

CBRN Events and International Environmental Law: From Fragmentation to Mutual Supportiveness and Coordination

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1 Introduction

The prevention of, preparedness for, response to and recovery from CBRN events intersect with the protection of the environment (consisting of all living and non-living natural components and factors surrounding humans) in many ways. At the same time, international environmental law (IEL) does not address the CBRN threat holistically, so that – similarly to what happens with several other environment-related issues – the regulation of CBRN activities and events is scattered throughout a multiplicity of universal, regional and sectoral treaties, while the legal status of unifying principles and norms of general application in IEL remains contested.¹

Whether the piecemeal nature of IEL is detrimental to its effectiveness or, conversely, allows for flexibility in dealing with issues that are inherently technical and evolving is still very much debated.² The former argument might, nonetheless, have become prevailing, as the UN Secretary-General was recently entrusted – at the urging of a group of experts – with the preparation of a report on gaps in IEL and, on this basis, discussions are ongoing on the need for a comprehensive Global Pact for the Environment.³

1 U Beyerlin, 'Different Types of Norms in International Environmental Law Policies, Principles, and Rules' in D Bodansky, J Brunnée and E Hey (eds), *The Oxford Handbook of International Environmental Law* (OUP 2012); P Sands and J Peel, *Principles of International Environmental Law* (4th edn, CUP 2018) ch 6.

2 On the problems deriving from 'treaty congestion' in IEL, E Brown Weiss, 'International Environmental Law: Contemporary Issues and the Emergence of a New World Order' (1993) 81 *GeolJ* 697ff.; conversely, on the advantages of IEL fragmentation, T Gehring, 'Treaty-Making and Treaty Evolution' in Bodansky, Brunnée and Hey (n 1) 474ff especially.

3 UNGA 'Gaps in international environmental law and environment-related instruments: towards a global pact for the environment. Report of the Secretary-General' (2018) UN Doc A/73/419; and UNGA Res 72/277 (10 May 2018) UN Doc A/RES/72/277. For information on the Global Pact's progress, see the dedicated websites: <<https://globalpactenvironment.org/en/>> and <<https://globalpact.informea.org/>> (all links were last accessed on 29 November 2021).

As things stand, however, the actors concerned are still confronted with a complex web of IEL-based obligations relating to CBRN activities and events – obligations which Section 2 of this chapter identifies and systematises, to the extent possible, by focusing on those that are aimed at protecting the environment as such, separately from any injury to persons or their property. The chapter then zooms in on two highly topical issues that exemplify the interconnections between IEL and CBRN events, but which have rarely been considered in this light: epidemic outbreaks of zoonotic origin (Section 3) and climate change (Section 4).

In drawing some conclusions, Section 5 underlines the importance of an interpretation and application of IEL norms that adequately consider the prevention of, preparedness for, response to and recovery from CBRN events, on the basis of mutual supportiveness among CBRN-related IEL norms, as well as between IEL and non-IEL norms that are relevant to CBRN hazards – as has been put forward by the UN Secretary-General with respect to international instruments that more or less directly address the protection of the environment.

2 CBRN Events and International Environmental Law: An Overview

If a comprehensive notion of CBRN risks and events is adopted,⁴ it becomes apparent that IEL is of the utmost relevance for their management. In general terms, areas of IEL that pertain to CBRN activities and events include transboundary environmental harm; the generation, movement, and disposal of hazardous substances and waste; nuclear waste and accidents; the marine environment; fresh water; the atmosphere; climate change; biodiversity; and the production and use of specific substances, such as mercury and persistent organic pollutants. While much has been written on these areas individually, it appears appropriate here to look at this complex body of rules from a CBRN-oriented perspective and, specifically, in light of the four phases of the CBRN emergency management cycle, *ie* prevention, preparedness, response and recovery.⁵

Prevention plays a crucial role in IEL in general. As recovery following environmental damage is more often than not impossible or extraordinarily difficult, IEL aims to prevent such damage from occurring in the first place, to the extent that this is possible. Accordingly, the obligation not to cause (significant)

⁴ See ch 1 by Frulli in this volume.

⁵ *Ibid.*

transboundary environmental harm is one of the main tenets of IEL and its oldest customary rule.⁶ Such a broad due diligence obligation is related to a number of more specific procedural obligations that, while autonomous, could also be interpreted as giving substance to the prevention of transboundary environmental harm.⁷ These encompass the obligations to conduct an environmental impact assessment (EIA) prior to authorising a hazardous activity;⁸ notify potentially affected States and/or international organisations prior to authorising a hazardous activity;⁹ exchange information with other States regarding the conditions of and dangers to shared resources or other States' resources;¹⁰ and consult and/or negotiate with them on planned hazardous activities with potential transboundary effects.¹¹ All of these obligations also clearly embody the principle of cooperation, which is one of the cornerstones of the prevention of emergency situations in international law in general.¹²

