3

Definition and Valuation of Compensable Environmental Damage

3.1 INTRODUCTION

Principles and rules on liability and compensation need to define the nature and scope of losses that may be recoverable. This chapter examines issues related to the definition and valuation of environmental damage in areas beyond national jurisdiction (ABNJ), that is: what general principles govern reparation for environmental damage; what types of environmental damage should give rise to compensation or other measures of reparation; and how should such compensation or other measures be assessed in monetary terms. This chapter draws out the characteristics of, and considerations relating to, the global commons areas that might affect the approach taken to these questions, and how, if at all, compensation for environmental damage has been addressed in the existing regimes governing ABNJ under consideration in this study. To inform the discussion, the chapter examines other relevant international principles and rules that have been adopted or applied to address compensation for environmental damage at the international level.

As international concern for the environment and recognition of the significance and value of ecosystem services to humans has increased,[1] there has been some evolution in international legal approaches to compensability of environmental harm, both in international agreements addressing liability for damage arising from hazardous activities and in judicial forums. Approaches to defining compensable environmental damage remain, for the most part, incomplete, to the extent that they fail to adequately address irreparable environmental damage or interim losses pending restoration of the damaged environment. Legal approaches to defining compensable environmental damage, particularly in the more developed context of civil liability regimes, have usually been determined in light of concerns about

[1] ES Brondizio, J Settele, S Díaz and HT Ngo (eds), *Global Assessment Report on Biodiversity and Ecosystem Services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services* (IPBES 2019).

valuation methodologies, limits on liability and insurability of risks. There remains a lack of clarity about the elements of environmental damage that can be compensated, and the methods by which any monetary compensation should be assessed.[2] Most debate has concerned whether damage to environmental resources without a recognized commercial or market value[3] should be compensable, and, if so, how such losses should be quantified. This concept of pure environmental loss encompasses damage that is irreparable, or that may entail significant interim losses pending reinstatement or natural recovery of the damaged environment. On this point there are differences in the approaches that have been taken in different contexts and forums, but recent developments indicate that as a matter of principle such losses should be compensated notwithstanding difficulties in quantification.[4] These developments encompass a growing recognition of the importance of framing environmental damage not simply in terms of damage to components of the environment, but rather in the context of the loss of ecosystem services or functions: the provisioning, regulating, cultural and supporting services provided by environmental resources.[5]

As discussed further in Section 3.2.2, environmental damage in ABNJ could thus encompass various heads of damage, such as:

- Consequential loss as a result of impairment to the environment (loss of profit). This could include, for example, losses from reduced access to fisheries, mineral resources or marine genetic resources;
- The costs of measures to prevent environmental damage;
- The costs of measures of reinstatement taken to restore the damaged environment;

[2] See generally, Louise de La Fayette, 'The Concept of Environmental Damage in International Liability Regimes' in Michael Bowman and Alan Boyle (eds), *Environmental Damage in International and Comparative Law: Problems of Definition and Valuation* (OUP 2002) 149; Edward Brans, *Liability for Damage to Public Natural Resources: Standing, Damage and Damage Assessment* (Kluwer Law International 2001); Peter Wetterstein (ed), *Harm to the Environment: The Right to Compensation and the Assessment of Damages* (OUP 1997); Jason Rudall, *Compensation for Environmental Damage under International Law* (Routledge 2020).

[3] The International Court of Justice (ICJ) has referred to 'damage caused to the environment, in and of itself'. *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* [2018] ICJ Rep 15, para 41 (*Certain Activities*). See further Section 3.2.1.3.

[4] According to the International Law Commission (ILC), 'the earlier reluctance to accept liability for damage to the environment *per se*, without linking such damage to persons or property is gradually disappearing'. ILC, 'Draft Principles on the Allocation of Loss in the Case of Transboundary Harm Arising Out of Hazardous Activities, with Commentaries' (2006) UN Doc A/61/10 (Draft Principles), commentary to principle 3, 73, para 8.

[5] See Brondizio and others (n 1); and on compensability of ecosystem service loss in the marine environment, see Günther Handl, 'Marine Environmental Damage: The Compensability of Ecosystem Service Loss in International Law' (2019) 34 IJMCL 602, arguing that '[ecosystem services] compensability is a touchstone for the robustness of contemporary international law and policy regarding the protection and conservation of the marine environment', at 611–612.

- Assessment and monitoring costs associated with identifying environmental damage and the effects of preventive or restoration measures; and
- Pure environmental damage that is incapable of restoration or that gives rise to interim losses pending restoration. Such losses would incorporate loss of ecosystem services, as well as components of biodiversity, and could incorporate provision of equivalent resources or services.

Environmental damage in ABNJ could occur in a range of different situations that impact on the appropriate approach to reparation and valuation of damage. For example, environmental damage could arise from impacts from approved activities, such as seabed mining in the Area. Such impacts may have been foreseen in the environmental impact assessment (EIA) prior to approval, and addressed in risk management measures, or they may comprise adverse effects unforeseen in nature and/or scale. Damage could also arise due to accidents, such as discharges of oil or chemicals in the high seas or in Antarctica. Environmental damage may arise from specific incidents, such as catastrophic pollution events, or it might arise as a result of the cumulative effects of certain activities, such as overfishing or destructive fishing practices. It may also result from more complex interactions between diffuse or cumulative sources, such as pollution of the marine environment by plastic, marine pollution by land-based sources or from the impacts of climate change including ocean acidification. Diffuse and cumulative damage raises complex questions around causation, remoteness and attribution. Beyond harm to components of the environment and ecosystem services as such, further consideration might also be given to environmental damage in the context of cultural harm, particularly in relation to indigenous peoples.[6]

Determining workable legal approaches to defining and valuing environmental damage also has to account for the significant technical and scientific challenges associated with assessing and monitoring damage to the environment in ABNJ, and with identifying and implementing any appropriate restoration or compensatory measures. Valuation methodologies have been a thorny issue in the international regime on oil pollution damage, and also in the context of national liability regimes.[7]

Section 3.2 of this chapter first outlines existing and emerging approaches to reparation for environmental damage in general international law, with Section 3.2.1 focusing on the rules of state responsibility and claims against states in respect of environmental damage made in international tribunals and the United Nations Compensation Commission (UNCC). These general rules and principles, as the

[6] Julian Aguon and Julie Hunter, 'Second Wave Due Diligence: The Case for Incorporating Free, Prior and Informed Consent into the Deep Seabed Mining Regulatory Regime' (2019) 38 Stan Envtl L J 3.

[7] See Rudall (n 2) 2, noting that 'there are many ways of calculating monetary compensation for environmental damage, and their outcomes vary significantly'.

default rules governing state liability, are applicable in ABNJ, and also provide the foundations for understanding how international law approaches the concept of environmental damage. Section 3.2.2 then examines elements of compensable environmental damage in various international instruments addressing civil liability for environmental harm. While not directly applicable to ABNJ,[8] these regimes provide further examples of the approaches to defining environmental damage in the context of specific hazardous activities that are likely to inform the development of rules in global commons areas. Section 3.3 then turns to the definition of environmental damage in relevant existing and emerging rules in ABNJ: in respect of Antarctica, the deep seabed and the high seas. Finally, Section 3.4 considers challenges associated with assessing or quantifying claims for environmental damage, and the ways in which such challenges might affect liability rules on environmental damage in ABNJ.

3.2 DEFINING COMPENSABLE ENVIRONMENTAL DAMAGE UNDER INTERNATIONAL LAW

3.2.1 *State Responsibility*

Under general international law, principles of state responsibility apply to reparation in respect of transboundary environmental damage arising from an internationally wrongful act of a state. States have the obligation to ensure that activities under their jurisdiction or control do not cause damage to the environment of ABNJ, or of other states.[9]

[8] Although note the provision for compensation in respect of preventive measures in, for example, International Convention on Civil Liability for Oil Pollution Damage (adopted 29 November 1969, entered into force 19 June 1975) 973 UNTS 3 (1969 Oil Pollution Liability Convention), amended by the 1992 Protocol to Amend the 1969 International Convention on Civil Liability for Oil Pollution Damage (adopted 27 November 1992, entered into force 30 May 1996) 1956 UNTS 255 (1992 Oil Pollution Liability Convention), art II(b); International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea (adopted 3 May 1996) (1996) 35 ILM 1415 (1996 HNS Convention), art 3(d) as amended by the International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea (adopted 30 April 2010) (2010 HNS Convention); and Basel Protocol on Liability and Compensation for Damage Resulting from Transboundary Movement of Hazardous Wastes and their Disposal (adopted 10 December 1999) UNEP/CHW.1/WG/1/9/2 (1999 Basel Liability Protocol), art 3(3)(c). On the high seas 'gap' in relation to pollution from tankers, see Nicholas Gaskell, 'Liability and Compensation Regimes: Pollution of the High Seas' in Robert C Beckman, Millicent McCreath, J Ashley Roach and Zhen Sun (eds), *High Seas Governance: Gaps and Challenges* (Brill Nijhoff 2018) 229–272, 236–237.

[9] Declaration of the United Nations Conference on the Human Environment (1972) UN Doc A/Conf.48/14/Rev.1 (1972 Stockholm Declaration) principle 21; Report of the United Nations Conference on Environment and Development (1992) UN Doc A/Conf.151/26/Rev.1, Annex I (1992 Rio Declaration) principle 2; *Legality of the Threat and Use of Nuclear Weapons*

3.2.1.1 General Principles of Reparation

Violations of international obligations by states constitute an internationally wrongful act, giving rise to an obligation to make reparation for the injury caused by the wrongful act.[10] While this principle is relatively straightforward, its application in the context of environmental damage raises a number of questions. In its work on state responsibility, the International Law Commission (ILC) touched upon some specific considerations concerning reparation for environmental harm, but, in light of the general scope of the Draft Articles on Responsibility of States for Internationally Wrongful Acts (ASR), left others unaddressed.[11] As the commission of an internationally wrongful act is the trigger for the application of rules of state responsibility, for these rules to come into play, states must either violate a rule of international environmental law directly or violate their obligations of due diligence in respect of the oversight of relevant activities.

The approach taken under article 31 of the ASR is that the wrongful act gives rise to a secondary obligation on the responsible state to make full reparation for the injury caused by the wrongful act.[12] The ILC notes that structuring reparation as an obligation of the responsible state, as opposed to being the right of the injured state, avoids difficulties where the obligation is owed simultaneously to several or many states, but only a few are specially affected by the breach. This is likely to be a recurring feature of harm to the global commons, and may facilitate a more inclusive approach to standing by allowing invocation of state responsibility by non-injured states.[13]

3.2.1.2 Causation and Remoteness

Article 31 makes references to the concept of causality, in that reparation must be made for injury 'caused by' the internationally wrongful act. This is addressed further in the commentary to article 31, which refers to various formulations concerning directness, proximity and remoteness of damage. While recognizing that no single formula can fully capture the question of remoteness, and that 'the

(Advisory Opinion) [1996] ICJ Rep 226, para 29; United Nations Convention on the Law of the Sea (adopted 10 December 1982, entered into force 16 November 1994) 1833 UNTS 397 (UNCLOS) arts 192 and 194(2); *The South China Sea Arbitration (The Republic of Philippines v The People's Republic of China)* (Award) (2016) Oxford Reports on ICGJ 495 (PCA) (*South China Sea Arbitration*), para 940.

[10] ILC, 'Draft Articles on Responsibility of States for Internationally Wrongful Acts, with Commentaries' (2001) UN Doc A/56/10 (ASR) art 1, 32; art 31, 91.

[11] See generally Alan Boyle, 'Reparation for Environmental Damage in International Law: Some Preliminary Problems' in Michael Bowman and Alan Boyle (eds), *Environmental Damage in International and Comparative Law: Problems of Definition and Valuation* (OUP 2002) 17.

[12] ASR (n 10), art 31, 91.

[13] ibid art 48, 126 (also discussed in Chapter 6).

requirement of a causal link is not necessarily the same in relation to every breach of an international obligation', article 31 reflects the need for a 'sufficient causal link which is not too remote'.[14] This is consistent with the approach to environmental damage in the *Trail Smelter* case, which noted that recovery may not be available for damage that is 'too indirect, remote and uncertain to be appraised'.[15]

Restricting recovery based on remoteness addresses two separate issues germane to damage in the commons. First, there is a policy question of the extent to which a responsible actor ought to bear the unforeseeable consequences of its breach. In complex ecosystems, such as oceans, the causal chains linking damage to specific (and attributable) actions are likely to be attenuated and subject to greater scientific uncertainty. A strict approach to remoteness or foreseeability may narrow the scope of recoverable damages, leaving indirect or unforeseeable harms unaddressed.

