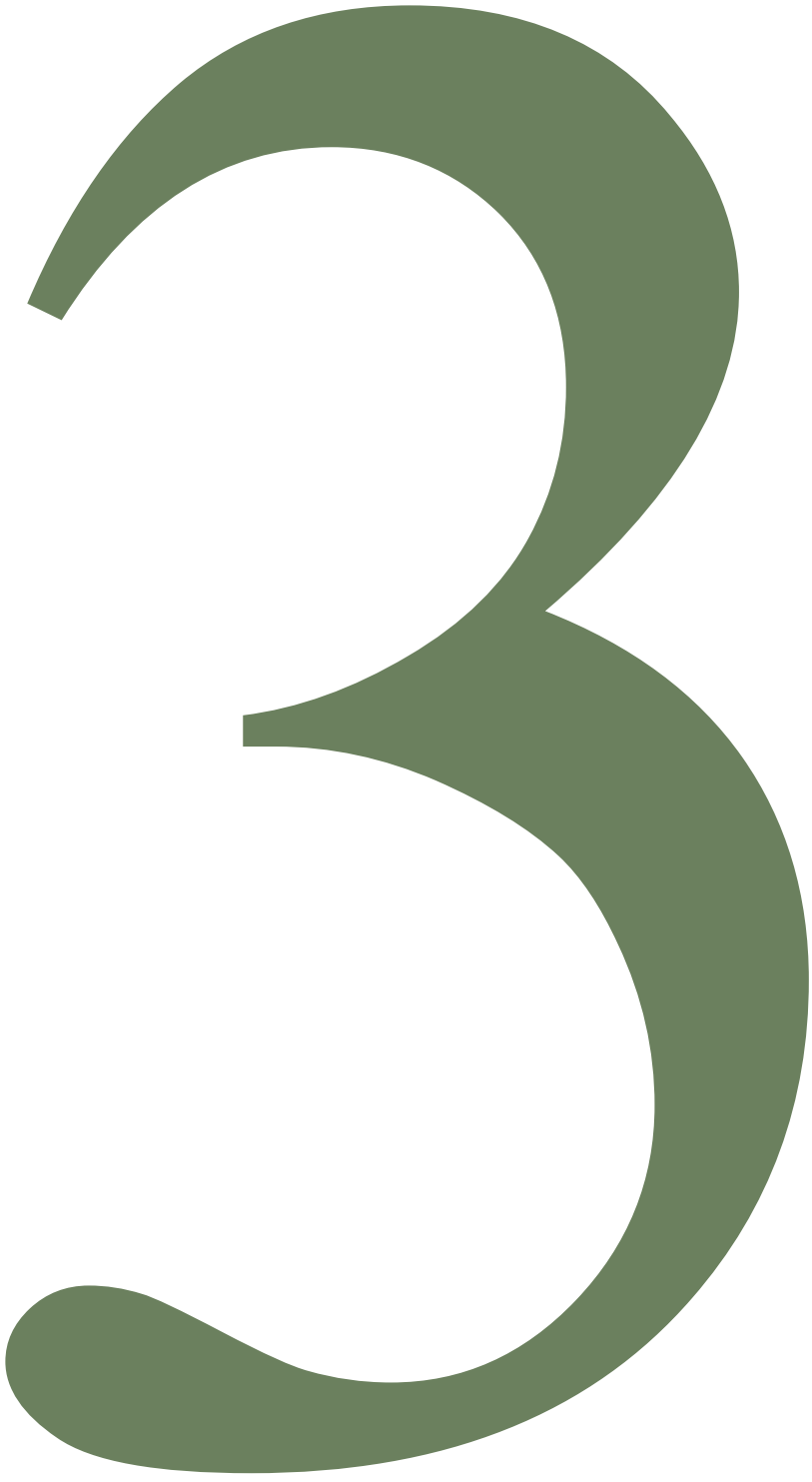
[605] https://www.eufje.org/index.php?option=com_content&view=article&id=40&Itemid=228&lang=en accessed 29 January 2023; https://www.eufje.org/index.php?option=com_content&view=article&id=66&Itemid=257&lang=en accessed 29 January 2023

[606] This need for training is echoed by Pring & Pring 2016, p. 57, as well as Preston 2014. Also in this regard, the expertise that already lies with specialized courts could be of great value. Once again, the Land and Environment Court of New South Wales, the Indian National Green Tribunal and the Philippines Supreme Court come to mind.

[607] Several jurists and scholars have pointed out the importance of the ICJ taking on a more guiding role in the matter of environmental damage valuation. See, for example, the Dissenting Opinion of Judge Dugard to *Costa Rica v. Nicaragua* Judgement on Compensation, para 9. But also, Rudall 2018, p. 288 who states: "*Given the increasing number of cases involving the environment, it is unfortunate that international courts and tribunals will garner only limited guidance from the methodology adopted by the ICJ in valuing environmental damage.*" And, Harrison 2018b, p. 531. Who states: "[…,] *the judgement demonstrates that the law on this topic may not be completely settled and there is plenty to argue about in future cases*". As well as, Kindji & Faure 2019; Mohan & Kini 2021, and Harrison 2022.



Chapter 3

Normative reflections on the concept of (ecological) harm

1. Introduction

The concept of harm and the translation of harm suffered to a monetary value is part and parcel of judges' day to day practice. Whether it is the harm of having a car stolen that is expressed in the blue book value of the vehicle or more egregious things, such as the loss of someone's right arm, judges are regularly confronted with the task of assigning damages for harm suffered.[608] Harms to nature, and particularly pure ecological harms, as demonstrated by the previous chapter, still pose a significant challenge as they often concern harms that are difficult to readily quantify in economic terms. The difficulty of quantifying nonmaterial harm is, of course, a problem that is not limited to environmental harms. Over the years, an evolution on the topic of damage valuation for non-pecuniary losses has taken place in various countries, allowing this field of law to develop further.[609] In fact, the law expressly provides ways of dealing with certain instances of nonmaterial harm, such as non-pecuniary loss, threat or risk of immaterial harm, personal injury, trespass. Nevertheless, where it comes to harm to nature, there are still some challenges left. And, however difficult (or even immoral) the question of monetary valuation of pure ecological harm may seem, for the practice of law, it is one we cannot avoid.

The case law analysis provided in the last chapter demonstrated that judges often end up "anthropocentrizing" ecocentric harms in order to fit them into existing legal frameworks. This causes courts to lose sight of part of the totality of the harm that is suffered, specifically the pure ecological part of the harm. This in turn leads to there being no damage assignment for pure ecological harm or to damage assignments that are significantly lower than those assessed by experts (and claimed by parties). Having established that judges appear to have a rather traditional legal view of environmental harm, meaning they can valuate trees as timber and salmon as human food, but not as having intrinsic or other types of value, this gives cause to delve deeper into the tenableness of the legal concept of harm itself. This chapter will be dedicated to the concept of "harm" in relation to nature and/or ecosystems. For an analysis of the concept of harm, input will be sought from legal and normative philosophy. The reason being that in order to re-evaluate the law (i.e. the legal notion of harm), one must look at more fundamental considerations of the law. These cannot be found in the law itself, but rather in the philosophy that grounds the law and in 'proto-legal' normative considerations about what we consider right and wrong, harmful and harmless. The aim is to uncover whether it is possible, counter to the impressions left by the case law examination in the previous chapter, to fit pure ecological harm into our existing legal framework. And, if so, how.

[608] In the case of non-pecuniary losses, the task of damage valuation remains a difficult one as it concerns "*losses which are not damage to a person's assets or wealth or income and which are therefore incapable of being quantified in objective financial manner by reference to a market*", see Rogers 2001, p. 246. Tort law, however, generally recognizes non-pecuniary losses to some extent as losses that should be compensated by money. See Lindenbergh & Van Kippersluis 2009, p. 215 Over the years, an evolution on the topic of damage valuation for non-pecuniary losses has taken place in various countries, allowing this field of law to develop further. Without being comprehensive, see for example Fraser 1984; Ott & Schäfer 1986 and 1990; Szöllösy 1994; Faure 2000; Rogers 2001; Lindenbergh & Van Kippersluis 2009; Palmer 2015; Knetsch 2022

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2. Methodology

In this chapter, the legal concept of harm will be examined at a deeper level by juxtaposing it with a more basic normative philosophical concept of harm. For the avoidance of doubt, I wish to acknowledge that our laws, naturally, comprise a normative framework in themselves, but that in this chapter, I wish to distinguish this legal normative framework (i.e. our laws) from the more basic normative philosophical framework (i.e. our ethics) that determines what we as humans find to be "right" and "wrong" and that grounds any laws we create for ourselves.

For this analysis, I will draw on our current civil law concept of harm[610] and the work of Immanuel Kant on the topic of harm, grounded particularly in his *Doctrine of Right*, which forms the first part of The Metaphysics of Morals.[611] The choice for Kant as a resource, supplemented by some works of contemporary Kantian philosophers,[612] is founded on the general acceptance among jurists of Kant's *Doctrine of Right* as offering a plausible normative philosophical explanation of our legal system.[613]

Before proceeding, three things should be noted. Firstly, an analysis of the topic of harm can be approached from many different angles. Likewise, reference could be made to other philosophers and their work for an analysis of this subject matter. Specifically, it is clear that philosophers from the utilitarian school, such as Bentham, Locke, and Smith, more directly offer solutions on how to practically economically valuate ecological harms. However, the choice for Kant is made because this chapter aims to primarily address the (more philosophical) concept of harm *sec*; rather than how to practically assign a monetary value to ecological harms. The latter topic, and the relevant economic theorems, shall be addressed in Chapter 4. And so, for the purposes of this research, and for the reasons mentioned above, the choice is made to limit the analysis to the work of Immanuel Kant. Secondly, Kantian moral philosophy is generally "*considered inimical both to the moral claims and to the legal rights of non-human*

[610] The concept of harm as found in the law of civil law countries is largely grounded in the French Code Civil of 1804. In this chapter, the civil law concept of harm will, at times, be supplemented with a reference to common law approaches to harm.

[611] Kant's Doctrine of Right (or *Rechtslehre*), which forms the first part of The Metaphysics of Morals. Kant's work exists in many different editions and translations. When citing and referencing Kant's *The Metaphysics of Morals*, reference shall be made to both Mary Gregor's 1991 and 1996 Cambridge University Press translations as provided respectively in *Texts in German Philosophy* and *Practical Philosophy*. The latter translation is generally referenced as a co-authorship of Kant and Gregor. In this chapter, this custom shall be followed and both works shall therefore be refenced as Kant & Gregor 1991 or Kant & Gregor 1996. Because several citations of the 1996 work were found through the work of Arthur Ripstein, the latter's accompanying explanation should be added: "*Because the work exists in so many different editions and translations, and even the Gregor translation in multiple editions and paginations, all references are to the Prussian Academy pagination appearing in the margins. References to the Doctrine of Right are by academy pagination only; others works included in the Practical Philosophy volume are by title and academy pagination.*" See Ripstein 2009, p. 2. The reason for using two translations of the same work lies in the fact that relevant citations were found through various secondary sources (mainly Ripstein 2009 and Wright 1997) who reference both works. When citing and referencing Kant's *Foundations of the Metaphysics of Morals*, Lewis W. Beck's 1959 translation is used, referenced as Kant & Beck, 1959. Because many of the citations were found through secondary sources, where useful, a citation can be referenced by indicating the secondary source through which the citation was found, accompanied by a reference to Kant's original work as translated by Gregor or Beck.

[612] Mainly Korsgaard 2011, 2012, 2013, 2018, 2018a, 2020; Tadros 2011; and Julius 2006

[613] See, for example, Wright 1997, p. 159, where it states: "*The two principal monistic theories of law are the utilitarian efficiency theory and the Kantian-Aristotelian theory of right or justice, based on the foundational norm of equal individual freedom, which asserts that the purpose of tort law is and should be just compensation and deterrence. It is clear that the equal freedom theory, rather than the utilitarian efficiency theory, provides the foundation for morality and law in general and for tort law in particular.*"

animals".[614] Kant is known for considering animals "mere means" and "instruments" there to be used by humans.[615] An exercise in ecocentric approaches to harm, based on Kantian moral philosophy, therefore, intuitively seems far-fetched. However, the purpose of this exercise is not to prove that Kant cared about animals and nature after all, or, alternatively, to prove that if Kant time travelled to the 21st century he would be an ecologist, but rather to see whether an ecocentric approach fits, in principle, into the ideas that lie at the core of Kantian moral philosophy. Lastly, other ethical debates, e.g. on rights of nature or on the permissibility of humans harming nature and / or eating other species, are not considered here.

In sum, the below analysis aims at pinpointing the source of the tendency for our civil law concept of harm to seemingly automatically equal anthropocentric harm, as well as testing this concept's tenableness.

3. Terminology

This chapter revolves around the topic of harm. The term 'harm' can be used interchangeably with 'damage' or 'injury' under the law.[616] In this chapter, however, preference is given to usage of the term 'harm' instead of the terms 'injury' and 'damage' for two reasons: firstly, in the normative philosophical literature the term 'harm' is commonplace. Using the term 'damage' or 'injury' for the legal analysis and the term 'harm' for the normative philosophical analysis would wrongly imply that it concerns different matters taking place in different sites (i.e. the legal realm versus the moral realm), which in turn could wrongly imply something about the (un)enforceability of the notion of harm. After all, the legal notion of harm is directly based on our normative considerations of harm. Secondly, the term 'harm' poses a greater contrast with the term 'damages' (i.e. the remedy for the harm/damage suffered) than does the term 'damage'. For the sake of the clarity of the argument made, it is important to emphasize the focus on harm as an obligation-creating criterion in the law and not to confuse it with the obligation that is created, e.g. the damages to be paid.

4. The significance of harm

In everyday life, people unavoidably interact constantly with each other and with their environment in ways that are morally and/or legally significant. Sometimes we interact with the aim to bring about certain (legal) effects, sometimes we more or less accidentally create (legal) effects. In these interactions, intentionally or unintentionally, harm can be caused. Our laws aim at the prevention of harm by prescribing obligations for each of us to act or to omit. They create enforceable obligations, in contrast to unenforceable, moral obligations. If harm occurs, whether it be as the consequence of the breach of a contractual obligation or a tort, the law prescribes solutions, again in the form of obligations to act or omit, to cure the harm done.[617]

[614] See Korsgaard 2012, p. 1-2
[615] See Korsgaard 2012, p. 1-2
[616] In U.S. parlance the term "injury" refers to the harm or damage done, it is less frequently used in continental legal contexts.
[617] For the avoidance of doubt, this chapter is focused on the concept of civil harm in environmental liability. It will deal primarily with tortious harm, as the cases under review in the precious chapter were also examined from a tort law perspective.

In this way, our laws provide a framework that enables people to interact with one another. The legal prescriptions to avoid harm and to cure harm when it occurs are central to all our legally salient interactions and ultimately enable us to live together.

5. A civil law conception of harm

Below, the civil law[618] notion of harm shall be expounded on. For this purpose, both sources that address this concept from a common law and a civil law legal tradition are considered in order to create a general idea of the legal notion of harm. Collecting and mixing perspectives from the two legal traditions to create a general idea is inappropriate for the analysis of specific cases; depending on the jurisdiction, specific cases need to be analysed in line with the prevailing legal tradition. This chapter, however, deals with the "idea of harm" and is therefore served well with a wider casting of the net in terms of the notions of harm that exist in our legal system and across legal traditions.

5.1. Interaction and the role of harm

Roughly phrased, under civil law, legally salient interactions can be divided up into two categories; those that are lawful and those that are unlawful.[619] Lawful interactions entail the performance of our obligations under the law and do not stand in need of correction. Unlawful interactions entail the non- or faulty performance of our legal obligations, triggering obligations to repair the harm thus done. For example, the non-performance of a contractual obligation can trigger the obligation to pay a penalty. Likewise, the tort of libel can trigger an obligation to publish a rectification statement.[620]

Whether an interaction is unlawful is assessed using a cumulative legal test. For example, in Dutch tort law, this test determines whether: 1) an unlawful act has taken place; 2) this act can be attributed to the perpetrator; 3) it has caused harm; 4) there is causality between the act and the harm; 5) the relativity requirement has been met.[621] Variations of this test can be found across civil law countries, with harm always a constitutive component.[622]

Compare this to Birks, who describes the main elements of civil and/or tort wrongs in the Anglo-Saxon tradition as a breach of a legal duty consisting of: harm to a victim caused by

[618] The term "civil law" is generally used in this chapter to indicate the law of civil or private rights. Only in two instances does it refer to the continental European legal tradition of civil law, in contrast to the Anglo-Saxon common law. When it is used as such, this shall be clear from the context.

[619] The terms lawful and unlawful are used here in the broader legal philosophical sense, meaning the term "unlawfulness" as used here is not to be equated with the obligation generating criterion of unlawfulness as found in the tort law test (see below) nor the violation of a regulation. For comparison, when speaking legally philosophically, Kant avoids the terms lawfulness and unlawfulness and instead uses the terms Rightfulness and Wrongfulness to indicate the permissibility of an act or omission.

[620] See, for example, article 6:167 Dutch Civil Code

[621] See articles 6:162 and 6:163 Dutch Civil Code. The concept of relativity can be found in article 6:163 Dutch civil Code and means that the norm as infringed by the perpetrator, must have been codified with the aim of protecting the interest that has been harmed. Article 6:163 Dutch Civil Code reads: "*No obligation to pay compensation shall exist if the norm infringed is not designed to offer protection against the loss suffered by the aggrieved party.*"

[622] Van Dam 2013, p. 353-359. See also Van Gerven 2001 and Magnus & Spier 2000 for comparison.

conduct (either acts or omissions) of a defendant in respect of which the defendant was blameworthy. In short: (1) harm, (2) conduct, and (3) blameworthiness.[623]

Harm thus functions as a constitutive criterium for the creation of obligations to right unlawful acts. If harm cannot be proved, no obligation for compensation (e.g. damages) can be generated. The scope of the legal notion of harm determines in which situation obligations to pay damages (or non-pecuniary compensation) are triggered. It follows from this that if the legal notion of harm is too limited, it brings about a risk of excluding certain situations from triggering obligations for compensation that reasonably ought to do so. If the legal notion of harm is too broad, it brings about a risk of creating a paralysis in our interactions, because the slightest setback of a party's interest will create legal obligations to compensate said setback.

5.2 The civil law matter of harm

Having seen the role that harm plays in creating obligations, below, the focus will shift to what establishes harm.

Harm, legally speaking, is in and of itself a rather elusive concept. It only becomes more tangible by the law indicating specific heads of damages that qualify for compensation. See for example Spier et al. who explain, in regards to Dutch law, that strikingly enough the law of obligations as codified in the Dutch civil code, is not based on a specific notion of harm. "*Nowhere in the law, nor in the parliamentary history can a definition of harm be found. However, this does not pose any large problems. Afterall, [the law does provide] which heads of damage are eligible for compensation and what these damages consist of.[…]*"[624] The only definition Dutch law provides in the way of 'harm' is what form it can take, namely financial loss or other disadvantages.[625]

The point of the elusiveness of the legal harm concept is further illustrated by Van Dam's overview of the concept of harm under the French, German and English legal systems. In France, *"[t]he founding fathers of the Code Civil left the word* dommage *(damage) for interpretation by the courts, just as they did the word* faute *[…]. Dommage in itself does not contain any restriction as to the scope of the protected rights and interests. The only requirements the case law has developed are that someone has suffered damage, that this damage was suffered in a legitimate interest, and that it was certain and personal to the claimant.*".[626] Also here, harm is explained by way of reference to whether something qualifies for damages. Likewise, when explaining the German and English system, Van Dam refers to the heads of damage acknowledged under those legal systems.[627]

From the above it appears that, at least for lawyers, the notion of harm is one that is presumed when accompanied by a head of damage prescribed by the law. For a conceptualization of harm in and of itself, it appears that an appeal must be made to more fundamental considerations at the proto-legal level.

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[623] Birks 1997, p. 38

[624] See Hartlief et al. 2021, p. 259-260 who refer to section 6.1.10 Dutch Civil Code on legal obligations for compensation (or "wettelijke verplichtingen tot schadevergoeding")

[625] Möller 2008, p. 32. See article 6:95 Dutch Civil Code, which reads (freely translated): "*The harm that must be compensated on the basis of a legal obligation to pay compensation consists of financial loss and other disadvantages, the latter insofar as the law entitles the holder to compensation.*"

[626] Van Dam 2013, p. 353

[627] Van Dam 2013, p. 353-359

Perry, who addresses the topic of harm from a legal philosophical point of view, explains that a civil harm roughly entails the setback to an interest as an aspect of personal well-being, welfare or wealth.[628] Birks, explaining the concept of a civil wrong, states that the plaintiff must be *affected adversely* in a manner which the law deems sufficient to identify him as a victim of the breach of duty and to give him standing to sue on his own account.[629] What the law deems to be a sufficiently adverse effect may vary across different situations. In some cases, physical injury will be a necessary requirement, in other cases encroachments on protected interests as simple trespassing will be considered sufficient harm suffered.[630]

In sum, the civil law notion of harm concerns a setback or adverse effect that is legally salient, meaning, whether something constitutes harm depends on whether the law has prescribed it so. Importantly, this means that harm can be considered absent, in other words a wrong, any act or an omission, can be considered *harmless*, where the law has not provided anything in respect of the particular situation. So, if a victim suffers a legally harmless wrong, no obligation for compensation is generated under the law.

6. A Kantian conception of harm

Above, a rough idea of the civil law conception of harm was sketched. Here, a normative philosophical conception of harm shall be elaborated on. For this, reference shall be made to Immanuel Kant's Doctrine of Right (*Rechtslehre*). Before turning to Kant's conception of harm, some of his more overarching ideas shall be touched upon, as those provide the basis for his conception of harm. Besides the work of Immanuel Kant himself, this part of the chapter draws largely on secondary sources that analyse Kant's Doctrine of Right, such as the seminal works of Arthur Ripstein, Christine Korsgaard, as well as that of Richard Wright, Victor Tadros, and A.J. Julius.

6.1 The innate right to freedom

Capital in Kant's moral philosophy figures every human's innate right to freedom. According to Kant, freedom "*is the only original right belonging to every human being by virtue of his humanity*"[631], and it entails: "*independence from being constrained by another's choice, insofar as it can coexist with the freedom of every other in accordance with a universal law*".[632]

For a legal audience, the term "universal law" can best be described as entailing a general law/rule that is applicable to all people at all times. In the original German, Kant employs the

[628] Perry 1997, p. 322
[629] Birks 1997, p. 40-41, where it also states: "*However, it is in the nature of a civil wrong to raise a practical question: when shall an individual be allowed to complain on his or her own account and to take the benefit of the secondary or remedial obligation born of the wrong? The obvious answer is in terms of harm suffered. But it may be convenient or prudent to allow other kinds of answer. The plaintiff must be affected adversely in a manner which the law deems sufficient to identify him as a victim of the breach of duty and to give him standing to sue on his own account. Arguably, the effect on the plaintiff need not even be 'adverse'. 'Adversely' here is certainly to be understood in a weak or technical sense, so as not to exclude encroachments on protected interests which do not cause loss or harm or suffering of the conventional kind.*"
[630] Birks 1997, p. 40; Van Dam 2013, p. 357
[631] Ripstein 2009, p. 241, who references Kant & Gregor 1996, 6:237; Alexander & Penalver 2012, p. 71
[632] Kant & Gregor 1996, 6:237; http://plato.stanford.edu/entries/kant-social-political/ accessed 11 November 2021; Ripstein 2009, p. 35. For more on the concept of "universal law", see Korsgaard 1985.

term "allgemeines Gesetz", which, for lawyers, is a much more intuitive term. However, here we shall employ the term "universal law" as this is the term generally employed in English academic literature on Kant.

Contrary to what a quick reading of the definition of the innate right to freedom might suggest, Kant's idea of freedom does not imply completely unrestricted self-determination. Rather, it aims at self-legislation: self-determination in accordance with universal law.[633] As Wright puts it, "*[m]oral behaviour consists in overcoming, through subjecting the maxim of one's actions to the condition of qualifying as universal law, inclinations that are in opposition to the dictates of the moral law […]*".[634]

The core idea of 'freedom as independence' revolves around the distinction between persons and things. A person is a being capable of setting his or her own purposes, while a thing is something that can be used in pursuit of purposes. You have freedom, you are independent, if you are the one who decides which purposes you will pursue.[635] Kant explains: "*[M]an regarded as a person [rather than a mere animal], that is, as the subject of a morally practical reason, is exalted above any price; for as a person (homo noumenon) he is not to be valued merely as a means to the ends of others or even to his own ends, but as an end in himself, that is, he possesses a dignity (an absolute inner worth) by which he exacts respect for himself from all other rational beings in the world. He can measure himself with every other being of this kind and value himself on a footing of equality with them.*"[636]

Following Kant, the right to freedom is a right inherent to rational beings by virtue of their moral status. This moral status is grounded in the ability to act for reasons, to determine what ends to set for ourselves, by assessing what we value among the range of things that are valuable. [637] Korsgaard refers to our "*powers of reflective endorsement*" in this regard.[638] This moral worth is absolute and equal for all rational beings.[639] It distinguishes us as agents from objects and prohibits us from using people as means and from allowing ourselves to be used as means by others. In other words, it dictates the quality of our actions and forces us to treat everyone, including ourselves, as an end in itself.[640] Consequently, we owe it to each other that our attitudes toward one another and our actions that involve or affect each other be governed by reasoning that takes proper notice of the fact that we both are persons who can act for reasons; that we both have innate right.[641]

For the individual, innate right practically entails that she can choose and pursue purposes through the use of her body and bodily abilities. Innate right by itself is limited, however, because it only considers entitlements relating directly to the body (i.e. bodily integrity and

[633] Ripstein 2009, p. 13-14; Wright 1997, p. 163
[634] Wright 1997, p. 162, who references Kant & Gregor 1991, *213–14, 221–3, 225–7, 379–80 & n. *, 383, 394, 397, 405.
[635] Ripstein 2009, p. 14
[636] Kant & Gregor 1991, *434–5, * 223, 237–8. See also Korsgaard 2012, p. 6, where it says about Kant's idea of rationality: "*Rationality or autonomy is a property that confers a kind of intrinsic value or dignity on the beings who have it, and therefore they are to be respected in certain ways. Lacking this property, the other animals lack this dignity or value.*"
[637] Tadros 2011, p. 127
[638] Korsgaard 2013, p. 89
[639] Wright 1997, p. 163
[640] Tadros 2011, p. 125-127
[641] Julius 2006, page number not available

reputation). It fails to provide a vehicle for the entitlement of individuals to pursue their goals through external things, such as property, the actions of others, etc. Other sorts of rights, ones that extend beyond the body, are needed to implement innate right into the external world, so they can facilitate our external freedom.[642] Below, the external exercise of innate right shall be elaborated on further. But first, Kant's Categorical Imperative must be addressed, as this principle rules both the internal and external exercise of our innate right to freedom.

6.2 The Categorical Imperative

Kant finds that the supreme principle of morality is a standard of rationality. He coins this standard of rationality the "Categorical Imperative" (Kategorischer Imperativ) and characterizes it "*as an objective, rationally necessary and unconditional principle that we must always follow despite any natural desires or inclinations we may have to the contrary*".[643] He formulates the Categorical Imperative as: "*act only according to that maxim by which you can at the same time will that it should become a universal law*". In simpler terms: "*act so that you treat humanity, whether in your own person or in that of another, always as an end and never as a means only*".[644] The Categorical Imperative is the supreme rule for human deliberative action[645] and thus rules the practice of our innate right internally and externally.[646]

6.3 Exercising our internal and external freedom in practice

Each person's innate right to freedom needs to be upheld internally, in the way we act towards ourselves, and externally, in the way we act towards others. In the elaboration of his moral philosophy, Kant provides for this internal and external maintenance of innate right through the doctrine of Virtue and the doctrine of Right. Both are corollaries of the Categorical Imperative[647]; both have the Categorical Imperative as their highest principle.[648] "*The doctrine of Right focuses on the external aspect of the exercise of freedom—the constraints on action required for the practical operation of freedom in the external world. The doctrine of Virtue, on the other hand, focuses on the internal aspect of the exercise of freedom—one's subjecting the maxim of one's actions to the condition of qualifying as universal law.*"[649]

[642] Ripstein 2009, p. 20
[643] https://plato.stanford.edu/entries/kant-moral/ accessed 6 November 2021
[644] Wright 1997, p. 162, who references Kant & Beck 1959, *421, 429
[645] See the Stanford Encyclopedia of Philosophy, where it reads: "*The Groundwork for the Metaphysics of Morals provided Kant's main arguments that the categorical imperative is the supreme rule for human deliberative action. In its Preface, he notes that the Groundwork is to be a preparatory book for a future Metaphysics of Morals. Twelve years later he published that Metaphysics of Morals in two parts, the "Doctrine of Right" and the "Doctrine of Virtue". Both are equally parts of Kant's practical philosophy, and both thus have the categorical imperative as their highest principle[…]*", https://plato.stanford.edu/entries/kant-social-political/ accessed 11 November 2021
[646] See the Stanford Encyclopedia of Philosophy https://plato.stanford.edu/entries/kant-social-political/ accessed 11 November 2021
[647] Wright 1997, p. 163
[648] See the Stanford Encyclopedia of Philosophy https://plato.stanford.edu/entries/kant-social-political/ accessed 11 November 2021
[649] Wright 1997, p. 163

For the purposes of this chapter, the doctrine of Right is of most interest, as this concerns the maintenance of our innate right to freedom in our interactions with others.[650] Right authorizes us to obligate others through external coercion in accordance with a universal law of freedom.[651] This part of Kant's moral philosophy specifies which moral obligations are also enforceable legal obligations and addresses the notion of harm. Before turning to Kant's views on harm, first, the Universal Principle of Right shall be explained in more detail.

6.4 The Universal Principle of Right

To enable the maintenance of our innate right to freedom externally in our interactions with others, Kant devises the Universal Principle of Right: "*An action is right if it can coexist with everyone's freedom in accordance with a universal law, or if on its maxim the freedom of choice of each can coexist with everyone's freedom in accordance with universal law.*" [652] In simpler terms: "*so act externally that the free use of your choice can coexist with the freedom of everyone in accordance with a universal law*".[653]

Inevitably, peoples' exercise of their free choice can conflict with other peoples' exercise of *their* free choice. Kant takes this into account: *[I]f a certain use of freedom is itself a hindrance to freedom in accordance with universal laws (i.e., wrong), coercion that is opposed to this (as a hindering of a hindrance to freedom) is consistent with freedom in accordance with universal laws, that is, it is right*.[654] Kant's idea of legal rights is to define and uphold a maximal domain of individual freedom for each citizen within which the latter can act as seems just and good to them.[655] Coercion is only ever allowed, in Kant's view, when it protects freedom. The protection of freedom is the use of coercion against coercion itself.[656]

The former lines up with our current idea of civil (un)lawfulness as described earlier. If I choose to use my free choice to publish a defamatory article about you, this poses a hindrance to your freedom (i.e. to not be defamed). Your subsequent hindrance of my freedom, e.g. you coercing me to publish a rectification, corrects my wrongdoing and makes the situation right again. One could say that the Universal Principle of Right provides the theoretical basis for the enforceability of our laws and for the genesis of obligations to correct instances where the law is breached.

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[650] Ripstein 2009, p. 11

[651] Wright 1997, p. 163. Note that the supreme principle of virtue is *'[a]ct in accordance with a maxim of ends that it can be a universal law for everyone to have'*, see Wright 1997, p. 163. See also Ripstein 2009, p. 12 where it states: "*Other persons are entitled to enforce duties of right, but not duties of virtue.*"

[652] Ripstein 2009, p. 13, who references Kant & Gregor 1996, 6:230

[653] Wright 1997, p. 163

[654] Ripstein 2009, p. 165. To be clear, the Universal Principle of Right only affects the exercise of external freedom through plural or joint interactions that we engage in. It is only in the external realm that enforceable legal obligations may arise. Internal freedom cannot be coerced by another and merely brings about unenforceable moral obligations.

[655] Korsgaard 2012, p. 3. Here, Korsgaard also points out that Kant's approach forms a contrast to that of many other philosophers for whom the point of legal rights is the protection of our "more important interests".

[656] See Korsgaard 2012, p. 5 where she explains: "*Kant believed that the protection of freedom is the only thing that justifies the use of coercion, because the protection of freedom is the use of coercion against coercion itself. According to Kant, people do not get to push each other around in the name of what one or another of us, or the majority of us, or for that matter, even all of us, considers to be good. The only thing that justifies us in preventing someone from acting as she chooses is that her action is a hindrance to someone else's freedom.*"

6.5 Rightful ways of interacting - the acquired rights of property, contract, and status

As briefly mentioned above, innate right by itself is limited, because it only considers entitlements relating directly to the body (i.e. bodily integrity and reputation). To implement innate right into the external world, Kant devises a system of Private Right(s) through which actors can access wider entitlements, so-called "acquired rights". The system of Private Right consists of the categories of property, contract and status, which form the backbone of all Western legal systems.[657] As Ripstein explains it, these three categories "*provide an exhaustive specification of the possible types of interaction consistent with freedom. Property concerns rights to things; contract concerns rights against persons; and status contains rights to persons "akin to" rights to things*".[658]

Acquired rights allow us to possess external things, which further facilitate our pursuit of purposes by adding the use of usable objects to the use of our body and bodily abilities. [659] The right to property is an extension of our freedom of action.[660] Acquired Rights provide a way for us to exercise our innate right, our freedom, in the external world. Korsgaard points out: "*Of course Kant thought that one of the things in which we could claim property is the other animals. Their legal status as property is the direct correlate of their moral status as mere means*", (but this will be elaborated on below).[661]

The three ways of Rightful interaction 'property', 'contract', and 'status', respectively supply one with the following rights: In property, I have both possession and use of a thing, for example the ownership of a house. In contract, I have a limited right to the use of your powers for my purposes, but I do not possess you. An example would be a labour contract between parties. In status, I have possession of you but am not entitled to use you for my own purposes, e.g. the relationship between parent and child.[662] In short, it means that I can be entitled to an object, the performance of a specific deed by another person, or a right to a person akin to a right to a thing.[663] These three categories represent "*ways in which something can be "one's own," that is, where it can operate as a constraint on the conduct of others*".[664]

Ripstein explains how underlying this division is the intuitive idea that separate persons who are free to set their own purposes can interact in three basic ways. They can pursue separate ends separately, which requires rights to person and property; they can pursue ends interdependently and consensually, which requires rights by contract; or they can pursue ends interdependently and non-consensually, which requires a relationship of status.[665]

As pointed out above, these three categories concern rightful ways of interacting. Below, the focus will shift to what it then means to interact in a wrongful manner and what role harm plays in this.