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- 6 The prohibition of transboundary environmental harm was first recognised in *Trail smelter case (United States, Canada)* (1938, 1941) III RIAA 1905, and it has since been applied repeatedly as a customary rule by the ICJ, most recently, in *Certain Activities Carried Out by Nicaragua in the Border Area (Costa Rica v Nicaragua)* [2015] ICJ Rep 665, para 118. The no-harm rule is laid down in numerous IEL instruments: eg, UN Convention on the Law of the Sea (1982) (UNCLOS) art 194; Declaration of the UN Conference on the Human Environment (1992) (Stockholm Declaration) principle 21; Rio Declaration on Environment and Development (1992) (Rio Declaration) principle 2; Convention on Biological Diversity (1992) (CBD) art 3; Draft articles on Prevention of Transboundary Harm from Hazardous Activities (2001) (Draft Articles on Prevention) art 3.
- 7 I Plakokefalos, 'Prevention Obligations in International Environmental Law' (2012) 23(1) YIntlEnvL. On the principle of prevention in IEL and its articulations, see also *The Environment and Human Rights*, Advisory Opinion OC-23, IACtHR Series A No 23 (15 November 2017) paras 127ff.
- 8 UNCLOS, art 206; Convention on Environmental Impact Assessment in a Transboundary Context (1991) (Espoo Convention); CBD, art 14(1)(a) (referring to biodiversity as such, as opposed to the biodiversity of other States); Draft Articles on Prevention, art 7; Directive 2014/52/EU [2014] OJ L124/1 (EIA Directive).
- 9 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1989) (Basel Convention) art 6; Espoo Convention, arts 2(4), 3; Convention on the Transboundary Effects of Industrial Accidents (1992) (UNECE Industrial Accidents Convention) art 4(1); CBD, art 14(1)(c); Convention on the Law of the Non-Navigational Uses of International Watercourses (1997) (Watercourses Convention) arts 12–16; Draft Articles on Prevention, art 8.
- 10 UNCLOS, art 200; CBD, art 14(1)(c); Watercourses Convention, arts 9, 11; Draft Articles on Prevention, art 12.
- 11 Convention on Long-range Transboundary Air Pollution (1979) (LRTAP Convention) art 5; Espoo Convention, art 5; UNECE Industrial Accidents Convention, art 4(2)–(3) and annexes II–III; CBD, art 14(1)(c); Watercourses Convention, arts 11, 17; Draft Articles on Prevention, arts 9, 10.
- 12 See ch 3 by Venier in this volume.

At the domestic level, the prohibition of transboundary harm translates into the obligation for States to adopt all appropriate measures, including laws and regulations, to prevent the occurrence of such harm,¹³ thereby also regulating the conduct of private actors, who are to be required to take all necessary steps to avoid or minimise environmental damage.¹⁴

As a reinforcement of the principle of prevention, precaution still suffers from ambiguities regarding its scope and legal status but is increasingly found in legal instruments and judgments.¹⁵ By requiring States to adopt, without delay, measures to prevent (serious or irreversible) environmental damage, even in the absence of full scientific certainty that the damage will, in fact, occur, the precautionary principle or approach may very well apply to CBRN substances – such as chemicals¹⁶ and various products of synthetic biology¹⁷ – whose adverse effects on the environment are not fully known yet.

13 UNCLOS, arts 207, 208, 210–212; Basel Convention, art 4; Espoo Convention, art 2(2); UNECE Industrial Accidents Convention, arts 3(4), 6(1), 7; UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes (1992) (UNECE Water Convention) art 3; CBD, art 10(a)–(b); Draft Articles on Prevention, art 5.

14 Basel Convention, art 4(2)(c); UNECE Industrial Accidents Convention, arts 3(3), 6 and annexes IV–V; UNECE Water Convention, art 3; Directive 2012/18/EU [2012] OJ L197/1 (Seveso III Directive) art 5(1). On private actors and CBRN-related activities and risks, see ch 2 by Di Francesco Maesa and ch 30 by Corcione in this volume.

15 The precautionary principle or approach can be found in several IEL instruments, including the UN Framework Convention on Climate Change (1992) (UNFCCC) art 3(3); Rio Declaration, principle 15; UNECE Water Convention, art 2(5)(a); 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (1972) (London Convention) art 3(1); Cartagena Protocol on Biosafety to the CBD (2000) (Cartagena Protocol) arts 10(6), 11(8); Stockholm Convention on Persistent Organic Pollutants (2001) (Stockholm Convention) arts 1, 8(7)(a). The precautionary principle has also been recognised and applied in the case law of international courts: *Southern Bluefin Tuna (New Zealand v Japan; Australia v Japan)* (Provisional Measures) [1999] ITLOS Rep 280, para 77; *Pulp Mills on the River Uruguay (Argentina v Uruguay)* [2010] ICJ Rep 14, para 164; and *Responsibilities and Obligations of States with respect to Activities in the Area* (Advisory Opinion) [2011] ITLOS Rep 10, para 135. In the literature, among many, D Freestone and E Hey (eds), *The Precautionary Principle and International Law: The Challenge of Implementation* (Kluwer Law International 1996).