A second, related issue relates to the evidentiary challenges associated with proving damage. In the *Certain Activities* case, the International Court of Justice (ICJ) acknowledged that issues may arise as to the existence of damage and causation in cases of alleged environmental damage. It also noted in respect of valuation of such damage, that the absence of adequate evidence as to the extent of material damage would not, in all situations, preclude an award of compensation for that damage.[16] However, in a subsequent case, the ICJ did reject a claim in respect of damage to biodiversity through deforestation on the basis that the claimant did not provide evidence of the damage.[17] A liability claim related to environmental damage in an area beyond national jurisdiction would presumably impose an evidentiary burden on the claimant to prove the damage that has occurred as well as the causal link, which could give rise to challenges in terms of evidence-gathering. For example, the nature and accessibility of certain areas beyond national jurisdiction might mean that in practice only states with significant economic, technical and scientific capacity, or perhaps international organizations, could engage in gathering evidence upon which to found a claim for environmental damage, setting up a *de facto* barrier to access to justice.

Another issue with respect to causation is that while some incidents of environmental damage in ABNJ may be caused by a single identifiable event, conduct or source, there will be other situations in which such damage arises because of diffuse sources or of cumulative impacts over time – for example, impacts of marine

[14] ibid commentary to art 31, 93, para 10.

[15] *Trail Smelter Arbitration* (1949) III UNRIAA 1905, 1931. For a discussion of difficulties applying concepts of causation in the context of transboundary air pollution, see Phoebe Okowa, *State Responsibility for Transboundary Air Pollution in International Law* (OUP 2000) 184–190.

[16] *Certain Activities* (n 3), paras 34–35; see also para 86. See Section 3.4.

[17] *Armed Activities on the Territory of the Congo (Democratic Republic of the Congo v Uganda)* Judgment of 9 February 2022, General List No 116 [2022], para 350. The Court found that the claimant had not provided the Court with any basis for assessing damage to the environment, in particular to biodiversity, through deforestation.

pollution from land-based sources or of climate change. These challenge traditional concepts of causation for the purposes of establishing responsibility for harm and may operate to limit the potential for claims for environmental damage. Assessing responsibility in situations where there are multiple and cumulative sources of environmental damage will depend upon available evidence. However, in ABNJ, establishing a sufficient causal link in these circumstances may be complicated by factors such as deficient baseline data, scientific understanding of cause-and-effect relationships in complex ecosystems or the lack of monitoring to provide data on how and when environmental damage has occurred.

The ILC touched upon this scenario in its commentary to article 31 in the ASR noting that injury may be caused by a combination of factors,[18] but it did not directly consider the situation of environmental damage arising as a result of multiple drivers or impacts, focusing rather on the implications for allocation of responsibility. In its judgment on compensation in the *Certain Activities* case between Costa Rica and Nicaragua, the ICJ noted the need for a factual assessment of the evidence in addressing causation as follows:

> In cases of alleged environmental damage, particular issues may arise with respect to the existence of damage and causation. The damage may be due to several concurrent causes, or the state of science regarding the causal link between the wrongful act and the damage may be uncertain. These are difficulties that must be addressed as and when they arise in light of the facts of the case at hand and the evidence presented to the Court. Ultimately, it is for the Court to decide whether there is a sufficient causal nexus between the wrongful act and the injury suffered.[19]

The UNCC considered issues related to parallel or concurrent causes of harm in relation to environmental and natural resource claims, concluding that

> [w]here the evidence shows that damage resulted directly from Iraq's invasion and occupation of Kuwait but that other factors have contributed to the damage for which compensation is claimed, due account is taken of the contribution from such other factors in order to determine the level of compensation that is appropriate for the portion of the damage which is directly attributable to Iraq's invasion and occupation of Kuwait.[20]

International law allows for the invocation of state responsibility against a plurality of responsible states, allowing for actions to be brought against a group of states that are

[18] ibid paras 12–13.

[19] *Certain Activities* (n 3), para 34.

[20] United Nations Claims Commission (UNCC), 'Report and Recommendations made by the Panel of Commissioners concerning the Third Instalment of "F4" Claims' (2003) UN Doc S/AC.26/2003/31, para 39 (UNCC Third Instalment). See Vladyslav Lanovoy, 'Causation in the Law of State Responsibility' (2022) British Yearbook Intl L 1, 70–72, https://doi.org/10.1093/bybil/braboo8, 27 January 2022.

jointly responsible for environmental harm.[21] The suggestion by the UNCC indicates that in relation to the calculation and allocation of damages, this may be done on a proportional basis.

3.2.1.3 Forms of Reparation

Chapter II of the ASR addresses forms of reparation for injury caused by an internationally wrongful act, namely restitution, compensation and satisfaction.

The basic approach in the ILC ASR is that of full reparation, reflecting the well-known dictum in the *Factory at Chorzów* case with its emphasis on restitution in kind or, if this is not possible, the payment of a sum corresponding to such restitution and the award, if necessary, of damages for loss sustained which would not be covered by restitution in kind or payment of such corresponding sum.[22] The notion of reparation to 'wipe out' the consequences of the illegal act and re-establish the *status quo ante* is inherently attractive in the environmental context, as it addresses the dual goals of compensation and environmental protection and restoration. There is no reason that the rationale for restitution hinges on individual rather than collective harm, as might be suffered in harm to the global commons. The wording of article 35 of the ASR, which addresses restitution, refers to an obligation 'to re-establish the situation which existed before the wrongful act was committed'.

One general concern in this regard is the question of proportionality: whether the requirement of full reparation might lead to 'disproportionate or crippling' requirements for the responsible state.[23] Rather than address the issue of proportionality as an aspect of the obligation to make full reparation, the ILC addresses it in respect of different forms of reparation.

In terms of the forms of reparation that may be appropriate, the starting point is restitution. Article 35 of the ASR recognizes that the obligation to make restitution is not unlimited. Restitution may be materially impossible or may impose a disproportionate burden compared to compensation.[24] Depending upon any preventive and remedial action taken in such scenarios, some costs incurred might be capable of calculation and recovery, but restoration in full may be impossible, or might only occur over long and/or uncertain timescales leaving significant interim losses, for example in terms of the physical environment, components of biodiversity and/or ecosystem functioning. As envisaged in article 35, the expected costs of such efforts might exceed anticipated benefits so that in some situations, the costs of restoration efforts may be deemed disproportionate to any potential benefits of restoration, even if feasible.[25] Determining when attempts at restoration are appropriate might in

[21] See Chapter 4, Section 4.3.4.
[22] *Chorzów Factory Case* (Indemnity) [1927] PCIJ Series A No 8/9.
[23] ASR (n 10) commentary to art 34, 96, para 5.
[24] ibid commentary to art 35, 98, para 7.
[25] ibid commentary to art 35, 98, para 11.

itself be a difficult task, and one that can only be resolved on a case-by-case basis. Relevant to proportionality, some civil liability conventions and other instruments discussed in Section 3.2.2 have made reference to recoverability of costs of 'reasonable measures' of reinstatement, which then requires that some criteria of reasonableness are established.

Compensation is the form of reparation envisaged where damage cannot be made good by reparation.[26] In terms of the standard of compensation, the implication in the ASR is that compensation should be full in that it should result in full reparation, including filling any reparation 'gap' where damage is not made good by restitution. In this regard it is noteworthy that article 235 of United Nations Convention on the Law of the Sea (UNCLOS) refers to the objective of assuring 'prompt and adequate' compensation in respect of all damage caused by pollution to the marine environment, and reference to 'prompt and adequate' compensation is also included in the ILC's Draft Principles on the Allocation of Loss (Draft Principles), principles 3 and 4.[27] However, the ILC notes that 'adequacy' here is not intended to denote 'sufficiency' but relates to a number of issues, including due process of law requirements, and that provided compensation given 'is not arbitrary, and grossly disproportionate to the damage actually suffered, even if it is less than full it can be regarded as adequate'.[28]

Compensation is not a straightforward solution for environmental damage.[29] Article 36 of the ASR provides that compensation shall cover 'financially assessable damage'. In accordance with article 31(2), both material and moral damage is covered by the obligation of reparation, but the commentary to article 36 clarifies that the term 'financially assessable' is intended to exclude moral damage (e.g. suffered by a state) which is to be reparable by way of satisfaction.[30] Compensation is not to be punitive, but is intended to ensure full reparation for damage suffered.[31] What constitutes financially assessable environmental damage, and how is such damage to be assessed? This requires a breakdown of the components of environmental damage that are compensable – the 'definition' of environmental damage – and then the assessment or valuation of such components in monetary terms. In light of the general applicability of the ASR, the ILC commentary to article 36 acknowledges that the appropriate heads of compensable damage and the principles of assessment to be applied in quantification will vary.[32] In

[26] ibid art 36, 98.
[27] Draft Principles (n 4) principle 3, 72.
[28] ibid commentary to principle 4, 78, para 8.
[29] See Section 3.4.
[30] ASR (n 10) commentary to art 36, 99, para 1.
[31] ibid paras 3–4. See also *Certain Activities* (n 3) para 31, 'compensation may be an appropriate form of reparation, particularly in those cases where restitution is materially impossible or unduly burdensome … Compensation should not, however, have a punitive or exemplary character'.
[32] ASR (n 10) commentary to art 36, 100, para 7.

relation to environmental damage, the ILC noted state practice in the context of Canada's Cosmos 954 claim, as well as the environmental claims in the UNCC, and referred to compensation payments relating to expenses reasonably incurred in preventing or remedying pollution, or providing compensation for a reduction in the value of polluted property.[33] The ILC's commentary also supports the view that pure environmental damage is compensable, acknowledging that

> environmental damage will often extend beyond that which can be readily quantified in terms of clean-up costs or property devaluation. Damage to such environmental values (biodiversity, amenity, etc. – sometimes referred to as 'non-use values') is, as a matter of principle, no less real and compensable than damage to property, though it may be difficult to quantify.[34]

While this supports compensation for pure environmental loss, in its work on state responsibility the ILC did not offer further guidance on such elements of environmental damage or on how they might be quantified.

In 2018, the ICJ handed down its judgment on compensation in the *Certain Activities* case, the first case in which the ICJ has made an order for compensation in respect of environmental damage caused by one state on the territory of another.[35] The ICJ affirmed 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'.[36] The ICJ took the view 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

[33] ibid 101, paras 14–15.

[34] ibid 101, para 15.

[35] The ICJ has dealt with numerous disputes involving alleged violations of international law giving rise to actual or potential environmental harm. For example, in *Aerial Herbicide Spraying*, Ecuador detailed in its application to the Court the nature and extent of the environmental harm it claimed to have suffered, but did not address quantum of compensation. The case was settled before hearings on the merits commenced, *Case Concerning Aerial Herbicide Spraying (Ecuador v Colombia)* (Application Instituting Proceedings) General List No 138 [2008] ICJ Rep 4. In the *Gabčikovo-Nagymaros* case, Hungary referred in its Memorial to reparation for environmental damage, including compensation, and noted the difficulties associated with evaluating the costs of environmental damage. *Case Concerning the Gabčikovo-Nagymaros Project* (Hungary/Slovakia) Memorial of the Republic of Hungary, Volume 1, 2 May 1994, paras 8.22–8.48. However, the Court was not asked to address the question of quantum in the merits phase of the dispute. The ICJ has also addressed a case involving alleged violations of international environmental law taking place at least in part in areas beyond national jurisdiction in the *Whaling in the Antarctic* case. However, that case did not involve a claim for compensation and the Court's judgment was based solely on an analysis of the compatibility of Japan's activities with its obligations under the International Convention on the Regulation of Whaling. *Whaling in the Antarctic (Australia v Japan: New Zealand Intervening)* [2014] ICJ Rep 226, paras 39–40.

[36] *Certain Activities* (n 3), para 41.

that '[s]uch 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'.[37] While the judgment reflects challenges associated with the valuation of such claims,[38] the Court's approach reflects more contemporary approaches to address environmental damage 'in and of itself' not only in terms of damage to specific resources but also by reference to the services that those resources provide.