[657] Ripstein 2009, p. 20
[658] Ripstein 2009, p. 20
[659] Ripstein 2009, p. 17
[660] Korsgaard 2012, p. 4
[661] Korsgaard 2012, p. 4
[662] For a more elaborate exposition of the categories of acquired rights, see Ripstein 2009, p. 19-22
[663] Ripstein 2009, p. 66
[664] Ripstein 2009, p. 66
[665] Ripstein 2009, p. 66

However, before turning to this, and in the interest of completing Kant's argument, it should be added that for acquired rights to be available to us, and for us to effectively and meaningfully exercise our freedom through their use, they need to be protected. In a state of nature, possession of objects would be up for grabs for anyone and maintaining possession would depend on the possessor's ability to physically control and defend those objects against aggression by others.[666] This is problematic, because under those circumstances rightful possession acquired is always provisional and never conclusive, since no person can through unilateral action conclusively bind others. "*Absent the universal consent of all, which can occur only in civil society, no one has any better right than any other person to acquire any external thing, and the rightful limits of acquisition cannot be conclusively established*". [667] In simpler words, any external object of choice could be yours or it could be mine.[668] Kant finds the solution to this in the creation of a system of Public Right(s) with the state as an enforcement mechanism.[669] The sum of this, so the system of private and public right with the state (a government) as an 'enforcer' establishes a "condition of right", also called the Rightful Condition. [670] Our right to freedom (exercised through acquired rights) is a right to a state; we have a duty to form a state, since otherwise we fail to respect others' rights. Kant asserts that a secure right to freedom can only exist when there are known laws defining its reach and punishing its violation, independent courts and judges to apply those laws to cases, and an executive apparatus to enforce those laws. [671] Without the Rightful Condition freedom cannot be exercised or maintained. Only through the Rightful Condition is each person able to act consistently with the acts of everyone else.[672]

6.6 Wrongfulness

Above, it was pointed out that Kant distinguishes between three categories in which people can (inter)act. They can pursue separate ends separately, which requires rights to person and property; they can pursue ends interdependently and consensually, which requires rights by contract; or they can pursue ends interdependently and non-consensually, which requires a relationship of status.

These types of interaction can come to fruition based on shared intentions of the parties involved, but they may also be the product of the actions of parties that do not partake in the

[666] Wright 1997, p. 164
[667] Wright 1997, p. 164-165
[668] Alexander & Penalver 2012, p. 72
[669] Alexander & Penalver 2012, p. 72
[670] Alexander & Penalver 2012, p. 72
[671] Reiman 2012, p. 104
[672] This obviously concerns an extremely simplified rendition of Kant's Doctrine of Right. For the purposes of this chapter, however, it is not useful to engage in a deeper, philosophical exploration of the Doctrine of Right. The focus is on Kant's views on harm and the Doctrine of Right forms the backdrop against which these views are developed. See also Korsgaard 2012, p 3 where it says: "*[Kant] argued that without the institution of enforceable legal rights, our relationships with each other must be characterized by the unilateral domination of some individuals over others. The problem is not, or not merely, that the strong are likely to tyrannize over the weak. Even if the strong were scrupulous about not interfering with the actions or the possessions of the weak, still, without rights, the weak would be able to act on their own judgment and retain their own possessions only on the sufferance of the strong [ref]. Since her innate right to freedom is violated when one person is dependent on some other person's good will, Kant thinks it is a duty, and not just a convenience, for human beings to live in a political state in which every person's rights are enforced and upheld [ref]. No matter how well-intentioned we are, we can be rightly related to each other only if we live in a political state with a legal system that guarantees the rights of everyone.*"

same intention. After all, in most situations, the reasons people have to do things and the reasons others have to want them to do things come apart.[673] Particularly the case where intentions are not shared is of interest when it comes to wrongdoing, because when intentions come apart, the risk of wrongdoing, whether it be accidental or intentional, increases.

Ripstein points out how wrongfulness can occur in each of the three categories of interaction.[674] In property, wrongfulness occurs when one interferes with another's ability to set and pursue such ends as they have set for themselves. An example would be if I cut down the apple trees in your orchard (i.e. your property) for firewood, hindering you from plucking and selling the fruit (i.e. the purpose you have set). In contract, wrongfulness occurs when one fails to provide another with a means (ones action) to which one has given them a right. For example, we agree that you pay me to paint your house, but subsequently, I simply do not perform the task. My labour is the means that I should provide you with to your end of having your house freshly painted. Me not performing the task entails me denying you the means to which I have already given you a right. In status, wrongfulness occurs when one uses another person to advance ones ends, as that deprives that person of the freedom to set their own ends. An example would be if I, the parent of a child, pull the child out of school in order to have them help me around the house with chores (i.e. my own ends). As the parent, I ought to do what is best for the child, which would be, among other things, to enable it to go to school.

Whatever my interference, whether it be in property, contract or status, I do it because it serves my purpose better to do as I please or to have you do as I please. My doing so hinders your right to freedom, because I am using you or your property as a means to my ends.

Returning to a more abstract analysis of wrongdoing, Ripstein sums up the possible ways in which we can do wrong. He poses that this concerns an exhaustive list, as we can only hinder someone's freedom by interfering with their *setting and/or pursuit* of ends.[675]

[673] Julius 2006, page number not available
[674] Ripstein 2009, p. 76
[675] See Ripstein 2009, p. 77

Figure 1. Doing wrong

We do wrong when we:

1. Hinder someone's *setting* of ends by:
    a. Making them pursue an end they have not set for themselves, by
        i. Using their goods without their permission *(recall the orchard)*
        ii. Using a relationship you have with them for private purposes *(recall forcing your child to perform chores around the house in lieu of attending school)*

and/or

2. Hinder someone's *pursuit* of ends, by:
    a. Wrongfully depriving them of a means they already have *(recall, once more, the orchard)*
    b. Failing to provide them with a means to that pursuit to which you have given them a right *(recall the painting of the house)*

All the above boils down to the following: It is wrong to hinder someone's freedom to set and/or pursue their own ends if that person has not consented to having their freedom curbed or curbed in that specific way. We wrong each other whenever we treat the counterpart in our interactions as a means to an end, instead of as an end in itself. This happens whenever we hinder our counterparts' ability to set and pursue their own purposes. Hindering someone's freedom to set and pursue ends indicates a lack of consideration of the fact that they too are rational beings able to conceive of ends. Ignoring someone's ability to conceive of ends and forcing your ends onto them indicates non acknowledgement of the moral status they have.[676]

It follows from this that when one genuinely, so without being coerced, consents to one's freedom being hindered, this is rightful. In that case, consent turns an act that would otherwise be someone's despotism over you into an exercise of your freedom.[677] This is only the case when there is genuine consent to lose that independence. This is the case if one decides to make the other person's end one's own end. In effect, one decides to use one's powers for the other person's end. Giving up one's independence through giving consent then actually is an indirect exercise of one's freedom to set and pursue purposes, only here one makes the other person's purpose, one's own purpose.[678]

Finally, it is important to recall that a hindrance to a wrongful hindrance to freedom is rightful.

[676] In this context, see Tadros 2011, p. 122-138 on moral status and the means principle, and particularly p. 127 where it states: "*When a person is used as a means, she is used in pursuit of a certain goal. But as an independent person, she ought to be able to set goals for herself. It is wrong to compel her to act for the sake of some end that she is permitted to reject for herself. Her permission to reject the goal is grounded in her status as an independent endsetter.*" See also Julius 2006, who expounds extensively on acts of coercion that are intended to steer the behaviour (read: the setting and pursuit of goals) of others.
[677] Ripstein 2009, p. 47
[678] "Indirect", because Ripstein 2009, p. 47 emphasizes: "*The right to engage in consensual interactions and the rights you acquire through consensual interactions are, strictly speaking, not parts of the innate right of humanity as such. Instead, they are acquired rights, which require affirmative acts to establish them.*"

6.7 Harm

Strikingly, the earlier mentioned types of rightful interactions (i.e. property, contract, and status) and the abovementioned wrongs that can occur in these interactions (i.e. the hindrance to the setting and/or pursuit of ends) make no mention of a harm-concept.[679] Nevertheless, Kant considers these wrongs *in and of themselves* to be obligation-generating instances. After all, these rightful interactions and the wrongs that can occur in them form the landscape of Right, and Right authorizes us to obligate others through external coercion in accordance with a universal law of freedom.[680]

Kant's account of obligation can therefore be said to be wrongdoing sensitive. It focuses completely on the one capital right to freedom and the wrong of having that violated. When freedom is violated, that constitutes wrongdoing, and an obligation to repair the wrong is generated. Kant's account therefore appears less 'conditional' than the law's approach. Recall that both civil law and common law legal traditions employ a multiprong test that includes 'harm' as a constitutive criterion for the generation of enforceable obligations. Kant, however, is less concerned with harm, in the sense that harm by itself is not a trigger for obligation. Importantly, Kant defines harm not as a diminishment of welfare or as a significantly adverse effect, as is the practice in tort law, but as the diminishment of a person's power to set and/or pursue purposes. Harm is only significant when it wrongfully, so without consent, diminishes a person's powers, and so her freedom. But it is not significant merely because it diminishes either welfare or wealth.[681] This means then, that wrongdoing as the hindrance of freedom is in a way at the same time the harm done. That is not to say that the harm of a hindrance of freedom cannot be 'supplemented' with harm in the form of the diminishment of wealth or other forms. But the harm that gives rise to an obligation for restoration, that provides a victim a title to coerce a wrongdoer to right a wrong, is the harm of wrongfully hindering someone's freedom to set and/or pursue purposes through a diminishment of their powers.[682]

Following Kant's Rechtslehre, the harm of diminishing someone's powers can take two forms:

[679] Ripstein 2009, p. 21
[680] See Wright 1997, p. 163
[681] Ripstein 2009, p. 22
[682] Rightful harm, such as is the case with *negotiorum gestio* and instances where the harm constitutes a hindrance to a hindrance of freedom, does not stand in need of correction.

Figure 2. Doing harm[683]

One can:

1. Usurp someone's power, by
    a. Exercising it for one's own purposes
    b. Getting them to exercise their powers for one's own purposes (*through force or fraud*)
2. Destroying their power (*i.e. treat their means as though they were yours to dispose of; e.g. intentional injury*)

As opposed to civil law's material harm notion, Kantian harm comprises those actions that facilitate the wrong of hindering someone's freedom. It is that which one does to render another person powerless.[684] This forms a stark contrast to the civil law concept of harm as a diminishment of wealth or general welfare. Kant's notion of harm revolves around the quality of our actions, whereas civil law's notion of harm is about the negative material consequences of our actions. The occurrence of material harm is used as an indicator of wrongfulness. Even more striking is Kant's view that material harm as such (and therefore the civil law harm-concept that we work with today) is absolutely insignificant for the generation of obligations. Compare this to civil law obligations, which cannot be generated *but for* the occurrence of material harm. Meaning, in principle, there always needs to be material harm for an obligation to arise. Without threat or risk of material harm, the law will simply not generate an obligation for restoration.[685]

In practice this means that if someone compromises another's power or uses another's body or means to pursue certain goals, without causing material harm, civil law does not generate any obligations. For example, I take your car without asking your permission, drive it around the block and then return it unharmed and without you ever knowing. If you were at some point to find out what I did, without there being any harm done to the car or to you, you have no tort law claim against me.[686] Kant's Rechtslehre has a different approach to this, rooted in the fact that it is wrongdoing-sensitive. In the same scenario, you would have a claim against me, for the legal basis of the claim is not the material harm, or in this case the materially harmless act, but the wrong of having taken something that does not belong to me without you having consented to it. To further emphasize the dichotomy between civil law and Kantian harm, take the following example: I take your car, which is almost out of gas, without your permission. I drive it around the block, fill up the tank and return it to you without you ever knowing. I have

[683] Figure based on Ripstein's explanation provided in Ripstein 2009, p. 43-44
[684] See also Korsgaard 2012, p. 7, where she explains that respecting persons as ends in themselves entails an obligation "*not to usurp [their] control over their own actions by forcing or tricking them into doing what we want or think would be best – that is, we are not allowed to use other people as mere means to our ends. We also have a duty to promote the ends of others.*"
[685] Save for those instances for which the law expressly has provided, e.g. non-pecuniary loss, threat or risk of immaterial harm, personal injury, trespass.
[686] The example given here is focused on tortious harms. It therefore leaves unaddressed the possibility of a civil law claim based on the violation of a property right.

now actually increased your wealth or general welfare. Under tort law, you would have no claim. In fact, you would be considered better off than you were before. After all, you now have a full tank of gas. My transgression of having taken your car without permission, in the absence of any harm done, would not qualify as unlawful, but at most morally wrong. When applying Kant's harm notion, we arrive at a different conclusion. According to Kant, I do have a claim, for the legally salient part of my action has not changed. Even though I have eventually increased your wealth by taking your car, I have still wronged you by having taken something that does not belong to me without your consent.[687] Moreover, according to Kant, you have indeed suffered harm, because I have usurped your property right of the car for my own purposes (see Figure 2 above). What form a claim would take, be it monetary compensation or something else, is not so important to the point made. What matters is Kant gives you legal standing in this scenario, when tort law does not. And because in Kant's legal theory wrongdoing is in a way the harm done (for harm in many a case is just the action you take to exercise the wrong, and so where there is wrong, there is harm), Kant's account of obligation captures many more instances of wrongdoing than merely those that are supplemented by some form of material harm as is civil law's practice. What civil law and Kant do agree on is that material harm by itself, so without wrongdoing, cannot trigger obligations for reparation.[688]

While the Kantian conception of wrongdoing and the civil law notion of unlawfulness line up in many ways, it is clear that Kant's notion of harm as power loss, as opposed to mere material harm, allows for many more instances of obligations being triggered. Below, this is demonstrated in a side by side comparison between the Kantian and civil law conception of interaction (see Figures 3 and 4). Both figures should be read from left to right. The top banner indicates the criteria that can cumulatively generate an obligation. Figure 3 uses the term Rightful/lawful act (criterion 1) to refer to what Kant calls an interaction that is in line with the principle of Right and in civil law we call a lawful interaction. As seen above, these line up pretty accurately, and so can be referred to in one column. Figure 4 uses the term Wrongful/unlawful act (criterion 1) to refer to what Kant calls interactions that are in violation of the principle of Right and what civil law deems unlawful interactions. Harm as a power loss (criterion 2) refers to Kantian harm. Material harm (criterion 3) refers to the civil law notion of harm as a diminishment of wealth or general welfare. The column marked "Result" indicates whether an obligation is generated under the combination of criteria marked as present by an X.

Figure 3 illustrates that in rightful/lawful interactions neither Kant's Rechtslehre nor civil law generate obligations, irrespective of whether harm as a power loss or harm as a material loss was suffered. As already mentioned earlier, Kant and civil law agree that harm in and of itself (so in the absence of wrongdoing) does not generate an obligation for compensation.

Figure 4, on the other hand, discloses two discrepancies between Kant and civil law when it comes to Wrongful/unlawful interactions. One discrepancy is indicated in the colour blue and the other in orange. The blue banner indicates the situation where an interaction is wrongful/unlawful, but it has caused no harm. In this case, Kant's Rechtslehre generates an

[687] Again, here, the possibility of a civil law claim based on the violation of a property right is left unaddressed, as the focus of this chapter is on tortious harms.
[688] Alternatively, rather than focusing on the dichotomy between Kant and civil law, one could also characterize the relationship between the two as Kant providing a better explanation for our legal practice than currently employed theoretical resources do.

obligation for compensation. Tort law does not. In this context, recall the earlier mentioned example of the car being taken without permission and unbeknownst to the car owner. The orange banner indicates the situation where an interaction is wrongful/unlawful and harm as a power loss has occurred. Also here, a Kantian approach generates an obligation and civil law does not. Recall, once again, the example of the car. Kant generates an obligation, both when there is harm as a power loss and when there is not, because the obligation generating criterion is not the harm, but the wrongdoing in and of itself. Civil law does not generate an obligation, because it only allows for that when unlawfulness is combined with material harm. It should be noted that Figures 3 and 4 do not consider the civil law criteria of blameworthiness and causality. For the purposes of this chapter, these criteria are of less consequence. In reading the table we may assume that in each instance where there is wrongdoing, a blameworthy party exists and a causal link can be drawn between that party's actions and the harm that has occurred. Lastly, in Figure 4, the civil law blue and orange banners are nuanced in a footnote, indicating that no obligation is generated under civil law, save for those instances for which the law expressly has provided, e.g. non-pecuniary loss, threat or risk of immaterial harm, personal injury, trespass.

Figure 3. Juxtaposition of Kant's Rechtslehre and civil law in *Rightful/lawful* interactions

Cumulative, obligation generating criteria → / Kant's Rechtslehre versus civil law ↓	Criterion 1: Rightful/Lawful act	Criterion 2: Harm as power loss	Criterion 3: Material harm	Result:
Kant	X			**No obligation generated**
	X	X		**No obligation generated**
	X	X	X	**No obligation generated**
	X		X	**No obligation generated**
Civil Law	X			**No obligation generated**
	X	X		**No obligation generated**
	X	X	X	**No obligation generated**
	X		X	**No obligation generated**

Figure 3 and 4 are to be read from left to right. The X's indicate the presence of the criterion in question (read: the presence of a rightful/lawful act and/or harm as a power loss and/or material harm). The column marked "Result" indicates whether the given combination of criteria, read from left to right, generates an obligation or not. For example, in Figure 3, under Kant, the combination of Criterion 1. A Rightful act + 2. Harm as a power loss + 3. Material harm, generates no obligations.

Figure 4. Juxtaposition of Kant's Rechtslehre and civil law in *Wrongful/unlawful* interactions

Cumulative, obligation generating criteria → / Kant's Rechtslehre versus civil law ↓	Criterion 1: Wrongul/Unlawful act	Criterion 2: Harm as power loss	Criterion 3: Material harm	Result:
Kant	X			Obligation generated
	X	X		Obligation generated
	X		X	Obligation generated
	X	X	X	Obligation generated
Civil law	X			No obligation generated[689]
	X	X		No obligation generated[690]
	X		X	Obligation generated
	X	X	X	Obligation generated

[689] Save for those instances for which the law expressly has provided, e.g. non-pecuniary loss, threat or risk of immaterial harm, personal injury, trespass.
[690] Save for those instances for which the law expressly has provided, e.g. non-pecuniary loss, threat or risk of immaterial harm, personal injury, trespass.

6.8 The in between category

Figure 3 and 4 establish that, as suspected, Kant's Rechtslehre provides a broader harm-concept than does our civil law. The fact that Kant's Rechtslehre and civil law are, other than the two instances indicated in blue and orange, aligned, once more validates that Kant's Rechtslehre indeed does provide a plausible and relevant theoretical explanation and grounding of our current civil law system. This is turn validates the critical question: ought our current legal system's harm concept be so limited, or are we better served with a broadening of the scope of the civil law harm concept? The case law in the previous chapter would seem to indicate that a broadening of the scope is necessary. The above analysis is not to advocate that the Kantian harm concept ought to replace our current civil law harm concept, but it does prove that a broadening of the scope of the current civil law harm concept (i.e. to include more than just material harm) does not pose a theoretical impossibility. After all, the theory that grounds our legal system prescribes a broader harm concept.

What could be done about the dichotomy between the Kantian legal theory and civil law practically? Reasoning deductively, there are two avenues to explore, of which only the latter is of direct relevance for this particular research. Firstly, one could aim to stretch our current civil law harm concept by applying a more Kantian approach to the relationships between humans and nature.[691] Taking inspiration from Kant's category of 'status', which involves inherent power asymmetries, one could argue that humans have taken control of a world which belongs to both humans, animals, and other species/life forms. As we, humans, cannot but rule the others, we owe it to nature to rule it for its good.[692] Based on Kant's status category, we could infer something about the quality of our actions that involve nature. This means that humans must act in the best interest of nature, promoting the latter's good. this is not to say that the relationship between humans and nature is to be categorised as a status relationship. That would be too crude of a comparison. The aforementioned concerns *ex ante* prescriptions for our behaviour towards nature.

This research, however, is primarily concerned with *ex post* valuation of harm suffered. *Ex post*, a more Kantian approach could entail finding ways to "materialize" non-material harm so that we can fit it into our current legal system. The cases addressed in the last chapter are in effect examples of where this has been attempted. By assigning a monetary value to individual components of nature that were harmed, nonmaterial harm was "materialized". As was demonstrated in the last chapter, this approach is not yet commonplace in the court room and hence attempts made largely failed. Nevertheless, from a legal practical point of view, it remains an avenue worth exploring. Therefore, the next chapter shall be dedicated to valuation of harm through the concept of ecosystem services as a possible way of bridging the gap between non-material and material harm. For the avoidance of doubt, it should be pointed out that the choice for the exploration of this approach does not entail an argument or plea *for* this approach. Regardless its legitimacy, this research shall not engage with ethical concerns surrounding valuation of nature as such, meaning the question *is it appropriate, permissible and / or justifiable to valuate nature?* Instead, this research takes for granted that valuation of immaterial harms in monetary terms inherently brings about legitimate practical difficulties and

[691] This is not to say that humans are not part of nature. But for the sake of constructing an intuitive argument this phrasing has been chosen.
[692] Please see Korsgaard 2018a for an argument in this line in regards to the relationship between humans and animals. It should be mentioned that she does not connect this to Kant's "status" category.

ethical concerns. It also takes for granted, however, that for day to day environmental legal practice it is unavoidable to ask the (amoral) question: how many dollars is nature worth? To answer that unavoidable question, the analysis conducted in the next chapter is valuable.

Before moving on to the exploration of this topic, one large vulnerability in this chapter's analysis must first be addressed.

7. A Kantian approach to harm inflicted on ecosystems

At first glance the above argument appears complete, however, there is a weakness in the Kantian account given above when it comes to matters pertaining to nature (in the broadest sense). The Kantian approach entirely revolves around interaction between *human* beings. In fact, as far as for example animals are concerned, "*Kant himself concluded that animals, as non-moral beings, have no value at all. He did not think that what happens to them – or what we do to them – matters morally.*" [693] At first glance, this is not surprising. Recall an earlier quote from Kant that emphasized that humans are capable of morally practical reason, which exalts them above any price. Humans are not to be valued merely as a means to the ends of others or even their own ends, but as ends in themselves. As such they possess a dignity; an absolute inner worth.[694] Their moral status is grounded in the ability to act for reasons, to determine what ends to set for themselves, by assessing what they value among the range of things that are valuable.[695] Therefore, in the context of this research, we cannot yet close the above argument without addressing the question: can Kant's account nevertheless be applied to non-human beings (as individuals or as a collective) and/or ecosystems as such?

7.1 The is and ought of the moral standing of nature

There are different ways one could approach this question. From a strictly legal perspective, one could expound on whether (parts of) nature can be assigned legal personhood and therefore can stand in relation to and interact with human beings (or other legal persons, such as corporations), in the same way that humans stand in relation to and interact with one another. Examples of natural entities being granted legal personality abound, such as the Whanganui river in New Zealand[696] or a group of dolphins in the Philippines.[697] An affirmative reply to this question would mean that Kantian legal philosophy, as expounded on in this chapter, would in principle apply the same way to nature as it does to humans.The academic literature on legal personality for (parts) of nature is instructive for this. However, on reflection, this concerns too superficial an exercise. It usually follows a rather unrefined logic that poses the question: if a corporation can have legal personality, in other words benefit from a legal fiction, why should not nature? This is followed by an empirical test of whether certain parts of nature (e.g. a river

[693] Korsgaard 2020, page number not available
[694] Wright 1997, p. 162, who references Kant & Gregor 1991, *434–5, * 223, 237–8
[695] Tadros 2011, p. 127
[696] https://www.theguardian.com/world/2017/mar/16/new-zealand-river-granted-same-legal-rights-as-human-being accessed 24 April 2022
[697] Eisma-Osorio, Presentation at the 2018 IUCN Academy of Environmental Law Colloquium, 4 July 2018. Currently, legal personality is also being sought for the river Maas in the Netherlands, see https://www.uu.nl/en/news/river-the-maas-a-legal-entity-that-can-defend-its-own-health-welfare-and-interests accessed 24 April 2022

or a group of dolphins) lend themselves for legal personality. The latter is then exercised through representation by a human steward in the form of an individual or an interest group. Following this path in essence poses an inquiry into the question of whether it is, legally practically speaking, *possible* to "elevate" (parts of) nature to legal personhood. At best it would place nature in an equal position to the legal fiction of a corporation. This in and of itself raises ethical questions, the corporation being a mere thing, and nature being made up of many living beings.

Alternatively, one could approach the matter from a more fundamental, normative philosophical point of view. Rather than looking at whether it is *possible* for (parts of) nature to have legal standing, one could examine whether that *ought* to be the case, based on the characteristics of nature, such as the fact that it is made up of living, sentient beings.[698] This concerns something much more profound; an inquiry into the moral standing of nature, as a fundamental step that precedes and founds legal standing. Should this more fundamental approach render a positive answer, this automatically would support the call for legal personality for (parts of) nature, and imaginably for many other legal and policy efforts for the protection of nature. It would mean that Kantian legal philosophy does not only apply *in principle* but *absolutely*. As this would appear a more fruitful endeavor, and as is it is in keeping with the approach taken in this chapter so far, this is the path that shall be taken below.

It speaks for itself that also this part of the chapter shall rely heavily on the work of Immanuel Kant, particularly through the interpretation of Prof. Christine Korsgaard, who has written extensively on Kantian approaches to animal rights.[699] The Stanford Encyclopedia of Philosophy's online entries on 'moral status', 'the moral status of animals', and 'environmental ethics' are cited and referenced many times as those provide an excellent overview of the state of the art on the moral status of non-human beings.

7.2 The concept of moral status as such

In the Stanford Encyclopedia of Philosophy, the entry on 'moral status' starts out with: "*An entity has moral status if and only if it or its interests morally matter to some degree for the entity's own sake. For instance, an animal may be said to have moral status if its suffering is at least somewhat morally bad, on account of this animal itself and regardless of the consequences for other beings.*"[700]

There are various views on what grounds moral status. The Kantian view, elaborated on above (but see also below), is based on the idea that a being has so-called Full Moral Status if it possesses sophisticated cognitive capacities. These can be intellectual or emotional in nature.[701] In Kant's view, human beings are able to choose their own way of life because they are rational beings. Rationality is a normative capacity, "*grounded in what Kant took to be the unique human ability to reflect on the reasons for our beliefs and actions, and decide whether they are good reasons or bad ones*".[702] The term Full Moral Status stems from the idea that moral status can come in degrees, Full Moral Status being the highest degree. An alternative view is the

[698] Among which human beings.
[699] See Korsgaard 2011, Korsgaard 2012, Korsgaard 2018, Korsgaard 2018a Korsgaard 2020
[700] https://plato.stanford.edu/entries/grounds-moral-status/ accessed 20 December 2021
[701] https://plato.stanford.edu/entries/grounds-moral-status/ accessed 20 December 2021
[702] Korsgaard 2012, p. 4

notion that the *capacity to develop* these sophisticated capacities (without losing one's identity) are necessary and sufficient to establish Full Moral Status, or, in the alternative a certain degree of moral status (e.g. some or enhanced moral status). The ability to develop these capacities is sometimes referred to as the 'potential' account.[703] Both accounts avoid anthropocentrism without according most nonhuman animals the same moral status as humans. As such, they would at first glance appear unhelpful for the question of moral status of non-human animals and/or ecosystems.[704]

Other views on the grounding of moral status, which would intuitively lend themselves better for the assignment of moral status to non-human beings, include an "*appeal to having a good or well-being of one's own that can be enhanced or damaged*". Moral status would then turn on the idea of a being having 'interests'.[705]

Other philosophers have turned away from the idea of 'interests' and instead base moral status on the feature of "*not being designed by anyone to fulfill any purpose*", the idea being that this renders them a being that ought to be treated as an end and not a mere means, and thus at least as having some degree of moral status.[706] The state of being unaltered by humans, so-called "naturalness", has been proposed as a ground of intrinsic value, and so as grounding at least some degree of moral status,[707] as well as harmony and beauty as grounding moral status of ecosystems.[708]

Lastly, and for the purposes of being complete, another option for moral status grounding is to posit membership in the human species as a sufficient condition for Full Moral Status.[709] Obviously, this approach is not useful when addressing the matter of moral status for non-human animals and ecosystems.

The literature on the abovementioned grounds for moral status often fails to provide a justification for the use of those grounds, save for the work that has been done in the Kantian tradition on sophisticated cognitive capabilities. The latter's justification is found mostly in the

[703] https://plato.stanford.edu/entries/grounds-moral-status/ accessed 20 December 2021

[704] After all, "*A being of any type that has these sophisticated cognitive capacities has [Full Moral Status], and so the accounts avoid anthropocentrism. However, since most (but not necessarily all) animals lack sophisticated cognitive capacities, they are not accorded the same moral status as an unimpaired adult human. Similarly, in the case of a living organism such as a redwood tree or a fetus, as well as non-individual entities, such as species and ecosystems, they would not have [Full Moral Status] on these views.*" See, https://plato.stanford.edu/entries/grounds-moral-status/ accessed 20 December 2021

[705] See https://plato.stanford.edu/entries/grounds-moral-status/ accessed 20 December 2021, also where it says: "*Of course, the central challenge for such views is to explain how and why inevitable conflicts among all those with a well-being or interests should be settled. It is not enough to provide principles adjudicating these conflicts (as does Taylor 1986, p. 261); one must justify these principles in a way that is not grounded in the moral status of the beings under consideration (since their status is taken to be equal).*"

[706] https://plato.stanford.edu/entries/grounds-moral-status/ accessed 20 December 2021; Brennan 1984, p. 44 and 56; Katz 1997, pp. 129–131

[707] https://plato.stanford.edu/entries/grounds-moral-status/ accessed 20 December 2021; Elliot 1997, p. 80

[708] See https://plato.stanford.edu/entries/grounds-moral-status/ accessed 20 December 2021, and also where it states; "*These views do not discuss whether moral status comes in degrees and provide no guidance for how to adjudicate the numerous conflicts that would arise among entities with moral status*". Leopold 1949; Callicott 1980

[709] See https://plato.stanford.edu/entries/grounds-moral-status/ accessed 20 December 2021,

claim that autonomy, or the capacity to set ends according to reason, is unconditionally valuable and the ultimate condition of value of everything else.[710]

7.3 A Kantian approach to the moral status of non-human animals

In assessing the applicability of the Kantian approach to ecosystems, it is instructive to venture out into moral philosophical work done in the field of animals rights. Of particular interest is the body of work developed by Prof. Christine Korsgaard which specifically applies Kantian ethics to the case of animals rights.[711] As this chapter is concerned with Kantian moral and legal philosophy, this section will address the moral status of non-human animals exclusively from the Kantian perspective, and will leave unaddressed other views on the matter, such as speciesism, human exceptionalism, personhood, and sentience.[712] While this section speaks of non-human animals, Korsgaard's account, which this section relies on, speaks of animals or fellow creatures. In this section, the terms animals, non-human animals and fellow creatures are used interchangeably. Once we have achieved a clear view of Korsgaard's arguments, below, the case shall be made for the applicability of this argument to the case of ecosystems.

"*The central idea of moral thinking is sometimes expressed by the idea that human beings have, or human life has, a special kind of value, different from the value of the ordinary objects that we use, exchange, or appreciate. It is because of this special kind of value that it matters what happens to people, and how we treat them.*"[713] Some philosophers have argued that it is humans' capacity for rational thinking that gives them value and makes them objects of moral concern.[714] Recall above, where it stated that according to Kant "*[m]oral behaviour consists in overcoming, through subjecting the maxim of one's actions to the condition of qualifying as universal law, inclinations that are in opposition to the dictates of the moral law […]*".[715] This refers to humans' ability to reflect upon their own ideas (the setting and pursuit of ends) before putting them into practice. Recall also that the core idea of 'freedom as independence' revolves around the distinction between persons and things. A person is a being capable of setting his or her own purposes, while a thing is something that can be used in pursuit of purposes. [716] On the Kantian view, humans possess a special kind of value, a "dignity" that renders them irreplaceable, and which cannot be substituted for anything else. Each person's life matters, in a way that admits of no equivalent, because it matters to that person themselves.[717]

[710] https://plato.stanford.edu/entries/grounds-moral-status/ accessed 20 December 2021; see also Korsgaard 1996; Korsgaard 2020; and Sussman 2003
[711] See Korsgaard 2011, Korsgaard 2012, Korsgaard 2018, Korsgaard 2018a, Korsgaard 2020
[712] For more information on these views, see https://plato.stanford.edu/entries/moral-animal/ accessed 22 April 2022, where reference is made to the work of proponents of these views.
[713] Korsgaard 2020, page number not available. In her essay, Korsgaard expounds on the way the two dominant philosophical traditions, being the utilitarian and the Kantian tradition, approach the topic of human value. For the purposes of this chapter, attention is paid to her analysis of the Kantian tradition on this topic. It is also this tradition that Korsgaard deems more accurate in its approach to the matter of human value.
[714] Korsgaard 2020, page number not available. But see also Korsgaard 1996.
[715] Wright 1997, p. 162, who references Kant & Gregor 1991, *213–14, 221–3, 225–7, 379–80 & n. *, 383, 394, 397, 405.
[716] Ripstein 2009, p. 14
[717] Korsgaard 2020, page number not available

These traits being exclusively linked to humans, is not very promising for other beings. Not being a 'person' renders them mere 'things' that can used by persons as means to ends.[718] Following this logic, and contrary to how humans ought to treat one another, as humans we do not owe it to 'things' that our attitude toward them and our actions that involve or affect them are governed by reasoning that takes proper notice of them.[719] This goes for all non-human beings and entities, making humans absolutely and unequivocally superior to all other beings. On this view, human beings are 'ends' in themselves, capable of conceiving and pursuing ends, only hindered in this freedom by the other human beings who are equally valuable and capable of conceiving and pursuing ends. All other beings, not having moral status, may be (ab)used to facilitate the setting and pursuing of ends by humans. This means that humans may cause non-humans pain, discomfort, suffering and death.[720]

At first glance, the above would seem to make the case for the moral standing of non-human animals (let alone for ecosystems) a rather open and shut matter. However, "*[…] an increasing number of philosophers have argued that while humans are different in a variety of ways from each other and other animals, these differences do not provide a philosophical defense for denying non-human animals moral consideration. What the basis of moral consideration is and what it amounts to has been the source of much disagreement*".[721]

Where it comes specifically to non-human animals, Korsgaard provides an instructive argument on the source of the moral consideration we owe animals. She formulates her argument in the

[718] See Korsgaard 2012, p. 1-2, where it states: "*Kantian moral philosophy is usually considered inimical both to the moral claims and to the legal rights of non-human animals. Kant himself asserts baldly that animals are "mere means" and "instruments" and as such may be used for human purposes. […] Kant says: Beings the existence of which rests not on our will but on nature, if they are beings without reason, have only a relative worth, as means, and are therefore called things, whereas rational beings are called persons because their nature already marks them out as an end in itself, that is, as something that may not be used merely as a means [...] [ref] […] In his essay "Conjectures on the Beginnings of Human History," a speculative account of the origin of reason in human beings, Kant explicitly links the moment when human beings first realized that we must treat one another as ends in ourselves with the moment when we realized that we do not have to treat the other animals that way. He says: When [the human being] first said to the sheep, "the pelt which you wear was given to you by nature not for your own use, but for mine" and took it from the sheep to wear it himself, he became aware of a prerogative which, by his nature, he enjoyed over all the animals; and he now no longer regarded them as fellow creatures, but as means and instruments to be used at will for the attainment of whatever ends he pleased. [ref]*"

[719] This is to strike a juxtaposition with an earlier mentioned reference to Julius 2006, page number not available, where he explains that we [humans] owe it to each other that our attitudes toward one another and our actions that involve or affect each other be governed by reasoning that takes proper notice of the fact that we both are persons who can act for reasons; that we both have innate right.