16 Eg, the European Commission purports that the REACH Regulation (Regulation No 1907/2006 [2006] OJ L396/1) is based on the precautionary approach, even though this claim has been contested: S Foss Hansen, L Carlsen and JA Tickner, 'Chemicals regulation and precaution: does REACH really incorporate the precautionary principle' (2007) 10 *Environmental Science and Policy*.

17 CBD, arts 8(g), 19(3)–(4) in particular; and Cartagena Protocol. On synthetic biology in the CBD context, F Keiper and A Atanassova, 'Regulation of Synthetic Biology: Developments Under the Convention on Biological Diversity and Its Protocols' (2020) 8 *Frontiers in Bioengineering and Biotechnology*.

Additionally, both prevention and precaution rely on or benefit from public participation in environmental decision-making, which broadens the sources of input and lends greater legitimacy to the relevant measures. Public participation is, in turn, connected to the provision of access to environmental information, and to the availability of remedies against decisions contrary to environmental law and decisions restricting the rights to information/participation. While, until recently, the most comprehensive codification of the rights to information, participation and remedy in environmental matters could be found in the Aarhus Convention,¹⁸ adopted in the UNECE context, similar provisions have now been incorporated in the Escazú Agreement, concluded under the auspices of UNECLAC in 2018.¹⁹ If one considers that these rights have also been recognised in several IEL sectoral treaties and non-binding instruments,²⁰ it can be said that ‘environmental democracy’ is becoming an increasingly important pillar of IEL. Nevertheless, the exercise of ‘environmental democracy’ rights can be restricted on a number of grounds, including national security and industrial or commercial secrecy,²¹ which are of special relevance to CBRN-related activities. Thus, particularly in relation to nuclear activities, access to information and public participation regarding the activities and their effects on the environment and human health might be severely restricted.

As for preparedness, response and recovery, these phases of the CBRN emergency management cycle are considered jointly in several environmental treaties – a fact which highlights the functional interconnectedness of the cycle’s phases, but, on the other hand, might result in the relative neglect of some phases compared to others (particularly of preparedness compared to

18 Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (1998).

19 Regional Agreement on Access to Information, Public Participation and Justice in Environmental Matters in Latin America and the Caribbean (2018). Besides, in the Inter-American context, the IACtHR had already derived ‘environmental democracy’ rights from the American Convention on Human Rights in its advisory opinion on *The Environment and Human Rights*, paras 211ff. While no comparable instrument exists in the African context, participatory rights have been recognised in the African Convention on the Conservation of Nature and Natural Resources (2003) art XVI.

20 Rio Declaration, principle 10; UNECE Water Convention, art 16; Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (1998) (Rotterdam Convention) art 15(2); Stockholm Convention, art 10; Draft Articles on Prevention, art 13; Minamata Convention on Mercury (2013) (Minamata Convention) art 18(1); Paris Agreement (2015) art 12.

21 Aarhus Convention, art 4(4); Escazú Agreement, art 5(6). See also Espoo Convention, art 2(8); Draft Articles on Prevention, art 14; Seveso III Directive, art 22.

response). As far as the international plane is concerned, the relevant norms essentially provide for obligations of cooperation – first of all, through the notification of the CBRN incident by the State of origin to other affected States and/or to international organisations.²² As a first step of the response, notification can also contribute to the prevention of (further) environmental harm. Following notification, assistance in the response to the emergency comes into play. While the request for and provision of assistance are both generally voluntary (although conventions and complementary regulations might prescribe the form and modalities of the request or offer), there exist instances where the provision of assistance is compulsory.²³

With more specific regard to preparedness, some conventions ask States – ‘where appropriate’ – to adopt joint contingency plans.²⁴ In practice, several bilateral instruments have been concluded to prepare for pollution incidents at sea, together with some multilateral ones (such as the 2018 ASEAN Regional Oil Spill Contingency Plan), and a ‘Checklist for contingency planning for accidents affecting transboundary waters’ has been developed by UNECE.

IEL treaties dealing with preparedness for, response to and recovery from CBRN incidents also give rise to obligations for States at the domestic level, including the obligation to establish appropriate national systems to respond to incidents²⁵ and the obligation to require that the private actors in charge of hazardous activities report any incidents and have contingency plans in place to deal with such incidents.²⁶

22 UNCLOS, art 198; Convention on Early Notification of a Nuclear Accident (1986) arts 2, 5; Basel Convention, art 13(1); International Convention on Oil Pollution Preparedness, Response and Co-operation (1990) (OPRC) art 5(1)(c)–5(4); CBD, art 14(1)(d); UNECE Industrial Accidents Convention, art 10 and annex IX; Watercourses Convention, art 28(2); Draft Articles on Prevention, art 17.