In establishing the UNCC, the UN Security Council had already determined that Iraq 'was liable under international law for any direct loss, damage, including environmental damage and the depletion of natural resources ... as a result of [its] unlawful invasion and occupation of Kuwait'.[39] Thus, the purpose of the UNCC was essentially to administer verifiable claims. Nonetheless, it was recognized that addressing claims for environmental damage and depletion of natural resources would pose special challenges. In this context, the UNCC had to develop criteria and methods to address such claims, and it received numerous claims under this head of damage.[40] As a first step, the UNCC Governing Council decided that compensation in respect of environmental damage or depletion of natural resources would *include* losses and expenses arising from:

(a) Abatement and prevention of environmental damage;
(b) Reasonable measures already taken to clean and restore the environment or future measures which can be documented as reasonably necessary to clean and restore the environment;
(c) Reasonable monitoring and assessment of the environmental damage for the purpose of evaluating and abating the harm and restoring the environment;
(d) Reasonable monitoring of public health and performing medical screening for the purposes of investigating and combating increased health risks as a result of the environmental damage; and
(e) Depletion of or damage to natural resources.[41]

The panel dealing with environmental damage and depletion of natural resources claim found that the criteria established by the Governing Council were not

[37] ibid para 42.
[38] See Section 3.4.
[39] UN Security Council Res 687 (1991) UN Doc S/RES/687, para 16.
[40] On environmental and natural resources claims in the UNCC, see Michael T Huguenin, Michael C Donlan, Alexandra E van Geel and Robert W Paterson, 'Assessment and Valuation of Damage to the Environment' in Cymie Payne and Peter Sand (eds), *Gulf War Reparations and the UN Compensation Commission: Environmental Claims* (OUP 2011) 67.
[41] UNCC, 'Criteria for Additional Categories of Claims' (1992) UN Doc S/AC 26/1991/7/Rev 1 (Governing Council Decision 7), para 35. The Governing Council decision did not address valuation of compensation for such damage.

exhaustive,[42] and that the term 'environmental damage' was not limited to damage to natural resources with a commercial value.[43] It also took the view that where loss or damage to the environment was temporary, this did not affect the question of compensability, although it might affect the nature and quantum of compensation deemed appropriate.[44] The panel found that there was 'no justification for the contention that general international law precludes compensation for pure environmental damage'.[45]

The UNCC also addressed claims in respect of monitoring and assessing environmental damage for the purpose of evaluating and abating the harm and restoring the environment.[46] Here, the UNCC found that environmental monitoring and assessment were justified even where it was not yet firmly established that environmental damage had occurred. Conclusive proof of environmental damage was not a prerequisite for a monitoring and assessment activity to be compensable.[47] However, the panel did not award compensation for monitoring and assessment activities that were 'purely theoretical and speculative'.[48]

The principles of state responsibility offer some valuable starting points in relation to defining and valuing compensable environmental damage, but they do not address all aspects. The approaches adopted in civil liability regimes provide a further indication of the international community's understanding of the scope of compensable damage. While liability under civil liability regimes is channelled to operators, often on a strict liability standard, the underlying theory of damage in civil liability regimes remains rooted in restitution and, as such, provides a fuller picture of how damage should be approached in specific commons regimes.

3.2.2 *Civil Liability*

The ILC has specifically addressed compensation for environmental damage in its Draft Principles on the Allocation of Loss. Principle 3 of the Draft Principles provides that '[t]he purpose of the present draft principles are: ... (b) to preserve and protect the environment in the event of transboundary damage, especially with

[42] UNCC, 'Report and Recommendations Made by the Panel of Commissioners Concerning the Second Instalment of "F4" Claims' (2002) UN Doc S/AC 26/2002/26, paras 22–23.

[43] UNCC, 'Report and Recommendations Made by the Panel of Commissioners Concerning the Fifth Instalment of "F4" Claims' (2005) UN Doc S/AC 26/2005/10, para 55.

[44] ibid para 56.

[45] ibid para 58. The panel added that '[i]n particular, the Panel does not consider that the exclusion of compensation for pure environmental damage in some international conventions on civil liability and compensation is a valid basis for asserting that international law, in general, prohibits compensation for such damage in all cases, even where the damage results from an internationally wrongful act' (footnote omitted).

[46] Governing Council Decision 7 (n 41) para 35(c).

[47] UNCC, 'Report and Recommendations on the First Instalment of "F4" Claims' (2001) UN Doc S/AC.26/2001/16, paras 29–30.

[48] ibid para 31.

respect to mitigation of damage to the environment and its restoration or reinstatement'. In relation to the purposes of the Draft Principles, the ILC notes that Draft Principle 3(b) gives

> a prominent place to the protection and preservation of the environment and to the associated obligations to mitigate the damage and to restore or reinstate the same to its original condition to the extent possible. Thus it emphasizes the more recent concern of the international community to recognize protection of the environment *per se* as a value by itself without having to be seen only in the context of damage to persons and property. It reflects the policy to preserve the environment as a valuable resource not only for the benefit of the present generation but also for future generations. In view of its novelty and the common interest in its protection, it is important to emphasize that damage to the environment *per se* could constitute damage subject to prompt and adequate compensation, which includes reimbursement of reasonable costs of response and restoration and remediation measures undertaken.[49]

Principle 2 defines 'damage' as significant damage caused to persons, property or the environment, and including

i. loss of life or personal injury;
ii. loss of, or damage to, property, including property which forms part of the cultural heritage;
iii. loss or damage by impairment of the environment;
iv. the costs of reasonable measures of reinstatement of the property, or environment, including natural resources;
v. the costs of reasonable response measures.

'Environment' for the purpose of the Draft Principles includes natural resources, both abiotic and biotic, such as air, water, soil, fauna and flora and the interaction between the same factors, and the characteristic aspects of the landscape.[50]

The ILC's work on allocation of loss draws upon the approach taken in several of the civil liability instruments.[51] Each of these international agreements set out a scope and approaches tailored to the particular activity and/or environment that they address. They reflect the types of damage that might be caused by the activity or substances in question, and the degree of consensus amongst states about the nature and scope of risks posed and potential harm. The definition of compensable damage

[49] Draft Principles (n 4) commentary to principle 3, 73, para 6.
[50] ibid principle 2(b), 64.
[51] For example, 1992 Oil Pollution Liability Convention (n 8); 1996 HNS Convention (n 8); Lugano Convention on Civil Liability for Damage Resulting from Activities Dangerous to the Environment (adopted 21 June 1993) 32 ILM 1228 (1993 Lugano Convention); 1999 Basel Liability Protocol (n 8); International Convention on Civil Liability for Bunker Oil Pollution Damage (adopted 23 March 2001, entered into force 21 November 2008) UNTS No 47 (2001 Bunker Oil Convention).

to the environment varies under the agreements,[52] and is generally incorporated into a wider definition of the 'damage' that is recoverable under the agreement. They typically define environmental damage in terms of reasonable preventive, response or reinstatement measures actually undertaken or to be undertaken, rather than by reference to impacts on the environment – that is, they are concerned with what type of costs might be recoverable under the arrangements established by the agreement. The approach to defining compensable damage in these regimes is influenced by considerations related to limits on liability and insurability of relevant activities.[53] Heads of environmental damage covered by some or all of the civil liability agreements are described below.

3.2.2.1 Loss of Profit Arising from Impairment to the Environment

This head of recoverable damage is included in most international civil liability regimes.[54] It does not compensate damage to the environment as such, but rather loss of income suffered by natural or legal persons derived from an economic interest in a use of the environment as a result of environmental impairment. Numerous claims for such loss have been addressed within the civil liability regime on oil pollution damage. The International Oil Pollution Compensation Funds' (IOPC Funds) 2016 Annual Report notes that, in addition to property damage, admissible claims include economic losses by fishers or those engaged in mariculture and economic losses in the tourism sector.[55]

It is conceivable that such losses from impairment to the environment might arise because of environmental damage in ABNJ. Such losses might be suffered by, for example, high seas fishing entities, tourism enterprises operating in Antarctica or operators with seabed mining licences impacted in some detrimental way by environmental harm. Claiming compensation for such losses in respect of environmental damage in ABNJ is more complicated in the context of non-exclusive rights based on high seas freedoms, but many of these high seas activities are subject to licensing regimes which arguably provide a legal basis for a claim and for quantifying losses.

3.2.2.2 Reasonable Preventive Measures

Reasonable costs relating to prevention of further environmental harm are also covered in most liability regimes. These are defined in the 1992 Oil Pollution Liability Convention as 'any reasonable measures taken by any person after an

[52] See generally, de La Fayette, 'The Concept of Environmental Damage' (n 2); Brans (n 2).
[53] See Chapter 8.
[54] For example, 1992 Oil Pollution Liability Convention (n 8) art I(6)(a); 1996 HNS Convention (n 8) art 1(6)(c); 1993 Lugano Convention (n 51) art 2(7)(c); 1999 Basel Liability Protocol (n 8) art 2(2)(c)(iii); 2001 Bunker Oil Convention (n 51) art 1(9).
[55] International Oil Pollution Compensation Funds (IOPC Funds), Annual Report 2016, 12.

incident has occurred to prevent or minimize pollution damage'.[56] The 1999 Basel Liability Protocol refers to measures to 'prevent, minimize, or mitigate loss or damage, or to effect environmental clean-up'.[57] Costs of preventive measures taken outside national jurisdiction may be recoverable where they are taken to avoid or minimize other environmental damage – within national jurisdiction – covered by the agreement in question.

As regards preventive measures to avoid or minimize environmental damage to ABNJ, a key issue, as described in relation to reinstatement costs below, would be who would have the requisite interest or entitlement to take such measures in ABNJ (discussed in Chapter 6). There is also a more general question of how the reasonableness of such preventive measures is to be determined as a matter of proportionality.[58]

3.2.2.3 Reasonable Measures of Reinstatement Actually Undertaken or to Be Undertaken

Reasonable measures of reinstatement reflect the approach to reparation in the work of the ILC on both state responsibility and allocation of loss. Such measures are incorporated into the definition of damage in most international civil liability regimes.[59] Some guidance as to what would constitute reasonable measures of reinstatement has also been provided, either within the treaties themselves or in subsequent guidance. The IOPC Funds Guidelines for presenting claims for environmental damage, published in 2018, address claims for costs of post-incident studies and reinstatement measures.[60] The Guidelines discuss, *inter alia*, specific criteria for reinstatement measures, which focus on accelerating and enhancing the recovery of the damaged components of the environment, and establish that the costs of reinstatement must be proportionate to the extent and duration of the damage and the benefits likely to be achieved.[61] Measures taken at some distance from the damaged area, but still within the general vicinity, may be acceptable as

[56] 1992 Oil Pollution Liability Convention (n 8) art I(7); similar provisions are found in the 1996 HNS Convention (n 8) art 1(7); 2001 Bunker Oil Convention (n 51) art 1(7); 1993 Lugano Convention (n 51) art 2(9).

[57] 1999 Basel Liability Protocol (n 8) art 2(2)(e).

[58] See Section 3.3 on existing and emerging approaches to this question in ABNJ-specific contexts.

[59] For example, 1992 Oil Pollution Liability Convention (n 8) art I(6)(a); 1996 HNS Convention (n 8) art 1(6)(c); 1993 Lugano Convention (n 51) arts 2(7)(c) and 8; 1999 Basel Liability Protocol (n 8) art 2(2)(c)(iv) and 2(2)(d); 2001 Bunker Oil Convention (n 51) art 1(9)(a). On the debates concerning the incorporation of such measures into the definition of 'pollution damage' in the oil pollution liability regime, see Wu Chao, *Pollution from the Carriage of Oil by Sea: Liability and Compensation* (Kluwer Law International 1996) 147–153.

[60] *Guidelines for Presenting Claims for Environmental Damage* (2018 edn, IOPC Funds 2018) (IOPC Guidelines).

[61] ibid para 4.3.

long as it can be demonstrated that they would actually enhance the recovery of the damaged components of the environment and the services those components provide.[62] However, the replacement of a damaged site by 'creating' an equivalent resource elsewhere may not satisfy the IOPC Funds' criteria.[63] The Guidelines acknowledge that there is little experience of admissible claims for reinstatement measures.[64]

It is evident that restoration measures will not always be feasible or effective. The determination of what constitutes reasonable measures of restoration might be challenging where there is no market value for the environmental resource, and the issue of proportionality of restoration measures is likely to arise given that quantifying both the damage and the benefits from reinstatement may be more challenging in ABNJ. The prospects for success of restoration measures in certain environments might also be open to question, and other potential environmental impacts of restoration measures need to be considered. In such situations, alternative methods for making good the environmental loss or loss of ecosystem services may be required.