[720] Or as Korsgaard 2020, page number not available, states: "*throughout history, we have eaten the other animals, experimented on them, tested medications on them, kept ourselves warm with their fur and skin and feathers, used them for transport and for heavy work like pulling ploughs and tractors, enlisted them in our wars, made them fight and race for our entertainment, and held them in captivity for the sake of their companionship. Most of these practices are detrimental to the interests of the animals themselves, whom we have genetically altered in harmful ways by selective breeding, made to work beyond their capacity, subjected to torments in laboratories, and confined to factory farms where they lead short lives in deplorable conditions. Even when we do not use the other animals, we have usually been heedless of their welfare, freely killing them whenever they are a nuisance to us, and depriving them of the habitat on which they and their communities depend for leading their own lives.*"

[721] https://plato.stanford.edu/entries/moral-animal/?utm_source=mp-fotoscapes accessed 20 December 2021. Important in this regard is the work of Richard Ryder and Peter Singer. See also Korsgaard 2020, page number not available

Kantian tradition.[722] On Korsgaard's view, the Kantian account, where it comes to non-human animals, in its current form is incomplete.[723]

Korsgaard's argument, as I understand it, goes like this: Kant's view, that non-human animals do not have moral status because they do not make rational choices in the same sense that humans do - meaning choices that have the characteristic of qualifying as universal law - is incomplete. Instead, she argues, contrary to Kant, that there are *two* sources of moral standing; two senses of "end in itself": 1. Autonomy, and 2. having a good. Autonomy; the capacity to make laws for ourselves and one another pertains only to rational beings, while having a good pertains to all animals, humans included. Kant saw these two properties as going together - we "legislate" the good when we choose our ends as part of our maxims. Korsgaard, however, thinks they are separable.[724]

Most of the ends humans choose are simply objects of our inclinations, things that we find good *for* ourselves, and not necessarily things that that are good *absolutely*. '*Absolutely'*, in the sense of qualifying as a universal law; qualifying as something that is good for all people.[725] The fact that we pursue objects of our inclinations indicates that humans "*take it to be absolutely good that we should act as we choose and get the things that are good for us*".[726] Kant's view is that we do this because we take ourselves to be ends in ourselves; we *""represent" ourselves as ends in ourselves insofar as we take what is good for us to be good absolutely. It is as if whenever you make a choice, you said: "I take the things that are important to me to be important,* period*, important absolutely, because I take* myself *to be important."*"[727] Through an analysis of what it means for rational beings to make choices[728], Korsgaard arrives at a pertinent question: "*Do we presuppose our value only insofar as we are beings who are capable of willing our principles as laws? Or do we presuppose our value as beings for whom things can be good or bad?*"[729] Human beings are not 'just' rational beings. They do not go around (to put it in Kant's terms) "willing" desired ends, without that end being preceded by a original decision that is usually based on a simple inclination. Korsgaard uses the example of choosing to grow a vegetable garden. The original decision to choose or will the desired end of the vegetable garden is not motivated by respect for my own autonomy in *that* sense. Instead, it is based on an inclination, the desire to grow a vegetable garden. Only after I have made the choice to grow a vegetable garden can I then respect my own choice and/or do what is necessary to carry it out in the sense of respecting my own autonomy; in the sense of taking my choice to

[722] Korsgaard in fact expounds on both the utilitarian and Kantian view on the topic of the value of animals, favouring the latter, see Korsgaard 2020, page number not available.
[723] Korsgaard, Harvard Law School lecture, 28 February 2020
[724] Email correspondence with professor Korsgaard dated 18 January 2022, Korsgaard 2018, Korsgaard 2018a
[725] Korsgaard 2012, p. 10. See also where she explains: "*Kant supposes that a rational being pursues an end only if she thinks it is good absolutely, so he thinks we do not pursue the objects of our inclinations merely because we think those ends are good for us. Yet we do pursue the objects of our inclinations, and we often expect others to help us in small ways, or at least not to interfere without some important reason for doing so. That suggests that we take it to be absolutely good that we should act as we choose and get the things that are good for us.*"
[726] Korsgaard 2012, p. 11
[727] Korsgaard 2012, p. 11
[728] For the purposes of this chapter and this research, it goes too far to elaborate in detail on this analysis. For a detailed account of the analysis, see Korsgaard 2012, p. 10-16
[729] Korsgaard 2012, p. 11

be a law. But my original choice is one where I am choosing something that is good *for me* as opposed to something that is good absolutely, in the sense of qualifying as a universal law.[730]

What follows from Kant's own argument is that the pertinent fact about humans is that they are beings for whom things can be good or bad. This is not necessarily related to their capacity for rationality, but to the fact that they are animate beings; the sort of beings who have interests, who can experience things as good and bad for themselves. Many of the things that humans experience as good or bad they do not experience insofar as they are autonomous, rational beings, but rather because they are animate beings. Think of food, sex, comfort, freedom from pain and fear.[731] And if that is the pertinent fact about human beings which sets them apart as having a non-comparative dignity, as opposed to their capacity for morality being the pertinent fact (as Kant posed), this has important consequences. It means that, contrary to what Kant says, there are two sources of moral standing: autonomy and having a good. Having a good is something we have in common with the non-human animals. They too have interests, experience things as good and bad for themselves and are therefore ends in themselves.[732] What does this mean for our rights and obligations? We, humans, owe our fellow humans respect for autonomy. That is, we must treat them as fellow lawmakers. At the same time, we owe both humans and animals concern for their good. After all, animals, sharing one of the sources of moral standing with humans (having a good), are owed moral consideration, legal rights and duties. Practically, this means that humans have duties to animals even though the latter can have no duties to us.[733]

For the purposes of this research, Korsgaard's argument is particularly compelling, as it fills the gap that is left in Kant's Rechtslehre where it comes to the inclusion of animals in our legal system.[734] Taking Kant's Rechtslehre and Korsgaards argument on the moral status of animals together, there can be no doubt that the Kantian account, including the broader scope of harm, is applicable to animals.

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[730] See Korsgaard 2012, p. 14-16, where she illustrates this point fully through the already mentioned example of her choosing to grow vegetables in her garden. By making that choice she binds her future self to a project of regular weeding and buying the necessary tools for growing a vegetable garden. In that sense she has legislated a categorical imperative for herself. "*In this simple sense, when I make a choice, I impose obligations on myself - I create reasons for myself. When I act on those reasons, you can say that I am respecting my own autonomy, by obeying the law that I myself have made.*" But, and most importantly, her original decision to choose or will some desired end is not motivated by respect for her own autonomy in *that* sense. "*I cannot respect my own choice or do what is necessary to carry it out until* after *I have made that choice. So the sense in which I "represent myself" as an end in itself when I make the original choice is not captured by the idea that I respect my own autonomy, in the sense of taking my choice to be a law. When I make the original choice, I have no other reason for taking my end to be absolutely good, than that it is good* for me*. This suggests that the pertinent fact about me is simply that I am the sort of being* for *whom things can be good or bad, a being with interests.*"

[731] Korsgaard 2012, p. 14, 16

[732] Korsgaard 2012, p. 36. The above concerns a very abbreviated and no doubt far too simplistic rendition of Korsgaard's argument. For a full, undiluted rending of her argument, please see Korsgaard 2012 and Korsgaard 2020.

[733] E-mail correspondence with Prof. Korsgaard, dated 6 and 18 January 2022. See also Korsgaard 2018 and 2018a. On a separate note, it is needless to say that the topics of moral status and certainly legal rights of non-human animals are somewhat controversial. Consequently, some might argue against the legitimacy of making the jump from accepting that non-human animals have interests and welfare to actually accepting their capacity to be holders of legal rights. Thoughts on these topics are rapidly evolving. In this context the works of Precht 2018 and Donaldson & Kymlicka 2011, among others, are most informative.

[734] Korsgaard's argument is not so much a deviation from Kant, but rather an elucidation of his own point. She highlights a nuance in his own argumentation which has so far been overlooked, even by Kant himself.

7.4 The moral status of ecosystems

Questions of moral status are not limited to humans and non-human animals, but matter for any other living being/entity (e.g. trees and flowers), other species, ecosystems, and non-living entities, such as mountains or natural landscapes.[735] Inspired by Kant and Korsgaard, below an attempt shall be made at an argument for the applicability of Kant's views to nature, or rather our planet's ecosystems. To be clear this section does not propose that a Kantian view is superior to other approaches to environmental ethics (e.g. deep ecology, feminist environmental ethics, animism, social ecology, other traditional ethical theories, including consequentialism, deontology, virtue ethics etc.). It simply aims to further explore the applicability of the Kantian account as provided in this chapter in the context of harm to ecosystems.

Following Korsgaard's argument above, it would appear that if it can be established that good and bad things can happen to ecosystems and that this matters to the ecosystems themselves, the Kantian approach is applicable. This would mean that ecosystems are owed moral and legal consideration. If this indeed would appear to be the case, this would complete the Kantian argument made above for a broader harm concept being applicable in the interaction between humans and ecosystems.

In order to experience something, an impulse, as good or bad for oneself, there has to be a 'self' of sorts; a distinguishable entity that is characterized by an ability to receive impulses. For the reception of these impulses to be established, this entity would have to give some sort of expression of experiencing an impulse as good or bad. In other words it has to be able to give expression of harm suffered or benefits enjoyed. Below, these criteria are examined for the case of ecosystems.

7.4.1 The ecosystem as an entity

The Millennium Ecosystem Assessment (MEA) defines ecosystems as "*a dynamic complex of plant, animal, and microorganism communities and the nonliving environment interacting as a functional unit.*[736] Britannica defines them as "*the complex of living organisms, their physical environment, and all their interrelationships in a particular unit of space*".[737] Merriam Webster defines them as "*the complex of a community of organisms and its environment functioning as an ecological unit*".[738] The National Geographic encyclopedia defines ecosystems as "*a geographic area where plants, animals, and other organisms, as well as weather and landscapes, work together to form a bubble of life*".[739]

The above concern just a few examples of definitions of ecosystems. What they have in common is that each delineates ecosystems as a type of functional unit; a type of 'inter-cooperative' entity consisting of many beings. From this it would appear that it is appropriate to qualify ecosystems as entities in and of themselves.

[735] Stanford Encyclopedia of Philosophy on 'the grounds of moral status' https://plato.stanford.edu/entries/grounds-moral-status/ accessed 20 December 2021
[736] MEA 2005, v
[737] https://www.britannica.com/science/ecosystem accessed 21 December 2021
[738] https://www.merriam-webster.com/dictionary/ecosystem accessed 21 December 2021
[739] https://www.nationalgeographic.org/encyclopedia/ecosystem/print/ accessed 21 December 2021

7.4.2. Can good and bad things happen to ecosystems?

This criterion would also appear to be checked. The 'good' that can happen to an ecosystem are the circumstances that allow it to thrive and sustain. The 'bad' would be events that interfere with its thriving and sustaining, e.g. polluting events, biodiversity loss, deforestation, natural disasters (e.g. causing mass species mortality and loss of habitat).

7.4.3. Do ecosystems give expression of suffering harm?

The idea here is that it matters to humans, and, following Korsgaard's take on Kant, also to non-human animals that good and bad happens to them. Intuitively, in order to probe whether it also matters to ecosystems when good and bad happens to them, we would have to examine whether ecosystems *experience* the good and the bad that happens to them. In other words, we would have to look for expression of having received an impulse as good and bad by ecosystems. An expression of that would be for example a type of recoiling at a harmful impulse and a type of advancement or blossoming at a beneficial impulse. The most obvious avenue to take is to find indications of the ecosystem avoiding harm or adapting to a new situation. Below, the example of coral reefs shall be taken to further explore this criterion, as well as the preceding two criteria.

7.4.4. The example of coral reefs

Above it was already established that ecosystems as such, and thus also coral reefs, function as a unit. Nevertheless, below, for the purposes of illustrating the point completely, a description of coral reef functioning will be given, whereafter the other criteria formulated above shall be tested.

The below description of coral reefs and coral reef functioning is based on the NOAA, EPA, National Geographic, Great Barrier Reef Foundation, the Australian Institute of Marine Science, and World Economic Forum websites, which break down this very complicated subject matter in ways understandable for a lay audience.[740] The aim is to demonstrate that coral reefs (as an example of an ecosystem) meet the demands of moral status. The aim explicitly is not to elucidate the subject of coral reefs in great biological detail.

7.4.4.1 The coral reef as a functioning unit

Coral reefs are considered some of the most diverse and productive ecosystems in the world.[741] Thousands of species of corals live under diverse circumstances. Some thrive in warm, shallow, tropical seas. Others live in the cold, dark depths of the ocean.[742] Coral reefs are often referred

[740] For a more academic approach to the subject, please see Brandl et al. 2019
[741] Odum & Odum 1955; https://www.noaa.gov/education/resource-collections/marine-life/coral-reef-ecosystems accessed 7 January 2022
[742] https://www.noaa.gov/education/resource-collections/marine-life/coral-reef-ecosystems accessed 7 January 2022

to as the 'rainforests of the sea' due to the grand diversity of life found in the habitats they create.[743]

Coral reefs are built by coral polyps, which are tiny, soft-bodied organisms related to hydroids, sea anemones and jellyfish.[744] Coral Polyps can take many forms: large reef building colonies, graceful flowing fans, and even small, solitary organisms.[745] At their base there is a hard, protective limestone skeleton, the so-called 'calicle', which forms the structure of coral reefs. A reef is born when a polyp attaches itself to a rock on the sea floor, subsequently dividing into thousands of clones. Polyp calicles connect to one another, creating a colony that acts as a single organism. Besides asexual reproduction, corals also reproduced through coral spawning.[746] Once a year, over several days following the full moon, coral mass spawning takes place. This is a natural phenomenon whereby multiple species of coral synchronise the release of sperm and eggs over several days. Coral sperm and eggs float to the surface of the ocean, fertilise and then develop into larvae, which in turn settle on the reef where they metamorphose into coral polyps and create new coral colonies.[747] Colonies grow over hundreds to thousands of years and can join with other colonies, creating coral reefs.[748] Some of the coral reefs present on our planet today are over 50 million years old.[749]

Polyps of shallow water, reef-building corals contain microscopic algae, so-called 'zooxanthellae'.[750] The zooxanthellae, who live in the tissues of the polyps of reef-building corals, live in a symbiotic relationship with the corals.[751] The coral polyps (animals) provide the algae (plants) a home, and in exchange the algae provide the polyps with three services; namely food, oxygen production, and waste removal. Through photosynthesis, the algae that live inside coral absorb carbon dioxide molecules from the air and turn them into food and energy.[752] Photosynthesis requires sunlight, therefore, most reef-building corals live in clear, shallow waters that are easily penetrated by sunlight. Lastly, the algae give the coral its colour. Coral polyps on their own are transparent; it is the colour of the algae inside that shows through

[743] https://www.noaa.gov/education/resource-collections/marine-life/coral-reef-ecosystems accessed 7 January 2022. See also where it states; "*The Northwest Hawaiian Island coral reefs, which are part of the Papahānaumokuākea National Marine Monument, provide an example of the diversity of life associated with shallow-water reef ecosystems. This area supports more than 7,000 species of fishes, invertebrates, plants, sea turtles, birds, and marine mammals. Deep water reefs or mounds are less well known, but also support a wide array of sea life in a comparatively barren world.*"

[744] https://www.nationalgeographic.com/animals/invertebrates/facts/corals-1 accessed 7 January 2022; https://www.epa.gov/coral-reefs/basic-information-about-coral-reefs accessed 7 January 2022

[745] https://www.noaa.gov/education/resource-collections/marine-life/coral-reef-ecosystems accessed 7 January 2022

[746] https://www.weforum.org/agenda/2021/11/coral-spawning-great-barrier-reef-climate-change/ accessed 6 March 2022

[747] https://www.aims.gov.au/seasim-coral-spawning-activities accessed 6 March 2022. See also where it says: "*For example, along the Great Barrier Reef spawning usually occurs after the full moon in October and November.*"

[748] https://www.nationalgeographic.com/animals/invertebrates/facts/corals-1 accessed 7 January 2022

[749] https://www.nationalgeographic.com/animals/invertebrates/facts/corals-1 accessed 7 January 2022

[750] https://www.epa.gov/coral-reefs/basic-information-about-coral-reefs accessed 7 January 2022; https://www.noaa.gov/education/resource-collections/marine-life/coral-reef-ecosystems accessed 7 January 2022

[751] https://www.epa.gov/coral-reefs/basic-information-about-coral-reefs accessed 7 January 2022; https://www.noaa.gov/education/resource-collections/marine-life/coral-reef-ecosystems accessed 7 January 2022

[752] In fact, all green plants, including seagrass and mangroves are able to do this. Moreover, the ocean's surface naturally dissolves carbon dioxide molecules from the atmosphere above, collecting almost one third of all global carbon dioxide emissions. See https://www.barrierreef.org/news/blog/what-is-blue-carbon accessed 22 January 2022

the polyps. This type of symbiosis, that mutually benefits the entities involved in it is called mutualism. [753]

It is estimated that 25 percent of all marine life, including more than 4,000 species of fish are dependent on coral reefs at some point in their life cycle.[754] EPA points out that the habitat, feeding, spawning, and nursery grounds that coral reefs provide benefit over 1 million aquatic species, including commercially harvested fish species.[755] Coral reefs also enable nearby seagrass meadows and other coastal ecosystems to absorb carbon dioxide. The stored carbon builds up over time and is deposited in coastal sediments and soils. Some of the carbon found in coastal ecosystems is up to thousands of years old. Evidence suggests that when coral reefs are damaged, this also affects the ability of nearby coastal ecosystems to absorb carbon dioxide.[756]

Humans also retain many benefits from coral reefs.[757] Coral reefs protect the coastal infrastructure and prevent loss of life due to storms, tsunamis, floods, and erosion. They offer opportunities for recreation and tourism, such as fishing, scuba diving, and snorkelling, which contribute billions of dollars to local economies. They provide food for humans living in their vicinity (especially on small islands)[758] and are a source of new medicines that can be used to treat diseases and other health problems.[759] Globally speaking, approximately half a billion people depend on coral reef ecosystems for food, coastal protection, and income from tourism and fisheries.[760]

From the above explanation, specifically on the mutualist nature of coral reefs, it would seem apparent that they function as a unit.

7.4.4.2 The good and bad that coral reefs experience

Coral reefs face natural and human induced threats. Natural threats include diseases, predators, and storms. Human induced threats include pollution, sedimentation, unsustainable fishing practices, as well as climate change, which raises ocean temperatures, causing ocean acidification. [761]

[753] https://www.epa.gov/coral-reefs/basic-information-about-coral-reefs accessed 7 January 2022; https://www.noaa.gov/education/resource-collections/marine-life/coral-reef-ecosystems accessed 7 January 2022
[754] https://www.epa.gov/coral-reefs/basic-information-about-coral-reefs accessed 7 January 2022; NOAA states that "*[a]bout 25% of the ocean's fish depend on healthy coral reefs*, see https://www.noaa.gov/education/resource-collections/marine-life/coral-reef-ecosystems accessed 7 January 2022
[755] https://www.epa.gov/coral-reefs/basic-information-about-coral-reefs accessed 7 January 2022
[756] https://www.barrierreef.org/news/blog/what-is-blue-carbon accessed 22 January 2022
[757] See Moberg & Folke 1999, p. 215-216 and 219 for an overview of the goods and services that coral reefs provide humans.
[758] For example fish, mussels, crustaceans, sea cucumbers and seaweeds. See Moberg & Folke 1999, p. 217
[759] https://www.epa.gov/coral-reefs/basic-information-about-coral-reefs accessed 7 January 2022
[760] https://www.epa.gov/coral-reefs/basic-information-about-coral-reefs accessed 7 January 2022
[761] https://www.noaa.gov/education/resource-collections/marine-life/coral-reef-ecosystems accessed 7 January 2022

7.4.4.3 Do coral reefs give expression of suffering harm?

As stated above, in order to probe whether it matters to coral reefs when good and bad happens to them, we would have to examine whether they *experience* the good and the bad that happens to them. Experiencing something as bad would, intuitively, cause the coral reef to recoil. Experiencing something as good would, intuitively, cause the coral reef to 'blossom'. An intuitive approach is to find indications of the ecosystem avoiding harm or adapting to a new situation. Below, coral reef reaction to stresses and pressures shall be expounded on. For the purposes of this research this examination shall not venture into great biological scientific depths, but shall approach the subject in a manner that is understandable for a lay audience. For the avoidance of doubt, the point that shall be made here is that coral reefs can react to "good and bad" things happening to them. It is clear that a coral reef's expression of suffering cannot necessarily be equated to a human's expression of suffering. The latter's is characterised by an awareness of / an ability to reflect on, his/her own suffering. The idea that ecosystems experience suffering in the same way, may be taking it a little far for some. The point is that corals display reactions to bad things that happen to them. And, as a result of this, it could be argued that one can speak of so-called positive and negative experiences that coral reefs are exposed to and that cause them to express harm.

When coral reefs are confronted with stressors, like the ones mentioned above, it can lead to physical damage to the coral reef, coral bleaching and possible death.[762] For example, "*during the 2014-2017 coral bleaching event, unusually warm waters (partially associated with a strong El Niño) affected 70% of coral reef ecosystems worldwide. Some areas were hit particularly hard, like the Great Barrier Reef in Australia, where hundreds of miles of coral were bleached. Corals are able to recover from bleaching events if conditions improve before they die, though it can take many years for the ecosystems to fully heal.*"[763] Other ways in which corals express harm endured are e.g. less frequent spawning and reduced growth rates.[764]

Under favourable conditions, in turn, coral reefs respond by procreating through cloning and coral spawning, and healthy growth rates.[765]

In sum: It is clear from the above that coral reef ecosystems function as a unit. It is also clear that they experience the good and the bad that happens to them and that that matters to the coral reefs themselves. Coral reefs give expression of harm suffered through, for example, coral bleaching. They also give expression of experiencing the good that happens to them through growth and procreation.

[762] https://www.noaa.gov/education/resource-collections/marine-life/coral-reef-ecosystems accessed 7 January 2022

[763] https://www.noaa.gov/education/resource-collections/marine-life/coral-reef-ecosystems accessed 7 January 2022, see also where it says: "*Scientists are also testing new ways to help coral reef ecosystems, such as growing coral in a nursery and then transplanting it to damaged areas.*"

[764] Mumby et al. 2007, p. 28

[765] See Mumby et al. 2007, p. 30, where it says: "*The trajectory of corals on a reef can either be one of recovery – if recruitment and growth outweigh mortality – or decline, where rates of background mortality outweigh recruitment and growth [ref]*".

8. Discussion

This chapter started out with reiterating one of the main findings established in the last chapter, namely that courts tend to "anthropocentrize" ecocentric harms. The aim of this chapter was to explore whether it is possible – counter to the impressions left by the case law analyses advanced in the last chapter - to fit pure ecological harm into our current legal system. Below, this question shall be addressed from a theoretical and a practical point of view. Theoretically, the question can be answered conclusively as this chapter's analysis has provided the foundation for that. Practically, the question cannot yet be answered conclusively. However, some preliminary intuitions that flow from the theoretical findings shall be put forward. Lastly, a suggestion for how to continue this research in order to reach a practical answer shall be advanced.

8.1. The theory

In this chapter, an attempt was made to question the legitimacy of our current anthropocentric approach to harm as well as to explore the *theoretical* possibility of fitting an ecocentric approach (read: the notion of pure ecological harm) into our current legal system. To this end, an analysis was conducted of our current civil law concept of harm and Kant's ideas on harm as expressed in his Doctrine of Right. It was found that Kant's ideas almost perfectly line up with our current approach to tort law[766], save for one crucial exception: the notion of harm. Kantian theory allows for a much broader notion of harm than does our legal system. Whereas Kant views a loss of power as harm, our current legal system only views material loss or a setback in welfare as harm.

Having established that, theoretically, it is perfectly legitimate to adopt a broader harm-concept, the focus was then turned to the question to whom Kant's theories apply. Kant intended his work to only apply to humans, to the exclusion of all other beings. His work departs from the idea that humans have moral status, derived from the fact that they are rational beings. This moral status gives them an unequivocal dignity; their capacity for rationality allows them to make laws for themselves (read: qualifies them as legal subjects). Morally and legally speaking, that renders them beings who hold rights and duties toward themselves and others. Kant is explicit about the fact that animals do not share this moral status with humans as they are not rational beings. They do not qualify as holders of rights and duties and are there merely to be used by humans. While the aforementioned would, at first glance, appear to shut the door on using Kant's work to explore a more ecocentric approach to harm, the work of contemporary philosopher and Kantian, Prof. Christine Korsgaard pushes the door back open. Korsgaard's work on the moral status of animals and animal rights is based on Kantian theory, but enhances it in areas where it appears to be incomplete. Korsgaard puts forward that humans' moral status is not derived singularly from the property of having rational capacities that allow us to make laws for ourselves, but importantly also from humans "having a good". Meaning, humans are beings for whom things can be good or bad. And that is less related to their capacity for rationality, but sooner related to the fact that they are animate beings, much like animals. Having a good is a source of moral status shared by humans and animals, rendering the Kantian

[766] Confirming once more Kant's continued relevancy for the explanation and further development of our contemporary legal system.

account applicable to animals. This has implications for their legal status. Having moral status means that animals too can have rights and be owed duties by humans, but cannot – due to the lack of their rational capabilities – be expected to carry duties towards humans.

The question was then posed whether, using Korsgaard's enhanced views of the Kantian account, this line of reasoning could also be applied to ecosystems. This was tested by directly applying Korsgaard's instructive animal rights account to the case of coral reefs. From this exercise, it appeared that ecosystems too qualify for the source of moral status of "having a good". As shown above through the example of coral reefs, ecosystems are distinguishable entities that experience good and bad. Much like with humans and animals, this matters to the ecosystems themselves as they give expression of their positive or negative experience (recall the example of coral spawning under favourable circumstances and coral bleaching under unfavourable circumstances). Thus, the Kantian account appears applicable to humans, animals, and ecosystems alike. Having moral status has implications for the legal status of ecosystems. Like with animals, ecosystems too can have rights and be owed duties by humans, but cannot – due to the lack of their rational capabilities – be expected to carry duties towards humans.

Having established that ecosystems have moral status, makes them legal subjects of our legal system. This means that the conclusions that were drawn earlier, about our civil law system's harm concept being too narrow, are equally applicable to ecosystems as they are to any other legal subject. (Having addressed the moral status of ecosystems sufficiently, the argument shall continue below, taking for granted that they are in fact legal subjects.) Adopting a Kantian account of harm entails that nonmaterial harm, like pure ecological harm, unequivocally qualifies for compensation.

Taken all the above together, it is now possible to answer the question posed at the top of this chapter, "is it possible to fit pure ecological harm into our legal system?". The answer is: Yes, not only is it possible to fit pure ecological harm into our legal system, following a Kantian account, it is legally theoretically unsound and illegitimate not to do so. The normative philosophical foundations of our law do not merit an approach whereby only humans count as legal subjects and where the concept of harm is limited to material harm. It demands a more inclusive approach to who counts as a legal subject and a more holistic approach where it comes to the notion of harm.

For ecosystems this means that they qualify for legal status.[767] It also means that the nonmaterial harm they suffer, which usually consists of humans disposing of the ecosystem's means as though it were theirs, or in other words, "harm as a power loss", qualifies for compensation.

In sum, our current civil law approach to who counts as a legal subject and what counts as harm lacks theoretical legitimacy. The very normative foundation that our law is built on does not license an approach whereby humas and ecosystems are treated as not having equal value. Neither does it license an approach whereby harm is limited to the idea of a material/financial setback. Theoretically speaking, pure ecological harm can and ought to be fit into our existing legal system. The underlying aim of tort law to make victims whole again, or in other words, to place them as much as possible in the situation as though the tort had not occurred in the first

[767] Obviously, in court they require representation by humans acting through e.g. a governmental organization or an interest group.

place, is irreconcilable with a harm concept that ignores an entire category harm, namely nonmaterial harm.

8.2 The practice

What does this mean, practically speaking, for the role of pure ecological harm in the courtroom? After all, this research is focused on the rather practical matter of *ex post* valuation of pure ecological harm for the purposes of claiming damages in court.

What we have found so far is that the normative philosophy underlying the law demands that we fit pure ecological harm into our legal system. However, it does not provide a suggestion for the manner in which to do this. Below, firstly, some preliminary observations on the practical implications of the aforementioned theoretical finding shall be given. Thereafter, a suggestion for how to examine the manner in which to apply pure ecological harm in the courtroom shall be made.

As seen in the case law analyses provided in the previous chapter, most claims for pure ecological harm fell flat due to the nonmaterial nature of the harm suffered. The fact that the harm could not be valued in dollars or euros meant that courts found it difficult to identify harm suffered as "legal harm" and to translate it to a sum of damages. While the pure ecological harm suffered in the cases examined might not have been easily captured under the banner of "classic" material harm, as we know it in tort law, it certainly can be captured under the banner of Kantian harm (read: harm as a power loss). After all, the harm that resulted from the foundering of the *Exxon Valdez* and the *Erika*, and the actions taken by Nicaragua in the border region of Costa Rica, all entailed the destruction of power[768] of all those who were equally entitled to and benefited from the respective ecosystems remaining intact. This included humans, animals, but also the ecosystems themselves. If a Kantian harm concept would have been applied, the outcome of the cases would have been very different.[769] Instead of not acknowledging pure ecological harm as such, the courts would have had to acknowledge it and assign compensation for it.

This leads us to an unavoidable question, namely how to practically approach the recognition of Kantian harm in the courtroom. The fact is that for day-to-day (environmental) legal practice, damages claimed must ultimately be formulated in a monetary fashion.[770] Therefore, the concept of nonmaterial harm, while theoretically sound, is practically a challenging one to work with. How does one translate something as intangible as nonmaterial harm to a tangible monetary claim?

In court, a more Kantian approach would entail finding a way to "materialize" nonmaterial harm so that it can be fit into the current legal system. For example, by assigning a monetary value to individual components of nature that are harmed, nonmaterial harm can be

[768] Recall that destruction of power entails treating someone's means as though they are yours to dispose of.
[769] Under a Kantian account, also the approach taken to the case by claimants can be given shape differently. Instead of only claiming damages on behalf of people who have lost use value due to the disruption of an ecosystem by a polluter, one could claim damages on behalf of the ecosystem itself. The ecosystem is a victim of suffering harm as a power loss (read: e.g. having its means used by the polluter as though they were the polluter's to dispose of, or being the victim of infliction of intentional injury, e.g. in the case of waste dumping).
[770] This research focuses solely on the monetary compensation of damages and is not concerned with alternative forms of compensation and restoration, such as rectification, restorative justice.

"materialized" so that it becomes a tangible and manageable matter to deal with in the courtroom. The cases addressed in the previous chapter are examples of - albeit failed - attempts to do so. This chapter confirms the theoretical legitimacy of such an approach, but, as pointed out already, it does not provide anything concrete in the way of making this approach a practical possibility. Therefore, the next logical step in this research would be to pursue a line of inquiry into how to practically implement the Kantian harm account in the courtroom.

The case law under review showed an increasing awareness across time of the concept of pure ecological harm among both claimant parties and judges. While attempts to claim pure ecological harm largely failed, this chapter has shown that those attempts were legitimate and therefore merit further examination. In particular the ecosystem services approach, as formulated by Costa Rica in *Costa Rica v. Nicaragua*, remains worth exploring as it in essence entailed exactly what is suggested in this chapter: a conscious effort to materialize nonmaterial harm for the purposes of claiming damages in court. Furthermore, it was based on state of the art valuation methodology as applied in environmental economics and policy making, and therefore also offers a state of the art point of departure. The next chapter shall examine the possibility to valuate harm through the concept of ecosystem services as a possible way of bridging the gap between nonmaterial and material harm.

For the avoidance of any doubt, it is important to point out that this research is concerned with a niche topic within a much broader existing debate. This research is concerned only with *ex post* valuation of pure ecological harm in the courtroom. The suggested avenue for exploration is chosen as the concept of an ecosystem services approach intuitively appears to be able to provide an answer to the difficulty of quantification of nonmaterial damages. The choice for the exploration of this approach does not entail an argument or plea *for* this approach, nor does it aim to idealize this method. It merely is tested as to its ability to meet the demand of quantification of nonmaterial harm in the courtroom. This research leaves untouched the existing, much broader, ethical debate surrounding valuation of nature as such, meaning the question *is it appropriate, permissible and / or justifiable to valuate nature?* Instead, it departs from the conviction that valuation of nonmaterial harms in monetary terms inherently brings about legitimate ethical concerns and practical difficulties. It also takes for granted, however, that for day to day environmental legal practice it is unavoidable to ask the (amoral) question: how many dollars/euros is nature worth? To answer that unavoidable question, the analysis conducted in the next chapter is unavoidable and valuable.

9. Conclusion

This chapter started out with the finding, based on Chapter 2, that judges often "anthropocentrize" ecocentric harms in order to fit them into existing legal frameworks and/or traditional legal notions of harm. The question was then posed whether it is nevertheless possible to fit pure ecological harm into our existing legal system. And, if so, how?

To answer this question theoretically, a legal and normative philosophical approach was chosen, relying on the work of Immanuel Kant; particularly his Rechtslehre. It was found that Kant's Rechtslehre and civil law theoretically almost perfectly line up, with the important exception of Kant's Rechtslehre providing a broader harm concept than does civil law. Specifically where it comes to torts, Kant allows for instances of nonmaterial harm to create obligations, where

tort law generally does not. It was found that the broader Kantian harm concept could nevertheless potentially be translated to the daily practise of courts, thereby "lining up" the philosophy that grounds the law and the law as we practice it today. It was proposed that this could be done by "materialising" harms formerly thought of as nonmaterial (read: pure ecological harm) through attaching monetary values to parts of nature.

Finally, an important vulnerability in the analysis was tackled, namely the fact that Kant's Rechtslehre revolves entirely around interaction between human beings. After all, according to Kant only human beings have moral standing and so are owed moral and legal consideration. However, following Korsgaard's extensive body of work on animal rights, it was established that the Kantian view on moral status is incomplete. Korsgaard argues, contrary to Kant, that there are two sources of moral standing, namely autonomy and having a good. The first, autonomy, only applies to human beings. The second, having a good, is a source of moral standing shared by human beings and animals. This means that following Korsgaard's approach, which in essence concerns an improved Kantian approach, animals have moral status and are therefore owed moral and legal consideration.

Subsequently, the applicability of Korsgaard's approach was tested on the case of ecosystems. It was found that ecosystems too have a good. As functioning units, good and bad can happen to them and they give expression of this. In the case of coral reefs, through respectively coral bleaching and mortality versus coral spawning and growth.

What does all the above mean? It means that pure ecological harm, at least theoretically, does fit into our legal system. The next chapter shall be dedicated to an exploration of how this theoretical finding can find practical implementation. As alluded to before, the avenue explored shall be that of how to materialise nonmaterial harm. For the avoidance of doubt, it should be pointed out that the choice for the exploration of this approach does not entail an argument or plea *for* this approach. This research is not focused on a *for* or *against* debate on the ethical concerns surrounding valuation of nature as such, however legitimate those concerns may be. Instead, this research takes for granted that valuation of immaterial harms in monetary terms inherently brings about practical difficulties and ethical concerns. Nevertheless, for the day to day environmental legal practice it is unavoidable to ask the (amoral) question: how many dollars is nature worth? To answer that unavoidable question, the analysis conducted in the next chapter is necessary.

Obviously in the legal system, as will be explored in the next chapters, to an important extent the question whether ecological damage can be compensated, has been answered in the affirmative. However, to some extent this idea is still debated. It is precisely for that reason that it was considered useful in this chapter to address the philosophical foundations of the notion of harm on the basis of the Rechtslehre from Emmanuel Kant. That led to the conclusion that to the extent that some would doubt whether pure ecological harm fits into our legal system, this can, with the support of Kant, absolutely be confirmed. Obviously Kant provides a useful philosophical underpinning to fit pure ecological harm into our legal system, yet it does not answer all practical problems. One of the most important ones is how pure ecological harm can exactly be valuated. Although Kant does not provide concrete indications that could, e.g. help a judge to valuate pure ecological harm, the conclusion from Kant's approach is certainly that pure ecological harm should be taken seriously and that the amount to be allocated for harm to the environment can therefore definitely not be equated to zero. But admittedly, the value of a

philosophical approach, like the one from Kant, is rather to provide theoretical foundations instead of concrete indications, e.g. on the appropriate amount to valuate ecological harm in case it would be injured. That is not what a philosophical approach purports to do and not what has been attempted in this chapter.As mentioned at the top of this chapter, many other avenues for exploration of the Kantian account's (but also other philosophical accounts') relevancy for current environmental legal practise come to mind, not the least of which the earlier mentioned idea of an *ex ante* increased quality of our actions as humans towards nature (read: a legal and moral obligation to act in the best interest of nature). However, for the purposes of this research, which is concerned with the matter of valuation of pure ecological harm, it makes the most sense to further explore valuation. Against the background of the ecosystem services approach taken in the most recent of our case studies, namely the case of *Costa Rica v. Nicaragua*, in the next chapter the concepts of ecosystem services and payments for ecosystem services shall be expounded on with the aim of assessing (the development of) their potential practicality for the courtroom towards the future.