23 Eg, UNECE Water Convention, art 15(1). Albeit ‘subject to their capabilities and the availability of relevant resources’ and ‘when the severity of such incident so justifies’, Parties to the OPRC are also required to cooperate in the response to a pollution incident (art 7). In the UNECE Industrial Accidents Convention, the provision of assistance remains voluntary, but the requested Party ‘shall promptly decide and inform the requesting Party whether it is in a position to render the assistance required’ (art 12(1)); similarly, Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (1986) art 2).

24 UNCLOS, art 199; OPRC, art 10; CBD, art 14(1)(e); Watercourses Convention, art 28(4); Draft Articles on Prevention, art 16.

25 OPRC, art 6; CBD, art 14(1)(e); UNECE Industrial Accidents Convention, arts 8, 10, 17.

26 OPRC, arts 3–4; UNECE Industrial Accidents Convention, art 8 and annex VII; Nagoya-Kuala Lumpur Supplementary Protocol on Liability and Redress to the Cartagena Protocol (2010) (Nagoya-Kuala Lumpur Protocol) art 5(1); Seveso III Directive, arts 12, 16 and annex IV.

Further IEL-based obligations that intersect with more than one phase of the CBRN emergency management cycle, or are not specifically related to the cycle, include monitoring the conditions of shared resources and the (potential) effects of hazardous activities and pollution;²⁷ exchanging information and reporting;²⁸ cooperating in research and training, especially in favour of developing countries;²⁹ and assisting developing countries financially.³⁰

Arguably, the least developed component of IEL consists of liability and compensation regimes for environmental damage – a state of affairs which is made evident by the number of IEL instruments where the parties commit to support (future) international efforts to establish such regimes³¹ and by the circumstance that those agreements on liability and redress which have been concluded have mostly yet to enter into force.³² This does not mean that, at present, responsibility for violations of IEL is not recognised. However, as shown by recent ICJ jurisprudence,³³ traditional State responsibility might not be the most effective means of enforcement and redress in environmental matters, as uncertainties still surround the scope and legal status of various IEL primary norms; the assessment of environmental damage and compensation

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- 27 UNCLOS, art 204; Basel Convention, art 10(2)(b); CBD, art 7; UNECE Water Convention, arts 4, 11; Stockholm Convention, art 11.
- 28 Basel Convention, art 13; LRTAP Convention, art 8; UNECE Industrial Accidents Convention, art 15 and annex XI; UNECE Water Convention, arts 6, 13; CBD, art 17; Rotterdam Convention, art 14; Stockholm Convention, arts 9, 15; Minamata Convention, arts 17, 21.
- 29 LRTAP Convention, art 7; UNCLOS, arts 200, 202; OPRC, arts 8–9; Espoo Convention, art 9; UNECE Water Convention, arts 5, 12; CBD, arts 12, 18; Rotterdam Convention, art 16.
- 30 CBD, art 20; Stockholm Convention, art 13(2)–(8); Minamata Convention, art 13; Paris Agreement, art 9.
- 31 Stockholm Declaration, principle 22; London Convention, art x; 1996 Protocol to the London Convention, art 15; UNCLOS, art 235(3); Rio Declaration, principle 13; CBD, art 14(2); UNECE Industrial Accidents Convention, art 13; UNECE Water Convention, art 7.
- 32 UNECE Convention on Civil Liability for Damage Caused during Carriage of Dangerous Goods by Road, Rail and Inland Navigation Vessels (1989; one ratification); CoE Convention on Civil Liability for Damage Resulting from Activities Dangerous to the Environment (1993; no ratifications); Protocol on Liability and Compensation for Damage Resulting from Transboundary Movements of Hazardous Wastes and Their Disposal (1999; 12 parties, all developing countries); UNECE Protocol on Civil Liability for Damage and Compensation for Damage Caused by Transboundary Effects of Industrial Accidents on Transboundary Waters (2003; one ratification); International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea (1996, as amended by its 2010 Protocol; five parties).
- 33 *Costa Rica v Nicaragua* (Compensation) [2018] ICJ Rep 15; for a critical appraisal of the judgment, K Kindji and M Faure, 'Assessing reparation of environmental damage by the ICJ: A lost opportunity?' (2019) 57 *QuestIntL*, Zoom-in.

is still far from satisfactory; and the actual breach of an international norm is often immaterial to the environmental harm and its severity.³⁴

The broadening of strict liability for environmental damage might thus be needed in the face of legal but hazardous activities.³⁵ Further, a number of international instruments call for the strengthening of civil liability regimes which, by incorporating the 'polluter pays' principle,³⁶ make the private operators responsible for the environmental harm bear the costs of restoration and compensation (at least up to a certain ceiling), thus at the same time incentivising preventive action.³⁷ Ultimately, a reinforcement of liability and redress regimes, in terms of both general principles and sector-specific norms, is needed.³⁸ The gaps in this area of IEL constitute a serious problem for CBRN incidents, which can cause devastating harm to the environment.