In areas within national jurisdiction, coastal states have a right to undertake reinstatement actions, or to require or authorize others to do so. In ABNJ, it is less clear who might be entitled to recover as a result of taking such action. In the absence of clear authority to undertake reinstatement measures, a state or private entity may be viewed as acting voluntarily, and as such could be viewed as an 'officious intermeddler' since the claimant confers a benefit on the international community that was not necessarily asked for, and as such, the claimant may not be entitled to restitution.[65] The alternative view would be that states and their agents do have an interest in protecting the environment of the commons and should be able to recover their reasonable costs of reinstatement. This latter position is supported by the general approach in international law that the obligation to make reparation flows from the wrongful act and not from the right of an injured state.[66] There are also doctrines in both civil and common law jurisdictions that support the idea of necessitous intervention (*negotiorum gestio*) that permits recovery for interventions in support of community or public interests.[67] The point of law is far from clear, and the absence of a clear right of recovery acts as a disincentive for states to undertake reinstatement actions, notwithstanding the public benefit in such actions.

A final point in relation to reinstatement is that recovery is limited to the costs of measures 'actually undertaken or to be undertaken'.[68] Thus, reinstatement costs cannot be used as a proxy for calculating general damages.

[62] ibid.
[63] ibid para 5.22.
[64] ibid para 5.11.
[65] See, for example, C Mitchell and William Swadling (eds), *Restatement (Third) of Restitution and Unjust Enrichment* (Bloomsbury Publishing 2013) §§ 20–30.
[66] ASR (n 10) art 31, 91.
[67] Discussed in John McCamus, 'Necessitous Intervention: The Altruistic Intermeddler and the Law of Restitution' (1979) 11 Ottawa L Rev 297.
[68] 1992 Oil Pollution Liability Convention (n 8) art II; 1996 HNS Convention (n 8) art 1.

3.2.2.4 Monitoring and Assessment of Environmental Damage

Measures to prevent environmental damage and to reinstate damaged environments presuppose the assessment of damage, in order to understand the scope and nature of appropriate response measures. Monitoring the status and recovery of damaged environments, and impact of any reinstatement measures, will also be an important element of minimizing adverse effects on components of the environment and on ecosystem services. International liability instruments do not always make express reference to such costs, but as noted above, the IOPC Funds' 2018 Guidance makes reference to post-incident studies. The 1999 Basel Liability Protocol includes in the definition of 'measures of reinstatement', reasonable measures to 'assess' damaged or destroyed components of the environment.[69] Guidelines on liability adopted under the Barcelona Convention[70] also incorporate activities and studies to assess damage.[71]

In areas beyond national jurisdiction, questions as to who should be responsible for conducting assessment and monitoring of environmental damage arise. Depending upon the way in which any relevant rules are framed, responsibility might fall upon the entity responsible for causing the damage, upon a state or states or upon an international organization. In addition to identifying the most appropriate way to allocate such responsibility, capacity to conduct such activities in areas beyond national jurisdiction may limit the availability of assessment and monitoring.

3.2.2.5 'Pure Environmental Damage' and Ecosystem Services Loss

While the elements of environmental damage above relate to reasonable costs incurred in taking measures to prevent environmental damage or to reinstate damaged environments, it is evident that in some instances irreparable harm may occur, or that the affected environment or ecosystem services can only be restored over the long-term. While the concept of pure environmental damage can relate to notions of the intrinsic value of environmental resources, increasingly environmental loss is framed within the context of the ecosystem services provided by those resources. This type of damage is difficult to quantify in economic terms as the environmental resources and systems affected may well not have a commercial value. The compensation of pure environmental damage, or environmental damage

[69] 1999 Basel Liability Protocol (n 8) art 2(2)(d).

[70] Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean, 16 February 1976, 15 ILM 290 (adopted 16 February 1976, entered into force 1 February 1979), as amended June 1995, UNEP(OCA)/MED IG.6/7 (entered into force 9 July 2004) (Barcelona Convention).

[71] Barcelona Convention, Decision IG 17/4 Guidelines for the Determination of Liability and Compensation resulting from Pollution of the Marine Environment of the Mediterranean Sea Area, UNEP(DEPI)MED IG.17/10 Annex V, 18 January 2008 (Barcelona Convention Guidelines) para 10.

per se, has been a matter of debate both in the context of international liability conventions and in other international forums.[72] In its commentary to principle 2, the ILC observed that

> [r]ecent trends are ... encouraging in allowing compensation for loss of 'non-use value' of the environment. There is some support for this claim from the [International Law] Commission itself when it adopted its draft articles on State responsibility, even though it is admitted that such damage is difficult to quantify. The recent decisions of the United Nations Compensation Commission (UNCC) in opting for a broad interpretation of the term 'environmental damage' is a pointer of developments to come. In the case of F-4 category of environmental and public health claims, the F-4 Panel of the UNCC allowed claims for compensation for damage to natural resources without commercial value (so-called 'pure' environmental damage) and also claims where there was only a temporary loss of resource use during the period prior to full restoration.[73]

As yet, pure environmental damage is not generally incorporated into international civil liability regimes. Handl observes that

> [t]oday, both national legal systems and international law reflect a broad consensus that the compensation of environmental damage would cover the costs of any reasonable measures – already taken or to be taken – that aim to assess, reinstate or restore damaged or destroyed components of the environment, the principal goal of such measures being to return the affected environment to its pre-existing or baseline condition. However, as soon as in-kind, in-place restoration ('primary restoration', or 'primary remediation') is not possible and alternative measures might have to be contemplated, this consensus breaks down.[74]

Some commentators have observed that the unfortunate consequence of such an approach might be that minor, reparable damage might be subject to compensation through restoration costs, while more severe irreparable or long-term harm would not.[75] As is well known, the IOPC Funds have maintained that compensation for impairment to the environment is limited to financially assessable loss: loss of profit arising from impairment to the environment, and the costs of reasonable preventive measures and reasonable measures of reinstatement of the environment actually undertaken or to be undertaken. In the oil pollution regime, there has been a resistance to the idea of compensating non-economic loss associated with environmental damage. As discussed further below, such damage would require different means of assessment and valuation. In 1980, Resolution No. 3 of the 1971 IOPC Fund stated that assessment of compensation to be paid by the Fund would not be

[72] Allan Rosas, 'Issues of State Liability for Transboundary Environmental Damage' (1991) 60 Nord J Intl L 29, 42.
[73] Draft Principles (n 4) commentary to principle 2, 69, para 18 (footnotes omitted).
[74] Handl (n 5) 607–608.
[75] de La Fayette, 'The Concept of Environmental Damage' (n 2) 183.

made on the basis of an abstract quantification of damage calculated in accordance with theoretical models.[76] This position has been maintained, most recently in Guidelines for presenting claims for environmental damage published by the IOPC Funds in 2018.[77] Nonetheless, it has been the subject of growing critique and seems anachronistic in the face of evolving international environmental principles.[78]

Some liability instruments do incorporate ecosystem services within the definition of environmental damage. The 2010 Nagoya-Kuala Lumpur Supplementary Protocol on liability in the context of transboundary movement of genetically modified organisms refers to '[t]he reduction of the ability of components of biological diversity to provide goods and services' as a factor relevant to establishing a significant adverse effect for the purpose of establishing damage.[79] Other factors in determining a significant adverse effect under that Protocol include 'long-term or permanent change, to be understood as change that will not be redressed through natural recovery within a reasonable period of time' and 'the extent of the qualitative or quantitative changes that adversely affect the components of biological diversity'.[80]

Some international liability instruments include within the definition of covered damage the introduction of equivalent components of the environment, in the context of reinstatement measures, where reinstatement or restoration is not possible. The 2010 Nagoya-Kuala Lumpur Supplementary Protocol gives preference to restoration of biodiversity to the condition that existed before the damage occurred, or its nearest equivalent, but also provides for 'replacing the loss of biological diversity with other components of biological diversity for the same, or another type of use either at the same or, as appropriate at an alternative location'.[81] The 1993 Lugano Convention takes this approach, and leaves it to domestic law to determine who may take such measures.[82] The 2004 Protocol amending the

[76] IOPC Funds, *Resolutions of the 1971 Fund*, Resolution No. 3 Pollution Damage (October 1980), 5.

[77] IOPC Guidelines (n 60) 10, para 4.1.

[78] Handl observes that this 'categorical denial of [ecosystems services] loss … is at odds with international public policy'. Handl (n 5) 611. Wetterstein has also called for expansion of compensable environmental damage in the oil pollution liability regimes and other civil liability conventions, Peter Wetterstein 'Pure Environmental Damage' in Günther Handl and Kristoffer Svendsen (eds), *Managing the Risk of Offshore Oil and Gas Accidents* (Edward Elgar 2019), 305, 330.

[79] Nagoya-Kuala Lumpur Supplementary Protocol on Liability and Redress to the Cartagena Protocol on Biosafety (adopted 15 October 2010, entered into force 5 March 2018) (2011) 50 ILM 105 (2010 Nagoya-Kuala Lumpur Supplementary Protocol) art 2(3)(c). See Akiho Shibata (ed), *International Liability Regime for Biodiversity Damage: The Nagoya-Kuala Lumpur Supplementary Protocol* (Routledge 2014).

[80] 2010 Nagoya-Kuala Lumpur Supplementary Protocol (n 79) art 2(3)(a) and (b).

[81] ibid art 2(d). See also Barcelona Convention Guidelines (n 71) para 10 (e).

[82] 1993 Lugano Convention (n 51) art 2(8). See also 2003 Protocol on Strategic Environment Assessment to the Convention on Environmental Impact Assessment in a Transboundary

1960 Paris Convention on liability in the field of nuclear energy also provides for the introduction of equivalent components of the environment.[83]

Guidelines on liability adopted under the Barcelona Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean[84] include within the scope of compensation for environmental damage 'diminution in value of natural or biological resources pending restoration' and 'compensation by equivalent if the impaired environment cannot return to its previous condition'.[85] The Guidelines note that where compensation is granted for these types of damage, it should be earmarked for intervention in the environmental field in the Mediterranean Sea Area.[86] The Guidelines are also to apply to damage caused by pollution of a diffuse character provided it is possible to establish a causal link between the damage and activities of individual operators.[87]

Given the challenges that reinstatement may pose in ABNJ, calculating losses with reference to the provision of offsets may be an attractive, even necessary, alternative.[88] The difficulty would be in determining suitable equivalents for losses to deep ocean ecosystems.

3.2.3 *Threshold of Harm*

A general issue that arises in terms of defining compensable environmental damage is the question whether there is a threshold of harm which must be met before any liability arises.[89]

The rationale for a threshold of severity to trigger both the obligation of prevention and corresponding liability is based on a recognition that lawful activities

Context (adopted 21 May 2003, entered into force 11 July 2010) 2865 UNTS 140 (2003 Kiev Protocol) art 2(2)(g).

[83] Protocol to Amend the Convention on Third Party Liability in the Field of Nuclear Energy of 29 July 1960, as amended by the Additional Protocol of 29 January 1964 and by the Protocol of 16 November 1982 (adopted 12 February 2004, in force 1 January 2022), art I.B, www.oecd-nea.org/jcms/pl_20361/2004-protocol-to-amend-the-paris-convention, accessed 17 March 2023.

[84] Barcelona Convention (n 70).

[85] Barcelona Convention Guidelines (n 71) para 10(d) and (e). Para 10 also covers the types of environmental damage discussed above in relation to other agreements: activities and studies to assess damage; costs of preventive measures; and costs of measures taken or to be undertaken to clean up, restore and reinstate the impaired environment.

[86] ibid para 13.

[87] ibid para 15. See Tullio Scovazzi, 'The Mediterranean Guidelines for Determination of Environmental Liability and Compensation: The Negotiations of the Instrument and the Question of Damage that Can Be Compensated' (2009) 13 Max Planck UNYB 183.

[88] HJ Niner and others, 'Deep-Sea Mining with No Net Loss of Biodiversity – An Impossible Aim' (2018) 5 Front Mar Sci 5(53).

[89] See K Sachariew, 'The Definition of Thresholds of Tolerance for Transboundary Environmental Injury under International Law: Development and Present Status' (1990) XXXVII NILR 193; see also Okowa (n 15) 88–90; Philippe Sands and Jacqueline Peel, *Principles of International Environmental Law* (4th edn, CUP 2018) 743–745.

conducted within the jurisdiction of one state may well have impacts on other states in light of the ecological unity of the planet. Such mutual impacts are to be considered tolerable as long as they do not reach the 'significant' threshold.[90] Most notably the obligation of due diligence requires states to take reasonable steps to prevent significant environmental harm.[91] Such a threshold does not however seem to be of general application, but the degree of harm seems nonetheless to be relevant to the assessment of reparation. For example, in examining environmental claims, the UNCC rejected an argument by Iraq that only significant damage was compensable, finding that any direct loss or damage was covered. However, it did note that '[i]n considering the reasonableness of remediation measures, it is appropriate to have regard to the extent of the damage involved'.[92]

The question of whether environmental harm must exceed some minimum threshold is a function of the primary rule that defines the internationally wrongful act. In the UNCC claims, the wrongful act, the invasion of Kuwait by Iraq, is not connected to a threshold of harm. In the case of due diligence, where the wrongful conduct incorporates a threshold of significant harm, environmental harm below the threshold would not appear to result in a wrongful act. This situation may again be complicated by cumulative impacts, where the synergistic effects of multiple actions result in a harm that exceeds the significance threshold, but no one state's actions may amount to significant harm on their own.