Chapter 4

Valuation of ecosystem services

1. Introduction

In the last chapter it was found that going forward, theoretically speaking, the acknowledgement of pure ecological harm by our legal system is not only possible, but necessary. This chapter shall examine how this theoretical finding can practically be given shape.

Departing from the legal reality that in order for a court to be able to adjudicate a claim for damages it must be presented with a tangible claim formulated in monetary terms, this chapter shall focus on ways to materialize nonmaterial harm. After all, from the case law analysis in Chapter 2 it was found that when harm remains nonmaterial it remains unacknowledged and unadjudicated in the courtroom. From the normative philosophical analysis in Chapter 3, it followed that when harm remains nonmaterial it falls outside of our current legal system. It appears that in order to prevent pure ecological harm from falling through the cracks of our legal system, we will have to convert it to something material; something expressible in a monetary fashion.

Following from the findings in the last two chapters, this chapter shall aim to assess whether an ecosystem services approach presents a practically sound way forward for formulating and adjudicating claims for pure ecological harm in the courtroom.

In order to answer this matter, this chapter shall delve into two concepts, being 1. ecosystem services (ES), and 2. payments for ecosystem services (PES). The first must be examined as a concept on its own before any normative views can be formed as to its practicability for the courtroom. The second, PES, is examined as an example of a policy practice that has already adopted a type of ecosystem services approach. From the experiences so far made with PES in the policy realm, inferences can possibly be made for the usableness of an ecosystem services approach in the legal realm.

As alluded to in the previous chapter, the reason for specifically delving into the concept of ES as a possible way forward for claiming pure ecological harm, is the pioneering "ecosystem services approach" taken by Costa Rica in *Costa Rica v. Nicaragua*. This approach is, legally-theoretically, legitimate and sound. As concluded in Chapter 2, it would appear that in *Costa Rica v. Nicaragua* some valuable opportunities for formulating an in-court valuation methodology were forgone in spite of parties' (in particular Costa Rica's) astute approaches to the matter. The "ecosystem services approach" by Costa Rica, therefore, deserves a second look.

At this point, it should briefly be pointed out that ES harm does not equal pure ecological harm. They are closely related and at times overlap, but are not interchangeable.

ES concern the benefits that humans obtain from ecosystems. These benefits consist of goods and services, some of which lend themselves for ownership (often ecosystem goods, such as products of agriculture, aquaculture, and forestry), while others do not (often ecosystem services, such as flood prevention, nutrient cycling, disease regulation). Those ES that are characterized by ownership, fall outside the scope of the definition of pure ecological harm. After all, recall that pure ecological harm "*is understood to mean ecological harm to environmental assets that are not subject to property rights, (including but not limited to air, atmosphere, water, soil, land, landscapes, natural sites, biodiversity and the interaction between these elements), which has no impact on a particular human interest but on a legitimate collective interest*". This means that harm to ES that (can) have property rights vested in them

falls within the scope of 'classic, material harm'; something our laws and courts are more used to dealing with. Harm to ES that are not subject to property rights falls within the scope of pure ecological harm.

Below, first, the concept of ES shall be examined in-depth, expounding on what ecosystem services are, what their value is, and why it is important that they are conserved. Then, an analysis of the PES concept, which builds upon the concept of ES, shall be conducted.[771] Finally, the relevancy of an ecosystem services approach for the courtroom shall be addressed.

For the avoidance of any doubt, it should be stated from the outset that this chapter is concerned with economic valuation of ecosystem services. Over the past 40 years, a broad portfolio of valuation approaches and methodologies has developed. Part of those approaches and methodologies stem from other disciplines, such as anthropology and biology, as well as from various indigenous and local traditions.[772] For state of the art information on this broader portfolio, reference is made to the 2022 'Summary for policy makers of the methodological assessment regarding the diverse conceptualization of multiple values of nature and its benefits, including biodiversity and ecosystem functions and services (assessment of the diverse values and valuation of nature)' of the Intergovernmental Science- Policy Platform on Biodiversity and Ecosystem Services.[773]

2. Ecosystem services

"*An ecosystem is a dynamic complex of plant, animal, and microorganism communities and the nonliving environment interacting as a functional unit. […] Ecosystem services are the benefits people obtain from ecosystems. These include provisioning services such as food, water, timber, and fiber; regulating services that affect climate, floods, disease, wastes, and water quality; cultural services that provide recreational, aesthetic, and spiritual benefits; and supporting services such as soil formation, photosynthesis, and nutrient cycling. The human species, while buffered against environmental changes by culture and technology, is fundamentally dependent on the flow of ecosystem services.*"[774]

Ecosystem services (ES) and the natural capital stocks that produce them are critical to the functioning of the Earth's life-support system and consequently for human wellbeing. The various components that make up ES, directly or indirectly make life on Earth possible. As such, they can be said to represent part of the total economic value of the planet.[775]

ES are not easily tangible, quantifiable, measurable, translated in economic terms or captured in commercial markets, as is the case with "regular" commercial goods. This causes their value

[771] This abbreviation is sometimes used to refer to Payment(s) for *Environmental* Services, as opposed to ecosystem services. So far, the literature has not settled on one standard use of terminology, nor on a standard definition of PES. This will be addressed more elaborately below.
[772] IPBES 2022, p. 13. See also IPBES, p. 5, where it states: "*More than 50 valuation methods and approaches, originating from diverse disciplines and knowledge systems, are available to date to assess nature's values; choosing appropriate and complementary methods requires assessing trade-offs between their relevance, robustness and resource requirements.*"
[773] IPBES 2022
[774] MEA 2005, v
[775] Costanza et al. 1997, p. 253

to be underestimated or not considered at all when it comes to policy decisions.[776] Already in 1997, Costanza et al. warned that *"This neglect may ultimately compromise the sustainability of humans in the biosphere. The economies of the Earth would grind to a halt without the services of ecological life-support systems, so in one sense their total value to the economy is infinite."*[777] The 2019 IPBES Global Assessment confirms this concern, stating: "*Nature and its vital contributions to people, which together embody biodiversity and ecosystem functions and services, are deteriorating worldwide. […] Nature is essential for human existence and good quality of life. Most of nature's contributions to people are not fully replaceable, and some are irreplaceable.*"[778]

Markets exist for some ES, mostly ecosystem goods, such as products of agriculture, aquaculture, and forestry. But many ES are hard to capture in markets. Benefits that humans retain from watershed protection, habitat provision, pest and disease regulation, climatic regulation, and hazard protection remain largely unpriced.[779] The latter are more easily framed as public or common pool resources and property rights are less easily assigned to them, making them less tangible and measurable.[780] Some assert that while the metaphor of "ecosystem services" has helped us in recent years to think about our relation to nature, it has become (too) "*integral to how we are addressing the future of humanity and the course of biological evolution*" and that "*the metaphor of nature as a stock that provides a flow of services is insufficient for the difficulties we are in or the task ahead*".[781]

With the continued provision of ES for future generations under threat, solutions are being sought to combat this ever-deteriorating state of affairs. One economic instrument that has garnered much attention in recent years is Payments for Ecosystem Services (PES).[782] PES schemes involve a voluntary transaction between buyers (or beneficiaries) and sellers (ecosystem managers or safeguards) of ES through contractual agreements. "*In this way, a market or quasi-market is created where the ES that was formerly provided for free suddenly gets a price tag and is valued as a commodity in a trade.*"[783]

PES is a relatively new conservation method, and as such, the definition of PES, as well as its scope, content and design are still under development. Recent studies show that there is no one-fits-all approach to PES and that further exploration of the topic is necessary.[784] Issues that require more attention range from conceptual justification of PES, meaning the appropriateness of economic valuation of nature, to very practical matters, e.g. how to fit PES into existing institutional structures, policy design and matters pertaining to the development of individual PES schemes to ensure efficient and effective outcomes.[785]

Because the PES concept builds upon the concept of ecosystem services, the first part of the chapter will be dedicated to the latter. It will address what ecosystem services are, what their

[776] Costanza et al. 1997, p. 253
[777] Costanza et al. 1997, p. 253
[778] See IPBES 2019, p. 10
[779] Kinzig et al. 2011, p. 603; Sattler & Matzdorf 2013, p. 2
[780] Kinzig et al. 2011, p. 603; Sattler & Matzdorf 2013, p. 2
[781] Norgaard 2010, p. 1219–1227
[782] Wunder et al. 2008; Kinzig et al. 2011; Jack et al. 2008, Cole et al. 2012, Cole et al. 2014
[783] Sattler & Matzdorf 2013, p. 2
[784] Cole et al. 2012; Cole et al. 2014, Wunder 2005
[785] Jack et al. 2008; Sattler & Matzdorf 2013; Morrison & Aubrey 2010

value is, and why it is important that they are conserved. The second part of the chapter will be dedicated to the concept of payments for ecosystem services.[786]

2.1 Defining ecosystem services

One of the original 'modern' definitions of ecosystem services stems from Daily, who describes them as: *"the conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfill human life. They maintain biodiversity and the production of ecosystem goods, such as seafood, forage, timber, biomass fuels, natural fiber, and many pharmaceuticals, industrial products, and their precursors. […] In addition to the production of goods, ecosystem services are the actual life-support functions, such as cleansing, recycling, and renewal, and they confer many intangible aesthetic and cultural benefits as well."*[787] *[…]"Ecosystem services are generated by a complex of natural cycles, driven by solar energy, that constitute the workings of biosphere – the thin layer near earth's surface that contains all known life […]*".[788]

A more recent definition of ES, that most scholars at present take as a point of departure, was provided by the Millenium Ecosystem Assessment (MEA) and defines ecosystem services as all the benefits people obtain from ecosystems. These include "*provisioning services such as food and water; regulating services such as regulation of floods, drought, land degradation, an disease; supporting services such as soil formation and nutrient cycling; and cultural services such as recreational, spiritual, religious and nonmaterial benefits*".[789]

The concept of ES can be subdivided into several categories. The MEA mentions *ecosystem* services and *supporting* services (see above). Costanza et al. explicitly divide ES into ecosystem functions, goods, and services, stating: *"Ecosystem functions refer variously to the habitat, biological or system properties or processes of ecosystems. Ecosystem goods, such as food; ecosystem services, such as waste assimilation represent the benefits human populations derive, directly or indirectly, from ecosystem functions. For simplicity, we will refer to ecosystem goods and services together as ecosystem services."*[790]

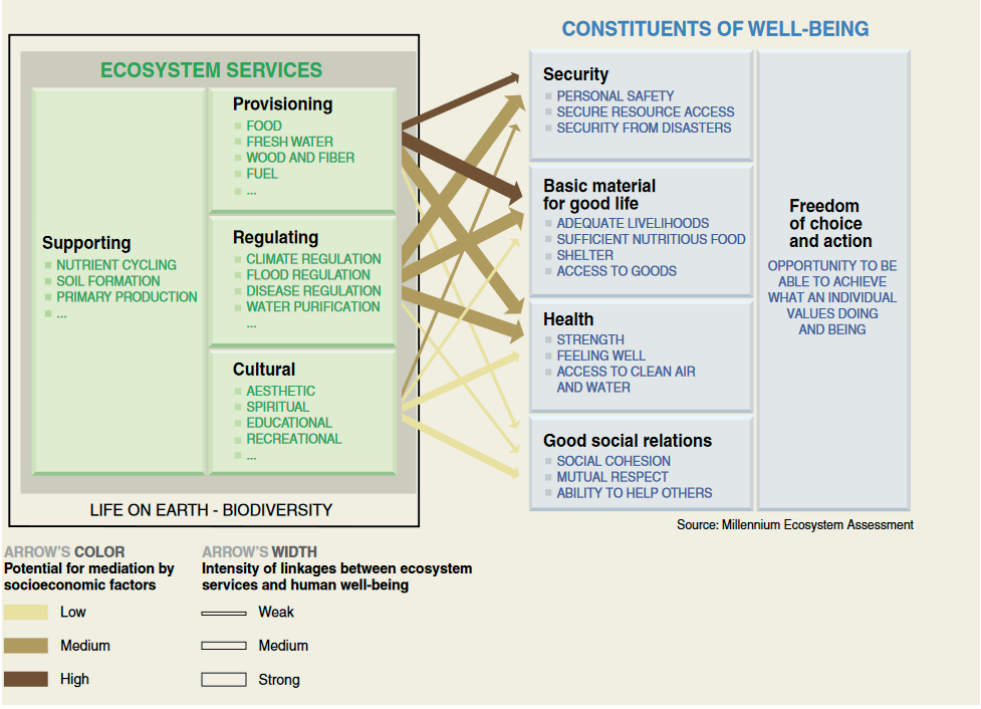
UNDP subdivides ES into four main categories: 1. Provisioning services (the products obtained from ecosystems such as food and fresh water); 2. Regulating services (the benefits obtained from the regulation of ecosystem processes such as air quality and pollination); 3. Cultural services that directly affect people (the non-material benefits that people obtain such as spiritual enrichment, recreation and aesthetic experiences); 4. The supporting services needed to maintain the other services (such as photosynthesis and nutrient recycling)."[791]

Whichever categorization is preferred, it is clear that ES are crucial to the sustainability of human life and that their deterioration negatively affects the services rendered, which in turn

[786] This abbreviation is sometimes used to refer to Payment(s) for *Environmental* Services, as opposed to ecosystem services. So far, the literature has not settled on one standard use of terminology, nor on a standard definition of PES. This will be addressed more elaborately below.
[787] Daily 1997, p. 3
[788] Daily 1997, p. 4
[789] MEA 2005
[790] Costanza et al. 1997, p. 253
[791] UNDP (no year available), http://www.sdfinance.undp.org/content/sdfinance/en/home/solutions/payments-for-ecosystem-services.html> accessed 21 October 2018

has negative consequences for human well-being.[792] MEA illustrates through a model (see Fig. 1) ES' effect on human well-being. On the left side, the natural science domain is depicted, and on the right side, the human, social and economic domain. ES flow from the left to the right. The strength of linkages between categories of ecosystem services and components of human well-being are expressed through the width of the arrows. The colour of the arrows give an indication of the potential for mediation of degradation through socioeconomic factors. MEA stresses that the strength of the linkages and the potential for mediation differ in different ecosystems and regions, and that besides ES having an effect on human wellbeing, other environmental factors as well as economic, social, technological, and cultural factors do so as well and that ecosystems are in turn affected by changes in human well-being.[793]

Figure 1. Ecosystem services according to MEA



Borrowing from Daily, the non-exhaustive lists of ES presented in Figure 1 can be supplemented with amongst others: purification of air, mitigation of droughts, detoxification and decomposition of wastes, generation and renewal of soil and soil fertility, pollination of crops and natural vegetation, control of the vast majority of potential agricultural pests, dispersal of seeds and translocation of nutrients, maintenance of biodiversity, from which humanity has derived key elements of its agricultural, medicinal, and industrial enterprise, protection from the sun's harmful ultraviolet rays, partial stabilization of climate, moderation

[792] TEEB 2010
[793] MEA 2005, vi

of temperature extremes and the force of winds and waves, support of diverse human cultures, provision of aesthetic beauty and intellectual stimulation that lift the human spirit.[794]

Human life depends on the continuation of these natural cycles. If these cycles are disrupted – e.g. the carbon cycle that protects against climatic changes, the life cycles of pollinators of plants or natural pest controls – this can cause significant social and economic consequences.[795] Importantly, ES are mostly not replicable through human technology.[796]

The concept of ES has regained broader attention in recent years when in 2005, the United Nations published its MEA. The MEA was the result of a four-year, 1300-scientist study for policymakers. It shed light on three major problems associated with our management of the world's ecosystems that are already causing significant harm to some people: 1. Approximately 60% (15 out of 24) of the ecosystem services examined during the MEA were found to currently be degraded or used unsustainably, including fresh water, capture fisheries, air and water purification, and the regulation of regional and local climate, natural hazards, and pests; 2. It was found that there is evidence, albeit incomplete, that changes being made in ecosystems are increasing the likelihood of nonlinear changes in ecosystems (including accelerating, abrupt, and potentially irreversible changes) that have important consequences for human well-being. These concern matters such as disease emergence, abrupt alterations in water quality, the creation of "dead zones" in coastal waters, the collapse of fisheries, and shifts in regional climate; 3. It was found that the harmful effects of the degradation of ecosystem services (the persistent decrease in the capacity of an ecosystem to deliver services) are being borne disproportionately by the poor. As such, they contribute to growing inequities and disparities across groups of people and are sometimes the principal factor causing poverty and social conflict.[797]

A second UN initiative, conducted by the UN Environment Programme (UNEP), followed between 2007 and 2010, called the Economics of Ecosystems and Biodiversity (TEEB). TEEB is a global initiative that aims to make nature's values visible and to ensure that the values of biodiversity and ecosystem services are mainstreamed into decision-making at all levels. "*It aims to achieve this goal by following a structured approach to valuation that helps decision-makers recognize the wide range of benefits provided by ecosystems and biodiversity, demonstrate their values in economic terms and, where appropriate, capture those values in decision-making.*"[798] Publications by the World Business Council for Sustainable Development show active support and further development of the concept.[799]

In 2019, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) published the Global Assessment Report on Biodiversity and Ecosystems Services.[800] The report found that "*human actions threaten more species with global extinction*

[794] Daily 1997, p. 3-4
[795] Daily 1997, p. 5
[796] Costanza et al. 1997, p. 255; IPBES 2019, p. 10
[797] MEA 2005, p. 1-2
[798] TEEB 2010
[799] Costanza et al. 2014, p. 152; WBCSD 2011; WBCSD 2012
[800] IPBES 2019. IPBES strives toward a more holistic approach when it comes to framing the human-nature relationship: "*In science and management, the ecosystem services framework has been extensively used to relate different facets of nature to people's good quality of life. The IPBES framing of nature's contributions to people aims to more explicitly include values like responsibility, reciprocity and respect for nature, as well as to embrace*

now than ever before. An average of around 25% of species in assessed animal and plants groups are threatened, suggesting that around one million species already face extinction, many within decades, unless action is taken to reduce the intensity of drivers of biodiversity loss. Without such action, there will be a further acceleration in the global rate of species extinction, which is already at least tens to hundreds of times higher than it has averaged over the past 10 million years."[801] According to IPBES 2019, the two largest drivers of the extinction of species are: 1. the ever expanding room that humans take up on planet Earth; and 2. fishery, hunting, and poaching.[802] It showed that, by now, 75% of the planet's land surface has been significantly altered, 66% of the ocean area is experiencing increasing cumulative impacts, and over 85% of wetlands (area) has been lost. While, globally, the rate of forest loss has slowed down since 2000, this impact is not distributed equally. "*Across much of the highly biodiverse tropics, 32 million hectares of primary or recovering forest were lost between 2010 and 2015.*"[803] The most widespread form of land-use change is agricultural expansion. More than one third of the terrestrial land surface is being used for cropping or animal husbandry. At the same time, urban area has doubled since 1992 and we are witnessing an unprecedented expansion of infrastructure linked to growing population and consumption. These developments come mostly at the expense of forests (largely old-growth tropical forests), wetlands and grasslands.[804] At the same time, oceans are suffering from overexploitation of fish, shellfish and other organisms, pollution, including from river networks, and land-/sea-use change, including coastal development for infrastructure and aquaculture.[805]

With the MEA, the Ecosystem Services Approach adopted by UNEP, initiatives such as the Global Diversity Assessment, and the IPBES Global Assessment, the concept of ES has become mainstreamed and has achieved a firm place on the policy agenda.[806] This development has in part been received positively, illustrated by the increase in development and use of monetary valuation studies, and in part critically (more on this follows below).[807]

2.2 Ecosystem services in history[808]

The concept of ES has gained a lot of momentum in recent years, but it is not a new concept. Already Plato described disruptions in the provision of nature's benefits caused by human action, writing about the effects of deforestation on soil erosion and the drying of springs in 400 BC.[809] In the first century AD, Pliny the Elder wrote about the hydrological role of forests,

other knowledge systems that conceive people as part of nature, such as those of indigenous peoples and local communities and emerging movements centred around holistic people-nature wellness." IPBES 2019, p. 8

[801] IPBES 2019, p. 11-12

[802] IPBES, p. 12; Glaubrecht 2021, p. 77. Other drivers identified by IPBES include climate change, pollution, and invasive alien species. Also, over the past 50 years, the human population has doubled, the global economy grown nearly fourfold, and global trade tenfold, driving up the demand for energy and materials. Moreover, IPBES finds that "*economic incentives have generally favoured expanding economic activity, and often environmental harm, over conservation or restoration*". See IPBES, p. 13-14

[803] IPBES 2019, p. 11

[804] IPBES 2019, p. 12

[805] IPBES 2019, p. 12

[806] Gómez-Bagghethun et al. 2010, p. 1213-1214; IPBES 2019; IPBES 2022

[807] Gómez-Bagghethun et al. 2010, p. 1214

[808] This paragraph is concerned with the history of the concept of ES. For more on the economic history of ES, please see Gómez-Bagghethun et al. 2010; Costanza et al. 2017, p. 2-3; Braat & De Groot 2012, p. 6-7

[809] Daily 1997, p. 5-6

observing that *"Often, after woods have been cut down, springs on which trees used to feed emerge: for example, on mount Himus, when Cassander besieged the Gauls, who cut down a forest to build themselves an entrenchment. Often, disastrous torrents are formed after the felling of mountain woods, which used to hold back clouds and feed on them"*.[810] Andreassian notes that Pliny's observation covers the two main aspects of forest influence: the hydrological (impact of forest cutting on spring flow) and the meteorological one (impact on rainfall).[811] Mooney and Ehrlich say that one might point to Marsh's 1864 book *Man and Nature* as the origins of modern concern for ecosystem services,[812]which makes the point that America's resources are finite.[813] Other notable early publications include Forbe's paper *The Lake as a Microcosm* (1887), Henry Chandler Cowles work on ecological succession in the Indiana dunes (1899), Osborn's *Our Plundered Planet* (1948), Vogt's *Road to Survival* (1948), Leopold's *A Sand County Almanac* (1949) and Sears' *The Processes of Environmental Change by Man* (1956).[814] Later publications, like Carson's *Silent Spring* (1968); *Population Bomb* by Ehrlich (1968) and *Limits to Growth* by Meadows (1972) focused on the value of nature's functions to human society and further contributed to building the foundation for the development of the concept of ES.[815] More recently, Grove published on the relevancy of the social phenomenon of the European colonial expansion as a backdrop against which global environmental consciousness was able to develop. [816] In his 1995 publication *Green Imperialism* he states: *"[…] a coherent and relatively organized awareness of the ecological impact of the demands of emergent capitalism and colonial rule started to develop, to grow into a fully fledged understanding of the limited nature of the earth's natural resources and to stimulate a concomitant awareness of a need for conservation"*.[817]

The term "Ecosystem Services" as such is first coined by Ehrlich and Ehrlich in their 1981 publication *Extinction: the causes and consequences of the disappearance of species*.[818] Around that same time, other terms relating to the same concept were also developed, such as ecological services, environmental services and nature's services.[819]

Environmental commitments by governments also have a long history. For example, the Indian treatise Arthashastra, dating back to 300 B.C., prescribed punishments for those who pollute, suggesting an early appreciation of environmental values.[820] A more recent example from 1970,

[810] Pliny Natural History, book XXXI, p. 30; Andreassian 2004, p. 2
[811] Andreassian 2004, p. 2
[812] Mooney & Ehrlich 1997, p. 11-19
[813] Braat & de Groot 2012, p. 5
[814] Mooney & Ehrlich 1997, p. 11-19. In this chapter Mooney and Ehrlich also recap the more recent development of the concept of ecosystem services. See also Gómez-Baggethun et al. 2010, p. 1210. Braat & de Groot emphasize that Leopold, Osborn and Vogt's work *"had explored the role of nature in economic and social dynamics"*, see Braat & de Groot 2012, p. 5
[815] Braat & de Groot 2012, p. 5
[816] Redford & Adams 2009, p. 785
[817] Grove 1995, p. 6
[818] Ehrlich & Ehrlich 1981
[819] See Gómez-Baggethum et al. 2010, p. 1213 who make reference to several contemporaneous publications in which this terminology was developed, such as Westman's *How much are Nature's Services Worth?* (1977); Pimentel's *Environmental Quality and Natural Biota* (1980); Ehrlich & Ehrlich's *Extinction: The Causes and Consequences of the Disappearance of Species* (1981); Thibodeau & Ostro's *An Economic Analysis of Wetland Protection* (1981); Kellert's *Assessing Wildlife and Environmental Values in Cost-benefit Analysis* (1984); de Groot's *Environmental Functions as a Unifying Concept for Ecology and Economics* (1987).
[820] Cole et al. 2012, p. 17 who reference the National Programme of Technology Enhanced Learning 2012 online course in Environment and Ecology on this topic (source not accessible anymore); Hassan 2013

is the first state constitutional recognition of environmental rights in the U.S. in Pennsylvania, that reads: "*The people have a right to clean air, pure water, and to the preservation of the natural, scenic, historic and aesthetic values of the environment. Pennsylvania's public natural resources are the common property of all the people, including generations yet to come. As trustee of these resources, the Commonwealth shall conserve and maintain them for the benefit of all the people.*"[821] The author of the proposal said he intended to "*give our natural environment the same kind of constitutional protection that [is] given our political rights.*"[822]

Over the years, more than 100 constitutions all over the world developed to include a right to a clean and healthy environment, imposing a duty on the state to prevent environmental harm, or mentioning the protection of the environment or natural resources.[823]

2.3 Value of ecosystem services

"The disparity between actual and perceived value is probably nowhere greater than in the case of ecosystem services."[824]

Despite the benefits that ES provide society, the majority are being used unsustainably and as a consequence are rapidly becoming more scarce.[825]

The value that ES represent for human well-being is illuminated primarily through the disruption and loss of ES. Deforestation has revealed the critical role of forests in the hydrological cycle. Forests play a crucial role in mitigating flood, drought, and the forces of wind and rain that cause erosion. "*The release of toxic substances, whether accidental or deliberate, has revealed the nature and value of physical and chemical processes, governed in part by a diversity of microorganisms, that disperse and break down hazardous materials. Thinning of the stratospheric ozone layer sharpened awareness of the value of its service in screening out harmful ultraviolet radiation.*"[826]

The value of ES is also emphasized through man-made efforts and technology to replicate their functions, which has turned out to be very difficult and costly and often impossible altogether.[827]

[821] PA. Const. art. I, §27; Shelton 2015; Kirsch 1997
[822] Shelton 2015
[823] Shelton 2015
[824] Daily 1997, p. 6
[825] OECD 2012; TEEB 2010; MEA 2005; IPBES 2019
[826] Examples borrowed from Daily 1997, p. 5
[827] Costanza et al. 1997, p. 255; Daily 1997, p. 6. Biosphere 2 is an example of an attempt at recreating ES. *"Biosphere 2, scientific research facility located in Oracle, Arizona, U.S., designed to emulate Earth's environment (Biosphere 1) that was perhaps best known for two missions conducted in the early 1990s in which crews were sealed inside the enclosure to study survivability. The driving force for these studies was to assess whether humans were capable of building and living in self-sustaining colonies in outer space."* From: https://www.britannica.com/topic/Biosphere-2 accessed 1 December 2018. The mission encountered grave problems including dropping of oxygen levels, necessitating oxygen injections into the facility and failure to achieve maximal food production. For more on the work that continues to be done at Biosphere 2, see: http://biosphere2.org/ accessed 1 December 2018; for more on Biosphere 2's research outcomes, see: http://biosphere2.org/research-outcomes accessed 1 December 2018;

The annual value of the world's ecosystem services was most recently estimated to be US$125 trillion.[828] Costanza et al., from whom this estimate stems, emphasize that it concerns a conservative estimate, due to existing errors and caveats in the rather basic nature of valuation techniques and information available on ES. They expect that with valuation methods becoming more sophisticated, estimates will only increase.[829]

2.4 Appropriateness of valuation

Valuation of ES is difficult and can be approached from various angles. It inevitably involves choosing an ultimate goal or base-value to measure performance, such as efficiency, fairness, or sustainability.[830] And value can be interpreted according to how it relates to humans' wellbeing or nature's wellbeing, in other words an anthropocentric or ecocentric approach can be adopted.[831] Some authors emphasize the fact that valuation involves resolving fundamental philosophical issues, such as determining what underlying bases for value are most appropriate, [832] others dispute that this is a matter of much importance as we simply cannot get around valuating ES and we do so every day.[833]

Costanza et al. point out that valuating ES poses significant difficulties as ES are inherently not readily comparable to other typical marketed goods or services. This has to do with the fact that human life depends on the existence or supply of ecosystem services and in that sense, demand for and value of ES are infinite in total.[834] Nevertheless, an attempt at valuation is valuable for several reasons: firstly, it is important to assess changes in the quantity or quality of various types of natural capital and ecosystem services as those have an effect on human welfare. Secondly, whether we like it or not, we do valuate ecosystem services on a daily basis, directly or indirectly, through the choices we make in our dealings with nature. Depending on the choice we make, ecological systems and (human) life will be off better or worse. Our decisions imply valuations. Consequently, Costanza et al. argue that "[…] *although ecosystem valuation is certainly difficult and fraught with uncertainties, one choice we do not have is whether or not to do it. Rather, the decisions we make as a society about ecosystems imply valuations. We can*

[828] Costanza et al. 2014, p. 156; UNDP (no year available) <http://www.sdfinance.undp.org/content/sdfinance/en/home/solutions/payments-for-ecosystem-services.html> accessed 21 October 2018

[829] Costanza et al. 2014, p. 156-157

[830] Costanza et al. 2017, p. 8

[831] This chapter will not elaborate further on normative philosophical matters as they relate to the topic of ES and PES. Reference is made to Chapter 3 in which the anthropocentric nature of the law, its harm concept, and the question of who has legal status are critically assessed.

[832] Daily 1997, p. 7; For a discussion on the philosophical issues relating to Ecosystem Services, see Goulder & Kennedy 2011, p. 15-33; Norton 1992, p. 23-41

[833] Costanza et, al. 1997, p. 255 "*The issue of valuation is inseparable from the choices and decisions we have to make about ecological systems [ref]. Some argue that valuation of ecosystems is either impossible or unwise, that we cannot place a value on such 'intangibles' as human life, environmental aesthetics, or long-term ecological benefits. But, in fact, we do so every day. When we set construction standards for highways, bridges and the like, we value human life (acknowledged or not) because spending more money on construction would save lives. […] So, although ecosystem valuation is certainly difficult and fraught with uncertainties, one choice we do not have is whether or not to do it. Rather, the decisions we make as a society about ecosystems imply valuations. We can choose to make these valuations explicit or not; we can do them with an explicit acknowledgement of the huge uncertainties involved or not but as long as we are forced to make choices, we are going through a process of valuation.*"

[834] Costanza et a. 1997, p. 255.

choose to make these valuations explicit or not; we can do them with an explicit acknowledgement of the huge uncertainties involved or not but as long as we are forced to make choices, we are going through a process of valuation."[835] Thirdly, valuation, even if fraught with uncertainties, at least gives some insight into the immense value that ecosystem services present to human welfare. It can answer or at least approximate an answer to a question such as: What would it cost to replicate certain ES in a technologically produced, artificial biosphere? Biosphere II in Arizona has proven that this is "*an exceedingly complex and expensive proposition. Biosphere I (the Earth) is a very efficient, least-cost provider of human life-support services.*".[836] An exercise in valuation also allows for comparisons to be drawn between nature's capital and services and economic markets and gross national product, and it allows for the pinpointing of individual or combined ecosystems services' value in facilitating our economy, manufactured products and services.[837] Also, it can help raise awareness and interest, be of use for national income and wellbeing accounts, specific policy analyses, urban and regional land use planning, payment for ecosystem services, full cost accounting, common asset trusts, etc.[838]

2.5 Valuation of ecosystem services

Valuation of ES can serve many purposes, among which raising awareness and interest, estimating national income and well-being accounts, developing specific policy analyses, planning urban and regional land use, designing PES schemes, full cost accounting, developing common asset trusts,[839] natural resource and land use management, developing sustainable development policy, as incentives for collective action,[840] or – as seen in *Costa Rica v. Nicaragua*, in litigation to translate environmental damages into a monetary claim.[841]

It falls outside the scope of the purpose of this paragraph to delve deeply into all practical applications of valuation methods. For the purposes of this research, the practical application of valuation methods in litigation in the field of ecological damage is the primary focus.[842] This matter shall be addressed later on. Firstly, in this paragraph, an overview will be given of existing economic valuation methods and attention will be paid to the results of ES valuation studies conducted over the past years.

2.5.1 Valuation methods

Over the past 40 years, a broad portfolio of valuation methods and approaches has been developed from various disciplines, including anthropology, biology, economics, as well as

[835] Costanza et a. 1997, p. 255
[836] Costanza et al. 1997, p. 255
[837] Costanza et al. 1997, p. 253-260
[838] Costanza et al. 2014, p. 154
[839] Costanza et al. 2014, p. 154; see also IPBES 2022
[840] Braat & De Groot 2012, p. 11-12
[841] See *I.C.J. Reports*, 2018, *Certain Activities Carried Out by Nicaragua in the Border Area (Costa Rica v. Nicaragua), Judgment, I.C.J. Reports 2018 (IV)*, p. 23.
[842] IPBES 2019, p. 17 confirms the pivotal role of the law in nature conservation, restoration, and sustainable usage. It explicitly emphasizes the importance of "*strengthening environmental laws and policies and their implementation, and the rule of law more generally*".

from various indigenous and local traditions.[843] For the avoidance of any doubt, this research is only concerned with economic valuation of the environment for the purposes of its practicability for the courtroom. That is not to say that other approaches and valuation methods do not lend themselves for application the courtroom.

Economists approach valuation of the environment in terms of 1) utility to individuals and 2) impacts on production.[844] As pertains to the former, use values are the value that individuals attach to the direct utility they derive from the environment, e.g. bird watching or mountaineering. Non-use values or existence values are the utility that individuals derive from "*knowing that environmental resources are preserved even if they will never directly use them*", .e.g. knowing that Antarctica is preserved or whales are protected.[845] Because utility itself cannot be measured[846] and markets do not exist for most ES, economic values are ascertained through indirect valuation methods to establish willingness to pay (WTP) or willingness to accept compensation (WTAC).[847] Respectively, these determine how much people are willing to sacrifice (pay) either to acquire or not to lose certain environmental benefits, or by finding out what minimum payment they would accept to abandon an ES or to put up with something negative, like pollution.

For ecosystem goods that are traded in the market, such as timber, produce, and fish, WTP and WTAC can be measured by looking at market prices.[848] "*Demand depends on WTP and supply on WTAC, so that the interaction of demand and supply in producing a market price gives us a measure of value for goods and services which reflect both concepts of value.*"[849] Many ES, though, are "*public goods, that is, nonrival, nonexcludable and essentially free to any user*".[850] Some services like stability, resilience, and reparability, are very difficult to translate into market value.[851] For those goods that are not traded in the market, WTP and WTAC can be ascertained through so-called stated preference valuation techniques.

The most commonly applied stated preference method is contingent valuation, whereby individuals are asked through surveys how much they would be willing to pay either to acquire or not to lose a certain specified environmental benefit, such as the maintenance of a city park.