Overall, it can be said that IEL is the source of multiple obligations for States and, indirectly, private actors dealing with CBRN substances, activities and emergencies. The incremental process by which IEL and CBRN-related IEL, in particular, have come into existence – following discrete, major incidents – has resulted in a patchwork of regimes that often lack coherence and give rise to both overlaps and gaps. While waiting for a possible future Global Pact for the

34 On these and other challenges facing State responsibility for environmental harm, M Fitzmaurice, 'International Responsibility and Liability' in Bodansky, Brunnée and Hey (n 1); T Scovazzi, 'State Responsibility for Environmental Harm' (2001) 12 *YIntlEnvL*.

35 This is the path taken by the ILC Draft principles on the allocation of loss in the case of transboundary harm arising out of hazardous activities (2006). See also the resolution by the Institute of International Law, 'Responsibility and Liability under International Law for Environmental Damage' (4 September 1997).

36 On the content and functions of the 'polluter pays' principle, N de Sadeleer, *Environmental Principles: From Political Slogans to Legal Rules* (OUP 2002) 33ff. The principle is mentioned, *inter alia*, in TFEU (1957, as amended) art 191(2); Alpine Convention (1991) art 2(1); Rio Declaration, principle 16; UNECE Water Convention, art 2(5)(b); Convention on Nuclear Safety (1994) art 9; 1996 Protocol to the London Convention, art 3(2); Nagoya-Kuala Lumpur Protocol, art 12.

37 Civil liability regimes currently in force mainly focus on nuclear activities and oil pollution at sea: Convention on Third Party Liability in the Field of Nuclear Energy (1960) and its Supplementary Convention (1963); Vienna Convention on Civil Liability for Nuclear Damage (1963, as amended by the 1997 Protocol); Convention Relating to Civil Liability in the Field of Maritime Carriage of Nuclear Material (1971); International Convention on Civil Liability for Oil Pollution Damage (1992) and International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (1992). See also Directive 2004/35/EC [2004] OJ L143/56.

38 *Contra*, for a pessimistic view on the role that liability regimes can play in protecting the environment and even in making compensation easier, J Brunnée, 'Of Sense and Sensibility: Reflections on International Liability Regimes as Tools for Environmental Protection' (2004) 53 *ICLQ*.

Environment, the UN Secretary-General has identified the way forward in the mutual supportiveness of obligations, both within IEL and between IEL and related branches of international law. The following sections of this chapter put forward two areas of test ground for this approach – areas that are related to CBRN hazards and require the coordination of different IEL and non-IEL regimes: the prevention of zoonotic epidemics and the mitigation of and adaptation to climate change.

3 Zoonotic Epidemics and International Environmental Law

The fact that a pathogen originating from animals would spill over to humans and give rise to a deadly pandemic had long been predicted by experts, but – clearly – that prediction was not followed by the appropriate prevention and preparedness measures.³⁹ The foreseeability of the COVID-19 pandemic is connected, essentially, to the growing rates of urbanisation and globalisation. The shrinking of natural habitats to make room for farmland, mining, and human settlement, together with poaching and wild meat consumption, have multiplied contacts between humans and wildlife, which, in turn, considerably increase the risk that animal-borne (zoonotic) diseases will make the jump to human hosts. International trade and travel then cause these diseases to spread globally.⁴⁰

What is the role of IEL in such a scenario? The international community has at its disposal two main IEL instruments to prevent the recurrence of zoonotic epidemics by ensuring an appropriate balance between nature and humans: the Convention on Biological Diversity (CBD) and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).⁴¹

39 See ch 16 by Venier and ch 17 by de Guttry in this volume.

40 On zoonoses and their links with the destruction of ecosystems and the increase in contacts between humans and wildlife, KE Jones and others, 'Global trends in emerging infectious diseases' (2008) 451 *Nature*; WB Karesh and others, 'Ecology of zoonoses: natural and unnatural histories' (2012) 380 *Lancet*; D Quammen, *Spillover: Animal Infections and the Next Human Pandemic* (WW Norton 2013); M Everard and others, 'The role of ecosystems in mitigation and management of Covid-19 and other zoonoses' (2020) 111 *Environmental Science and Policy*.

41 A role could also be played by the Convention on the conservation of migratory species of wild animals (1979), as spillovers might originate from migratory species and migrations can facilitate the spread of zoonoses; at the same time, migrations have also been shown to reduce the risk of disease transmission: KD Reed and others, 'Birds, Migration and Emerging Zoonoses: West Nile Virus, Lyme Disease, Influenza A and Enteropathogens'

In order to attain the primary aims of conserving and sustainably using biological diversity, several obligations are established in the CBD for States Parties – from the development of national conservation plans to the monitoring of biodiversity and the conduct of environmental impact assessments (EIAs) for hazardous activities – which, however, are hardly specific and are often qualified by expressions such as ‘as far as possible and as appropriate’.