In the Draft Principles, the ILC defined 'damage' as meaning 'significant damage', so that to be eligible for compensation, damage should meet a certain threshold.[93] To support this approach it cited existing case law, the *Trail Smelter* arbitration and the *Lake Lanoux* case, both of which referred to 'serious' injury, as well as international conventions imposing thresholds such as 'significant', 'serious' or 'substantial' harm.[94] The threshold of 'significant' damage in relation to allocation of loss reflected the scope of the ILC's related work on Prevention of Transboundary Harm which applies to 'activities not prohibited by international law which involve a risk of causing significant transboundary harm through their physical consequences'.[95] In its commentary to draft article 2 on Prevention of Transboundary Harm, the ILC explained that 'significant' *'is something more than "detectable" but need not be at the level of "serious" or "substantial"*. The harm must lead to a real detrimental effect on matters such as … environment' and 'such detrimental effects must be susceptible of being measured by factual and objective

[90] ILC, 'Draft Articles on Prevention of Transboundary Harm from Hazardous Activities, with Commentaries' (2001) UN Doc A/56/10 (Draft Articles on Prevention of Transboundary Harm) art 1, commentary to art 2, 152, para 5.
[91] See discussion in Chapter 5, Section 5.3.1.
[92] UNCC Third Instalment (n 20) para 36.
[93] Draft Principles (n 4) commentary to principle 2(a), 64, para 1.
[94] ibid para 1 and footnote 326.
[95] Draft Articles on Prevention of Transboundary Harm (n 90) art 1, 149.

standards'.[96] In the 2010 Nagoya-Kuala Lumpur Supplementary Protocol, damage must be 'significant'. A significant adverse effect for the purpose of the Protocol is to be determined based on factors such as:

(a) The long-term or permanent change, to be understood as change that will not be redressed through natural recovery within a reasonable period of time;
(b) The extent of the qualitative or quantitative changes that adversely affect the components of biological diversity;
(c) The reduction of the ability of components of biological diversity to provide goods and services;
(d) The extent of any adverse effects on human health in the context of the Protocol.[97]

The term 'significant' is one that requires determination on a case-by-case basis, and involves more factual considerations than legal determinations.[98] According to the ILC, it also incorporates value determinations depending upon the circumstances of the case and the period in which the determination is made, that might reflect available scientific knowledge and/or the value ascribed to particular resources.[99] Assessing whether a threshold of significant damage is met therefore is not an exact science, and might well give rise to different determinations in different international and domestic courts.[100]

To what extent is the threshold of 'significant' harm appropriate in the context of liability for environmental damage to the global commons, and, if so, how it is to be measured? In principle, the rationale put forward by the ILC for the threshold in relation to its Draft Principles on Allocation of Loss appears to apply equally in the context of areas beyond national jurisdiction: the recognition that lawful activities conducted within the jurisdiction of one state may have some impacts on areas

[96] ibid, commentary to principle 2, 152, para 4; Draft Principles (n 4), commentary to principle 2 (a), 65, para 2.
[97] 2010 Nagoya-Kuala Lumpur Supplementary Protocol (n 79) art 2(3).
[98] Draft Articles on Prevention of Transboundary Harm (n 90) commentary to art 2, 152, para 4.
[99] ibid commentary to art 2, 153, para 7.
[100] In this regard, it is notable that additional guidance has been published in the European Union on defining environmental damage and significant adverse effects for the purposes of the EU Environmental Liability Directive (Directive (CE) 2004/35 of the European Parliament and of the Council of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage [2004] OJ L143/56). A European Commission evaluation of implementation of the Directive in member states of the EU revealed that implementation was hampered by significant lack of uniform application of key concepts, in particular concepts related to environmental damage. European Commission, 'Guidelines providing a common understanding of the term "environmental damage" as defined in Article 2 of Directive 2004/35/EC of the European Parliament and of the Council on environmental liability with regard to the prevention and remedying of environmental damage' [2021] OJ C 118/01.

beyond national jurisdiction as well as on other states. At the same time, the need for factual and case-by-case assessment of significance of harm raises specific questions in the global commons context. As noted elsewhere, the factual assessment of damage and its significance may be challenging, in the light of current scientific knowledge including the availability of baseline data and sufficient understanding of ecosystem functioning. Moreover, any assessment of the significance of harm may depend upon the contemporary state of scientific knowledge, and complex equations relating to the value and need for particular resources of economic value as well as economic and non-economic values ascribed to ecosystem services and components of the environment. Such an assessment should also appropriately take account of the precautionary approach given gaps and uncertainties in relevant scientific knowledge.

3.3 DEFINING COMPENSABLE ENVIRONMENTAL DAMAGE IN ABNJ

The existing agreements on Antarctica, the deep seabed and the high seas begin to address the question of damage within their liability rules. However, the development of relevant rules in respect of environmental damage in the global commons has been slow and patchy. This makes it difficult to ascertain any common approach to defining compensable environmental damage because, for the most part, liability regimes establishing such definitions are not in place. Still the limited, and as yet untested, rules that have been adopted, and the difficulties in establishing such rules and securing their entry into force, offer some insights in relation to gaps and approaches for consideration in the future.

3.3.1 *Antarctic*

Article 3 of the 1991 Antarctic Protocol, which provides that activities in the Antarctic Treaty area are to be planned and conducted so as to limit adverse impacts on the Antarctic environment and dependent and associated ecosystems, identifies specific impacts to be avoided, including significant adverse effects on air and water quality, significant changes in the atmospheric, terrestrial, glacial or marine environments and detrimental changes in the distribution, abundance or productivity of fauna and flora.[101] It also reflects particular characteristics of the unique environment of Antarctica, including some features that may be relevant in other ABNJ, requiring that assessment of planned activities in the area, should take into account, *inter alia:* cumulative impacts of the activity, both by itself and in combination with other activities in the Antarctic Treaty area; capacity to monitor key environmental parameters and ecosystem components so as to identify and provide early warning of

[101] Protocol on Environmental Protection to the Antarctic Treaty (adopted 4 October 1991, entered into force 14 January 1998) (1991) 30 ILM 1461 (1991 Antarctic Protocol) art 3(2)(b).

any adverse effects; and whether there exists the capacity to respond promptly and effectively to accidents, particularly those with potential environmental effects.[102]

Activities taking place in the Antarctic comprise primarily scientific research and tourism, with ancillary activities including supply vessels, but exploitation activities, with the exception of fisheries, are limited.[103] Despite these limitations, the allowable activities entail environmental risks relating, for example, to waste and wastewater, and pollution from aircraft or ships, including fuel oil spills.[104] To address these risks, the parties adopted Annex VI to the Protocol (Liability Annex),[105] which establishes a liability regime applicable to environmental emergencies.[106] The Liability Annex is more limited in scope than the rules and procedures on liability envisaged in article 16 of the Antarctic Protocol in that it addresses only environmental emergencies and response measures thereto addressed in article 15 of the Protocol.[107]

The regime established in the Liability Annex is administrative in nature. Under the Liability Annex, each party must require its operators to undertake reasonable preventive measures that are designed to reduce the risk of environmental emergencies and their potential adverse impact,[108] and to take prompt and effective response action to environmental emergencies arising from the activities of that operator.[109] 'Response action' means 'reasonable measures taken after an environmental emergency has occurred to avoid, minimize or contain the impact of that environmental emergency, which to that end may include clean-up in appropriate circumstances, and includes determining the extent of that emergency and its impact'.[110] There is no reference to restoration measures. 'Reasonable', in relation to preventive measures and response action, means 'measures or actions which are appropriate, practicable, proportionate and based on the availability of objective criteria and information, including: (i) risks to the Antarctic environment, and the rate of its natural recovery; (ii) risks to human life and safety; and (iii) technological

[102] ibid art 3(2)(c).

[103] Mineral resource activities, other than scientific research, are prohibited under the 1991 Antarctic Protocol (n 101), art 7, and military activities are prohibited under the Antarctic Treaty (adopted 1 December 1959, entered into force 23 June 1961) 402 UNTS 71 art 1.

[104] See, for example, the Bahia Paraiso 1989 CEDRE, 'Bahia Paraiso – Spill report' online <wwz.cedre.fr/en/Resources/Spills/Spills/Bahia-Paraiso> accessed 13 October 2022.

[105] Annex VI to the Protocol on Environmental Protection to the Antarctic Treaty on Liability Arising from Environmental Emergencies (adopted 17 June 2005) (2006) 45 ILM 5 (Liability Annex). Not yet entered into force.

[106] These are defined as 'any accidental event that has occurred, having taken place after the entry into force of this Annex, and that results in, or imminently threatens to result in, any significant and harmful impact on the Antarctic environment': Liability Annex (n 105) art 2(b).

[107] Liability Annex (n 105) art 1; Alan D Hemmings, 'Liability Postponed: The Failure to Bring Annex VI of the Madrid Protocol into Force' (2018) 8(2) Polar J 315, 323.

[108] Liability Annex (n 105) art 3(1).

[109] ibid art 5(1).

[110] ibid art 2(e) and (f).

and economic feasibility'.[111] Beyond the definition of 'reasonable' noted above, no guidance is provided as to how costs of reasonable response measures should be assessed.

Article 9 does establish limits on liability of an operator in respect of an environmental emergency. Where an operator does not take prompt and effective response action, then the state party of that operator and other parties are encouraged to take such action,[112] and in such circumstances, the operator shall be liable to pay the costs of such response action. Where prompt and effective response action is not taken, and no response action is taken by any party, article 6 makes provisions for payments to a Fund established under article 12 of the Liability Annex of 'an amount of money that reflects as much as possible the costs of response action that should have been taken'.[113] Decisions on requests for reimbursement from the Fund of 'reasonable and justified costs' incurred by a party that has taken response action are to be decided by the Antarctic Treaty Consultative Meeting (ATCM), which may seek advice from the Committee for Environmental Protection. As the Liability Annex has not yet entered into force, further guidance remains unavailable.

The approach clarifies two key issues that arise in the commons. The first issue relates to who is entitled to effect response measures to environmental harm. By specifying that any party may take action and then seek their costs from the operator, the 1991 Antarctic Protocol addresses the uncertainty surrounding whether third party responders would be considered 'officious intermeddlers'.[114] The approach in the Antarctic is to recognize the collective right to address environmental harms and seek compensation from responsible parties. The second issue that is addressed is that the costs of a response action not undertaken may be used as a proxy for damages. This is in contrast to the approach under civil liability regimes, which only allow for compensation related to reinstatement measures actually taken or to be taken. Insofar as the rule under civil liability regimes is motivated by concerns over windfall awards, the presence of a Fund under the Antarctic Liability Annex ensures that damages collected are directed towards collective environmental interests.

Prior to the adoption of the 1991 Antarctic Protocol, the 1988 Convention on the Regulation of Antarctic Mineral Resources Activities (CRAMRA) would have put in place more extensive liability rules.[115] While not in force, nonetheless it is worth examining the relevant provisions of CRAMRA as it could provide a possible model

[111] ibid art 2(e).
[112] ibid art 5(2)–(5).
[113] ibid art 6(b) in respect of payments to the fund by non-state operators. Under art 6(1), a state operator which did not take required prompt and effective response action under art 5 is liable to pay 'the costs of the response action which should have been taken'.
[114] See discussion in Sections 3.2.2.3 and 3.2.2.4.
[115] Convention on the Regulation of Antarctic Mineral Resource Activity (adopted 2 June 1988, not yet entered into force) 27 ILM 868 (CRAMRA).

for developing new liability rules in areas beyond national jurisdiction under the 1991 Antarctic Protocol, in relation to deep seabed mining, or perhaps more widely. At the same time, caution is needed as CRAMRA addressed a specific economic activity involving a limited range of actors. Article 1(15) CRAMRA provides

> Damage to the Antarctic environment or dependent or associated ecosystems means any impact on the living or non-living components of that environment or those ecosystems, including harm to atmospheric, marine or terrestrial life, beyond that which is negligible, or which has been assessed and judged to be acceptable pursuant to this Convention.