[843] IPBES 2022, p.13
[844] Hanley 2002, p. 27
[845] Hanley 2002, p. 27
[846] Hanley 2002, p. 28
[847] Farber et al. 2002, p. 388
[848] Hanley 2002, p. 29-30; Brauman et al. 2007, p. 84. Valuation techniques used for market goods are production function analysis (PF) and replacement or restoration cost (RC). For more detail on these valuation techniques, see Chee 2004, p. 553-556
[849] Hanley 2002, p. 30
[850] Brauman et al. 2007, p. 84
[851] Brauman et al. 2007, p. 84

Figure 2. ES valuation techniques[852]

	Valuation techniques for non-market goods		Valuation techniques for market goods
Type of valuation technique	Stated preference*	Revealed preference**	Direct market valuation
Valuation method	Surveys that determine individuals' maximum WTP or minimum WTAC	Study of actual behavior in related markets	Production approach
Examples	Contingent valuation Choice experiment	Travel cost methods Random utility modelling Hedonic Pricing	Avoided cost Replacement cost Mitigation or restoration cost Factor income

*Capable of estimating both use and non-use values
** Capable of estimating use values

Another example of a stated preference valuation technique is choice experiment, where individuals are asked what their preference is among different environmental goods such as whether they prefer a forest that is characterized by species diversity or by its provision of recreational activities.[853]

Because revealed preference approaches base their valuations on individuals' actual behaviour, they are in certain circumstances preferred over stated preference methods that are based on intent. The travel cost method departs from the idea that how much people pay to visit a site (for example in petrol costs) must reveal something about the minimum value they place on the visited area.[854] Hedonic Pricing is based on the assumption that service demand may be reflected in the prices people will pay for associated goods; individuals pay more for a house on the beach than they do for an inland home.[855]

Other valuation techniques include avoided cost, replacement cost and factor income. Farber et al. explain avoided cost as "*services [that] allow society to avoid costs that would have been incurred in the absence of those services; flood control avoids property damages or waste treatment by wetlands avoids health costs*".[856] Replacement or restoration costs assesses the value of an ecosystem services by how much it costs to replace/restore it after it has been damaged.[857] This includes costs tied to replacing ES with man-made systems, for example if natural waste treatment no longer would function and it would have to be replaced with costly treatment systems.[858] Factor Income assesses the enhancement that ES provide to incomes. For

[852] Based on Chapter 3 Hanley 2002; Farber et al. 2002; Brauman et al. 2007, p. 84; TEEB (no year available)
[853] Hanley 2002, p. 32
[854] Hanley 2002, p. 32
[855] Farber et al. 2002, p. 389
[856] Farber et al. 2002, p. 388
[857] Chee 2004, p. 554
[858] Farber et al. 2002, p. 388

example, water quality improvements will have a positive effect on the fishing industry by increasing commercial fisheries catch and fishermen's incomes.[859]

In practice, underlying economic values of ES are determined indirectly by a multiplicity of models and techniques.[860] For comparison, the TEEB valuation database takes twelve main categories for valuation methods into account:[861] avoided cost, benefit transfer, choice modelling and contingent valuation, direct market pricing, factor income / production function, group valuation, hedonic pricing, mitigation and restoration cost, payment for ecosystem services (not a valuation method, but separated from direct market pricing), replacement cost; travel cost; total economic value, and leaving room for a separate category of other methods and unknown methods.[862] Usually, depending on which valuation methods are applicable to a given ES, several methods are used to assess the economic importance of an individual ES. The values found through the various methods are added up to form a total value of that ES.[863] Another economic valuation initiative concerns the System of Environmental-Economic Accounting - Ecosystem Accounting (SEEA), which provides internationally recognised statistical standards and principles that integrate the physical extent and condition of ecosystems, ecosystem services and their values into national accounting systems. "*These economic initiatives each have their challenges, but can potentially complement each other's strengths and weaknesses.*"[864]

Brauman et al. point out the importance of the continued development of integrative approaches to valuation. They state that "*although in some cases nonmarket methods are very effective, in other cases monetary valuation of ecosystem services is highly imperfect*". In this context, they assert, it is important that sociocultural and ecological value are taken into account when determining overall ecosystem value and that "*new approaches to ecosystem valuation attempt to integrate economic valuation methods, which are based on consumer preferences and the exchange values of services, with ecological valuation methods, which are based on the cost of production, and social values. Production function approaches to valuation explicitly incorporate ecosystem processes into economic studies. These integrative approaches are more likely to capture the full value of ecosystems in providing services*".[865]

Also IPBES promotes a more integrative approach to valuation going forward. "*The large portfolio of valuation methods, originating from diverse disciplines and knowledge systems (including indigenous and local knowledge systems), can be grouped into four non-disciplinary method families that consist of nature-based, behaviour-based, statement-based and integrated methods. […] Different valuation methods and approaches can assess different types of values*

[859] Farber et al. 2002, p. 389 Farber et al. add that "*Each of these methods has its strengths and weaknesses. Also, each service has an appropriate set of valuation techniques. Some services may require that several techniques be used jointly. For example, the recreational value of an ecosystem will include not only the value that visiting recreationists place on the site (TC), but the increased incomes associated with site use (FI)*." See Farber et al. 2002, p. 388-389

[860] UNDP (no year available) <http://www.sdfinance.undp.org/content/sdfinance/en/home/solutions/payments-for-ecosystem-services.html> accessed 21 October 2018

[861] De Groot et al. 2012, p. 12

[862] De Groot et al. 2012, p. 29

[863] See Table 5 in De Groot et al. 2012, p. 29

[864] IPBES 2022, p. 22; https://seea.un.org/ accessed 29 September 2022

[865] Brauman et al. 2007, p. 84

of nature; however, challenges emerge when comparing different values to inform decision-making."[866]

By applying a combination of methods to an ES, an individual-based value can be ascertained and aggregated to represent a "*socially-relevant unit—a community, a state, a nation, or the entire planet*".[867] Aggregate values may also be required for the purposes of establishing value over larger spatial and temporal scales. This can be useful when planning for urban and regional land use, developing specific policy analyses, and raising awareness and interest, etc.[868] Early valuations, such as the 1997 study conducted by Costanza et al. used an aggregation method of basic benefit transfer (or basic value transfer), whereby a constant unit value per hectare of ecosystem type is assumed and multiplied by the area of each type to arrive at aggregate totals.[869] Costanza et al. point out that since then, attempts have been made to further improve value transfer techniques to arrive at an aggregate value by for example 1) adjusting values using expert opinion of local conditions;[870] 2) applying statistical value transfer, where through statistical modelling spatial and other dependencies are outlined, 3) spatially explicit functional modelling, which builds spatially explicit or dynamic systems models that incorporate valuation.[871]

While for some purposes aggregate totals are necessary, for others, such as PES schemes, it may be important that valuation applies to a specific site and a specific ecosystem service.[872] As it applies to PES, whether an aggregate sum or a "local/micro" valuation is more appropriate depends on the type of ecosystem service at hand. PES schemes involving carbon dioxide sequestration may be served well with an aggregate valuation, whereas a more local PES, e.g. increasing biodiversity for the rehabilitation of a specific, local wetland is better served with local/micro valuations.[873]

2.5.2 Results of valuation studies

Over the past twenty years, several studies have been conducted to estimate the total value of the Earth's ecosystem services.[874] In 1997, a seminal paper with the purpose of raising awareness of the value of ES was published by Costanza et al. which estimated the total value

[866] IPBES 2019, p. 15 and 17
[867] Farber et al. 2002, p. 389
[868] Costanza et al 2014, p. 154
[869] Costanza et al. 1997; Liu et al. 2010, p. 1271-1285
[870] Batker et al. 2008
[871] These techniques are listed in Costanza et al. 2014, p. 155 and Costanza et al. 2017, p. 9, table 4. Included are references to various valuation studies conducted by other scholars that exemplify the value transfer methods applied respectively.
[872] See Costanza et al. 2014, p. 154, table 1
[873] See Costanza et al. 2014, p. 154, table 1
[874] For a detailed overview of valuation methods and estimates see Costanza et al. 2014 and 2017. 1350 data-points from over 300 case study locations have been stored in The Ecosystem Services Valuation Database ESVD), see Van der Ploeg et al. 2010. *"After the release of the TEEB Valuation Database in 2010, the authors continued to develop the database, both in terms of content and design, under the name "Ecosystem Services Valuation Database" (ESVD). This database will be developed further as one of the main ESP activities, in close collaboration with the biome expert group, the valuation thematic working group, the Marine Ecosystem Services Partnership and the Ecosystem Valuation Toolkit (Earth Economics)."* < https://www.es-partnership.org/services/data-knowledge-sharing/ecosystem-service-valuation-database/ > accessed 4 November 2018

of the world's ES at $33 trillion per year (in 1995 US$), "*a figure significantly larger than global gross domestic product (GDP) at the time*."[875] The study pointed out that various methods had been used in the past by scholars to estimate both the market and non-market components of the value of ecosystem services and that the 1997 study synthesized these previous studies that were based on a wide variety of methods. This implied that there were important "*limitations and assumptions underlying each […study that was used…]*". "*Many of the valuation techniques used in the studies that were covered by the 1997 study, however, were based either directly or indirectly, on attempts to estimate the 'willingness-to-pay' of individuals for ecosystem services*".[876]

More recent work in this field indicates a significantly larger estimate at $125 trillion per year.[877] Costanza et al. provide a detailed comparison between the first results obtained in 1997 and the 2012 results obtained by De Groot et al.[878] The comparison shows a significant increase in the estimate of the global value of ecosystem services. "*The net effect yields an estimate of $124.8 trillion per year, which is 2.7 times the original estimate. For comparison, global GDP was approximately $46.3 trillion per year in 1997and $75.2 trillion in 2001 (in $ 2007).*"[879]

Figure 3.

Changes in area, unit values and aggregate global flow values from 1997 to 2011 (green are values that have increased, red are values that have decreased).

							A. Original	B. Change unit values only	C. Change area only	D. Change both unit values and area	E. Column C - Column A	F. Column D - Column B
							Assuming 1997 area and 1997 unit values	Assuming 1997 area and 2011 unit values	Assuming 2011 area and 1997 unit values	Assuming 2011 area and 2011 unit values	2011-1997 Change in Value	
Biome	Area (e6 ha)		Change	Unit values 2007$/ha/yr		Change	Aggregate Global Flow Value e12 2007$/yr				e12 2007$/yr	
	1997	2011	2011-1997	1997	2011	2011-1997	1997	2011	2011	2011	1997 unit values	2011 unit values
Marine	**36,302**	**36,302**	0	796	1,368	572	**28.9**	**60.5**	**29.5**	**49.7**	0.6	(10.9)
Open Ocean	**33,200**	**33,200**	0	348	660	312	11.6	21.9	11.6	21.9	-	-
Coastal	**3,102**	**3,102**	0	5,592	8,944	3,352	17.3	38.6	18.0	27.7	0.6	(10.9)
Estuaries	180	**180**	0	31,509	28,916	-2,593	5.7	5.2	5.7	5.2	-	-
Seagrass/Algae Beds	200	**234**	34	26,226	28,916	2,690	5.2	5.8	6.1	6.8	0.9	1.0
Coral Reefs	62	**28**	-34	8,384	352,249	343,865	0.5	21.7	0.2	9.9	(0.3)	(11.9)
Shelf	2,660	**2,660**	0	2,222	2,222	0	5.9	5.9	5.9	5.9	-	-
Terrestrial	**15,323**	**15,323**	0	1,109	4,901	3,792	**17.0**	**84.5**	**12.1**	**75.1**	(4.9)	(9.4)
Forest	**4,855**	**4,261**	-594	1,338	3,800	2,462	6.5	19.5	4.7	16.2	(1.8)	(3.3)
Tropical	1,900	**1,258**	-642	2,769	5,382	2,613	5.3	10.2	3.5	6.8	(1.8)	(3.5)
Temperate/Boreal	2,955	**3,003**	48	417	3,137	2,720	1.2	9.3	1.3	9.4	0.0	0.2
Grass/Rangelands	**3,898**	**4,418**	520	321	4,166	3,845	1.2	16.2	1.4	18.4	0.2	2.2
Wetlands	**330**	**188**	-142	20,404	140,174	119,770	6.7	36.2	3.4	26.4	(3.3)	(9.9)
Tidal Marsh/Mangroves	165	**128**	-37	13,786	193,843	180,057	2.3	32.0	1.8	24.8	(0.5)	(7.2)
Swamps/Floodplains	165	**60**	-105	27,021	25,681	-1,340	4.5	4.2	1.6	1.5	(2.8)	(2.7)
Lakes/Rivers	**200**	**200**	0	11,727	12,512	785	2.3	2.5	2.3	2.5	-	-
Desert	**1,925**	**2,159**	234	-	-	0	-	-	-	-	-	-
Tundra	**743**	**433**	-310	-	-	0	-	-	-	-	-	-
Ice/Rock	**1,640**	**1,640**	0	-	-	0	-	-	-	-	-	-
Cropland	**1,400**	**1,672**	272	126	5,567	5,441	0.2	7.8	0.2	9.3	0.0	1.5
Urban	**332**	**352**	20	-	6,661	6,661	-	2.2	-	2.3	-	0.1
Total	**51,625**	**51,625**	0				**45.9**	**145.0**	**41.6**	**124.8**	**(4.3)**	**(20.2)**

Source: Costanza et al. (2014), p. 156

The fact that the value of ecosystem services is often brought to the fore through their loss is clearly illustrated in Figure 3, which depicts a comparison drawn between estimates from 1997

[875] Costanza et al. 1997; Costanza et al. 2014, p. 152
[876] Costanza et al. 1997, p. 255
[877] Costanza et al. 2014
[878] Costanza et al. 2014, p. 156; De Groot et al. 2012, p. 50-61.
[879] Costanza et al. 2014

and 2012.[880] "*Column A uses the original values from Costanza et al. (1997) converted to 2007 dollars (total = $45,9 trillion/yr). If we assume that land areas did not change between the two time periods, the new estimate, shown in column B is $145 trillion/yr, are* (sic) *more than 3 times larger than the original estimate. This is due solely to updated unit values. However, land use* has *changed significantly between the two years, changing the supply (the flow) of ecosystem services. […] Column D shows the combined effects of both changes in land areas and updated unit values. The net effect yields an estimate of $124.8 trillion/yr – 2.7 times the original estimate. […]*".[881] The difference between columns D and B is the estimated loss of ecosystem services based on land use changes, which shows that marine systems and terrestrial systems have suffered large losses. Marine systems have suffered mainly due to a significant decrease in coral reef area, taking into account the substantially larger unit value for coral reef using the 2011 unit values. Terrestrial systems show some gains, but these do not weigh up against the losses suffered in tropical forests and wetlands. Using 2011 unit values, the new total value in 1997 could be recalculated (at the bottom of column B), which shows that where the total net value in annual services is estimated to be around US$ 145 trillion a year, this has decreased to US$ 124.8 a year in 2011 (column D).[882]

Costanza et al. differentiate between ecosystem functions, goods and services. They emphasize that besides valuation of these three categories, what should also be taken into account is that the production of ES requires a "*minimum level of ecosystem "infrastructure"*".[883] Costanza & Daly explain: "*The flow of services from ecosystems requires that they function as whole systems, the structure and diversity of the system is an important component in natural capital*".[884] The infrastructure of the ecosystem itself should therefore also count towards the total value of the ecosystem.[885]

In light of the fact that the 1997 study was based on other studies that used a variety of valuation methods, and taking into account that the 2012 study by De Groot et al. also uses a variety of valuation methods, the outcomes are vulnerable to criticism based on the lack of coherence in valuation methods.[886] The 2014 study by Costanza et al. in which these earlier two studies are juxtaposed against each other, uses basic value transfer to achieve aggregate values. In this context, Costanza et al. emphasize: "As we have previously noted, basic value transfer is a crude first approximation at best. "*[…] one problem is the limited number of valuation studies available and we expected that as more studies became available from 1997 to 2011 the unit*

[880] Figure 3 from Costanza et al. 2014, p. 156
[881] Costanza et al. 2014, p. 155-156
[882] Costanza et al. 2014, p. 156; Costanza et al. 1997 and Costanza et al. 2014 point out that as valuation methods become more sophisticated, value is expected to increase.
[883] Costanza et al. 1997, p. 254; Hanley refers to this infrastructure as a "*primary or 'glue' value which is essential to maintain ecosystem functioning*" Hanley 2002, p. 33.
[884] Costanza & Daly 1992, p. 38. Recall in this regard once more Glaubrecht's analogy of the ecosystem as a double triple knotted net, Glaubrecht 2021, p. 76-77
[885] Costanza et al. 1997, p. 254; Turner & Pearce 1993, p. 177-194; Costanza & Daly 1992. In addition to the academic literature that depicts the ecosystem infrastructure as being foundational to ecosystems and the sustainable flow of ES, some scholars point out that ecosystems *are* infrastructures in and of themselves. See for example Cardoso da Silva & Wheeler 2017 who, in referencing Yu 2012, state that: "*[…] since the 1980s, both scientists and conservationists have suggested that ecosystems should be also considered as a type of infrastructure*".
[886] See, for example, IPBES 2022, p. 17, where it states: "*Different valuation methods and approaches can assess different types of values of nature; however, challenges emerge when comparing different values to inform decision-making."*

value estimates would increase, and they did. We also anticipate that more sophisticated techniques for estimating value will lead to larger estimates".[887]

Given the recognition of economic value provided by ES and their continued provision being under threat, solutions are being sought to combat this deteriorating state of affairs.[888] One economic instrument that has garnered much attention in recent years is Payment for Ecosystem Services (PES).[889] PES schemes involve a voluntary transaction between buyers (or beneficiaries) and sellers (ecosystem managers or safeguards) of ES through contractual agreements. "*In this way, a market or quasi-market is created where the ES that was formerly provided for free suddenly gets a price tag and is valued as a commodity in a trade.*"[890] The second half of this chapter will be dedicated to the exploration of the PES-concept.

3. Payments for ecosystem services

3.1 Defining Payments for ecosystem services (PES) [891]

PES are a relatively new concept that allow the recognition of the economic value of ES to be "put to use" by creating markets for these ES in which buyers and sellers can partake in transactions that result in conservation (protection or prevention of decline) of a particular ES or multiple ES in question. Seeing as how PES are a relatively new conservation concept, the literature so far does not provide a formal definition of the concept of PES. [892] At the moment, many definitions exist and continue to develop side by side[893], as well as many attempts at categorization of PES through more "loose" descriptions of (different types of) PES. Sattler & Matzdorf and Derissen and Latacz-Lohmann provide a comprehensive overview of the PES definitions currently in circulation. Below a few of the definitions mentioned in these publications are repeated and supplemented with definitions found in other academic and policy sources in order to give some insight into the theoretical scope and content of PES. First, attention is paid to the definitions found in scientific literature, then attention is turned to the definitions employed in policy literature and practice.

One of the original and still most cited PES definitions stems from Wunder, who proposes a cumulative checklist:

"A PES is:

1. a *voluntary* transaction where,

2. a *well-defined* environmental service (or a land-use likely to secure that service),

[887] Costanza et al. 2014, p. 156
[888] Cole et al. 2014, xv-xvi; UNDP (no year available) <http://www.sdfinance.undp.org/content/sdfinance/en/home/solutions/payments-for-ecosystem-services.html> accessed 21 October 2018
[889] Wunder et al. 2008; Kinzig et al. 2011; Jack et al. 2008, Cole et al. 2012, Cole et al. 2014; IPBES 2019; IPBES 2022
[890] Sattler & Matzdorf 2013, p. 2
[891] Depending on the context, the abbreviation "PES" is in this chapter sometimes used to refer to the singular *payment* for ecosystem services and sometimes to the plural *payments* for ecosystem services.
[892] Wunder 2005, p. 3
[893] For an overview of the many definitions of PES and chronology of when these came into existence, see Sattler & Matzdorf 2013, p. 3-4 and Derissen & Latacz-Lohmann 2013

3. is being 'bought' by a (minimum one) ES *buyer,*

4. from a (minimum one) ES *provider*,

5. if and only if the ES provider secures ES provision (*conditionality*)."[894]

Wunder asserts that only PES schemes that tick all these boxes are "true" PES and that other schemes are to be seen as PES-*like* schemes.[895]

Ferraro proposes that PES "[…] generally have two common features. First, they are voluntary. Second, participation involves a contract between the conservation agent and the landowner. The landowner agrees to manage an ecosystem according to agreed-upon rules and receives a payment (in-kind or cash) conditional on compliance with the contract."[896]

Jack describes PES schemes as relying "on incentives to induce behavioral change and […as such, they…] can thus be considered part of the broader class of incentive- or market-based mechanisms for environmental policy".[897]

Corbera says that PES are "[…] new institutions designed to enhance or change natural resource managers' behaviour in relation to ecosystem management through the provision of economic incentives".[898]

Milder et al. describe PES as an approach to environmental management that uses cash payments or other compensation to encourage ecosystem conservation and restoration, implemented through contingent agreements between land stewards and ecosystem service beneficiaries such as private businesses, communities, and society as a whole.[899]

Muradian proposes that PES are "[…] a transfer of resources between social actors, which aims to create incentives to align individual and/or collective land use decisions with the social interest in the management of natural resources".[900]

The UNDP asserts that the originally narrower definition of PES "as a voluntary transaction negotiated among private contractors has been surpassed by the implementation of conceptually alike but broader schemes characterized by the intermediation of the Government between those who benefit and those who preserve the ecosystems' functioning."[901]

The WWF provides two definitions: 1. "PES are a variety of arrangements through which the beneficiaries of ES pay back the providers of those services to ensure their sustainability and timely provision",[902] and 2. "Payments for ecosystem services are, as the name implies,

[894] Wunder 2005, p. 3 explains that because of their voluntary, negotiated character, PES distinguish themselves from typical command-and-control measures
[895] Wunder 2005, p. 1
[896] Ferraro, 2008, p. 810
[897] Jack et al. 2008, p. 9465
[898] Corbera et al. 2009, p. 745
[899] Milder et al. 2010, (no page numbers in publication)
[900] Muradian et al. 2010, p. 1205
[901] UNDP (no year available) <http://www.sdfinance.undp.org/content/sdfinance/en/home/solutions/payments-for-ecosystem-services.html> accessed 21 October 2018
[902] WWF 2007

payments made to compensate and incentivize individuals or groups engaged in activities that support the provision of ecosystem services."[903]

From the above, we can see that scholars place special emphasis on the contractual nature of PES-interactions. The transactions arranged through the contract incentivize "good behaviour" towards the environment.

3.1.1 Payments for ecosystem services or environmental services?

The literature refers alternately to payment for *environmental* services and payment for *ecosystem* services. 'Ecosystem services' *"is the more explicitly defined term in the literature and most authors agree about its meaning, whereas the definition of 'environmental services' is more ambiguous."*[904] The two terms appear to sometimes be used interchangeably and inconsistently, causing some debate in the literature on which is the more appropriate term.[905]

Wunder refers to environmental services, considering that term to better indicate a separable nature of different services; the term ecosystem services is seen as steering toward a more integral interpretation, where *"multiple services cannot always be broken up into additive components."*[906] Muradian et al. view ecosystem services as a subcategory of environmental services, dealing only with the human benefits derived from natural ecosystems. [907]Also Derissen and Latacz-Lohmann argue in favour of the term payment for environmental services. They assert that the two terms – ecosystem services and environmental services - are distinguishable, because environmental services refer to all ecosystem goods, whether these are directly or indirectly (through human intervention) derived from nature. They divide the latter, benefits produced through human intervention, into intentionally or unintentionally produced benefits. Following this logic, they suggest that the term ecosystem services should be reserved for those services directly stemming from nature. They propose a definition of environmental services that encompasses the man-made nature of environmental benefits irrespective of whether those are produced intentionally (through environmental contracting) or unintentionally (by simply farming the land). They conclude that the term ecosystem services is "redundant" because "nature does not have a bank account". Most appropriate, they say, is the term environmental services as this encompasses better the fact that payments are made in respect of man-made conservation activities. [908]

[903] Morrison & Aubrey 2010, p. 4
[904] Derissen & Latacz-Lohmann 2013, p. 12
[905] Derissen & Latacz-Lohmann 2013
[906] Wunder 2005, p. 4, referring to Scherr et al. 2004
[907] Muradian et al. 2010, p. 1202
[908] Derissen & Latacz-Lohmann 2013, p. 15. Derissen and Latacz-Lohmann further explain their conclusion as: *"'payments for ecosystem services' is a redundant term in that nature does not need to be paid (and cannot technically be paid) for the flow of goods and services provided to humankind. Since only humans can be paid (and in many cases need to be paid) for the provision of environmental benefits, there can only exist one meaning of the acronym PES: namely 'payments for environmental services' in the sense of payments to the provider of environmental services."*, see Derissen & Latacz-Lohmann 2013, p. 14

Others reject this point of view or see the issue as less problematic; noting the existence of interchangeability in terminology, but at the same time pointing out that this is an issue of semantics rather than a discussion that adds to the content of PES development.[909]

For the purposes of this chapter, it suffices to acknowledge that this discussion is ongoing in the (P)ES literature. The abbreviation "ES" shall continue to be used with the intent of referring to the term 'ecosystem services', and references to literature where the term 'environmental services' is employed, shall be taken as referring to the same concept as ecosystem services.

3.2 History of PES

Although PES has garnered increasing attention in recent years, it is not a new concept. Before the PES-concept being formally named and framed over the past two decades, there have been many PES-like initiatives dating back to the 19th century:

"*The first American conservation easements were written in the late 1880s to protect parkways in and around Boston, according to a history of easements published by the Land Trust Alliance in 1985. The most extensive early use of easements was by the National Park Service in the 1930s along the Blue Ridge and Natchez Trace Parkways. Another early federal use in the same era was the creation of "refuge and flowage" easements in the Prairie Pothole region of Minnesota and the Dakotas by the U.S. Fish and Wildlife Service*."[910]

More recent examples of early PES-like schemes include price-based incentives in agricultural policy in the European Community to improve quality and biodiversity, PES-like schemes for pollination services and for the stimulation of benign agricultural practices to protect water, soil and biodiversity.[911]

The development of PES is said to have evolved from a need for more direct conservation approaches, and to have been facilitated by the emergence of the research field of Ecological Economics and the development of the foundational concept of ES.[912] Wunder points out, referring specifically to tropical conservation, that following the Brundtland Report (1987) and the Rio 1992 conference, conservation efforts gradually became more geared towards mechanisms that tackled poverty, with the aimed "side- effect" of conserving and protecting the environment.[913] In this context, integrated conservation and development projects (ICDPs)

[909] See Morrison & Aubrey 2010, p. 6 where it states: *"It is worth noting that the terms payments for ecosystem services, and payments for environmental services, tend to be used interchangeably and refer generally to the same concept. Wunder 2008 argues that PES should refer to environmental services, as some services such as the carbon sequestration services of an exotic, monoculture tree plantation are specific rather than systemic i.e. they do not rely on a functioning ecosystem. This argument is potentially controversial, as biodiversity is arguably a necessary underpinning requirement for the delivery of all ecosystem services, including climate regulation. This discussion falls out with the scope of this assessment, however, and we shall proceed using the term "ecosystem services" and assume that in the literature the terms are used to refer to the same concept."* Wunder 2005, p. 6 states: "*The "E" in PES has also been subject to discussion: does it stand for "environmental" or "ecosystem" services? We use the former, assuming a separable nature of different services. The latter probably has a more integral interpretation, implying that multiples services cannot always be broken up into additive components [ref]. However, the substantive difference for our purposes is minimal."*

[910] See Haapoja 1994 (no page number available) who also points out that: *"The first historic preservation easements sprang up in the 1970s."*

[911] Gómez-Bagghethun 2010, p. 1214, referencing Claassen et al. 2008 and Dobbs & Pretty 2008

[912] Wunder 2005, p. 1 and Sattler & Matzdorf 2013, p. 4

[913] Wunder 2005, p. 1

and sustainable forest management were developed as instruments to combat environmental degradation and increase incomes at the same time.[914] The merits of this approach have not remained undisputed. Salavsky & Wollenberg conclude: *"It is perhaps unsurprising that linked incentive strategies are not a universal panacea for conservation problems. […] if we have learned anything, it is that there is no one strategy that works everywhere – and indeed, probably no one strategy that can work on its own at any given site. The choice of a conservation strategy is not an either-or question, but rather, […] a matter of fitting the right combination of strategies to the conditions at hand*."[915]

The trans-disciplinary research field of Ecological Economics (or EE) and the continuingly evolving concept of ES formed a foundation for the concept of PES.[916] EE, which developed against the background of pressing global environmental problems, departs from the assumption that the "*human economy is embedded in nature and that nature functions as [the] economy's life-support system which is put at risk though unsustainable economic growth*".[917] Gómez-Baggethun et al. explain that it "*expands the scope of analysis of orthodox Neoclassical economics by developing methods to value and internalize economic impacts on the environment into decision making, e.g. through extended cost-benefit analysis*".[918]

As the ES concept has gotten more established around the 2000s, the PES concept has gained increasing promotion.[919] PES is seen as a characteristic of the most recent stage in the historical development of the conceptualization of ES. This stage is characterized by monetization and commodification of ES and follows from "*a slow move from the original economic conception of nature's benefits as use values in Classical economics to their conceptualization in terms of exchange values in Neoclassical economics*."[920] […] "*The commodification process is finally completed with the implementation of institutional structures allowing for transactions in market exchanges, as occurred with the establishment of MES and PES schemes.*"[921]

3.3 The general idea behind PES

"*As wilderness and natural habitats shrink, ES previously provided free by Mother Nature are becoming increasingly threatened. This scarcity makes them potentially subject to trade. The core idea of PES is that external ES beneficiaries make direct, contractual and conditional payments to local landholders and users in return for adopting practices that secure ecosystem conservation and restoration*." Wunder, 2005.[922]

[914] Wunder 2005, p. 1. For a history on linking livelihood and conservation, see Salafsky &Wollenberg 2000. For more on trends on the linkage between PES and poverty alleviation see Milder et al. 2010
[915] Salafsky & Wollenberg 2000, p. 1436; Salafsky et al. 1999. See also, for example: Brockington et al. 2006, p. 250-252
[916] Sattler & Matzdorf 2013, p. 4
[917] Sattler & Matzdorf 2013, p. 4
[918] Gómez-Bagghethun 2010, p. 1212
[919] Sattler & Matzdorf 2013, p. 4
[920] Gómez-Bagghethun 2010, p. 1216
[921] Gómez-Bagghethun 2010, p. 1215; see also Gómez-Bagghetun & Ruiz-Pérez 2011, p. 618, who state: *"These approaches for correcting market failures have been implemented via two main mechanisms: 'markets for ecosystem services' and 'payments for ecosystem services'. Thus the 'polluter pays principle' which underlies the former is complemented by the 'steward earns principle' which underlies the latter."*
[922] Wunder 2005, p. 3

With the continued provision of ES under increasing threat, action or inaction might be required from those who have control over, live in the proximity of, or use ES.[923] PES presents a tool for this purpose that is currently "*emerging as a central tenet of "contractual conservation"*".[924] In the last years the concept of PES has attracted significant attention from policy makers and researchers,[925] and "*analyses in Scandinavia have highlighted the importance of using an ES approach in environmental decision-making*".[926] "*Yet the concept of PES is rather new to policymakers and academic experts, and as a result, the development and evaluation of alternative PES designs based on experience remain limited.*"[927]

Referring back to Wunder's 2005 definition of PES[928], PES are ideally designed in a way that those who benefit from an ES (i.e., beneficiaries or users) take on the role of buyer, and those who have influence over an ES take on the role of seller (i.e., suppliers or providers).[929] Buyer and seller negotiate a contractual deal for the preservation or increase of a given ES in return for a recurring cash or in-kind payment. PES schemes then create economic incentives for the seller to conserve or increase the supply of ES. [930]

3.3.1 Prerequisites for PES

In order for a PES scheme to come about, some prerequisites need to be fulfilled. The ES must lend itself for a PES scheme. This can only be the case if it is under-valued or not valued which then threatens its supply.[931] An ES must also be able to attract a stable funding source.[932] "*In order to be 'marketable' or attract funding to make payments possible, services must be perceived as valuable and the flow of the services needs to be apparent ('tangibility').*"[933] This means that the traded ES must lend itself for valuation in economic and financial terms.[934] Markets exist for some ES, namely for the products of agriculture, aquaculture, and forestry,

[923] UNDP (no year available) <http://www.sdfinance.undp.org/content/sdfinance/en/home/solutions/payments-for-ecosystem-services.html> accessed 21 October 2018
[924] Morrison & Aubrey 2010, p. 4 referring to Wunder 2008
[925] Cole et al. 2012, p. 5
[926] Cole et al. 2014, p. 5, referring to two national studies conducted in Sweden and Norway, respectively SOU 2013 and NOU 2013
[927] Cole et al. 2014, xvi
[928] Although this definition is older than others circulating at this time, it remains one of the most cited and practically applicable working definitions. The individual criteria that Wunder formulated in his original definition have over time become more loosely interpreted. For example, while Wunder considers only PES contracts between private parties to be "true" PES, authors and policy makers have stretched this criterion to include governments or other public parties. See for example UNDP (no year available): "*The narrow definition of PES as a voluntary transaction negotiated among private contractors has been surpassed by the implementation of conceptually alike but broader schemes characterized by the intermediation of the Government between those who benefit and those who preserve the ecosystems' functioning. This broader definition includes direct payments by public authorities to private landowners to maintain or enhance the forest cover, for example.*" <http://www.sdfinance.undp.org/content/sdfinance/en/home/solutions/payments-for-ecosystem-services.html> accessed 21 October 2018
[929] Wunder 2005, p. 3
[930] Cole et al. 2014, xv-xvi
[931] Morrison & Aubrey 2010, p. 5
[932] Morrison & Aubrey 2010, p. 5. In this context, Wunder 2005 on p. 2 states: *"[…] But not all services are truly threatened and scarce, and not all users are willing to pay."*
[933] Morrison & Aubrey 2010, p. 5
[934] UNDP (no year available) <http://www.sdfinance.undp.org/content/sdfinance/en/home/solutions/payments-for-ecosystem-services.html> accessed 21 October 2018

but other ES may be less easily captured in markets. Kinzig et al. state: *"[…] benefits of watershed protection, habitat provision, pest and disease regulation, climatic regulation, and hazard protection are largely unpriced. Because existing markets seldom reflect the full social cost of production, we have incorrect measures of the scarcity of some ES and no measures for the rest.*"[935] Wunder points out that the traded ES should be well-defined; "*it can be a directly measurable service (e.g. additional tons of carbon stored) or land-use caps that are likely to help providing that service (e.g. "forest conservation provides clean water")*".[936] Some ES, by virtue of their inherent characteristics, may lend themselves better than others for trading through a PES scheme.[937] If an ES is dividable in units that can be valued and thereby better measurable, like carbon, this makes it very suitable for commodification.[938]

Payments or resources should be going from at least one buyer to one seller and should be truly contingent upon the service being continuously provided and being provided beyond what it would be in the absence of payment.[939] Sellers and buyers should be able to withdraw from a PES scheme if they do not get what they paid for or if conditions have changed.[940] Also of importance, is the legal recognition of the seller.[941] It must be clear to whom property rights are assigned and that these rights are enforceable.[942] "*Market participants must be clearly defined – who to pay, who to buy from – and their actions need predictable legal protection.*"[943] Cole et al. point out that "*governments have an important role to play in describing the need for markets, stimulating their development, and designing them efficiently*", as well as in "*ensuring equitable and environmentally-desirable outcomes and enforcing agreed-upon market rules*".[944]

Not all ES as distinguished by the MEA can fulfil the above (non-exhaustive) list of prerequisites, and so not all ES lend themselves for protection or increase through a PES scheme. The largest ES markets for which PES schemes have developed over recent years are the carbon sequestration and storage market, biodiversity conservation, watersheds, and landscape beauty.[945] For those ES not easily captured in markets, PES may, however, prove to be a tool for the creation of a market. Cole at al. state that "*today, so-called global 'ecosystem service markets' target biodiversity, water quality, water quantity, air quality, climate*

[935] Kinzig et al. 2011, p. 603
[936] Wunder 2005, p. 3
[937] See more generally Morrison & Aubrey 2010 and Cole et al. 2012
[938] Cole et al. 2014, p. 15-16
[939] Wunder 2005, p. 3 and UNDP (no year available) <http://www.sdfinance.undp.org/content/sdfinance/en/home/solutions/payments-for-ecosystem-services.html> accessed 21 October 2018
[940] Wunder 2005, p. 4
[941] UNDP (no year available) <http://www.sdfinance.undp.org/content/sdfinance/en/home/solutions/payments-for-ecosystem-services.html> accessed 21 October 2018. Although not said in so many words, presumably, the UNDP aims to point out the importance of the ES provider to have (recognized) ownership of the ES and/or control over it.
[942] Cole et al. 2014, p. 15
[943] Cole et al. 2014, p. 15
[944] Cole et al. 2014, p. 15-16. As will be pointed out later on in the chapter, this approach that emphasizes the role of the government, is considered a Pigouvian PES approach, as opposed to a Coasean approach to PES design, which specifically excludes the government from any involvement.
[945] Morrison & Aubrey 2010, p. 6

regulation, and open-access fisheries"[946] and note a rapid development of ES markets in recent years.[947]

It appears that scholars depart from the idea of PES schemes as one-on-one interactions whereby *one* buyer buys *one* ES from *one* seller. The reality is likely often more complex, where an ES provides a plurality of benefits to a diverse group of beneficiaries. Keeping the quality of a local water source up to par can benefit the general public, the agriculture industry, stimulate biodiversity, etc. In such a complex network of service provision and usage/benefit, it can be tricky to establish who qualifies as (a) seller(s) and who as (a) buyer(s).