Therefore, work is ongoing within the CBD system on the development of a post-2020 global biodiversity framework, which should set out specific biodiversity goals and targets. Whereas the current draft of the framework does not emphasise the nexus between the conservation of biodiversity and human health,⁴² most of the targets included would have an indirect positive impact on the prevention of zoonoses, eg those concerning the restoration of degraded ecosystems, the conservation and sustainable management of wildlife, and the eradication of invasive alien species.⁴³ Much will, nonetheless, depend on the final definition of the (quantifiable) targets and on the mobilisation of sufficient financial resources and capacity-building.

Furthermore, it should be considered that, within the latest three Conferences of the Parties to the CBD, decisions were adopted on ‘Biodiversity and Human Health’⁴⁴ that acknowledge the link between the two and promote the inclusion of biodiversity in the so-called One Health approach, whereby cross-sectoral research and policies are undertaken with a view to ensuring higher health protection.⁴⁵ Accordingly, States are, *inter alia*, encouraged to adopt national biodiversity strategies and action plans conforming to the

(2003) 1(1) Clinical Medicine & Research; S Altizer, R Bartel and BA Han, ‘Animal Migration and Infectious Disease Risk’ (2011) 331 Science.

Other potentially relevant IEL instruments include the Convention on Wetlands of International Importance especially as Waterfowl Habitat (1971) (Ramsar Convention on Wetlands) and the UN Convention to Combat Desertification (1994): P Horwitz, CM Finlayson and P Weinstein, *Healthy wetlands, healthy people: A review of wetlands and human health interactions* (Secretariat of the Ramsar Convention on Wetlands and WHO 2012); J Patz and others, *Our Planet, Our Health, Our Future. Human health and the Rio Conventions: biological diversity, climate change and desertification* (WHO 2012) 34ff especially.

42 Although Targets 8 and 11 refer to human health and well-being: CBD ‘Update of the Zero Draft of the Post-2020 Global Biodiversity Framework. Note by the Co-Chairs’ (17 August 2020) CBD/POST2020/PREP/2/1, 5–6.

43 Ibid, ss D and E.

44 CBD COP: Decision XII/21 (17 October 2014) UNEP/CBD/COP/DEC/XII/21; Decision XIII/6 (14 December 2016) CBD/COP/DEC/XIII/6; Decision 14/4 (30 November 2018) CBD/COP/DEC/14/4.

45 On the One Health approach, see WHO ‘One Health’ <<https://www.who.int/news-room/questions-and-answers/item/one-health>>.

One Health approach; promote inter-ministerial and inter-agency dialogue; undertake capacity-building and raise awareness on the biodiversity-health nexus; and consider linkages between biodiversity and health within EIAs.⁴⁶ Therefore, even though the decisions in question use soft-law language, it appears that there is broad agreement among the CBD Parties on the relevance of the Convention's obligations to the protection of human health. Additionally, the decisions have promoted the increasing engagement of the CBD system in the matter, starting with the establishment in 2012 of a Joint Work Programme with the World Health Organization.⁴⁷ In light of such progress and of the current circumstances, it is somewhat surprising that the draft post-2020 global biodiversity framework does not underline more strongly the connection between healthy ecosystems and human health.

As to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), since the initial spread of COVID-19 was traced back to a wet market, multiple calls have been made to ban – or radically change the conditions of – trade in wildlife,⁴⁸ which is considered to exacerbate the risk of spillovers by multiplying unnatural and unsanitary interactions between animals and humans and between different species of animals.⁴⁹ Those calls were also directed at CITES, whose Secretariat, however, rather hastily refused to comment on the possible connection between the ongoing pandemic and the handling or consumption of wild meat, by maintaining that zoonotic diseases are out of the purview of CITES, which is only concerned with regulating trade at the international level.⁵⁰

46 CBD COP, Decision 14/4 (n 44) paras 3, 5, 6, 8, 9; and CBD SBSTTA, 'Guidance on Integrating Biodiversity Considerations into One Health Approaches' (13 December 2017) CBD/SBSTTA/21/9.

47 CBD COP, Decision XI/6 (5 December 2012) UNEP/CBD/COP/DEC/XI/6, para 29. For the work of CBD bodies on the biodiversity-health nexus, see CBD 'Health and Biodiversity' <www.cbd.int/health/>.