This definition addresses both living and non-living components of the environment or ecosystems. The reference to damage 'which has been assessed and judged to be acceptable pursuant to this Convention' appears to relate to the regulatory objective to protect and preserve the Antarctic environment and to allow mineral resource activities only where it is judged, based upon assessment of possible impacts on the Antarctic environment and on dependent and associated ecosystems, that the activity in question would not cause significant adverse effects.[116] It is not linked to specific criteria or indicators that might define and revise acceptable levels of damage, and as the CRAMRA did not enter into force, no further elaboration of this definition was forthcoming. The definition suggests that damage arising out of authorized activities which have been subject to prior EIA would be non-compensable. This, in turn, raises the question whether and in what circumstances damage that is unforeseen in nature or scale prior to authorization might be compensable.

Article 8 of CRAMRA establishes certain rules and procedures for response action and liability. Under this provision, operators undertaking any Antarctic mineral resource activity would have to take necessary and timely response action, including prevention, containment, cleanup and removal measures, if that activity results in or threatens to result in damage to the Antarctic environment or dependent or associated ecosystems. Under article 8(2) an operator would be strictly liable for, *inter alia*, 'damage to the Antarctic environment or dependent or associated ecosystems arising from Antarctic mineral resource activities, including payment in the event that there has been no restoration to the *status quo ante*'.[117] This appears to provide for a compensatory payment where irreparable damage has occurred, rather than tying the obligation to compensate to reasonable response or restoration actions actually undertaken. The operator would also be liable for 'reimbursement of reasonable costs by whomsoever incurred relating to necessary response action, including prevention, containment, clean-up and removal measures, and action taken to restore the *status quo ante* where Antarctic mineral resource activities undertaken

[116] ibid art 4(2).
[117] ibid art 8(2) (emphasis added).

by that Operator result in or threaten to resulting damage to the Antarctic environment or dependent or associated ecosystems'.[118] Had CRAMRA entered into force, further liability rules and procedures were to be adopted through a separate protocol to enhance the protection of the Antarctic environment and dependent and associated ecosystems.[119]

3.3.2 *Deep Seabed*

The prospect of deep seabed mining in the Area gives rise to a range of potential environmental impacts.[120] While these activities and impacts relate to a distinct economic activity, they involve a range of actors, various mining techniques and diverse deep seabed ecosystems. In accordance with the relevant regulatory provisions, these activities will be subject to prior EIAs that should enable risks and risk mitigation measures to be identified before any approved exploitation activities commence. Nonetheless, it is possible that unforeseen impacts might arise, or that risks identified during the EIA have impacts of a scale beyond those envisaged. The possibility of cumulative impacts of deep seabed mining and other processes and activities on deep seabed ecosystems cannot be ruled out. Gaps and uncertainties in scientific knowledge about ecosystem functioning and services in the deep seabed must also be taken into account and, the precautionary approach constitutes an important element of the relevant regulatory framework.[121] Rates of recovery of deep seabed ecosystems raise potential issues of irreparable environmental damage or significant interim losses between damage and recovery.[122] In this context, defining environmental damage for the purpose of rules on liability and compensation poses particular challenges.

UNCLOS contains general obligations relating to protection of the marine environment, as well as more specific obligations in Part XI addressing protection of the marine environment from harmful effects which may arise from activities in the Area.[123] Article 1(4) defines pollution of the marine environment as the

> introduction by man, directly or indirectly, of substances or energy into the marine environment, including estuaries, which results or is likely to result in such

[118] ibid.
[119] ibid art 8(6).
[120] See discussion in Chapter 1.
[121] See, for example, International Seabed Authority's (ISA) Regulations on Prospecting and Exploration for Polymetallic Nodules in the Area (2013) ISBA/19/C/17 (PMN) reg 31 (2); ISA, 'Regulations on Prospecting and Exploration for Polymetallic Sulphides in the Area' (2010) ISBA/16/A/12/Rev.1 (PMS) reg 33 (2); ISA, 'Draft Regulations on Exploitation of Mineral Resources in the Area' (2019) ISBA/25/C/WP.1 (DER) reg 2 (e) (ii) and reg 44 (a).
[122] Lisa A Levin and others, 'Defining "Serious Harm" to the Marine Environment in the Context of Deep-Seabed Mining' (2016) 74 Mar Pol'y 245.
[123] UNCLOS (n 9) art 145; arts 192–206; arts 209 and 215.

> deleterious effects as harm to living resources and marine life, hazards to human health, hindrance to marine activities, including fishing and other legitimate uses of the sea, impairment of quality for use of sea water and reduction of amenities.

In relation to the activities in the Area, article 145 provides for the ISA to adopt rules for the prevention, reduction and control of pollution and other hazards to the marine environment, and to protect and conserve the natural resources of the Area and prevent damage to marine flora and fauna.

Part XI and Annex III of UNCLOS address responsibility and liability specifically in relation to damage arising from activities in the Area. Article 139(2) provides that damage caused by the failure of a *state party* or *international organization* to carry out its responsibilities under Part XI shall entail liability. Article 22 of Annex III provides that

> the contractor shall have responsibility or liability for any damage arising out of wrongful acts in the conduct of its operations, account being taken of contributory acts or omissions of the Authority. Similarly, the Authority shall have responsibility or liability for any damage arising out of wrongful acts in the exercise of its powers and functions … account being taken of contributory acts or omissions by the contractor. Liability in every case shall be for the actual amount of damage.[124]

In considering article 139 (2), the Seabed Disputes Chamber (SDC) in its 2011 Advisory Opinion noted that

> [n]either the Convention nor the relevant Regulations (regulation 30 of the Nodules Regulations and regulation 32 of the Sulphides Regulations) specifies what constitutes compensable damage, or which subjects may be entitled to claim compensation. It may be envisaged that the damage in question would include damage to the Area and its resources constituting the common heritage of mankind, and damage to the marine environment.[125]

The SDC also addressed the amount and form of compensation, by reference to Annex III of UNCLOS, article 22. Here the SDC was of the view that the provisions concerning liability of the contractor for the actual amount of damage under Annex III, article 22, were equally valid with regard to the liability of the sponsoring state.[126] The SDC suggested 'the form of reparation will depend on both the actual damage and the technical feasibility of restoring the situation to the *status quo ante*'.[127] While the SDC's Advisory Opinion makes reference on this point to article 31 of the ILC's ASR on reparation,[128] and to the material possibility (technical

[124] ibid Annex III, art 22.
[125] *Responsibilities and Obligations of States Sponsoring Persons and Entities with Respect to Activities in the Area* (Advisory Opinion of 1 February 2011) ITLOS Reports 2011 (*Activities in the Area* Advisory Opinion) para 179.
[126] ibid para 195.
[127] ibid para 197.
[128] ibid para 194.

feasibility) of restitution, it does not specifically address considerations of proportionality in respect of restitution. As noted above, the ILC subjects reparation by restitution to a proportionality test so that restitution would not be required where it involves a burden out of all proportion to the benefit deriving from restitution instead of compensation.[129] The SDC's Advisory Opinion falls short of defining when compensation might constitute a more appropriate form of reparation. The provisions of Part XI and Annex III of UNCLOS, and the SDC's Advisory Opinion, also leave open certain questions relating to the definition and valuation of environmental damage arising out of activities in the Area. These include how 'damage to the Area and its resources' and 'damage to the marine environment' might be defined; and how 'the actual amount of damage' might be quantified for the purposes of compensation.

Some of these issues are under discussion in the development of exploitation regulations by the ISA. The current version of the Draft Exploitation Regulations (DER) also envisages the establishment of an Environmental Compensation Fund (ECF) to finance, *inter alia*, the implementation of any necessary measures designed to prevent, limit or remediate any damage to the Area arising from activities therein, the costs of which cannot be recovered from a contractor or sponsoring state, and the restoration and rehabilitation of the Area when technically and economically feasible and supported by best available scientific evidence.[130] The DER do not currently contain a detailed definition of what types of costs might be recovered from, or met by, the proposed Fund. An ISA Technical Study on an Environmental Compensation Fund (ISA ECF Study), published in 2021, addressed, *inter alia*, the topic of compensable damage,[131] drawing upon a review of existing funds including the IOPC Funds. The study clarifies that only damage resulting from activities *in* the Area should be compensated from the proposed Fund – damage from other activities impacting the Area would in principle be excluded. It suggests that the Fund cover damage to the marine environment that cannot be recovered from a contractor or sponsoring State. On the basis of the provisions of article 145 of UNCLOS and the definition of pollution in article 1(4), the study suggests that the following elements may be considered as damage to the Area and the marine environment: interference with the ecological balance of the marine environment; damage to the flora and fauna of the marine environment; harm to living resources and marine life; hazards to human health; hindrance to marine activities, including fishing and other legitimate uses of the sea; impairment of quality for the use of sea water; and reduction of amenities.[132] The study further acknowledges that the DER allow for compensation of preventive measures, that is,

[129] ASR (n 10) commentary to art 35(3), 98, para 11.
[130] DER (n 121) regs 54–56.
[131] ISA, 'Study on an Environmental Compensation Fund for Activities in the Area' (2021) ISA Technical Study No. 27 (ISA ECF Study) 35–39.
[132] ibid 36.

measures intended to prevent or limit damage, as well as appropriate activities to study, monitor or assess damage. Under the DER, compensation would also be allowed for remediation measures aimed at cleaning up a contaminated area by removing or isolating contaminants, and for 'restoration and rehabilitation of the Area when technically and economically feasible and supported by best available scientific evidence'.[133]

The ISA ECF Study, referring to recent developments surveyed in Section 3.2, proposes following the model of the IOPC Funds in *excluding* pure environmental damage and limiting compensation to recovery for reasonable measures of reinstatement undertaken or to be undertaken and costs of post-incident studies (effectively excluding interim ecosystem services losses). Reasons given for excluding pure environmental damage include the challenges of quantifying such damage and the financial viability of the proposed ECF. The Study notes that the 'wider the notion of compensable damage, the higher the risk of dispute over the existence of an actual duty to compensate in any given circumstance', and that ambiguity in the notion of compensable damage should be avoided.[134] Mirroring the restricted IOPC Funds approach in respect of pure environmental damage seems problematic and out of step with more recent developments, particularly as the Study itself acknowledges that certain damage might not be capable of restoration. Of further note, the Study proposes that recovery of compensation from the Fund should not be subject to establishment of a threshold of harm – such as 'serious' or 'significant' harm, despite the fact that certain provisions of UNCLOS relating to activities in the Area, and certain provisions of the DER, refer to 'serious harm'. Instead compensation should be available for 'any damage' falling within the definition of compensable environmental damage, consistent with article 22 of Annex III UNCLOS, and the wording of the DER.[135]

The legal status of the Area and its mineral resources as common heritage of humankind generates additional questions concerning the definition and valuation of damage. As noted above, the SDC observed that 'the damage in question would include damage to the Area and its resources constituting the common heritage of mankind, and damage to the marine environment'.[136] This suggests that these elements may constitute separate heads of damage in some circumstances. On the one hand, it may be easier to determine when there has been an impact on mineral resources such that the extraction of such resources is affected in terms of volume, quality or cost. Given that the mineral resources of the Area have a commercial value, valuation of damage to such resources may be possible through more traditional commercial valuation methods. On the other hand, the mineral

[133] ibid.
[134] ibid 38.
[135] ibid 38–39.
[136] *Activities in the Area* Advisory Opinion (n 125) para 179.

resources of the Area, and the seabed itself, are at the same time important components of the deep seabed ecosystem.[137]

The authorization of mineral exploitation activities presupposes a level of acceptable interference in deep seabed ecosystems, in light of environmental impact assessment and the ISA decision-making process. However authorized activities could give rise to environmental impacts that are unforeseen in nature or extent, and that might be deemed to constitute environmental damage. The principle of common heritage of humankind also incorporates other considerations, such as intergenerational impacts, that might have a bearing on the definition of damage and questions of appropriate compensation.[138] Issues associated with impacts on marine genetic resources in the Area also require consideration. While such genetic resources fall within the concept of biodiversity, as a component of the environment that may be damaged, the legal status and terms of use of such resources have been addressed in negotiations outside the ISA (see Section 3.3.3). Conceivably, damage to marine genetic resources might be compensable as an aspect of damage to natural resources, where the recovery and exploitation of such resources is impacted by environmental damage arising out of activities in the Area. While loss or damage to such resources subject to existing recovery and use may be capable of economic valuation, any such valuation might pose challenges – for example if the resources are not unique to the damaged area or if they are not currently subject to commercial exploitation. Unlike mineral resources of the Area, marine genetic resources in the Area are not subject to exclusive rights in terms of access, and the legal status of such resources and issues relating to benefit-sharing, could raise questions of standing to claim.[139]

3.3.3 *High Seas*

As discussed in Chapter 1, there are a wide variety of processes and activities that impact on the environment and biodiversity of the high seas. This variety, and the physical nature of the high seas environment, poses particular challenges when it comes to identifying sources of specific environmental damage, and establishing causation. Where major pollution incidents occur, for example large spills of oil or other hazardous or noxious substances from vessels, it may be possible to establish

[137] The definition of 'Marine Environment' provided in the DER at the time of writing includes the physical, chemical, geological and biological components, conditions and factors which interact and determine the productivity, state, condition and quality and connectivity of the marine ecosystem(s), the waters of the seas and oceans and the airspace above those waters, as well as the seabed and ocean floor and subsoil thereof. DER (n 121), Schedule ('Use of terms and scope').