3.3.2 Measuring PES effectiveness and efficiency[948]

PES schemes aim to protect and/or increase an ES over time. Whether a PES in fact achieves this goal is dependent on many interacting factors, particularly so when a PES is embedded in complex socio-ecological systems.[949] Ferraro emphasizes that whether PES is effective is ultimately an empirical question, yet not much empirical research has been done to evaluate PES' environmental and social impacts.[950] Adding to the problem, is the fact that "*impact evaluation is often confused with efforts to monitor PES conditionality and compliance.*"[951]

Unlike with more easily marketable ES, like agricultural and forestry goods, for many ES it is not easily determinable whether one is indeed securing a steady flow or increase in ES. In other words, it is hard to be sure whether one is in fact getting one's bang for the buck. Since the ES is provided over time, measuring PES effectiveness requires considering and estimating what would happen if the PES scheme was not in place.[952] This is best done through counterfactual-based evaluation approaches.[953] Ferraro recommends relying on "*comparison groups and causal assumptions that help one differentiate PES impacts from impacts caused by confounding factors that affect both PES assignment and the measured outcomes*".[954]

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[946] Cole et al. 2014, p. 1-2; Kinzig et al. 2011, p. 603 indicate that "*Markets exist for the products of agriculture, aquaculture, and forestry*"

[947] Cole et al. 2012, p. 3

[948] This paragraph focuses on *how* PES efficiency and effectiveness can be measured. It does not aim to provide a synopsis of past evaluations of PES effectiveness and efficiency. For a recent synopsis of empirical studies of PES effectiveness, please see: Börner et al. 2017, p. 365-372

[949] Börner at al. 2017, p. 360

[950] Ferraro 2011, p. 1135

[951] Ferraro 2011, p. 1135

[952] Wunder 2005, p. 8

[953] According to Börner et al. 2017, p. 360; Wunder 2005, p. 8-9; Ferraro 2009 and Ferraro 2011.

[954] Ferraro 2011. See Ferraro 2009 for an elaborate analysis of the need for counterfactual approaches to environmental policy evaluation, where he notes on p. 78: "*Empirical analyses, however, are made difficult by pervasive confounding factors that mask program failure or mimic program success. This includes (1) cotemporaneous factors that are correlated with the treatment intervention and outcomes; and (2) selection bias, where treated units are selected, or select themselves, to receive the intervention on the basis of characteristics that also affect the outcome. These sources of confounding factors are found in nearly all environmental programs, and predicting their direction and magnitude ex ante is difficult. This in turn confounds efforts at credible ex post impact evaluations. With regard to cotemporaneous confounding factors, a large set of factors, including changes in weather and in relative prices and other economic characteristics (such as fuel prices or employment opportunities), affect environmental outcomes. Comparing outcomes in the treatment group to outcomes in a control group can reduce bias from cotemporaneous confounders, but pervasive selection bias implies that the outcome of the average untreated observation will rarely represent the counterfactual outcome of the average treated observation. For example, the characteristics that lead program administrators to target certain*

By constructing counterfactual baselines one can assess whether a given PES scheme has a sufficiently large, additional effect vis-à-vis that baseline.[955] This way it can be established whether the PES scheme really makes a difference, and so whether it is worthwhile.[956] Wunder points out that it is imperative to adopt the "right" baseline, differentiating between the choice for a static baseline, a deteriorating baseline and an improving baseline.[957] The baseline represents ES provision as it would be expected to happen without the PES scheme in place. The baseline can then be measured against ES provision as is taking place with the PES scheme in place. The difference between the two represents the so-called "additionality" of the PES scheme, which is an important indicator for evaluating PES effectiveness and efficiency. Wunder expounds on the necessity to adopt the "right" baseline using the example of the Costa Rican PES scheme aimed at forestry conservation and the Kyoto Protocol's Clean Development Mechanism (CDM). "*For example, the Costa Rican PES system builds on static baselines, but if in reality forest cover would increase even without PES, it means the system is likely to pay for reforestation or conservation that would have happened anyhow – a suspicion that seems substantiated by case studies of PES-receiving forest owners with holiday cottages who would be unlikely to clear or degrade their forest [ref]. Conversely, current CDM rules bypass important opportunities to slow down forest loss through economic incentives, due to the use of a rigid static baseline. Adopting the wrong baseline can thus lower PES efficiency, or in the worst case, waste all the money spent: if no de facto change in behavior is achieved, no additional environmental services will be produced.*"[958]

Börner et al. elaborate further on effectiveness in light of counterfactual thinking. They define environmental effectiveness as "*the change in provision of services induced by the program, compared to a counterfactual without PES*", and distil four factors that should be taken into account when determining effectiveness: 1) programme costs, i.e. transaction and implementation costs net of PES transfers – which determine the number of contracts that can be offered for a given programme budget and payment level.; 2) the direct changes in land/resource-use among participants induced by the program, compared to a baseline of "no PES" (i.e. additionality); 3) the indirect effects (positive or negative) of the programme on land-resource use and ES provision outside of contracted land (spillovers and/or leakages).[959] 4) the effects these changes in land-resource-use among participants and non-participants have on the actual provision of ES (e.g. the biophysical link between induced behavioural changes in practices and the targeted ES.[960]

individuals, firms, species, or areas are frequently correlated with outcomes (see Figure 7.1). Voluntary programs also suffer from self-selection bias. For example, incentive programs (payments for environmental services, eco-labeling, adoption of environmental management systems) often reward people or firms for not engaging in environmentally destructive activities that, at many places and times, would not be done even in the absence of the program."

[955] Wunder 2005, p. 8

[956] Wunder 2005, p. 8

[957] Also, the UNDP states: "*A robust baseline and supporting information are basic requirements for economic valuation of ecosystem services.*" See UNDP (no year available) <http://www.sdfinance.undp.org/content/sdfinance/en/home/solutions/payments-for-ecosystem-services.html> accessed 21 October 2018

[958] Wunder 2005, p. 8-9, where it also refers to Miranda et al. 2004

[959] Wunder 2005, p. 9 explains leakages as: *"If a carbon PES scheme finances reforestation in a certain area, but this directly causes deforestation pressures in a neighbouring area, then the PES scheme had a high leakage: It achieved high additionality only for the project area, but not for the broader, global goal."*

[960] Börner at al. 2017 , p. 360

Wunder emphasizes the issue of permanence in the context of effectiveness and efficiency. If in a PES scheme involving reforestation, "*after the scheme's termination all the reforested trees are cut down immediately for firewood, the scheme's permanence would be lower than if the trees were left standing*".[961]

Besides the above-mentioned factors, the UNDP points toward several other factors that (indirectly) influence PES efficiency and effectiveness: the existence of a stable legal and institutional framework as a backdrop to PES transaction; the level of organization of stakeholders; the capacity to pay of beneficiaries and providers; a sustainable and sufficient financing structure for the PES scheme.[962] The PES scheme must provide a "win–win" opportunity for both the supplier and the buyer(s) of the service.[963] In terms of efficiency for the ES buyers, it is pivotal that the costs of ES provision for the buyer is lower than any alternative method by which the buyer might secure the same service, yet sufficient to ensure that alternative uses of the ES by the ES provider are less economically attractive than preserving the ES.[964] Cole et al. add to this, that is important to verify whether the PES scheme presents a technically feasible intervention.[965]

Taking into account these factors can help determine whether it is worthwhile to start up a PES scheme (as opposed to implementing a different conservation method, for example), but it is also instructive for identifying trade-offs between PES alternatives.[966]

A wetland, for example, provides many ES: flood control, ground water replenishment, shoreline stabilisation and storm protection, sediment and nutrient retention and export, water purification, reservoirs of biodiversity, wetland products, cultural values, recreation and tourism, climate change mitigation and adaptation.[967] As there are so many ES provided, many PES schemes could potentially be developed around these ES, e.g. paying farmers to adopt Good Agricultural Practices (GAPs) for the conservation and wide use of wetlands, paying farmers for the enhancement of biodiversity and cultural services as a secondary livelihood

[961] Wunder 2005, p. 9

[962] UNDP no year available <http://www.sdfinance.undp.org/content/sdfinance/en/home/solutions/payments-for-ecosystem-services.html> accessed 21 October 2018

[963] UNDP (no year available) <http://www.sdfinance.undp.org/content/sdfinance/en/home/solutions/payments-for-ecosystem-services.html> accessed 21 October 2018; Wunder 2005, on p. 1 by contrast points out that: *"PES schemes are considered different from other conservation approaches in that they do not presuppose win-win situations but "recognize hard trade-offs in landscapes with mounting land-use pressures, and seeks to reconcile conflicting interests through compensation".*

[964] See UNDP (no year available), where it is also explained that: "*The (efficient policy) minimum compensation is set to counterbalance an income loss (e.g. not farming a certain area) or the costs of undertaking a certain activity. A maximum compensation (not recommended) is equal to the value of ecosystem services provided to society due to the management regime, but not captured by the land use decision maker*." <http://www.sdfinance.undp.org/content/sdfinance/en/home/solutions/payments-for-ecosystem-services.html> accessed 21 October 2018

[965] Cole et al. 2014, xxxii. Cole et al. 2014 provide a checklist with criteria to assess trade-offs among PES schemes: 1. Measurability; 2. Existence of buyers; 3. Existence of sellers; 4. Technically feasible interventions (e.g., to improve ES supply); 5. Defined property rights; 6. Voluntary participation; 7. Direct payment to providers; 8. Additionality; and 9. Conditionality. Most of these criteria overlap with those described by other scholars as pivotal to the assessment of whether or not to set up a PES scheme in the first place. It makes sense that these would also apply when deciding between various PES alternatives.

[966] Cole et al. 2014, xxxii

[967] Ramsar Convention on Wetlands of International Importance fact sheet <https://www.ramsar.org/sites/default/files/documents/library/services_00_e.pdf> accessed 14 October 2018

support or supplement to the income for wetland agriculture[968], a tourism operator paying local people not to disturb the wetland in order to conserve it for wildlife viewing, or tourists paying for their recreational experience and 90% of the revenue goes to individual households that host the tourists, the state or an environmental organisation paying for shoreline stabilisation services from willing coastal households, etc.[969]

By assessing potential PES schemes with the help of the criteria mentioned above, advantages and disadvantages to implementing those schemes can be uncovered and trade-offs associated with each PES scheme can be highlighted.[970] Typical trade-offs being:

1. Additionality versus overall ES supply: A PES scheme that focuses on ensuring additionality for one ES may inadvertently lead to the decline of a different ES within the same area;
2. Additionality versus Leakage of ES: A PES scheme that successfully increases the supply of a local ES may actually lead to the decline of that ES in another area (leakage);
3. Budget implications versus Existence of buyers: A PES scheme that targets non-local buyers may benefit from critical external funding to ensure an effective PES implementation, but this may come at the cost of giving up local control and administration of the PES scheme;
4. Transaction costs versus Conditionality/ Additionality: A PES scheme that focuses on reducing transaction costs may have insufficient funds to monitor ES flows, which makes it difficult to ensure conditionality and additionality.[971]

3.4 PES in practice[972]

Examples abound of PES in practice. Some PES initiatives take place on an international or national scale, others are locally based.

The UN-REDD programme (which stands for *reducing emissions from deforestation and forest degradation*), more commonly known as REDD+, is an example of an international PES initiative.[973] The UN describes the programme as "*a mechanism developed by Parties to the United Nations Framework Convention on Climate Change (UNFCCC). It creates a financial value for the carbon stored in forests by offering incentives for developing countries to reduce emissions from forested lands and invest in low-carbon paths to sustainable development. Developing countries would receive results-based payments for results-based actions. REDD+ goes beyond simply deforestation and forest degradation and includes the role of conservation, sustainable management of forests and enhancement of forest carbon stocks*".[974] In effect, it allows global citizens who benefit from additional carbon sequestration to buy carbon credits

[968] Examples from Bos et al. 2009, p. 8. These examples are not explicitly presented as PES schemes in the research report, but nevertheless form examples of PES and are therefore called upon in the text above.
[969] Cole et al. 2014, xxxi
[970] Cole et al. 2014, xxxii
[971] Cole et al. 2014, xxxiii-xxxiv
[972] This paragraph aims to expound on specific PES case studies. For more on the practicalities of setting up a PES scheme and PES design, see Morrison & Aubrey 2010 and Cole et al. 2014. The latter provides an extensive and very instructive report on PES design for the Mui Ca Mau national Park in Vietnam.
[973] https://www.unredd.net/about/what-is-redd-plus.html accessed 16 February 2019
[974] https://www.unredd.net/about/what-is-redd-plus.html accessed 16 February 2019

from local landowners, who have an economic incentive to supply this ES through forest restoration or protection. [975]

Costa Rica, Mexico, and China have developed nationally based PES schemes.

Costa Rica was one of PES' earliest pioneers. In 1997, the country set up a national payment scheme for the maintenance and enhancement of environmental services.[976] This programme concerns a public PES scheme whereby the state functions as an intermediary between ES buyers and sellers.[977] Through the collection of taxes and grants from ES buyers the state can pay ES providers for their services.[978]

In 2003, Mexico's National Forest Commission (CONAFOR) implemented a federal PES programme aimed at forest conservation.[979] Payments are made to owners of ecologically valuable land in order to protect these lands from conversion to croplands or pasture.[980] The catalyst for the inception of this PES programme was the fact that Mexico lost around 5.5 million hectares (7.8 percent) of its forest cover between 1990 and 2010.[981] According to PROFOR "*the program has grown substantially since its inception, encompassing 2.5 million hectares of forests as of the end of 2013, making it by far the largest PES program in Latin America*".[982]

China has developed five PES schemes that are fully established and widely implemented.[983] They protect key-ecofunctional zones, non-commercial forests, grassland conservation, watershed conservation, and the restoration of mining sites. [984] Funding for these PES schemes comes mostly from the central government, although local governments and business developers are also mentioned as funding sources.[985] These efforts are said to have "*contributed to [an] increase of forest area, comprehensive vegetation coverage and the volume of forest resources, reduction of over-grazing rate, as well as water quality improvement*".[986]

Although the above PES initiatives certainly appear to have brought forth improvements, they are not without their challenges. The implementation of a PES scheme often goes hand in hand with institutional challenges, monitoring inefficiencies, difficulties in measuring effectiveness, etc.[987] First experiences with REDD+, for example, have given rise to questions about the

[975] Cole et al. 2014, xxviii
[976] Pagiola 2008, p. 712
[977] Wunder 2005, p. 8
[978] Wunder 2005, p. 8. Older definitions of PES viewed "true" PES transactions as having to take place between private parties on a voluntary basis (see e.g. Wunder 2005). According to this definition, the Costa Rican initiative could only be categorized as a PES-like scheme. However, more recent definitions acknowledge the role that can be played in these transactions by public parties, such as governments or NGOs (see e.g. UNDP (no year available) <http://www.sdfinance.undp.org/content/sdfinance/en/home/solutions/payments-for-ecosystem-services.html> accessed 21 October 2018, Corbera 2009, Muradian et al. 2010).
[979] Perevochtchikova & Oggioni 2014; see also https://www.profor.info/knowledge/evaluating-mexico%E2%80%99s-payment-environmental-services-scheme accessed 16 February 2019
[980] See https://www.profor.info/knowledge/evaluating-mexico%E2%80%99s-payment-environmental-services-scheme accessed 16 February 2019
[981] FAO 2011
[982] https://www.profor.info/knowledge/evaluating-mexico%E2%80%99s-payment-environmental-services-scheme accessed 16 February 2019
[983] Pan et al. 2017, p. 203
[984] Pan et al. 2017, p. 204
[985] Pan et al. 2017, p. 204
[986] Pan et al. 2017, p. 206
[987] More about the pitfalls of the PES concept and practice follows under paragraph 3.6 below

programme's ability to sustainably reduce emissions, as well as its (negative) impact on forest-dependent local communities.[988]

Today, PES schemes are being developed all around the world. Perevochtchikova & Oggioni note that "*evidence of PES programs implementation and research is found in many countries from all continents, for example in America (Argentina, Bolivia, Brazil, Canada, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panamá, Perú and the United States), in Europe (Denmark, France, Germany, The Netherlands, Norway, Slovenia, Spain, Sweden, Switzerland, and the United Kingdom), in Asia (China, India, Indonesia, Japan and Vietnam), in Africa (Madagascar, South Africa and Tanzania), and in Oceania (Australia and New Zealand)*".[989]

PES also lend themselves for smaller scale schemes. Examples are the Ohio River Basin Water Quality Trading Project, which aims to reduce nutrient loading in water by connecting power plants, wastewater utilities, and over 200,000 farmers.[990] Farmers are paid to reduce the use of chemical pesticides instead of paying higher fees for water treatment facilities.

Another example is the case of Mui Ca Mau national Park in Vietnam, where a PES scheme has been developed and implemented for the conservation of wetlands and mangroves that simultaneously aims to create livelihoods for twenty local households.[991]

3.5 Economic rationale behind PES

Scholars point to two economic theories that most plausibly can be said to aptly conceptualize PES schemes. Depending on the private (or self-organized)[992] or public nature of PES, meaning a PES scheme not involving or involving the government, scholars point toward a Coasean or Pigouvian economic rationale respectively to economically conceptualize PES.

3.5.1 A Coasean conceptualization of PES

Sattler & Matzdorf describe Coasean PES schemes as ones where the "*beneficiary directly pays the ES provider with private money on a purely voluntary basis that is the outcome of a private negotiation […]*".[993] Referring back to one of the original working definitions of PES as

[988] See Bayrak & Marafa 2016; Friends of the Earth International 2014 report

[989] Perevochtchikova & Oggioni 2014, p. 47-65 referring to Ulgiati et al. 2011, Balvanera et al. 2012, Gross- Camp et al. 2012, McElwee 2012; Molnar & Kubiszewski 2012. The UNDP points out that: *The value of global annual transactions of PES is estimated between US$36–42 billion. This value includes more than 550 active programmes that pay for land management to secure the provision of ecosystem services. This estimation points to the growing potential of monetizing ecosystem services, but their real economic value remains far from what markets price.*" See UNDP (no year available) <http://www.sdfinance.undp.org/content/sdfinance/en/home/solutions/payments-for-ecosystem-services.html> accessed 21 October 2018

[990] Wunder 2005. For more information on the project, see http://wqt.epri.com/overview.html accessed 30 November 2011

[991] Cole et al. 2014; Biodiversity Conservation Agency, Vietnam Environment Administration 2014 http://www.ecosystemassessments.net/system/resources/W1siZiIsIjIwMTUvMDUvMTIvMTMvMDAvMzMvMjUvU0dBTl9BTV8yMDE0XzAzX1BFU19WaWV0bmFtX0h1eW5oX1RoaV9NYWkucGRmIl1d/SGAN%20AM%202014_03_PES%20Vietnam_Huynh%20Thi%20Mai.pdf accessed 22 June 2019

[992] Wunder 2005 used the term "private" and Perrot-Maitre & Davis 2001 use the term "self-organized" to describe PES schemes that take place wholly between private parties.

[993] Sattler & Matzdorf 2013, p. 3

proposed by Wunder (see above), a Coasean conceptualization of PES schemes seems befitting.[994]

Engel et al. assert more generally that "*PES programs attempt to put into practice the Coase theorem, which stipulates that the problems of external effects can, under certain conditions, be overcome through private negotiation between affected parties (Coase, 1960)*."[995] In the context of PES this translates to the assumption that private parties are perfectly capable of negotiating a PES scheme between themselves without governmental involvement being necessary to avoid internalizing externalities, so long as there is a low to no transaction cost and there are clear and enforceable property rights.[996] Negotiations strictly among private parties are considered to better lead to an optimal allocation of resources, and thus property rights, than negotiations with government involvement would. "*Rather, private 'market negotiations' among social actors will lead to an optimal allocation of resources regardless of initial allocations [read: of property rights], as the beneficiary will compensate the provider for the externality.*"[997] The government's role is then restricted to that of the initial allocator of property rights and to safekeeper of a system in which these property rights are enforceable. [998] Regardless of the initial allocation of property rights, private actors can achieve the social optimum through bargaining and trading their rights.[999]

Broadening this approach to cover environmental problems in general, the Coase theorem (with its prerequisites of low or no transaction costs and allocated, and enforceable property rights), would then propose that, "*individuals, communities and even supra-national entities would trade their rights away until a Pareto-efficient provision of environmental goods and services has been achieved. The creation of markets for trading environmental services thus becomes the solution for market failures leading to an undersupply of this type of services*".[1000]

An example of a Coasean type PES is Nestlé Waters' Vittel in the French Vosges Mountains. Since 1993, the company has been running a PES scheme in collaboration with 27 dairy farmers.[1001] Vittel finances these farmers to change their farming practices and technology in order to reduce nitrate contamination caused by agricultural intensification in the aquifer.[1002]

[994] Tacconi 2012, p. 29 confirms this, stating: *"The ENVEP [read: environmental economics perspective] has provided the earliest and most cited definition of PES, which is in line with a Coasian approach: 'a voluntary transaction where a well-defined ES (or a land-use likely to secure that service) is being 'bought' by a (minimum one) ES buyer from a (minimum one)ES provider, if and only if the ES provider secures ES provision(conditionality)' (Wunder, 2005, p. 3)*"
[995] Engel et al. 2008, p. 665
[996] Schomers & Matzdorf 2013, p. 18
[997] Schomers & Matzdorf 2013, p. 18
[998] Schomers & Matzdorf 2013, p. 18-19. They state further: *"According to Coase (1960) there is no reason to assume that governmental intervention will perform better or produce more efficient outcomes than leaving the distribution of resources to the market."*
[999] Muradian et al. 2010, p. 1203
[1000] Muradian et al. 2010, p. 1203. Muradian et al. 2010 add a critical note to this, stating: *"This is something that neoclassical economics fully embraces given its effort of 'getting the price right' for any environmental asset or service."*
[1001] Schomers & Matzdorf 2013, p. 19
[1002] Perrot-Maître 2006, p. 5. See also http://www.fao.org/fileadmin/user_upload/pes-project/docs/FAO_RPE-PES_Vittel-France.pdf accessed 30 November 2011

Another example forms the Paso de Caballos River Basin in Nicaragua, where downstream households pay upstream landowners for reforestation and conservation efforts.[1003]

Note that in both cases the payments are made directly by the ES beneficiary to the ES supplier.[1004]

Even though the Coase theorem has generally been accepted as providing the most plausible underlying economic rationale for PES, scholars point out that "pure" PES schemes that comply with Coasean requirements are hard to find in reality.[1005] Most PES schemes do in fact involve some sort of government involvement.[1006] For those PES that do involve government intervention, a Pigouvian approach is said to provide a more plausible underlying economic rationale.

3.5.2 A Pigouvian conceptualization of PES

Sattler & Matzdorf describe Pigouvan type PES as follows: "*[…] In Pigouvian type PES the government intervenes and either pays itself or makes others pay on behalf of the direct beneficiaries to spur ES provision. In the first case it spends public money to the benefit of society as a whole. In the latter case it makes third parties pay to offset environmental degrading activities for society. Furthermore, the agreement not necessarily has to be completed voluntarily, as it can be driven by compliance regulation, both on the demand and supply side.*"[1007]

In the Pigouvian philosophy, negative externalities are taxed and positive externalities subsidized within existing markets.[1008] Pigouvian type PES schemes move beyond this by focusing on the provision of certain (positive) services which are traded in newly-created markets.[1009] "*The PES approach thus recognizes externalities but, in contrast to the Pigouvian philosophy, detaches the positive externalities from their marketable commodity and creates a parallel market or quasi-market for them, which should lead to the lowest-cost conservation and consequently the highest social welfare*."[1010]

[1003] Schomers & Matzdorf 2013, p. 19
[1004] For more on methods of payment as regards PES, please see Wunder 2005 and UNDP (no year available) <http://www.sdfinance.undp.org/content/sdfinance/en/home/solutions/payments-for-ecosystem-services.html> accessed 21 October 2018
[1005] Muradian et al. 2010, p. 1203; Schomers & Matzdorf 2013, p. 19; Vatn 2010. As pointed out earlier, Wunder 2005 refers to pure PES schemes and PES-like schemes. The latter would cover all that do not completely comply with the working definition as provided by Wunder in Wunder 2005. Muradian et al. 2010 on p. 1203 state, in reference to a definition supplied by Engel et al. 2008, which is also relatively limitative, that "*most PES experiences do not comply strictly with these conditions. We think this is problematic, since a prescriptive definition of PES that excludes the bulk of PES cases can be deemed at least flawed. Furthermore, dividing PES into 'genuine' (good) and PES-like (less good) may cause a mismatch between theory and practice, given that practitioners may often feel the frustration of not meeting theoretical expectations."*
[1006] Muradian et al. 2010, p. 1203; Schomers & Matzdorf 2013, p. 19; Vatn 2010
[1007] Sattler & Matzdorf 2013, p. 3
[1008] Van Hecken & Bastiaensen 2010, p. 423
[1009] Van Hecken & Bastiaensen 2010, p. 424
[1010] Van Hecken & Bastiaensen 2010, p. 424

Governmental PES programs, such as the ones found in Costa Rica, Mexico and China (see above) are considered Pigouvian-type PES.[1011]

Payments are made indirectly through countries either accessing the general budget or introducing PES-like taxation with special-purpose taxes and fees, targeting the implied beneficiaries (e.g. the tourism, water, electricity, transport and extractives sectors).[1012] UNDP points out that the Costa Rican PES programme is financed with resources generated from gasoline taxes, and that in Vietnam "*prices are regulated for hydropower generators (20 VND/KWH), clean water suppliers (20 VND/m3), tourist service providers (1-2 per cent of revenues) for a total value of contracts that surpassed US$150 million in 2016*".[1013]

Regional PES schemes, like EU environmental programmes, are also considered to fall into this category. These schemes involve payments to farmers for adopting more environmentally friendly land management practices that place less of a burden on water bodies or for switching to organic farming.[1014]

3.6 Critique of PES

The PES concept and its practical implementation so far has been and remains not without criticism. Many scholars view this new conservation tool with much reservation. Their apprehension lies in e.g. the lack of plurality in valuation of ES, ethical issues associated with valuating nature in monetary terms, technical difficulties associated with the implementation of PES[1015], the perpetuation of institutional setups that are destructive to nature and conservation efforts, as well as the perpetuation of social injustices that, if not resolved, will continue to aggravate the problems in dispute. Below, these, and other lines of criticism are expounded on. Reference is made to several specific publications. These by no means cover the full body of academic literature devoted to critiquing PES but do cover the main arguments posited in that body of literature and can therefore be seen as representative of the main sources of concern surrounding PES.

3.6.1 Criticism of PES design and implementation in practice

Redford & Adams highlight seven issues that deserve attention, and that, if given proper consideration, can help crystallize the role of PES in conservation and make stronger the arguments pro-conservation.[1016] First, they stress that economic arguments about services valued by humans will overshadow noneconomic justifications for conservation.[1017]

Secondly, the ecosystem service (and therefore the PES) concept is often spoken about in light of what it means for human welfare. Importantly, however, many ecosystem processes do not

[1011] Schomers & Matzdorf 2013, p. 20-23
[1012] UNDP (no year available) <http://www.sdfinance.undp.org/content/sdfinance/en/home/solutions/payments-for-ecosystem-services.html> accessed 21 October 2018
[1013] UNDP (no year available) <http://www.sdfinance.undp.org/content/sdfinance/en/home/solutions/payments-for-ecosystem-services.html> accessed 21 October 2018
[1014] Sattler & Matzdorf 2013, p. 3
[1015] Schröter et al. 2014; Simpson 2011
[1016] Redford & Adams 2009, p. 785
[1017] Redford & Adams 2009, p. 785-786

(directly) serve human society, such as droughts, floods, disease. Yet, these are incremental to "*ecosystem function, structuring landscapes, and providing services and regulatory functions to nonhumans*". A strong focus on conserving those parts of ecosystems that serve human needs may come at the detriment of those parts that serve nonhuman needs.[1018]

Thirdly, in the context of PES efficiency and effectiveness, it might be found that certain species native to an ecosystem can best be replaced by introduced species, if the latter "do the job better". Redford and Adams use the example of zebra mussels that have excellent water filtering capabilities, yet at the same time present a strongly negative impact on ecosystems otherwise. Replacing native species with introduced species for the sake of achieving efficiency and effectiveness poses a risk to biodiversity conservation.[1019]

Fourthly, in a search to maximize ES output, it is not unrealistic to expect certain natural systems to be "remodeled" to optimally deliver critical services. Forestry plantations to sequester carbon or artificial wetlands to process sewage might satisfy a high demand for a particular ES but lack the biodiversity of their wild predecessors. Redford & Adams also warn that single-service provision would undoubtedly lead to ecological brittleness.[1020]

Fifth, they highlight several issues with ES *valuation*: the fact that not all ES can be captured in markets; that the value attached to ES represents their desirability to human consumers and not their diversity; and the existence of a potential mismatch between the scales at which ES are provided and the institutions available to realize those values. Redford & Adams suppose that when an ES is provided in close proximity to a consumer and there are institutions in place to facilitate this exchange, there is ample potential for effective conservation. Where these prerequisites are not in place, PES will not be effective.[1021]

Sixth, as ES become scarcer and therefore more valuable, they will become a source of competition, possibly having welfare implications, and consequences for biodiversity. Maximizing ES flow can incentivize taking action that can cause collateral damage to biodiversity.[1022]

Seventh, they warn that we cannot with certainty predict the impact that climate change will have in the coming years on ES provision. It might be that it causes ES to *"break apart and reassemble in new ways"*. If this interferes with ES provision as designed under PES schemes, will PES participants hamper this natural development, thereby stimulating a development toward ecological brittleness instead of ecological resilience?[1023]

[1018] Redford & Adams 2009, p. 786. See also Kinzig 2011, p. 603 where it is stated that: "*Incentives that encourage production of one service may have adverse effects on others [ref]. For example, incentives for carbon sequestration under the REDD scheme may simply cause carbon emitting activities to be relocated. Incentives for biofuels production that promote conversion of tropical forests to tilled fields may reduce both carbon storage and habitat that supports biodiversity [ref]. Incentives for habitat protection that create corridors between protected areas may increase disease risks by increasing contact between wild and domesticated animals [ref]. Where ES are jointly produced, paying for only one service can be as damaging as paying for none.*"
Paying
[1019] Redford & Adams 2009, p. 786
[1020] Redford & Adams 2009, p. 786
[1021] Redford & Adams 2009, p. 786
[1022] Redford & Adams 2009, p. 786
[1023] Redford & Adams 2009, p. 787

Kinzig et al. warn that "*Mechanisms of this kind [read: PES] promise much, but if poorly designed they can make things worse, not better*" and that "*markets are not a panacea*".[1024] Only if prices capture *all* significant effects of resource use do they pose useful indicators. If this is not the case, mechanisms such as PES can fail. To illustrate this point, Kinzig et al. make reference to the collapse of the first US market for sulphur dioxide (SO2) emissions, which collapsed because the market design addressed only one of many interacting pollutants. Proposals for a new SO2 market soon followed, but the resulting uncertainty of the first "try" drove SO2 market permit prices to zero. [1025]

Furthermore, they pose that while MES and PES are emerging as preferred conservation mechanisms, they are "*often imposed without due regard to the properties of the services they cover*"; that ES prices are not directly responsive to changing conditions; that ES markets are too "thin", meaning too few trades taking place for prices to track conditions; and that some suffer from design flaws as was the case with the SO2 market design. They also assert that science behind PES schemes does not offer security about the net effects yielded and payments appear to support goals other than the scarcity of resources, such as poverty alleviation.[1026]. Furthermore, they point out the fact that payments as such are not appropriate for all ES. Some, like ES from lands or seas beyond national jurisdiction, do not lend themselves to be captured in payment/monetary terms and are better served with other metrics to indicate their scarcity.[1027]

It should be noted that while Kinzig et al. make a point to differentiate between "*markets*" and "*marketlike mechanisms – payment for ES (PES) schemes*", their criticism of PES at moments seems to coalesce or be confused with criticism of MES, or broader, criticism of attaching a market value to nature as such.

Börner et al. point out how PES effectiveness hinges on proper design and that when not properly designed, a PES scheme can have adverse effects.[1028] As PES is based on financial incentives, poor design could lead to *"wasted financial resources and potentially adverse environmental or social outcomes, through for example unintended effects on human behaviour"*.[1029] This makes PES a demanding policy tool.[1030] They also point to the fact that, so far, there has been a lack of counterfactual-based evaluation approaches to PES, which makes it hard to accurately assess impacts.[1031]

According to Börner et al., the impact on welfare is determined by a range of socio-economic and environmental factors that each are associated with some vulnerabilities:

1) Programme costs: these can be distorted as "*Any cost of PES implementation above the minimum payment necessary to induce landowner participation in the PES program will indirectly reduce the environmental effectiveness of the program through a reduction in the*

[1024] Kinzig et al. 2011, p. 603
[1025] Kinzig et al. 2011, p. 603
[1026] Kinzig et al. 2011, p. 603
[1027] Kinzig et al. 2011, p. 604. Kinzig et al. add on p. 604: "*Physical indicators of the state of ecosystems need to be integrated into national income and product accounts and made comparable to other measures of income. Progress has been made in developing satellite accounts for environmental fl ows through the United Nations System of Environmental and Economic Accounts (SEEA).*"
[1028] Börner et al. 2017, p. 371
[1029] Börner et al. 2017, p. 371
[1030] Börner et al. 2017, p. 371
[1031] Börner et al. 2017, p. 360

number of PES contracts that can be secured for a given budget. This effect will not be captured by impact evaluations of PES as these usually only measure the effect of the contracts actually made."[1032]

2) Direct programme impacts (additionality): which is impacted by information asymmetry, which in turn can cause adverse participation selection. By this the authors refer to participants, who would have met programme conditions also in the absence of payment, self-selecting into the programme. An example of this is the case where someone is being paid to not fell trees on their land that they were anyway never intending to fell. Also, the absence of proper monitoring of compliance with the programme can cause non-compliance by participants (moral hazard) which then again compromises additionality.[1033]

3) Indirect programme impacts (spillovers): these may also undermine PES effectiveness, e.g. by moving the problem to another geographical area that falls outside the scope of the PES scheme.[1034] Wunder explains leakages as: "*If a carbon PES scheme finances reforestation in a certain area, but this directly causes deforestation pressures in a neighbouring area, then the PES scheme had a high leakage: It achieved high additionality only for the project area, but not for the broader, global goal.*"[1035]

4) Link between programme conditions and ES provision: depending on the type of PES programme, either action-based or outcome-based payments are more cost-effective and ought therefore to be given preference from an effectiveness point of view.[1036] If the 'wrong' payment type is given preference, this can negatively affect cost-effectiveness.