48 Most recently, the WHO, OIE and UNEP recommended the suspension of trade in live wild mammals for food: WHO 'Food safety: Sale of live wild mammals in traditional food markets' <<https://www.who.int/news-room/questions-and-answers/item/sale-of-live-wild-mammals-in-traditional-food-markets>> (12 April 2021). Caution is at any rate required, as bans risk fuelling illegal trade and endangering indigenous and local communities relying on wildlife trade and consumption for their livelihoods: D Challenger and others, 'Coronavirus: why a blanket ban on wildlife trade would not be the right response' (*The Conversation*, 8 April 2020) <<https://theconversation.com/coronavirus-why-a-blanket-ban-on-wildlife-trade-would-not-be-the-right-response-135746>>.

49 S Broad, *Wildlife Trade, COVID-19, and Zoonotic Disease Risks* (TRAFFIC 2020) <<https://www.traffic.org/site/assets/files/12764/covid-19-briefing-vfinal.pdf>>.

50 CITES 'CITES Secretariat's statement in relation to COVID-19', 17 March 2020 <https://cites.org/eng/CITES_Secretariat_statement_in_relation_to_COVID19>.

While *prima facie* solid, the Secretariat's argument appears to emphasise what divides and downplay what unites zoonotic epidemics and CITES. Although uncertainty persists over the identity of the intermediate host(s) for COVID-19, various reservoirs and intermediate hosts for past zoonotic diseases are included among the 'species threatened with extinction' in CITES Appendix I and are thus generally banned from international trade. Whereas spillovers might take place in the context of domestic trade, the CITES Secretariat itself, in the above-mentioned statement, recognised that the regulation of wildlife trade at domestic level 'will also contribute to the effective implementation and enforcement of the Convention and the conservation of CITES-listed species'. At any rate, after its rather timid initial stance, the CITES Secretariat appears to have engaged more closely with the causes and effects of the pandemic, starting by contributing to a workshop report by the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) on biodiversity and pandemics.⁵¹

In light of the link between uncontrolled or unsustainable wildlife trade and the exacerbation of the risk of zoonotic epidemics, the reinforced monitoring and implementation of CITES obligations concerning the international trade of endangered species would contribute to the minimisation of zoonotic spillovers, together with a more coherent regulation of the breeding of at-risk animal species in captivity for commercial purposes.⁵² The explicit expansion of the CITES mandate to regulate the trade of species that are not endangered but are at high risk of transmitting diseases to humans has also been proposed by some commentators; however, the issue is still debated among experts,⁵³ whereas the relevant intergovernmental debate does not appear to have even started. Undoubtedly, further steps are required for CITES to take the lead in the prevention of zoonotic epidemics. Meanwhile, the effective monitoring and implementation of existing CITES obligations – especially regarding

51 IPBES, *IPBES Workshop on Biodiversity and Pandemics – Workshop Report* (IPBES 2020).

52 As recognised by the CITES system and crudely shown by the culling of millions of farmed minks in Denmark and the Netherlands after a mutated form of COVID-19 was found in animals and farmers: C Lesté-Lasserre, 'Mutant coronaviruses found in mink spark massive culls and doom a Danish group's research' (*ScienceMag.org*, 11 November 2020) <<https://www.sciencemag.org/news/2020/11/mutant-coronaviruses-found-mink-spark-massive-culls-and-doom-danish-group-s-research>>.

53 See, among others, the following opinions published on the Scientific American website (<scientificamerican.com>): S Lieberman, 'CITES, the Treaty that Regulates Trade in International Wildlife, Is Not the Answer to Preventing Another Zoonotic Pandemic' (22 May 2020); D Ashe and JE Scanlon, 'A Crucial Step Toward Preventing Wildlife-Related Pandemics' (15 June 2020); BJ Weissgold and others, 'How We Can Use the CITES Wildlife Trade Agreement to Help Prevent Pandemics' (24 August 2020).

species known to host potentially zoonotic pathogens, or high-risk places such as wet markets or wildlife farms – would still greatly contribute to reducing the risk of spillovers.

In closing, mention should also be made of the fact that the conservation, sustainable management, and restoration of forests play a considerable role in ensuring healthy ecosystems, forests being some of the richest areas in terms of biodiversity. Accordingly, commitments undertaken by States in order to conserve these biomes also contribute to the prevention of epidemics⁵⁴ and should be considered in this light. Indeed, even though no dedicated treaty exists, forests fall within the purview of various conventions (such as the CBD)⁵⁵ and are the subject of an increasing number of soft-law instruments and programmes, such as REDD+, whereby developing countries receive funding for conserving and sustainably managing their forests.