[138] See Aline Jaeckel, Kristina M Gjerde and Jeff A Ardron, 'Conserving the Common Heritage of Humankind – Options for the Deep-Seabed Mining Regime' (2017) 78 Mar Pol'y 150 (linking common heritage of mankind principle to intergenerational equity).

[139] See Section 3.3.3, and Chapter 6.

the source vessel. Yet in other instances this will not be the case. Many of the sources of marine pollution on the high seas are diffuse, and the impacts of certain activities and/or pollutants are cumulative and may become apparent only over the longer-term. Impacts may be direct, for example the impacts of an oil spill on marine mammals, fish or birds that come into contact with the oil. They may be indirect, such as the impact on fish stocks and dependent species of degradation or destruction of spawning grounds or nursery areas. Such factors pose difficulties for defining compensable environmental damage within any liability regime. Moreover, identifying appropriate measures for restoration of damaged and degraded marine ecosystems may pose particular challenges.

The approaches and trends in relation to compensable damage identified in connection with civil liability regimes (discussed above) may provide some guidance for approaches to reparation for environmental damage should the currently scant liability rules for environmental damage in ABNJ be enhanced. In relation to the high seas, however, it is notable that the geographic scope of the civil liability instruments does not generally extend to damage to areas beyond national jurisdiction, although the cost of certain preventive measures taken on the high seas to prevent or minimize pollution damage to areas under national jurisdiction may be recoverable.[140] On the possible expansion of existing civil liability regimes to the high seas, Gaskell has examined legal options and political will for such a move, and Leigh has noted that during the negotiation of the HNS Convention, Australia proposed that liability for damage caused by contamination of the environment beyond the 200 nautical miles exclusive economic zone be included, but this proposal was not taken up in the Convention.[141]

The 2023 draft agreement on marine biodiversity of ABNJ[142] does not address liability, but its provisions on, *inter alia*, area-based management tools and environmental impact assessment provide a basis for generating new information and understandings on some issues associated with addressing environmental damage in ABNJ. The draft agreement defines cumulative impacts, for example, and requires that these

[140] 1992 Oil Pollution Liability Convention (n 8) art II; 1971 International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (adopted 18 December 1971, entered into force 16 October 1978) 1110 UNTS 57 (amended by the 1992 Protocol on the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage, 27 November 1992) (1992 Fund Convention) art 3; 1996 HNS Convention (n 8) art 3; 1999 Basel Liability Protocol (n 8) art 3(3); 2001 Bunker Oil Convention (n 51) art 2.

[141] Gaskell (n 8); Kathy Leigh, 'Liability for Damage to the Global Commons' (1993) 14 Aust YBIL 129, 139. Leigh notes that Australia made a similar proposal in negotiations on the revision of the 1963 Vienna Convention on liability for nuclear damage, ibid. See also Robert S Schuda, 'The International Maritime Organization and the Draft Convention on Liability and Compensation in Connection with the Carriage of Hazardous and Noxious Substances by Sea: An Update on Recent Activity' (1992) 46 U Miami L Rev 1009, 1046.

[142] Draft agreement 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, Advance unedited text, 4 March 2023 ('BBNJ Agreement').

are considered in the context of environmental impact assessment.[143] Its requirements concerning proposals for marine protected areas and on environmental impact assessment require the provision of baseline data on the relevant marine environment and biodiversity,[144] and those on EIA require uncertainties and gaps in knowledge to be identified and considered.[145] The draft agreement also establishes thresholds for screening and for the conduct of environmental impact assessments in relation to planned activities in areas beyond national jurisdiction. In particular, parties must ensure that an EIA is conducted where a planned activity may cause 'substantial pollution of or significant and harmful changes to the marine environment' in ABNJ. The objectives of the provisions of the draft agreement on EIA are, *inter alia*, to ensure that relevant activities are assessed and conducted to prevent, mitigate and manage 'significant adverse impacts'.[146] While this language on threshold has been adopted in the context of prior assessment of activities, not in the context of liability rules, it might be germane to determining what is deemed an 'acceptable' impact beyond which liability for environmental damage could arise. The draft agreement further provides for monitoring and reporting of impacts of authorized activities, and where significant adverse impacts that were unforeseen in nature or severity or that arise from a breach of conditions in the authorization are identified, it requires the party with jurisdiction or control over the activity to require that measures are taken to prevent, mitigate and/or manage those impacts or take other necessary action or halt the activity. The Scientific and Technical Body is also given the power to make recommendations to the party concerned with regard to addressing such impacts.[147] Significantly, the Scientific and Technical Body also has a broader mandate to develop standards and/or guidelines related to the EIA thresholds and processes under the agreement.[148]

Two further aspects of the draft agreement appear pertinent in the context of advancing common understandings of environmental damage and appropriate response measures. First, in the context of area-based management measures, the agreement provides that under certain conditions the Conference of the Parties can adopt decisions on emergency measures in ABNJ where a natural phenomenon or human-caused disaster has caused or is likely to cause serious or irreversible harm to marine biodiversity of ABNJ to ensure that such harm is not exacerbated. Procedures

[143] These are defined as 'the combined and incremental impacts resulting from different activities, including known past and present and reasonably foreseeable activities, or from the repetition of similar activities over time, and the consequences of climate change, ocean acidification and related impacts', BBNJ Agreement (n 142), art 1(8); and on consideration in the context of EIA processes, see arts 21 bis (c), 24, 30(1), 35, and 41 bis (1).

[144] ibid art 17(4)(d), art 35(2); see also art 51(3)(e).

[145] ibid art 24(2)(f), art 35(2).

[146] ibid art 22(2) and art 21 bis (b). The obligation to screen a planned activity to assess whether an EIA is required arises where the planned activity may have 'more than a minor or transitory effect on the marine environment or the effects of the activity are unknown or poorly understood', art 24(1).

[147] ibid arts 39–41.

[148] ibid art 41 bis.

and guidance for the establishment of any such measures are to be elaborated after the agreement enters into force.[149] Second, the provisions on the financial mechanism refer to the possibility of the Conference of the Parties establishing a fund to finance rehabilitation and ecological restoration of marine biodiversity of ABNJ.[150] It remains to be seen whether these provisions and others in the BBNJ Agreement, once it enters into force, provide an impetus and legal framework for the further development of liability rules.[151]

3.4 VALUATION OF ENVIRONMENTAL DAMAGE

As suggested above, issues associated with valuing environmental damage have been invoked to limit the elements of environmental damage that are compensable within environmental liability regimes.[152] In particular, in the IOPC Funds, this consideration has proved a bar to broadening the scope of compensable damage, with the Funds maintaining the position that compensation for environmental damage should not be assessed on the basis of abstract quantification of damage calculated in accordance with theoretical models. By contrast, as discussed further below, the UNCC and the ICJ have demonstrated willingness to look into different valuation methods to compensate damage to components of the environment without a market value, as well as interim environmental losses pending restoration.

Developments in law and practice at the national and regional level have to some extent informed the more innovative, and arguably progressive, approaches to the definition and valuation of environmental damage. In particular, domestic law in the United States, under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Oil Pollution Act 1990 have provided a forum for innovation in the assessment of natural resource damages, as well as for the evolution of an administrative approach to questions of assessing and restoring environmental damage.[153] The US approach has seen the utilization of a variety of valuation methods, such as contingent valuation methodology, travel cost method, hedonic pricing and habitat equivalency analysis (HEA), some of which were subsequently put forward to support claims in international forums.

[149] ibid art 20 ante.

[150] ibid art 52. See Chapter 8.

[151] Long suggested that the agreement should include an enabling provision for protocol on *sui generis* liability regime 'that is closely aligned with the rules on area-based management tools and environmental impact assessment' along similar lines to Annex VI of the Antarctic Protocol discussed above: R Long and Z Sun (eds), *Workshop Report: Biodiversity Beyond National Jurisdiction: Towards the Development of a Balanced, Effective and Universal International Agreement* (World Maritime University 2020) 6–7.

[152] Handl has noted that it is 'the valuation of ecosystem services that tends to pose a major obstacle to compensation'. Handl (n 5) 610.

[153] Emanuela Orlando, 'From Domestic to Global? Recent Trends in Environmental Liability from a Multilevel and Comparative Law Perspective' (2015) 24(3) RECIEL 289.

Contingent valuation is a stated preference model that bases valuation of damage upon a survey of people's willingness to pay to avoid such damage or maintain a level of environmental quality. The travel cost method assesses economic value of the quality and availability of environmental resources on the basis of willingness to pay to visit and use them; and hedonic pricing, an indirect valuation method, links changes in environmental quality to the market value of associated goods such as housing.[154] Decisions in other domestic jurisdictions have also supported the use of such methods, or the use of equitable considerations in quantifying environmental damage claims.[155] Amongst well-known cases in the context of civil liability for oil pollution damage are the *Patmos*[156] and *Haven*[157] cases in Italian courts, the *Erika*[158] case in France and the approach of the Soviet Union court in the *Antonio Gramsci*[159] incident (which prompted the IOPC Fund statement concerning abstract quantification methods). However, while these methods have faced an objection of principle in the IOPC Fund context, they also present more fundamental challenges in the context of quantifying environmental damage in areas beyond national jurisdiction. Applying contingent valuation based on willingness to pay seems difficult or impossible in relation to ABNJ; for the purpose of hedonic pricing, it is difficult to identify relevant marketed goods for the purpose of assessing changes in value; and travel cost methods face similar obstacles.

A more promising approach in relation to quantifying environmental damage by reference to ecosystem services loss is HEA, which assesses the nature and extent of the loss of ecological services from the damaged resources, determining the gain in ecological services anticipated from the compensatory projects, and calculating the cost of the compensatory projects. This method, and resource equivalency analysis, takes into account the biological, chemical and physical nature of the damage and remediation options. EU guidance on the Environmental Liability Directive explains that 'an equivalency analysis identifies which resources and services can be deemed to be "sufficiently similar" to the damaged resources and services and quantifies the amount to be remediated (credit) to be equal to the loss due to damage (debit)'.[160]

[154] See Nick Hanley, 'The Economic Valuation of Environmental Damage' in Michael Bowman and Alan Boyle (eds), *Environmental Damage in International and Comparative Law: Problems of Definition and Valuation* (OUP 2002) 27; and Tarcisio Hardman Reis, *Compensation for Environmental Damages under International Law: The Role of the International Judge* (Wolters Kluwer 2011) 138–141.

[155] See, for example, Rudall (n 2) 80–89.

[156] IOPC Funds, Annual Report 1994, 36–39.

[157] ibid 42–48.

[158] IOPC Funds, 'Incidents Concerning the IOPC Fund 2013', 6–11.

[159] IOPC Funds, Annual Report 1990, 27–30.

[160] European Commission, Environmental Liability Directive, Protecting Europe's Natural Resources (2013) 16. See also Annex II.