5) Welfare impacts and their links to environmental effectiveness: there are trade-offs associated with maximizing programme additionality. Achieving the latter often requires targeting landholders and not the actual poor. PES programmes can thus fail to reach the poor, which entails a trade-off between environmental effectiveness and equity considerations. Another trade-off is the necessity, from a PES effectiveness point of view, to minimize the ES provider's surplus, which then undercuts the goal of poverty alleviation.[1037]

3.6.2 Criticism of the PES concept

Norgaard ventures that the metaphor of "nature as a stock", in other words the concept of valuating ES, is too simple an approach to the environmental problems we are collectively facing. Indeed, he poses that while the concept of ES is certainly a useful metaphor for communicating the value of nature, it has now become integral to how we approach management of ecosystems. He points out that the theoretical literature frames ES, their

[1032] Börner at al. 2017, p. 360 who also refer to Ferraro 2008 on this point
[1033] Börner et al. 2017, p. 361-363
[1034] Börner et al. 2017, p. 363-364
[1035] Wunder 2005, p. 9
[1036] Börner at al. 2017, p. 364
[1037] Börner at al. 2017, p. 364. Börner et al. point to several studies that have shown varying effects of targeting payments for maximum additionality. On the one hand, this "*could lead to negative behavioural spillovers due to perceived unfairness among excluded PES applicants. Conversely, despite demonstrated tradeoffs between targeting both poverty alleviation and conservation outcomes [ref] designing a PES scheme that is not additional but legitimate and fair can eventually crowd-in conservation motivations across enrolled and non-enrolled farmers [ref].*"

valuation and PES within a partial equilibrium framework that assumes that *"all other things are equal"*. This he characterizes as a "*mistaken presumption that we can analyze a global problem within a partial equilibrium economic framework and reach a new economy project-by-project without major institutional change",* adding: *"the simplicity of the stock-flow framework blinds us to the complexity of the human predicament*".[1038]

Gómez-Baggethun & Ruiz-Pérez argue that "*economic valuation is likely to pave the way for the commodification of ecosystem services with potentially counterproductive effects in the long term for biodiversity conservation and equity of access to ecosystem services benefits.*" The root of this issue lies, firstly, in the "*institutional setup in which environmental policy and governance is currently embedded in shaping valuation outcomes*". And, secondly, in "*the broader economic and sociopolitical processes that have governed the expansion of pricing into previously non-marketed areas of the environment.*"[1039] They point out the controversial nature of the concept of commodification, that is questionable for ethical reasons ("*some things ought not to be for sale*")[1040], for its alleged effect as complexity blinder and mystification, as it masks, behind the homogeneity of monetary figures, critical processes and the ecological complexity underlying the production of ecosystem services, as well as non-economic values of ecosystems and power asymmetries underlying environmental trade.[1041] Also, they emphasize the 'commodity fiction' that fails to recognise that ecosystem functions are inextricably linked to each other and the interrelation that exists between ecosystem functions and services.[1042] Finally, they stress that *"commodification turns ecosystem services that in principle were in open access, public or communal property into commodities that can be accessed only by those having purchasing power. This involves a substantial institutional and social change that we can evaluate positively or negatively depending on our normative ideology."*[1043]

Kosoy & Corbera analyse PES departing from the concept of "*commodity fetishism*", defined as *"the masking of the social relationships underlying the process of production".*[1044] They advance that departing from the concept of commodity fetishism helps to uncover three aspects, namely 1) the invisibility of the complexity of ecosystems and ecosystem services; 2) the invisibility of the values attached to ecosystem services; 3) the invisibility of institutional asymmetries, particularly as it relates to price formation and property rights allocation.

As regards the invisibility of the complexity of ecosystems and ES, they argue that itemisation of ES for the purpose of monetary valuation, pricing, and exchange obscures the complex nature of ecosystems.[1045] It draws fictional legal and material boundaries around natural phenomena to accommodate their being bought, sold, and used.[1046] However, these boundaries simply do not match with the reality of the nature of ES, failing to acknowledge the interrelation and

[1038] Norgaard 2010, p. 1219-1220 and 1226. Norgaard adds on p. 1220: "*Using a general equilibrium framework, I show that the more significant one thinks our environmental problems are, the more inappropriate has been the partial equilibrium and project-by-project approach for utilizing the concept of Ecosystem Services*".
[1039] Gómez-Baggethun & Ruiz-Pérez 2011, p. 613
[1040] Gómez-Baggethun & Ruiz-Pérez 2011, p. 621
[1041] Gómez-Baggethun & Ruiz-Pérez 2011, p. 621
[1042] Gómez-Baggethun & Ruiz-Pérez 2011, p. 621
[1043] Gómez-Baggethun & Ruiz-Pérez 2011, p. 622
[1044] Kosoy & Corbera 2010, p. 1228
[1045] Kosoy & Corbera 2010, p. 1231
[1046] Kosoy & Corbera 2010, p. 1231

interdependence between different components of nature.[1047] This is turn can cause counterproductive results, when for example certain species of trees are planted and conserved over others because they are characterised by a larger carbon content or higher growth rates, "*changing current species richness and density, and disrupting water flows."*[1048]

They warn that itemisation *"contributes to veil important ecosystem interactions and reduces our perception of what actually an ecosystem is and how it functions"*, and that, without that knowledge, we cannot assess properly how ES' destruction can be reversed.[1049]

Concerning the invisibility of values attached to ecosystem services, Kosoy & Corbera note that assigning a single, monetary exchange-value to ES unjustifiably reduces the relationship that exists between humans and nature to a monetary value, when ES represent more than just that.[1050] Referring to Vatn, they quote: "*the price of even the most simple commodity only captures a subset of the dimensions of its importance, worth and meaning to humans*".[1051] Value-diversity would promote a more pluralistic approach to PES goals, which may prevent "crowding out" future environmental conservation behaviour by those who do not support a purely monetary valuation approach.[1052] According to Kosoy & Corbera: "*In a practical sense, pluralism involves the development of consensus-building processes, so as to gather existing knowledge, views and diverse values, and to define the most appropriate combination of monetary and non-monetary incentives. In this sense, the 'crowding out' effect needs to be considered, and the conditions through which both long-term individual and collective interest for conservation can be harnessed with and without financial incentives need to be addressed.*"[1053]

Lastly, the invisibility of institutional asymmetries, particularly as it relates to price formation and property rights allocation are also a source of concern. Kosoy & Corbera point out that for many ES, the market is not a level playing field. ES sellers are often poor and the fact that they are willing to participate in an ES transaction, does not mean that the prices placed on ES are fair, after all *"the poor sell cheap"*.[1054] They advance that prices for ES are rather socially constructed than a consequence of changes in quantity and quality of ES.[1055] This social inequality also affects who has ownership and can partake in an ES transaction in the first place. And, in those cases where new property rights regimes need to be introduced in order to get a PES scheme up and running, *"there is an inherent risk that these [read: property rights regimes] are defined by those with economic and social power and, consequently, legitimise a particular social order"*.[1056]

Chan et al. distil seven obstacles to current PES-practice.[1057] They warn for the development of new externalities, explaining that "*the danger with any new market or system of incentives intended to address environmental externalities is that it will itself yield actions with unintended*

[1047] Kosoy & Corbera 2010, p. 1231
[1048] Kosoy & Corbera 2010, p. 1231
[1049] Kosoy & Corbera 2010, p. 1232
[1050] Kosoy & Corbera 2010, p. 1232
[1051] Kosoy & Corbera 2010, p. 1232, referring to Vatn 2000, p. 495
[1052] Kosoy & Corbera 2010, p. 1233
[1053] Kosoy & Corbera 2010, p. 1233
[1054] Kosoy & Corbera 2010, p. 1233
[1055] Kosoy & Corbera 2010, p. 1234
[1056] Kosoy & Corbera 2010, p. 1234
[1057] Chan et al. 2017. In this publication, the authors also offer solutions to these obstacles.

consequences in the form of new externalities […] once an indicator is made a metric for success, it will cease to function as an affective metric because individuals and firms will find and exploit loopholes that enable success by the metric without its intent [ref]".[1058]

They further alert that PES might send the wrong message, implicitly signalling to people that they have the right to pollute and degrade the environment unless they are paid not to do so.[1059]

Like Kosoy & Corbera, they too indicate that a risk exists that financial incentives might crowd out "*existing "intrinsic" or altruistic motivations*".[1060]

They also highlight the continued tension between project efficiency and equity, meaning the PES-goal of "*achieving maximal conservation gain for the least money versus providing needed funds equitably across potential participants*", as well as the burden of monitoring PES effectiveness as financial incentives can motivate ES providers to cut corners as *"cheating pays"*. [1061]

They also assert that PES schemes really are not that commonly applicable to many environmental problems. The Coasean nature of the voluntary contracting for a PES transaction departs from the idea that a two-party negotiation can offer solutions to what, in reality, is not a two-party problem, but one that affects whole communities.[1062]

Finally, they point to the fact that PES schemes often function in a top down, one-size-fits-all manner, which can deter would-be participants who might feel PES conflicts with their values or restricts their *"creativity and wisdom as stewards of the land"*.[1063]

4. Relevancy of the ES concept for the courtroom

This chapter has demonstrated that it is difficult to attach an accurate monetary valuation to ES. Of course, by extension, this goes for *all* parts of nature, importantly also those that do not serve human interests. Likewise, it was demonstrated that it is difficult to attach property rights to many ES and, by extension, to many parts of nature, particularly those that do not serve human interests. The difficulty of applying property rights to an object or phenomenon in effect poses a difficulty to capturing that object or phenomenon in legal frameworks *per se*. The more intangible something is, both as an object that one could potentially own or possess, and as a matter of monetary value, the more difficult it is to capture for the sake of attaching legal rights and obligations. Importantly, this poses an obstacle to establishing legal damages in a court of law.

Having conducted a thorough analysis of the concept of ES and the example of PES as a policy tool that takes an ecosystem services approach, the chapter now turns to the question of the practicability of an ecosystem services approach for formulating pure ecological harm claims and adjudicating those claims in the courtroom.

[1058] Chan et al. 2017, p. 112
[1059] Chan et al. 2017, p. 112
[1060] Chan et al. 2017, p. 112
[1061] Chan et al. 2017, p. 113
[1062] Chan et al. 2017, p. 113-114
[1063] Chan et al. 2017, p. 114

It would appear that the concept of ES and the methods that have been developed to calculate their value could – *prima facie* – aid both in formulating a claim based on pure ecological harm as well as adjudicating it.

An ecosystem services approach would allow a claimant to first determine all ES harmed in a particular incident, apply the relevant, cumulative valuation methods, and calculate a total sum of harm. Should baseline data already be available locally, claimants could refer to those. Alternatively, data contained in the Ecosystem Services Valuation Database (ESDV) [1064] could serve as a point of departure and could be applied using benefit value transfer methods. It should be noted that the ESDV is a work in progress and for many ES there are no or incomplete data available.

When formulating their claim, claimants could apply these data sources, meaning, preferably local data, but in the alternative, data sourced from ESDV, and apply the standard ES valuation methods. This could arguably bring the matter of ES valuation more clearly into focus for the court. [1065] Should both parties avail themselves of this approach, it could also possibly limit the risk of an in-court rather hectic, unpredictable, economic theoretical back-and-forth unfolding, as was observed in the case law reviewed. Of course, there are limits to the clarity that an ES approach can bring to a legal proceeding. Parties remain free to argue the relevance of certain valuation methods to a particular type of ES, the volume of the harm suffered, the natural recuperation that might already have taken place, etc.[1066] Nevertheless, delineating from the get-go objective data sources and valuation methods could create a more level playing field for parties. By relying more on the (policy) standards already out there, claimants can help judges avoid having to speculate on the value of individual ES as well as contemplate (the applicability of) valuation methodology. As suggested already in Chapter 2, a court – having heard arguments from both parties - could (and should) also freely make use of the option to appoint an ES-valuation expert to independently inform the court and answer its questions.[1067] Such an approach could help courts to refocus on legal matters, such as the establishment of harm, causality, liability, proportionality, etc. Having said that, a prerequisite for sound adjudication in these types of cases, would seem that judges are facilitated in acquainting themselves, to a

[1064] ESDV is the successor of the TEEB valuation database.

[1065] For an earlier specific suggestion as to how to approach in-court valuation, see Olszynski 2005, who suggests a two-stage valuation methodology, whereby ecological loss is assessed through a *prima facie* presumption in favour of restoration costs, followed by an assessment of the use/passive use/inherent value of the affected environment through contingent valuation methodologies. A kindred argument, for standardisation procedures in valuation, but applied to the policy realm, is articulated in IPBES 2022, p. 18: "*Standardization procedures in valuation can help increase the uptake of ecosystem accounting into national policies, with due consideration to the ongoing challenges of implementation in decision-making, linking accounting to diverse valuation perspectives and the challenges of measurement and valuation.[…] National ecosystem accounting aims to assess ecosystem services at the national level and to organize the associated data into an agreed statistical framework. This requires employing standardized methods that allow comparisons across countries, sectors, and through time. The System of Environmental- Economic accounting- Ecosystem Accounting uses biophysical and monetary indicators ("exchange values", i.e., equivalent to the value of goods and services exchanged in markets) to capture key instrumental values of nature.*"

[1066] Here, the focus is solely on parties' arguments as pertains to the matter of ES in the courtroom. It goes without saying that parties will engage in broader back-and-forth, also on other matters relevant to arguing their case.

[1067] Mohan & Kini 2021 also make this point in regards the *Costa Rica v. Nicaragua* case. See also Harrison 2022, p. 501 who considers the relevancy (for future adjudication of environmental case law) of the ICJ appointing an environmental damage valuation expert in *Democratic Republic of Congo v. Uganda*, stating: "*This is the first time that the Court has appointed an independent expert to deal with environmental claims and, therefore, its approach to these matters may provide useful guidance for future cases*."

degree that may expected from a legal professional, with the matters of ES, ES data sourcing, and ES valuation.[1068] Should this approach be taken, expectedly, courts will be more equipped with ground knowledge on ecological harm, be relieved of some of the burden they currently carry of ploughing through many non-legal, purely economic issues, and be aided in refocussing on the core legal issues. Ultimately, this could lead to a better quality of court judgments when it comes to identification of ecological harm suffered and valuation of said harm.

At this point, it should once more be emphasized that ES harm does not equal pure ecological harm. They are closely related and at times overlap, but are not interchangeable.

Recall that ES concern the benefits that humans obtain from ecosystems. These benefits consist of goods and services, some of which lend themselves for ownership (often ecosystem goods, such as products of agriculture, aquaculture, and forestry), while others do not (often ecosystem services, such as flood prevention, nutrient cycling, disease regulation). Those ES that are characterized by ownership, fall outside the scope of the definition of pure ecological harm. After all, recall that pure ecological harm "*is understood to mean ecological harm to environmental assets that are not subject to property rights, (including but not limited to air, atmosphere, water, soil, land, landscapes, natural sites, biodiversity and the interaction between these elements), which has no impact on a particular human interest but on a legitimate collective interest*". This means that harm to ES that (can) have property rights vested in them falls within the scope of 'classic, material harm'; something our laws and courts are more used to dealing with. Harm to ES that are not subject to property rights falls within the scope of pure ecological harm.

The practice that courts will continue to find themselves confronted with will likely share the ambiguity of the attempted theoretical delineation between ES harm and pure ecological harm sketched immediately above. To illustrate, recall how in the commercial fishermen's claim in the Exxon Valdez case, damages were claimed for salmon and herring as marketed goods, worth an X-amount of dollars per pound. The Court readily assumed harm suffered and granted damages in the amount of pounds lost, multiplied by the market value per pound. Things were a lot more difficult when the Native Alaskan class claimed damages for the very same salmon and herring but this time as a non-marketed good. The Native Alaskan class viewed the salmon and herring as subsistence harvest and the loss of it meant a loss of their subsistence way of life. The Exxon Valdez case predates any attempts to explicitly bring ecosystem services into the courtroom, but it is clear that, here, the Native Alaskan Class is alluding to what today are deemed provisioning and cultural services under the MEA framework.[1069] The loss of salmon and herring can be both seen as classic, material harm (read: a financial setback) or as

[1068] This matter goes beyond the scope of this research and shall therefore not be elaborated on further. Instructive in this regard, however, is Preston 2014, p. 377 who speaks about the importance of environmental literacy of judges. See, where it says; "*An essential characteristic of successful [environmental courts and tribunals (ECTs)] is specialization. Environmental issues and the legal and policy responses to them demand special knowledge and expertise. In order to be competent, judges and other ECT members need to be educated about, and attuned to, environmental issues and the legal and policy responses—they need to be environmentally literate. Ideally, judges and other ECT members should be environmentally literate prior to their being appointed. There is a need for education for judges and other members who are to be appointed to a specialized ECT as well as continuing professional development of judges and other ECT members during their tenure. Having a critical mass of cases also enables judges and other members to increase knowledge and expertise over time—which proves practice makes perfect.*"

[1069] MEA 2005, vi

nonmaterial, pure ecological harm (read: a power loss[1070] in the form of - without having given your consent - being made unable to harvest food, and live a subsistence way of life).

Likewise, the *Costa Rica v. Nicaragua* case contained such an ambiguity. The wrongful felling of trees – as occurred in *Costa Rica v. Nicaragua* - can be viewed as the violation of a property right of the owner of the (land that hosts the) trees. After all, material harm was done to an ecosystem good on which rested a property right of the owner. As such, damages can be calculated according to the price of timber. However, it can also be considered a violation of the collective human interest to receive benefits from the trees felled, as they perform a function in climate regulation, flood control, water retention, etc. These concern provisioning services. However, this type of harm again sooner concerns nonmaterial, pure ecological harm.[1071] The first type of harm (read: harm to the trees as property of an owner) falls outside the scope of pure ecological harm. The second type of harm (read: loss of provisioning services) falls within the scope of pure ecological harm. Of course, one does not exclude the other. A court can hear claims for harm as loss or damage to property as well as claims for harm or loss of provisioning services (or other services).

Departing from Chapter 3's presumption of the legal status of ecosystems, in the above two cases, a further violation can be established. The violation of the interests of the ecosystems themselves of which the salmon, herring, and the trees respectively formed an integral part. Transposing Korsgaard's normative argument to the legal realm, one could add to the claims based on property law and pure ecological harm, claims on behalf of the ecosystems, and the individual species that were harmed or killed. Imaginably, based on something along the lines of a violation of physical integrity.[1072]

The above confirms once more the complexity of the formulation and adjudication of claims for pure ecological harm. An ecosystem services approach can help create more clarity on the matter of quantification, but it remains with the court to exercise extreme astuteness and nimbleness in assessing the types of (multiprong) harm they are presented with, and to always consider the possible cumulative nature of ecological harms and damages. Moreover, it is likely that courts will be confronted with a plurality of types of claimants toward the future, not limited to humans and corporations. However, this falls outside the scope of this research and shall therefore not be delved into deeper.

It could be said that this finding (as to the plurality of harms) is somewhat mirrored *ex ante* in the findings of IPBES 2022. IPBES 2022 provides a values typology that speaks of four categories of values that humans attach to nature; living from nature (anthropocentric), living in nature (anthropocentric), living with nature (bio/ecocentric /cosmocentric), living as nature (pluricentric/cosmocentric).[1073] The latter two categories lean more toward an ecocentric approach, although they of course still depart from a human perspective. The point this typology

[1070] Recall in Chapter 3 where nonmaterial harm is explained as entailing 'power loss'. Harm as a power loss means usurping or destroying someone's power, e.g. by treating their means as though they were yours to dispose of.
[1071] Recall in Chapter 3 where this type of nonmaterial harm is explained as a entailing a 'power loss'. Harm as a power loss means usurping or destroying someone's power, e.g. by treating their means as though they were your to dispose of.
[1072] This line of reasoning shall not be continued further, as it does not concern the core topic of this research, which is damage valuation. It is mentioned nevertheless, as it is important to keep in mind the possible wider implications of a broader harm concept.
[1073] IPBES 2022, p. 9

does make is that there are different types of value that can be attached to nature. Value being a corollary of harm, this means that many different types of harm can be established.

Another matter must be noted. Referring back to the conclusions of Chapter 2 and the outset of Chapter 3, where the anthropocentrism of our current legal concept of harm was critically questioned, it cannot be said that an ecosystem services approach is the end-all be-all answer to introducing ecocentrism into the courtroom. While an ecosystem services approach brings *more* ecology into the courtroom, it cannot be deemed an ecocentric approach. ES as a concept is anthropocentric; it revolves completely around the wellbeing that humans derive from the natural environment. It has little regard for the intricacies of intra-ecosystem functioning. Meaning, the mutual dependencies and 'obligations' – while perhaps not legal, but certainly vital - that exist among the countless non-human players in the ecosystem. For an ecosystem to function, these players rely on one another's functioning, just as much as humans rely on the functioning of ecosystems as a whole or parts thereof.[1074] Intra-ecosystem disruption, which clearly occurred in the case law reviewed, as a legal problem, remains unaddressed under an ecosystem services approach in the courtroom. The only thing that is addressed is what goods and services humans have lost. Sometimes these may line up with the intra-ecosystem disruption that has occurred, causing the ecosystem's interests to free ride on the protection of human interests under an ecosystem services approach, but it is imaginable that that will not always be the case. And so, unless a human makes a legal claim under an ecosystem services approach that happens to line up with the interests of the ecosystem itself, the harm following from the intra-ecosystem fall out from a disruptive event remains unaddressed. This means that an ecosystem services approach does not necessarily offer protection to the ecosystem itself.[1075] The interests of ecosystems themselves are – in that sense – not at the forefront of the concept of ES. Those interests might in many situations very well come apart from the interests that human beings have in using ecosystems. All the while, these intra-ecosystem interdependencies, ultimately, *are* of importance to human beings. After all, humans rely on the continued functioning of ecosystems for their own continued existence. An ecosystem services approach in the courtroom can, but does not necessarily, protect those interests best.

For an ecosystems services approach to be maximally beneficial for all involved, it requires claimants to formulate claims that consider – besides the direct human interests – the ecosystem's interests. The latter, of course, are at the very least indirectly of interest to humans, as humans cannot survive without the continued sustainable survival of ecosystems.

This chapter also addressed the policy tool of PES. It would appear that this policy concept is being applied with some success in policy practice. It concerns an, in principle, *ex ante* take on an ecosystems services approach. After all, it seeks to prevent harm/degradation of ES in the first place. It demonstrates that it is possible to work in an applied, practical fashion with ES valuation methods for the sake of environmental conservation. At the same time, it is clear that

[1074] Of course, human beings are part of the ecosystems they live in. However, for the sake of analysing the claiming of pure ecological losses, humans and ecosystems are framed here as being separate, interdependent agents. See also in this regard, IPBES 2022, p. 13, where it states: "*Predominant economic and political decisions have prioritised certain values of nature, particularly market-based instrumental values, often at the expense of non-market instrumental, relational and intrinsic values.*"

[1075] Of less concern for this research, but for the sake of the completeness of the idea expounded on here, an ecosystem services approach *prima facie* does also not allow the ecosystem, as a legal subject, the opportunity to protect itself. As already stated above, this research shall not delve into the depths of the discussion of legal personality of ecosystems or nature or parts thereof.

both the concepts of ES and PES, and the implementation of PES are not without critique. Nevertheless, the efforts to practically apply PES, though fraught with uncertainties, bolsters the motivation and conviction that more steps and tools can always be developed to combat environmental degradation. As regards bringing ES as a new legal tool into the courtroom, it concerns an effort to bring state-of-the-art economic valuation methodology into the courtroom, in the hopes of ensuring pure ecological harms do not go unnoticed or get thrown out. At the very least, PES offers inspiration for pioneering a more ecological approach in the courtroom.

Stretching the question of relevancy for the courtroom to PES itself, one can imagine that parties could make reference to existing PES schemes to bolster claims as to the value of certain ES. This could be done by directly referring to a local PES or even to one that is more remote, using benefit transfer. For example, someone claiming a certain harmed ES should be valued at X, could point to an existing PES scheme in which this ES is valued at X as well.[1076] Also, PES could be referred to in the courtroom as an argument for a monetary claim for restoration, citing the costs of an existing PES scheme as a basis for the costs claimed for a PES scheme to be introduced for the restoration of a degraded ES.

5. Conclusion

The concept of ES was first developed to communicate humans' absolute dependence on ES and, consequently, the immense value that they represent and the protection that they demand. This message was and remains paramount against the backdrop of ES' continued and ever-increasing degradation, often caused by human-induced processes.[1077]

Some scholars assert that valuation of ES has helped assess changes in the quantity or quality of ES, communicate their value, and that all decisions made pertaining to our environment imply valuation anyway, whether we like it or not.[1078] Also, it can help raising awareness and interest, be of use for national income and wellbeing accounts, specific policy analyses, urban and regional land use planning, PES, full cost accounting, developing common asset trusts,[1079] natural resource and land use management, developing sustainable development policy, as incentives for collective action,[1080] and in litigation to translate environmental damages into a monetary claim.[1081]

[1076] A different approach than suggested here to using a PES scheme for reference in a court case, was suggested by Nicaragua in *Costa Rica v. Nicaragua*. Nicaragua argued that valuation of the damage to the wetland could be based on "*the amount of money that Costa Rica pays landowners and communities as an incentive to protect habitat under its domestic environmental conservation scheme*". This approach was rejected by the ICJ, who argued "[c]*ompensation for environmental damage in an internationally protected wetland, however, cannot be based on the general incentives paid to particular individuals or groups to manage a habitat. The prices paid under a scheme such as that employed by Costa Rica are designed to offset the opportunity costs of preserving the environment for those individuals and groups, and are not necessarily appropriate to reflect the value of the goods and services provided by the ecosystem.*" See *Costa Rica v. Nicaragua* Judgement on Compensation, para 77
[1077] MEA 2005
[1078] Costanza et al. 1997, p. 255
[1079] Costanza et al. 2014, p. 154
[1080] Braat & De Groot 2012, p. 11-12
[1081] Costanza et al. 2014, p. 154; See *I.C.J. Reports*, 2018, *Certain Activities Carried Out by Nicaragua in the Border Area (Costa Rica v. Nicaragua), Judgment, I.C.J. Reports 2018 (IV)*, p. 23.

Other scholars are more critical of the concept, more specifically its recent evolution from communication tool to complexity-blinder.[1082]

From the ES concept has developed the PES concept. Also the development of the PES concept has been met with mixed feelings. Proponents largely follow mainstream economic rationality that views ES as externalities: they provide benefits that are not paid for and that are therefore not internalised in economic decisions.[1083] The degradation of ES is ascribed to a market failure, that prevents resources from being allocated optimally, in turn causing their overuse or exploitation, leading to environmental damage and the loss of ES.[1084] PES are seen as a way of correcting these market failures (MES are another way of achieving this goal).[1085]

Opponents view PES, as a concept, but also its practical implementation with much reservation. Concerns are both of an ethical nature, meaning "ought we value nature in monetary and market terms?", as well as of a more practical nature, meaning "does PES really deliver what it promises?".

What is certain is that PES is a new conservation tool that is being used in practice. Seeing as how it is relatively new, it will take more time to make a final judgement about whether it really delivers what is expected. For now, scholarly opinions remain divided.

What is also certain, is that PES brings into focus institutional, social justice, and legal complexities. Particularly the latter are of interest to this research. From a legal perspective, the above accounts of ES and PES once more confirm several issues, already alluded to before in this research, that complicate valuation of pure ecological harm.

Firstly, this chapter has shown once more how exceedingly difficult it is to attach an accurate monetary valuation to ES. By extension this goes for all parts of nature, importantly, also those that do not serve human interests. This explains and validates the struggles that courts have shown to have in adjudicating matters of pure ecological harm. The fact is that valuation concerns a very complex matter that can only be tackled with the proper expertise, which, primarily, is not legal but economic in nature.

Secondly, this chapter alluded to the existence of normative objections to monetary valuation of ES and other components of nature. By extension, these normative objections also apply to valuation of environmental harm in the context of a claim for legal damages. As stated earlier, this research does not engage with the broader, ethical debate surrounding valuation of nature as such. It departs from the conviction that valuation of nonmaterial harms in monetary terms inherently brings about legitimate ethical concerns and practical difficulties. Yet, taking for granted the existence and legitimacy of these concerns, this does not free us of the burden of having to bring a tangible claim to court when we seek to protect nature. Court proceedings

[1082] Norgaard 2010
[1083] Kosoy & Corbera 2010, p. 1228
[1084] Cole et al. 2014, p. 9-10
[1085] Gómez-Bagghetun & Ruiz-Pérez 2011, p. 618. While this chapter is concerned with PES, it is worth noting that besides PES and MES there are also other economically driven conservation instruments available, such as environmental taxes and subsidies, certification, and land acquisition. Besides these, there are also instruments available that are less so or not at all economically driven, such as command-and-control regulations, sustainable forest management and production, integrated conservation and development projects (ICDPs), and "social markets". For an overview of these instruments and how they measure up against each other in terms of how strongly economically incentivized they are and how directly they target the goal of conservation, see Wunder 2005.

force us to make valuations. In fact, when we refuse to do so - whether it be on principled grounds or other - we have by no means relieved ourselves of the burden of valuation. We have merely conceded to valuing nature at zero.

Thirdly, this chapter has brought to the fore the difficulty of attaching property rights to many ES. ES often do not lend themselves for ownership in the classical, legal sense. This makes them difficult legal "targets". Meaning, departing from the way our laws are set up now (see Chapter 3), it is no small feat to establish a legal framework that captures all parts of nature, including both those components that we are used to attaching property rights to (like land and agricultural goods) and those that generally fall outside the scope of property law (like ecosystem functions and biodiversity). The latter category is just as much vulnerable to harm as is the former. As follows from Chapter 3, harm to components that can have property rights vested in them, would generally be considered material harm. Harm to components that cannot have property rights vested in them, by default, renders them nonmaterial harm, or pure ecological harm. In practice, many cases will prove to be more complex, as a plurality of harms and victims of harm may present themselves. This third finding poses a confirmation of the empirical and theoretical discoveries made in, respectively, Chapters 2 and 3.

Applying an ecosystem services approach in the courtroom could aid in tackling these matters. It can help optimize the issues of acknowledgment of pure ecological harm (as defined in Chapter 2) and quantification of damages. However, as has become clear above, it by no means poses an optim*al* answer, but rather a step in the right direction. Or, at the very least, it presents a better alternative to the approaches taken in the three cases reviewed.

Chapter 5

Conclusion

1. Answers to the research questions

This research set out to answer the question: What is the optimal way for courts to deal with pure ecological damage assessment?

To this end, several subsidiary research questions were posed, namely:

1. Which frameworks have courts established for the valuation of pure ecological harm, meaning legal damages for those parts of the natural environment that, by nature, cannot have property rights vested in them?
2. Is it possible to fit pure ecological harm into our existing legal framework? And, if so, how?
3. Does an ecosystem services approach aid in formulating pure ecological harm claims and adjudicating those claims in the courtroom?

Below, the subsidiary questions shall be answered individually. Thereafter, the central research question shall be addressed.

Research question 1: *Which frameworks have courts established for the valuation of pure ecological harm, meaning legal damages for those parts of the natural environment that, by nature, cannot have property rights vested in them?*

In the case law that was analysed in this research, the Courts did not rely on a specific framework for the valuation of pure ecological harm. That is not to say that there were no frameworks available. For example, CERCLA, OPA and the Clean Water Act were already around at the time the *Exxon Valdez* oil spill became subject of the settlement agreement between the United States federal government and Alaska State government, and *Exxon Shipping co. v Baker* was filed. By the time the *Erika* and *Costa Rica v. Nicaragua* cases were brought, more frameworks were available, like the IOPC, as well as valuation frameworks developed in the field of policy and economics. Even though those (legal) frameworks were around, the Courts in the cases under review were found not to apply any specific framework in-court. Certainly, the Courts did not tackle the issue of pure ecological harm in the way that they tackled in-court establishment and assignment of more classical heads of damages such as pure economic damages. In that sense, one could say that, in the case law reviewed, the Courts did not establish a framework for the valuation of pure ecological harm. In the absence of such a framework, the Courts appeared to make issues of pure ecological harm, which in essence concern ecocentric matters, anthropocentric. By reframing the pure ecological harm suffered or by rejecting non-economic (read: nonmaterial) parts of the harm suffered, they effectively reshaped claims into (anthropocentric) terms they found more workable.

In the case law under review, the Courts' rationales and (separate) opinions demonstrated a deeply felt willingness to push the envelope on pure ecological harm toward a more ecocentric approach. However, this willingness was not (yet) met with the knowledge and skill in ecological damage valuation necessary for it to produce effective results. The development of such knowledge and skill among our judiciary is important as we cannot get around the fact that, necessarily, it is judges who finally determine damages for pure ecological harm in a court of law. In this regard, it is important to mention that there are courts and judges who are specialized in these matters and so the aforementioned should be read as a finding based on the

case law under review, and not as one that describes the judiciary in general. Departing from the finding that in the most recent of the three cases analysed, *Costa Rica v. Nicaragua*, the ICJ was critiqued for having failed to give direction for the field of ecological damage valuation[1086] – a critique uttered once more in an analysis of its more recent judgement in *Democratic Republic of Congo v. Uganda*[1087] - there does appear to be a call for courts to take on a guiding role in the development towards a more set approach to or framework for ecological damage valuation.

Currently, there are ongoing concerted efforts to create frameworks for better adjudication of environmental case law in general. More and more courts are becoming specialized in the adjudication of environmental cases and adopt / develop best practices.[1088] The matter of the development of frameworks for better ecological damage valuation would conceivably fit into these efforts.

The question naturally rises *how* a framework for better adjudication of environmental case law could be given shape. There may be a role to play for the legislator. However, depending on the legal system, imaginably a framework could also be given shape through guidelines, which could be developed by the judiciary itself. In this context, it is worth mentioning the example of the European Union Forum of Judges for the Environment (EUFJE) who, through their Bioval project, are developing guidelines that they can subsequently apply themselves.[1089]

Research question 2: *Is it possible to fit pure ecological harm into our existing legal framework? And, if so, how?*

Theoretically, the answer is: Yes. Not only is it possible to fit pure ecological harm into our legal system, following a Kantian account, it is legally theoretically unsound and illegitimate not to do so. The normative philosophical foundations of our law do not merit an approach whereby only humans count as legal subjects and where the concept of harm is limited to material harm. It demands a more inclusive approach to who counts as a legal subject and a more holistic approach where it comes to the notion of harm.

[1086] See, for example, the Dissenting Opinion of Judge Dugard to *Costa Rica v. Nicaragua*; Judgement on Compensation, para 9. But also, Rudall 2018, p. 288 who states: "*Given the increasing number of cases involving the environment, it is unfortunate that international courts and tribunals will garner only limited guidance from the methodology adopted by the ICJ in valuing environmental damage.*" And, Harrison 2018b, p. 531. Who states: "[…,] *the judgement demonstrates that the law on this topic may not be completely settled and there is plenty to argue about in future cases*". As well as, Kindji & Faure 2019; Mohan & Kini 2021.

[1087] See Harrison 2022, p. 4, where, in regards to the ICJs valuation of natural resource damages, it reads: "*There is some criticism in the separate opinions of individual judges of the lack of any 'indication as to how the different components of these sums were determined, or the way in which these figures may be justified by the facts' which, in the view of one judge, gives 'the impression to the reader … that the Court has arrived at these figures by way of* ex aequo et bono*, not on the basis of law and evidence'. Indeed, it can be observed that the unwillingness of the Court to ascribe individual sums to each head of damage contrasts with the approach taken both by the expert and the parties themselves. On this basis, one may legitimately ask whether the Court could have been more structured and transparent in its final assessment of the compensation due.*"

[1088] Pring & Pring 2016; see also the EU Forum of Judges for the Environment's BIOVAL project at https://www.eufje.org/index.php?option=com_content&view=article&id=66&Itemid=257&lang=en accessed 29 January 2023

[1089] See the EU Forum of Judges for the Environment's BIOVAL project at https://www.eufje.org/index.php?option=com_content&view=article&id=66&Itemid=257&lang=en accessed 29 January 2023

For ecosystems this means that they qualify for legal status.[1090] It also means that the nonmaterial harm they suffer, which usually consists of humans disposing of the ecosystem's means as though it were theirs, or in other words, Kantian "harm as a power loss", qualifies for compensation.

The concept of (the compensability of) nonmaterial harm, while theoretically sound, is practically a challenging one to work with, as court proceedings require the presentation and adjudication of concrete monetary claims. To meet this requirement would entail finding a way to "materialize" nonmaterial harm so that it can fit into the current legal system. An ecosystem services approach, as applied by Costa Rica in *Costa Rica v. Nicaragua*, may possibly provide a vehicle for the translation of nonmaterial, pure ecological harms to material claims.

Research question 3: *Does an ecosystem services approach aid in formulating pure ecological harm claims and adjudicating those claims in the courtroom?*

It would appear that the concept of ES and the methods that have been developed to calculate their value could – *prima facie* – aid both in formulating a claim based on pure ecological harm as well as adjudicating it.

An ecosystem services approach would allow a claimant to first determine all ES harmed in a particular incident, apply the relevant, cumulative valuation methods, and calculate a total sum of harm. Should baseline data already be available locally, claimants could refer to those. Alternatively, data could be sourced from objective sources, such as the Ecosystem Services Valuation Database (ESDV) [1091] or the System of Environmental-Economic Accounting - Ecosystem Accounting (SEEA). These could serve as a point of departure and could be applied using benefit value transfer methods. It should be noted that both the ESDV and SEEA are works in progress and for many ES there are no or incomplete data available.

This approach could bring the matter of ES valuation more clearly into focus in the courtroom.[1092] By claimants straightforwardly quantifying damage suffered through an ecosystem services approach, courts could be better facilitated in evaluating the claim made and finally determining an award for damages.

[1090] Obviously, in court they require representation by humans acting through e.g. a governmental organization or an interest group.
[1091] ESDV is the successor of the TEEB valuation database.
[1092] For an earlier specific suggestion as to how to approach in-court valuation, see Olszynski 2005, who suggests a two-stage valuation methodology, whereby ecological loss is assessed through a *prima facie* presumption in favour of restoration costs, followed by an assessment of the use/passive use/inherent value of the affected environment through contingent valuation methodologies. A kindred argument, for standardisation procedures in valuation, but applied to the policy realm, is articulated in IPBES 2022, p. 18: "*Standardization procedures in valuation can help increase the uptake of ecosystem accounting into national policies, with due consideration to the ongoing challenges of implementation in decision-making, linking accounting to diverse valuation perspectives and the challenges of measurement and valuation.[…] National ecosystem accounting aims to assess ecosystem services at the national level and to organize the associated data into an agreed statistical framework. This requires employing standardized methods that allow comparisons across countries, sectors, and through time. The System of Environmental- Economic accounting- Ecosystem Accounting uses biophysical and monetary indicators ("exchange values", i.e., equivalent to the value of goods and services exchanged in markets) to capture key instrumental values of nature.*"
[1092] Here, the focus is solely on parties' arguments as pertains to the matter of ES in the courtroom. It goes without saying that parties will engage in broader back-and-forth, also on other matters relevant to arguing their case.

If an ecosystem services approach would be applied by both claimant and respondent parties, it may potentially limit the risk of an in-court economic theoretical back-and-forth unfolding, as happened in the case law reviewed. Parties may enjoy a more level playing field when objective data sources and valuation methods are delineated from the get-go. By parties relying more on the (policy) standards already out there, judges would be spared having to speculate on the value of individual ES as well as having to contemplate (the applicability of) valuation methodology.

Moreover, courts could (and should freely) make use of the option of a court-appointed ES-valuation expert to independently inform it and answer its questions.[1093] Creating more clarity on the complex matter of quantification in this manner could allow the court to refocus on more traditional legal issues, such as the establishment of harm, causality, liability, proportionality, etc.

Imaginably, judges, who are likely to be confronted more often with environmental harm cases, would benefit from further specialisation in the matter of ecosystem services valuation.[1094]

Should this approach be taken, an ecosystem services approach may have the potential to develop into an in-court fixture for the valuation of pure ecological harm. By taking an ecosystem services approach, courts may feel better supported in carrying the burden of ploughing through many non-legal, economic issues, and aided in refocussing on the core legal issues. This, in turn, may lead to more straightforward in-court ecological damage valuations and awards than were found in the three cases reviewed.

Several matters should be noted. Firstly, there are limits to the clarity that an ecosystem services approach may bring to a legal proceeding. While it may make quantification more straightforward, parties still remain free to argue the relevance of certain valuation methods to a particular type of ES, the volume of the harm suffered, the natural recuperation that might already have taken place, etc.[1095] Secondly, successfully employing an ecosystems services approach and adjudicating cases of pure ecological harm requires that judges are facilitated in acquainting themselves, to a degree that may expected from a legal professional, with the matters of ES, ES data sourcing, and ES valuation.[1096] Thirdly, while an ecosystem services approach brings *more* ecology into the courtroom, it cannot be deemed an ecocentric approach.

[1093] Mohan & Kini 2021 also make this point in regards the *Costa Rica v. Nicaragua* case. See also Harrison 2022, p. 501 who considers the relevancy (for future adjudication of environmental case law) of the ICJ appointing an environmental damage valuation expert in *Democratic Republic of Congo v. Uganda*, stating: "*This is the first time that the Court has appointed an independent expert to deal with environmental claims and, therefore, its approach to these matters may provide useful guidance for future cases*."

[1094] Although this point shall not be elaborated on further as no specific research was done into this matter, see Preston 2014, p. 377 who stresses the importance of judges being already environmentally literate when they are appointed, as well as their continued education: "*An essential characteristic of successful [environmental courts and tribunals (ECTs)] is specialization. Environmental issues and the legal and policy responses to them demand special knowledge and expertise. In order to be competent, judges and other ECT members need to be educated about, and attuned to, environmental issues and the legal and policy responses—they need to be environmentally literate. Ideally, judges and other ECT members should be environmentally literate prior to their being appointed. There is a need for education for judges and other members who are to be appointed to a specialized ECT as well as continuing professional development of judges and other ECT members during their tenure. Having a critical mass of cases also enables judges and other members to increase knowledge and expertise over time—which proves practice makes perfect.*"

[1095] Here, the focus is solely on parties' arguments as pertains to the matter of ES in the courtroom. It goes without saying that parties will engage in broader back-and-forth, also on other matters relevant to arguing their case.

[1096] See, e.g. Preston 2014, who stresses the importance of judges' environmental literacy.

ES as a concept is anthropocentric; it revolves around the wellbeing that humans derive from the natural environment. It has little regard for the intricacies of intra-ecosystem functioning. Meaning, the mutual dependencies and 'obligations' – while perhaps not legal, but certainly vital - that exist among the countless non-human players in the ecosystem. Those interests might in many situations very well come apart from the interests that human beings have in using ecosystems. All the while, these intra-ecosystem interdependencies, may ultimately nevertheless be of importance to human beings, who rely on the continued functioning of ecosystems for their own continued existence.[1097]

For an ecosystems services approach to be more ecocentrically geared, would require claimants to formulate claims that consider – besides the human interests – the ecosystem's interests. These may in some cases easily line up. In others, they may come apart and pose a dilemma.

Having answered the three subsidiary research questions, attention can be turned to the central research question: *What is the optimal way for courts to deal with pure ecological damage assessment?*

Having conducted research into the chronological development in three prolific cases figuring ecological harm in which various assessment approaches were applied, the normative foundations that should dictate our (interpretation of) the law, and the most recent policy concepts developed in economic valuation of nature (read: ES and PES), it would appear that this research has not, and cannot for that matter, answer this question conclusively. At most, it can point toward the most optimal way forward which, for the moment, would seem to be the adoption of an ecosystem services approach for formulating claims for pure ecological harm.

In the three cases under review, the biggest problem facing claims for pure ecological harm was the difficulty in quantification of that harm.[1098] The ecosystems services approach appears to offer the most state of the art economic valuation methodology and the most promising alternative for valuation when it comes to those parts of nature that do not have property rights vested in them.

Applying an ecosystem services approach in the courtroom could aid in tackling some of the problematic issues currently plaguing the concept of pure ecological harm. Firstly, it allows harm to be quantified that used to be considered unquantifiable and therefore not eligible for compensation. By quantifying this harm it becomes eligible for compensation, and the risk of it getting lost in the legal fray, as happened in the case law reviewed, may be reduced.

By applying the ES concept and standardized valuation methodologies that have found strong footing in policy making and environmental economics, claimants will depart from a somewhat solid and objective basis. The ecosystem services approach does not pose a perfect solution, nor does it guarantee perfect outcomes. However, it would appear to have the potential to improve the current situation, which shows courts that are confronted with pure ecological harm claims struggling to tackle the issue of quantification. Imaginably, over time, a type of legal toolkit for environmental damage valuation could be created that could form part and parcel of the judiciary's arsenal, making the assessment of pure ecological damages as commonplace as

[1097] MEA 2005; IPBES 2019

[1098] The more recent ICJ decision in *Democratic Republic of Congo v. Uganda*, would seem to confirm the continued prominence of this obstacle.

assessment of economic damages. Currently, strides are being made in the development of frameworks for the better handling of environmental case law in general. The development of a legal toolkit and training for judges in the matter of quantification of pure ecological harm could fit into these efforts. However, this goes beyond the scope of this research.

As follows from the answers to the subsidiary research questions, an ecosystem services approach does not offer an optimal solution to pure ecological harm. It does, however, offer an optimal way forward relative to the *status quo*, which has been characterized by great uncertainties and difficulties when it comes to quantification of pure ecological harm in the courtroom.

2. Contribution to academic research and practice

This research aimed at tackling the topic of pure ecological damage assessment from an interdisciplinary point of view. Through case law research, normative philosophical analysis of the law, and a look toward (environmental) economic analysis, the thematic of pure ecological harm was examined from various angles.

The added value of this thesis to the field of ecological damage assessment, and possibly, to the broader field of environmental law is multiprong. Firstly, the case law analyses of *Exxon Valdez*, *Erika*, and *Costa Rica v. Nicaragua* are novel in terms of the detail of the analysis. So far, there are no publications available that analyse the multi-level court proceedings, parties' arguments and economic analyses for the purposes of valuation, and the respective Courts' reception of those arguments, rationales, and judgements to this degree. Conducting the analysis at this level allowed for the exact pinpointing of some of the existing bottlenecks in the law and the judiciary's approaches to pure ecological harm.

The normative philosophical analysis introduced a novel juxtaposition of the harm concept in law and philosophy. While the topic of "harm" is one that is written about extensively in normative philosophy, it is one that, as a distinct concept in and of itself, seems to slip through the fingers of our legal system. In the legal realm, the concept of harm *sec* seems to be presumed or taken for granted as one of several criteria for damages establishment. Bringing normative philosophy to bear on the justifiability of our current (passive) understanding of the harm-concept, allowed for the formulation of a broader harm-concept which, in turn, formed the theoretical justification for the introduction of pure ecological harm into our legal system. This has not been done before in this form.

Much has been written about the topics of ES and PES. However, bridging these policy concepts and tools to a legal context, taking into account recent case law, is new.

By suggesting in concrete, straight-forward terms the validity of adopting a broader harm-concept and the possibility of implementing this is the courtroom through an ecosystem services approach, this thesis may possibly function as a handy reference work. Both to stimulate and confirm the validity of the efforts of those who are already working toward the recognition of pure ecological harm in the courtroom (e.g. environmental lawyers, governments, NGOs, institutions that provide ecological damage assessments), but importantly also to support judges who find themselves confronted with this exceedingly complex material. This thesis offers a detailed account of three cases that are considered to be exceptionally emblematic of how courts

deal with valuation of ecological harm, spanning the course of around 30 years. It also offers an objective normative argument for giving a broader interpretation to the harm-concept, and a suggestion for an applied, practical approach to implement this is the courtroom. The aforementioned may help lawyers and judges to quickly gain oversight over the broader subject matter of pure ecological harm. It may also help lawyers find some useful points of departure for formulating a claim for pure ecological harm. It might encourage judges, who are newly confronted with this subject matter, to funnel the usual broader back-and-forth on economic valuation analyses to a sharp focus on concrete ES valuation. The normative argument posited for the application of a broader harm-concept, could potentially take away possible doubts on the part of judges as to whether they are acting within the bounds of the law when hearing and assigning claims for nonmaterial harm. As evidenced by the case law review, many judges acknowledge the existence of pure ecological harm and, consequently, want to assign damages for it. However, it appears that, constrained by traditional legal customs, they have so far not always felt the freedom to do so.

Finally, this research has, at several points, lightly brushed upon related topics that may be interesting for future research. Below, these related topics shall be listed summarily in the form of recommendations for future research.

3. Points for further research

It is clear that a lot is happening in the field of pure ecological damage valuation and that this thematic figures into a much broader (environmental) debate. It is therefore impossible to be complete in an analysis of this topic and in suggesting points for future research. Nevertheless, below, a few ideas for future research that have come to mind during the course of this research are briefly summed up. I take for granted that there are many more related topics that are of interest for future research and that the ideas mentioned below are still rather rudimentary.

1. It may be interesting to conduct further research into the role that independent, court appointed experts on environmental valuation (methodology) can fulfil in the courtroom. Imaginably, they could play an important role in clearly communicating, in a manner accessible to an audience of judges, complex economic methodologies and calculations as proposed by parties.[1099]
2. Towards the future, it may be useful to look into the possibility of developing a legal 'toolkit' for environmental damage valuation, for example, in the form of guidelines and training for judges. Imaginably, standardization could be sought for rules on valuation methodology that determine admissibility, interpretation, and application

[1099] See also Mohan & Kini 2021; Rudall 2018. Recall also Duffield 1997, p. 99 and 109-110, who emphasizes the importance of translating economic language in the courtroom to legal language. Referring to the Native Alaskans' claim in *Exxon Shipping Co. v. Baker*, he states: "*In a review of several cases, Cummings (1991) concludes that frequently the courts uncritically accept and inappropriately apply economic paradigms. Certainly the court environment is more demanding in terms of whether a given method seems reasonable and is readily communicated […] This case may serve as a warning to practitioners that groundwork needs to be done to communicate to the rest of the world what economists are doing. The court's decisions were consistent with the narrow folk definition of economics as the realm of markets and commodity exchange. […] This case also illustrates the importance of economic rhetoric. While the plaintiffs won the first round in terms of having a claim under Oppen, the defendants successfully labeled some claims as "non-economic," repackaged their economics, changed experts, and won the second round on economic methods.*"

in court; much like rules of evidence that determine, among others, how evidence may be collected, what evidence is admitted or excluded in court, and relevance. The legal frameworks described at the outset of Chapter 2 could possibly provide a point of departure for research in this area, as they prescribe specific valuation methods and, in their accompanying guidelines, give guidance on how these ought to be interpreted and applied in practice. However, one may also look toward the EU Forum of Judges for the Environment's BIOVAL project.[1100]

3. By extension, it would be useful to investigate how (i.e. by which institution) the abovementioned guidelines could best be developed. This may also raise the question of what role the legislator can play.
4. It would be interesting to conduct broader, comparative legal research into how courts in various countries deal with claims for pure ecological harm.
5. In Chapter 3, the moral and legal status of nature were addressed.[1101] While this research is not concerned with the topics of legal personality, rights of nature and the like, Chapter 3 did provide some ideas that could possibly lend themselves for transposition to research in that context. In particular, it provided an argument for the moral and legal status of animals and ecosystems. This argument may be relevant for research in the realm of protection of individual living beings, collectives or nature at large.[1102]
6. Departing from the idea that animals and ecosystems, too, have moral and legal status, this evokes questions on who will step us as a claimant. It may be interesting to further explore the role/duty, of governments in protecting the environment. Also the rights of local, indigenous peoples to act as public trustees for local ecosystems, as well as NGOs, would be interesting to examine further.[1103]
7. In the policy field, it appears that more interdisciplinary approaches to valuation of nature are emerging. These concern valuation methods from the field of economics, biology, anthropology, and indigenous and local traditions.[1104] Imaginably, toward the future, it would be interesting to research the relevancy of these interdisciplinary valuation approaches for the courtroom.
8. It may also be interesting to examine the role that PES could play *ex post* in restoration of injured ecosystems and / or ecosystem services, rather than only as an *ex ante* policy tool.[1105]
9. It may be interesting to examine how claims money (awarded to a government, an NGO, or a private party) for pure ecological harm is spent. Specifically, it might be

[1100] https://www.eufje.org/index.php?option=com_content&view=article&id=40&Itemid=228&lang=en accessed 29 January 2023; https://www.eufje.org/index.php?option=com_content&view=article&id=66&Itemid=257&lang=en accessed 29 January 2023

[1101] Drawing from Korsgaard's impressive body of work on the moral status and legal rights of animals, in particular Korsgaard 2011, Korsgaard 2012, Korsgaard 2018, Korsgaard 2018a and Korsgaard 2020. Chapter 3 also drew largely from the Stanford Encyclopedia of Philosophy and its comprehensive overview of normative thought on moral status, see https://plato.stanford.edu/entries/grounds-moral-status/ accessed 20 December 2021

[1102] Recent publications that entertain similar arguments in regards to the moral status and right of animals, concern Precht 2018, Donaldson & Kymlicka 2011, and Korsgaard 2018.

[1103] Recall in this regard, the opportunity that seemed to have been foregone in the *Exxon Valdez* case for the Native Alaskans to act as public trustees for the conservation of the local ecosystem.

[1104] IPBES 2022

[1105] See Chapter 4 for an overview of the academic literature on PES, which approaches this concept consistently from a policy perspective.

of interest to research in how far a successful claim for pure ecological harm can be said to end up benefiting the environment that was damaged.

10. Finally, it would be valuable to continue research on how to best quantify pure ecological harm in the courtroom, as this is not a cut-and-dried matter.[1106] Following this research, at the moment, an ecosystem services approach would appear to be the right way forward. But that is not to say that other approaches cannot be conceived of that are perhaps better than this approach.

[1106] See for earlier suggestions as to how to come to a final ecological harm valuation in-court, e.g. Olszynski 2005; Knudsen 2009; Fejes et al. 2011

Summary

This research was inspired by a 2018 claim for environmental damage made by Costa Rica against Nicaragua before the International Court of Justice. In its claim, Costa Rica asserted that Nicaragua had caused pure ecological harm to protected rainforests and wetlands and substantiated this claim by way of valuation of individual ecosystem services that had been damaged or lost. This approach presented a novelty in international environmental damage litigation, but appeared somewhat unsuccessful. Of the total of $2,880,745.82 that Costa Rica claimed for all ecosystem services lost, the ICJ awarded a mere $120,000, corresponding to 4% of the original claim.

This event raised questions as to which frameworks courts have established for the valuation of pure ecological harm, meaning legal damages for those parts of the natural environment that, by nature, cannot have property rights vested in them. As well as, whether it is possible to fit pure ecological harm into our existing legal framework. And, if so, how? And, whether an ecosystem services approach aids in formulating pure ecological harm claims and adjudicating those claims in the courtroom. The overall research question being: *What is the optimal way for courts to deal with pure ecological damage assessment?*

In this thesis, the aforementioned questions were each addressed in separate chapters, with chapter 5 summing up all the answers, as well as answering the overall research question.

Through case law analyses an attempt was made at finding out whether courts have established frameworks for ecological damage valuation. It was found that – at least in the case law studied here – that was not the case, even though such frameworks did exist. Neither did the Courts in the cases under examination make use of independently appointed environmental damage valuation experts.

Subsequently, through a juxtaposition between the law and Kant's Rechtslehre, the possibilities of fitting pure ecological harm into our current legal system were examined. It was found that pure ecological harm does fit into our legal system, provided we work with a broader harm concept, in line with Kantian legal philosophy. Furthermore, inspired by Korsgaard's work on animal rights, it was concluded that ecosystems – just like humans – have moral status and thus certain legal rights.

Then, an analysis was provided of the concepts of Ecosystem Services (ES) and Payments for Ecosystem Services (PES). Also, their usefulness for the courtroom was addressed. It was found that the concept of ES and the methods that have been developed to calculate their value could – *prima facie* – aid both in formulating a claim based on pure ecological harm as well as adjudicating it. Such an approach would allow a claimant to first determine all ES harmed in a particular incident, apply the relevant, cumulative valuation methods, and calculate a total sum of harm.

Finally, it was found that, having conducted research into the chronological development in three prolific cases figuring ecological harm in which various assessment approaches were applied, the normative foundations that should dictate our (interpretation of) the law, and the most recent policy concepts developed in economic valuation of nature (read: ES and PES), the

most optimal way forward, for the moment, would seem to be the adoption of an ecosystem services approach for formulating claims for pure ecological harm.

While an ecosystem services approach does not offer an optimal solution to pure ecological harm, it does offer an optimal way forward relative to the *status quo*, which has been characterized by great uncertainties and difficulties when it comes to quantification of pure ecological harm in the courtroom.

Samenvatting

De inspiratie voor dit onderzoek vloeit voort uit een milieuschadevordering ingediend door Costa Rica tegen Nicaragua in 2018 bij het Internationaal Gerechtshof (hierna ICJ). Costa Rica beweerde dat Nicaragua pure ecologische schade had toegebracht aan beschermde regenwouden en wetlands en onderbouwde deze claim met een waardering van individuele ecosysteemdiensten die beschadigd of verloren waren gegaan. Deze aanpak was een noviteit in internationale milieuschadegeschillen, maar bleek weinig succesvol. Van de totale $2.880.745,82 dollar die Costa Rica claimde voor alle verloren gegane ecosysteemdiensten, kende het ICJ slechts $120.000 dollar toe, hetgeen overeenkomt met 4% van de oorspronkelijke claim.

Deze gebeurtenis deed de vraag rijzen welke kaders rechtbanken hebben vastgesteld voor de waardering van pure ecologische schade, d.w.z. schadevergoeding voor die onderdelen van de natuur waarop geen eigendomsrechten rusten. En ook, of het mogelijk is pure ecologische schade te passen in ons bestaande rechtskader. En zo ja, hoe? Alsook, of een ecosysteemdienstenbenadering helpt bij het formuleren van pure ecologische schadeclaims en de behandeling daarvan in de rechtszaal. De algemene onderzoeksvraag zijnde: Wat is de optimale manier voor de rechter om met pure ecologische schadeclaims om te gaan?

In dit proefschrift zijn bovengenoemde vragen elk in aparte hoofdstukken behandeld, waarbij in hoofdstuk 5 alle antwoorden zijn samengevat en de algemene onderzoeksvraag is beantwoord.

Door middel van jurisprudentieanalyses is getracht te achterhalen of rechtbanken kaders hebben vastgesteld voor de waardering van ecologische schade. Gebleken is dat dit - althans in de hier bestudeerde jurisprudentie - niet het geval was, hoewel dergelijke kaders wel bestonden. Evenmin maakten de rechtbanken in de onderzochte zaken gebruik van onafhankelijk benoemde deskundigen op het gebied van de waardering van milieuschade.

Vervolgens is via een vergelijking tussen het recht en Kant's Rechtslehre onderzocht wat de mogelijkheden zijn om pure ecologische schade in te passen in ons huidige rechtssysteem. Hieruit bleek dat pure ecologische schade wel degelijk past in ons rechtssysteem, mits we werken met een breder schadebegrip, in lijn met de Kantiaanse rechtsfilosofie. Verder werd, geïnspireerd door Korsgaard's werk over dierenrechten, geconcludeerd dat ecosystemen - net als mensen - een morele status en dus bepaalde wettelijke rechten hebben.

Vervolgens werd een analyse gegeven van de begrippen ecosysteemdiensten (ES) en betalingen voor ecosysteemdiensten (PES). Ook hun nut voor de rechtszaal kwam aan bod. Geconstateerd werd dat het concept van ES en de methoden die zijn ontwikkeld om de waarde ervan te berekenen, op het eerste gezicht zowel kunnen helpen bij het formuleren van een vordering op basis van pure ecologische schade als bij de berechting ervan. Met een dergelijke aanpak zou een eiser eerst alle ES kunnen bepalen die bij een bepaald incident schade hebben geleden, vervolgens de relevante, cumulatieve waarderingsmethoden kunnen toepassen en de totale schade kunnen berekenen.

Na onderzoek naar de chronologische ontwikkeling in drie bekende gevallen van ecologische schade waarin verschillende beoordelingsmethoden werden toegepast, de normatieve

grondslagen die onze (interpretatie van de) wet zouden moeten dicteren, en de meest recente beleidsconcepten die in de economische waardering van de natuur (lees: ES en PES) zijn ontwikkeld, is ten slotte gebleken dat de meest optimale weg vooralsnog lijkt te bestaan in een ecosysteemdienstenbenadering voor het formuleren van claims voor pure ecologische schade.

Hoewel een ecosysteemdienstenbenadering geen optimale oplossing biedt voor zuivere ecologische schade, biedt zij wel een optimale weg vooruit ten opzichte van de status quo, die wordt gekenmerkt door grote onzekerheden en moeilijkheden bij de kwantificering van pure ecologische schade in de rechtszaal.

Impact paragraph

This research aimed at tackling the topic of pure ecological damage assessment from an interdisciplinary point of view. Through case law research, normative philosophical analysis of the law, and a look toward (environmental) economic analysis, the thematic of pure ecological harm was examined from various angles.

The added value of this thesis to the field of ecological damage assessment, and possibly, to the broader field of environmental law is multiprong. Firstly, the case law analyses of *Exxon Valdez*, *Erika*, and *Costa Rica v. Nicaragua* are novel in terms of the detail of the analysis. So far, there are no publications available that analyse the multi-level court proceedings, parties' arguments and economic analyses for the purposes of valuation, and the respective Courts' reception of those arguments, rationales, and judgements to this degree. Conducting the analysis at this level allowed for the exact pinpointing of some of the existing bottlenecks in the law and the judiciary's approaches to pure ecological harm.

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By suggesting in concrete, straight-forward terms the validity of adopting a broader harm-concept and the possibility of implementing this is the courtroom through an ecosystem services approach, this thesis may possibly function as a handy reference work. Both to stimulate and confirm the validity of the efforts of those who are already working toward the recognition of pure ecological harm in the courtroom (e.g. environmental lawyers, governments, NGOs, institutions that provide ecological damage assessments), but importantly also to support judges who find themselves confronted with this exceedingly complex material. This thesis offers a detailed account of three cases that are considered to be exceptionally emblematic of how courts deal with valuation of ecological harm, spanning the course of around 30 years. It also offers an objective normative argument for giving a broader interpretation to the harm-concept, and a suggestion for an applied, practical approach to implement this is the courtroom. The aforementioned may help lawyers and judges to quickly gain oversight over the broader subject matter of pure ecological harm. It may also help lawyers find some useful points of departure for formulating a claim for pure ecological harm. It might encourage judges, who are newly confronted with this subject matter, to funnel the usual broader back-and-forth on economic valuation analyses to a sharp focus on concrete ES valuation. The normative argument posited for the application of a broader harm-concept, could potentially take away possible doubts on the part of judges as to whether they are acting within the bounds of the law when hearing and

assigning claims for nonmaterial harm. As evidenced by the case law review, many judges acknowledge the existence of pure ecological harm and, consequently, want to assign damages for it. However, it appears that, constrained by traditional legal customs, they have so far not always felt the freedom to do so.

Finally, this research has, at several points, lightly brushed upon related topics that may be interesting for future research. Below, these related topics shall be listed summarily in the form of recommendations for future research. Before this is done, it should be pointed out that it is clear that a lot is happening in the field of pure ecological damage valuation and that this thematic figures into a much broader (environmental) debate. It is therefore impossible to be complete in an analysis of this topic and in suggesting points for future research. Nevertheless, below, a few ideas for future research that have come to mind during the course of this research are briefly summed up. I take for granted that there are many more related topics that are of interest for future research and that the ideas mentioned below are still rather rudimentary.

1. It may be interesting to conduct further research into the role that independent, court appointed experts on environmental valuation (methodology) can fulfil in the courtroom. Imaginably, they could play an important role in clearly communicating, in a manner accessible to an audience of judges, complex economic methodologies and calculations as proposed by parties.[1107]
2. Towards the future, it may be useful to look into the possibility of developing a legal 'toolkit' for environmental damage valuation, for example, in the form of guidelines and training for judges. Imaginably, standardization could be sought for rules on valuation methodology that determine admissibility, interpretation, and application in court; much like rules of evidence that determine, among others, how evidence may be collected, what evidence is admitted or excluded in court, and relevance. The legal frameworks described at the outset of Chapter 2 could possibly provide a point of departure for research in this area, as they prescribe specific valuation methods and, in their accompanying guidelines, give guidance on how these ought to be interpreted and applied in practice. However, one may also look toward the EU Forum of Judges for the Environment's BIOVAL project.[1108]
3. By extension, it would be useful to investigate how (i.e. by which institution) the abovementioned guidelines could best be developed. This may also raise the question of what role the legislator can play.

[1107] See also Mohan & Kini 2021; Rudall 2018. Recall also Duffield 1997, p. 99 and 109-110, who emphasizes the importance of translating economic language in the courtroom to legal language. Referring to the Native Alaskans' claim in *Exxon Shipping Co. v. Baker*, he states: "*In a review of several cases, Cummings (1991) concludes that frequently the courts uncritically accept and inappropriately apply economic paradigms. Certainly the court environment is more demanding in terms of whether a given method seems reasonable and is readily communicated […] This case may serve as a warning to practitioners that groundwork needs to be done to communicate to the rest of the world what economists are doing. The court's decisions were consistent with the narrow folk definition of economics as the realm of markets and commodity exchange. […] This case also illustrates the importance of economic rhetoric. While the plaintiffs won the first round in terms of having a claim under Oppen, the defendants successfully labeled some claims as "non-economic," repackaged their economics, changed experts, and won the second round on economic methods.*"

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4. It would be interesting to conduct broader, comparative legal research into how courts in various countries deal with claims for pure ecological harm.
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6. Departing from the idea that animals and ecosystems, too, have moral and legal status, this evokes questions on who will step us as a claimant. It may be interesting to further explore the role/duty, of governments in protecting the environment. Also the rights of local, indigenous peoples to act as public trustees for local ecosystems, as well as NGOs, would be interesting to examine further.[1111]
7. In the policy field, it appears that more interdisciplinary approaches to valuation of nature are emerging. These concern valuation methods from the field of economics, biology, anthropology, and indigenous and local traditions.[1112] Imaginably, toward the future, it would be interesting to research the relevancy of these interdisciplinary valuation approaches for the courtroom.
8. It may also be interesting to examine the role that PES could play *ex post* in restoration of injured ecosystems and / or ecosystem services, rather than only as an *ex ante* policy tool.[1113]
9. It may be interesting to examine how claims money (awarded to a government, an NGO, or a private party) for pure ecological harm is spent. Specifically, it might be of interest to research in how far a successful claim for pure ecological harm can be said to end up benefiting the environment that was damaged.
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[1109] Drawing from Korsgaard's impressive body of work on the moral status and legal rights of animals, in particular Korsgaard 2011, Korsgaard 2012, Korsgaard 2018, Korsgaard 2018a and Korsgaard 2020. Chapter 3 also drew largely from the Stanford Encyclopedia of Philosophy and its comprehensive overview of normative thought on moral status, see https://plato.stanford.edu/entries/grounds-moral-status/ accessed 20 December 2021

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[1111] Recall in this regard, the opportunity that seemed to have been foregone in the *Exxon Valdez* case for the Native Alaskans to act as public trustees for the conservation of the local ecosystem.

[1112] IPBES 2022

[1113] See Chapter 4 for an overview of the academic literature on PES, which approaches this concept consistently from a policy perspective.

[1114] See for earlier suggestions as to how to come to a final ecological harm valuation in-court, e.g. Olszynski 2005; Knudsen 2009; Fejes et al. 2011

Curriculum Vitae

Cenay Aliye Elisa Akin was born in 1986 in Aachen, Germany. In 2010, she graduated from Maastricht University, having obtained a bachelor and a master degree in European Law School. She also spent a semester abroad studying American corporate law at the Dickinson School of Law at Penn State University, USA.

Cenay has previously worked as a legal researcher for Nyenrode Business University and Antwerp University. In 2016, she joined Maastricht University's Administrative and Legal Affairs department as an in-house lawyer. In 2019, she became Deputy Director of the same department. In 2020, she took over as Director.

In 2018, she joined the Maastricht Institute for Transnational Legal Research (METRO), where, under the supervision of Prof. dr. Michael Faure, she pursued her doctoral degree. Through her co-supervisor, Prof. dr. George Pavlakos, Cenay's doctoral research is also connected to the University of Glasgow's School of Law.

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List of abbreviations

CLC	Convention on Civil Liability for oil Pollution Damage
CDM	Kyoto Protocol's Clean Development Mechanism
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
DOI	(United States) Department of the Interior
EA	Equivalency Analysis
EE	Ecological Economics
ELD	European Environmental Liability Directive
EIA	Environmental Impact Assessment
ES	Ecosystem Service(s)
EU	European Union
FAO	Food and Agricultural Organization of the United Nations
GAO	United States General Accounting Office
GDP	Gross Domestic Product
ICDP	Integrated conservation and development projects
IFEN	Institut français de l'environnement
IMO	International Maritime Organization
IOPCF	International Oil Pollution Compensation Funds
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
ITOPF	International Tanker Owners Pollution Federation
IUCN	International Union for Conservation of Nature and Natural Resources
KWH	Kilowatt Hour
MEA	Millennium Ecosystem Assessment
MES	Market(s) for Ecosystem Services
MIT	Massachusetts Institute of Technology
NOAA	U.S. National Oceanic and Atmospheric Administration
NOU	Norges Offentlige Utredninger (Official Reports of the Norwegian Government)
NPL	National Priorities List

OPA	Oil Pollution Act of 1990
PES	Payment(s) for Ecosystem Services
PROFOR	(World Bank) Program on Forests
REMEDE	Resource Equivalency Methods for Assessing Environmental Damage in the EU
SOU	Sveriges Offentliga Utredningar (Official Reports of the Swedish Government)
TEEB	The Economics of Ecosystems and Biodiversity
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
UNFCCC	United Nations Framework Convention on Climate Change
VND	Vietnam Dong
WBCSD	World Business Council for Sustainable Development
WIM	Warsaw International Mechanism on Loss and Damage
WTP	Willingness to pay
WTAC	Willingness to accept compensation


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