While the work of the UNCC and ICJ addresses damage arising out of wrongful acts of states, the approach to the definition and valuation of environmental damage has wider significance. The UNCC decided that where a resource had a commercial value, and was damaged for a period of time, compensation should be awarded on the basis of the market price for the period of time that the damage persisted, adjusted as appropriate to take into account the influence of other sources of damage.[161] For damage to resources that did *not* have a market reference price, the UNCC panel indicated that it would be willing to compensate natural resource losses by reference to the costs of other environmental projects that were put in place to compensate for the loss of ecological services that the natural resources would have provided had they not been damaged, so long as there was 'sufficient evidence that primary restoration will not fully compensate for any identified losses'.[162] Thus the emphasis was on primary remediation and restoration of services, but there appears to have been recognition that compensation for other restoration activities would be available where primary restoration was not possible or where there were interim losses.[163] Some claimants used HEA to determine the amount of compensation claimed. In considering approaches to valuation of damage, the panel expressed the view that 'international law does not prescribe any specific and exclusive methods of measurement for awards of damages for internationally wrongful acts by states. The general rule is to restore what has been damaged to integrity or, if this is not possible, to provide an equivalent for it'.[164] The panel recognized that

> there are inherent difficulties in attempting to place a monetary value on damaged natural resources, particularly resources that are not traded in the market. With specific regard to HEA, the Panel recognizes that it is a relatively novel methodology, and that it has had limited application at the national and international levels. The Panel is also aware that there are uncertainties in HEA calculations, especially for establishing a metric that appropriately accounts for different types of service losses and for determining the nature and scale of compensatory restoration measures that are appropriate for damage to particular resources. For these reasons, the Panel considers that claims presented on the basis of HEA or similar methodologies of resource valuation should be accepted only after the Panel has satisfied itself that the extent of damage and the quantification of compensation claimed are appropriate and reasonable in the circumstances of each claim. However, the Panel does not consider that these potential difficulties are a sufficient reason for a

[161] UNCC, 'Report on the Fifth Instalment of "F4" Claims' (n 43) paras 103–118, cited in Cymie Payne, 'UN Commission Awards Compensation for Environmental and Public Health Damage from 1990-91 Gulf War' (2005) 9(25) *ASIL Insights*.
[162] UNCC, 'Report on the Fifth Instalment of "F4" Claims' (n 43) para 82.
[163] José R Allen, 'Points of Law' in Cymie Payne and Peter Sand (eds), *Gulf War Reparations and the UN Compensation Commission: Environmental Claims* (OUP 2011) 141, 167.
[164] UNCC, 'Report on the Fifth Instalment of "F4" Claims' (n 43) para 80.

wholesale rejection of these methodologies, or for concluding that their use is contrary to international law principles.[165]

In the *Certain Activities* case between Costa Rica and Nicaragua, the ICJ made certain general observations about valuation of compensation and also addressed specific valuation methodologies put forward by the parties. As a general matter, in an earlier case, not involving environmental damage, the Court has observed that quantification of compensation for non-material injury rests on equitable considerations and awarded compensation on this basis.[166] The Court referred to this approach in its *Certain Activities* case reflecting that in respect of the valuation of damage, 'the absence of adequate evidence as to the extent of material damage will not, in all situations, preclude an award of compensation for that damage'.[167] It also cited the *Trail Smelter* award to the effect that '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'.[168] However, the Court also noted that compensation should not be punitive.[169] In terms of the specific arguments, the Court observed that the valuation methods put forward by the parties were not the only methods available, but that where certain elements of the proposed methods offered a reasonable basis for valuation, the Court would take them into account.[170] It noted that international law does not prescribe any specific method of valuation for the purposes of compensation for environmental damage, and that it was necessary to take into account the specific circumstances and characteristics of each case.[171] Costa Rica relied on an ecosystem service approach in evaluating its loss, referring to various categories of impaired goods and services including biodiversity, gas regulation and air quality services such as carbon sequestration, soil formation and erosion control. Nicaragua acknowledged Costa Rica's right to compensation for the ecosystem service replacement costs but challenged its valuation methodology. In the face of the competing valuation methodologies put forward by the parties, the Court's approach to the determination of compensation of environmental damage in this case was to assess the value to be assigned to the restoration of the damaged environment as well as to the impairment or loss of environmental goods and services prior to recovery.[172] Further, in the circumstances of the case, the Court considered it appropriate to approach the valuation of environmental damage

[165] ibid para 81.
[166] *Ahmadou Sadio Diallo (Republic of Guinea v Democratic Republic of the Congo)* (Compensation, Judgment) [2012] ICJ Rep 324, para 24.
[167] *Certain Activities* (n 3) para 35. See also Dissenting Opinion of Judge *ad hoc* Dugard on the Court's approach to valuation, and equitable considerations that the Court might properly have taken into account in quantification, para 29.
[168] ibid para 35.
[169] ibid para 31.
[170] ibid para 52.
[171] ibid.
[172] ibid para 53.

from the perspective of the ecosystem as a whole, by adopting an 'overall assessment' of the impairment of 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.[173] While in several respects, the Court's treatment of quantum remains unclear,[174] the judgment provides authoritative affirmation of the principle that damage to the environment *per se*, including interim losses pending full restoration, are compensable under international law.

In the reparations phase of *Armed Activities on the Territory of the Congo* in the ICJ,[175] Democratic Republic of the Congo (DRC) sought compensation for damage to natural resources including, in addition to claims for minerals, coffee and timber, damage to flora through deforestation and damage to fauna. In relation to deforestation, the Court noted that DRC had not offered evidence for the extent of environmental damage from deforestation, in particular loss of biodiversity, or a method for its valuation. The DRC did not address its environmental damage claim separately to that for unlawful exploitation of timber resources, and the Court-appointed expert had viewed the deforestation claim as referring to timber production.[176] The ICJ dismissed the claim for environmental damage resulting from deforestation as it had no basis upon which to assess it.[177] In relation to loss of fauna, the ICJ did make an award of compensation, but again found that the evidence adduced was not sufficient to determine a precise or approximate number of animal deaths. Finding that Uganda was nonetheless responsible for a significant amount of damage to fauna the Court awarded compensation for this damage as part of a 'global sum' for all damage to natural resources.[178] While the ICJ faced evidentiary obstacles in this case, the 'global sum' approach does little to clarify the approach to quantification of environmental damage, or other forms of damage addressed in the case.

A notable aspect of the *Certain Activities* case is that the ICJ approached the valuation of environmental damage without formally utilizing its power to appoint its own expert(s) to opine on the appropriate valuation methodology and its application. This bears noting as the Court has faced some criticism for aspects of its

[173] ibid para 78. For an analysis and critique of the Court's overall assessment approach, see Yoshifumi Tanaka, 'Temporal Elements in the Valuation of Environmental Damage: Reflections on the *Costa Rica v Nicaragua* Case before the International Court of Justice' (2021) 90 Nord J Intl L 257, 265–270.

[174] Kevine Kindje and Michael Faure, 'Assessing Reparation of Environmental Damage by the ICJ: A Lost Opportunity?' (2019) 57 QILJ 5, arguing that the ICJ took a narrow anthropocentric perspective on reparation of environmental damage and did not provide clear indications on how environmental damage would be assessed in future; see also Ronan Long, 'Restoring Marine Environmental Damage: Can the *Costa Rica v Nicaragua* Compensation Case Influence the BBNJ Negotiations?' (2019) 28 RECIEL 244; Rudall (n 2) 30.

[175] *Armed Activities on the Territory of the Congo* (n 17).

[176] ibid paras 345–347.

[177] ibid para 350.

[178] ibid para 363.

approach to expert evidence in environmental disputes.[179] In the *Pulp Mills* case, the joint dissenting opinion of Judges Al-Khasawneh and Simma highlighted questions and concerns about how the ICJ should approach issues of evidence in disputes that involve complex and voluminous scientific and technical evidence. The dissenting judges were highly critical of how the majority had approached the evaluation of evidence in the case, suggesting that the ICJ had approached the case 'in a way that will increase doubts in the international legal community whether it, as an institution, is well-placed to tackle complex scientific questions'.[180] In their view the ICJ was not, on its own, in a position adequately to assess and weigh complex scientific evidence of the types presented by Argentina and Uruguay in that case. By contrast, in the reparations phase of the *Armed Activities on the Territory of the Congo* case, the Court appointed experts to assist it, including in the assessment of damages related to natural resources.[181] In cases involving allegations of environmental harm, albeit not addressing compensation as such, other dispute settlement tribunals have also had recourse to tribunal-appointed independent experts to assess the existence and scale of damage.[182] The UNCC also made use of experts in its work on environmental damage claims.[183] In relation to ABNJ, such claims seem likely to involve complex issues of scientific evidence relating to baseline data, causation, the reasonableness or feasibility of any proposed restoration measures and consideration of alternative compensatory measures for ecosystem services loss. As such expert scientific input may be of particular importance.

3.5 CONCLUSIONS

How compensable damage is defined stands at the centre of liability for environmental harm in the global commons. If understood in narrow, economic terms, the ability of liability rules to protect the environment is severely constrained. On the

[179] On the *Certain Activities* case, see Tanaka (n 173) 282–287. See also Loretta Malintoppi, 'Fact-Finding and Evidence before the International Court of Justice (Notably in Scientific-Related Disputes)' (2016) 7 JIDS 421; Cymie Payne, 'Mastering the Evidence: Improving Fact Finding by International Courts' (2011) 41 Envtl L 1191; Caroline Foster, *Science and the Precautionary Principle in International Courts and Tribunals: Expert Evidence, Burden of Proof and Finality* (CUP 2011); Caroline Foster, 'New Clothes for the Emperor? Consultation of Experts by the International Court of Justice' (2014) 5 JIDS 139, 144.

[180] *Pulp Mills on the River Uruguay (Argentina v Uruguay)* [2010] ICJ Rep 14, Joint Dissenting Opinion of Judges Al-Khasawneh and Simma, para 3.

[181] *Armed Activities on the Territory of the Congo* (*Democratic Republic of the Congo v Uganda)* (Order of 8 September 2020) [2020] ICJ Rep 264 (Order of 12 October 2020) [2020] ICJ Rep 295; see also the appointment of an expert in *Corfu Channel Case (UK v Albania)* (Merits) [1949] ICJ Rep 4.

[182] *South China Sea Arbitration* (n 9) para 58; paras 978–983.

[183] See Huguenin and others (n 40). A further example, in the context of investor–state dispute settlement relating to an environmental claim, is the detailed account of the appointment and role of the tribunal-appointed independent expert in *Perenco Ecuador Limited and the Republic of Ecuador*, ICSID Case ARB/08/6 Award of 27 September 2019, paras 154–899.

other hand, if the legal definition of damage more closely reflects the evolving scientific understanding of environmental harm, then there is much greater scope for liability rules to play a more central role in protecting the commons environment. There is growing recognition in international law, including by the ILC and ICJ, of the need to provide for forms of compensation for loss of environmental resources and ecosystem services, including through restoration, and other measures such as the introduction of equivalent resources where primary restoration is not possible or gives rise to interim losses. However, as Handl has noted 'while there is evident and growing support for the compensability of ecosystem services losses in general, on the international legal plane the situation is fragmented'.[184] The concept of environmental damage ought to be seen in light of the evolving paradigm of international environmental policy-making in terms of the ecosystem approach and ecosystem services. Defining environmental damage in terms of lost ecosystem services, as well as lost or damaged components of the environment, better reflects contemporary understandings of ecosystem dynamics, even if it further complicates valuation exercises, particularly in ABNJ. This is already reflected in critiques of restricted definitions of environmental damage in civil liability conventions, and in the approach to assessment of environmental damage of the UNCC and the ICJ, albeit that neither body perhaps fully captured lost ecosystem services in their decisions on valuation.

Taking these developments in the compensability of environmental damage into the ABNJ environment poses a range of additional legal and other challenges. Cumulative environmental damage, a significant cause of concern in ABNJ, is difficult to address within existing liability approaches, both in terms of causation and attribution. In addition, potential claims in respect of preventive measures and reasonable measures of reinstatement for environmental damage in ABNJ are closely linked to challenges of establishing standing to bring a claim, and/or of incentives for states to take preventive or remedial action (discussed in Chapter 6). One possible avenue is to clarify the right of states or their agents to undertake response actions with the ability to seek compensation from responsible parties, as contemplated under the Antarctic Liability Annex. This might also imply the need for a role for international institutions in the provision of baseline data, and in assessing and determining appropriate responses to environmental damage in ABNJ – a feature that already appears to be evolving in the context of the role of ISA in a proposed Environmental Compensation Fund, and the role of the ATCM in the fund envisaged under Annex VI of the 1991 Antarctic Protocol.

Questions relating to the feasibility and likely success of restoration measures remain problematic, and, even where feasible, costs might prove disproportionate. The replacement of damaged components of the environment by 'equivalents' also poses potentially intractable challenges in the context of the high seas, deep seabed

[184] Handl (n 5) 609.

or Antarctica. Furthermore, baseline data on which to assess damage and ground restoration or offset efforts in ABNJ are likely to be incomplete or unreliable.

As to valuation of environmental damage in ABNJ, many of the existing valuation methods are poorly suited to the commons environment and pose significant evidentiary challenges. That said, these remain in a relatively early stage of development and the approach of UNCC and ICJ suggests methods such as HEA provide promising avenues for quantification and will likely evolve in concert with improved scientific understanding of ABNJ environments.