The same applies to climate change instruments. As climate change increasingly contributes to the destruction of ecosystems, the realisation of climate change commitments by States is critical to the protection of biodiversity; at the same time, care should be taken to ensure that climate action does not conflict with, and adequately considers, biodiversity conservation. In this respect, whereas climate change adaptation planning in a growing number of countries is incorporating an ecosystem-based approach,⁵⁶ mitigation strategies still too often ignore biodiversity concerns (eg the production of biofuel has proved particularly problematic).⁵⁷ Further, climate change is going to have particularly direct effects on the survival and spread of climate-sensitive pathogens, vectors and hosts.⁵⁸

54 On the links between deforestation (and mismanagement of forests) and zoonotic epidemics, S Morand and C Lajaunie, 'Outbreaks of Vector-Borne and Zoonotic Diseases Are Associated With Changes in Forest Cover and Oil Palm Expansion at Global Scale' (2021) 8 *Frontiers in Veterinary Science*.

55 For relevant COP decisions, workshops, reports, guidelines and partnerships, see CBD 'Forest Biodiversity' <<https://www.cbd.int/forest/>>. Regarding other international instruments on forests, see Sands and Peel (n 1) 428–431.

56 This is especially the case for developing countries, which, however, frequently lack the resources to fully implement such nature-based solutions; also, national adaptation plans submitted in the UNFCCC context often omit quantifiable targets: see CBD SBSTTA, 'Biodiversity and Climate Change. Note by the Executive Secretary' (19 August 2019) CBD/SBSTTA/23/3, para 52.

57 On the negative impact of biofuel production and use on biodiversity, CBD COP, Decision X/37 (29 October 2010) UNEP/CBD/COP/DEC/X/37; in the literature, LM Verdade, CI Piña and LM Rosalino, 'Biofuels and biodiversity: Challenges and opportunities' (2015) 15 *Environmental Development*.

58 UNEP and ILRI, *Preventing the Next Pandemic: Zoonotic Diseases and How to Break the Chain of Transmission* (UNEP 2020) 17, and the literature mentioned there.

One Health and EcoHealth⁵⁹ approaches would appear particularly suitable to incorporate all of these cross-sectoral interactions and – it is posited here – to offer a lens through which to consider the obligations incumbent on States in these interrelated areas with a view to effectively preventing and preparing for zoonotic epidemics. Much remains to be done in this respect, however, especially at the domestic level, where genuinely integrated national implementation plans are lagging behind.⁶⁰

4 CBRN Events and Climate Change

Climate change is not only relevant to CBRN events inasmuch as, by threatening biodiversity or otherwise impacting on pathogens, it heightens the risk of zoonotic epidemics. The thawing of permafrost caused by climate change is believed to have contributed to the release of 20,000 tonnes of oil in the Siberian tundra in May 2020, after the collapse of a fuel tank whose maintenance likely did not sufficiently consider the increasingly yielding nature of the soil. On the other side of the Pacific Ocean, the US Department of Defense has increasingly engaged with the potential impacts of climate change on US military operations, equipment and facilities.⁶¹ In the latter respect,

59 EcoHealth approaches investigate the interconnectedness of human health and ecosystems health by focusing on environmental and socioeconomic issues: J Lebel, *Health: An Ecosystem Approach* (International Development Research Centre 2003). On similarities and differences between One Health and EcoHealth (and Planetary Health), H Lerner and C Berg, 'A Comparison of Three Holistic Approaches to Health: One Health, EcoHealth, and Planetary Health' (2017) 4 *Frontiers in Veterinary Science*.

60 According to WHO and CBD Secretariat, 'Background paper for the Regional capacity-building workshop on Biodiversity and Health for the WHO European region' (2017), '[i]nternal analyses [...] have shown that the integration of biodiversity and health linkages is generally poorly reflected in national action plans' to implement the CBD domestically.

61 The interest demonstrated by the US Department of Defense can be traced back at least to 2010, when its 'Quadrennial Defense Review Report' identified climate change as a priority issue. In the following years, the Department has remained seized of the matter; among the most recent initiatives are a memorandum and a handbook to assist the US military in adapting their installations to the impacts of climate change: Secretary of the Army, 'Army Directive 2020-08 (U.S. Army Installation Policy to Address Threats Caused by Changing Climate and Extreme Weather)' (11 September 2020); and AO Pinson and others, *Army Climate Resilience Handbook* (US Army Corps of Engineers 2020). See also MT Klare, *All Hell Breaking Loose: The Pentagon's Perspective on Climate Change* (Metropolitan Books, 2019). In Europe, too, increasing attention is devoted to the impacts of climate change on defence and security: EEAS, 'Climate Change and Defence Roadmap' (9 November 2020) EEAS(2020)1251.

climate change is directly threatening several critical military installations on US soil: from the hurricane that ravaged Tyndall Air Force Base (Florida) in October 2018 to the wildfire that threatened the Vandenberg Air Force Base (California) a couple of years earlier, and the repeated flooding of the Norfolk Naval Station and various other facilities.⁶² The risk of CBRN events occurring as a result of damage to military installations – which not infrequently store chemical and even nuclear substances – is tangible and bound to rise with the acceleration of climate change.

The heightened risk of CBRN incidents as a consequence of climate change is, in turn, fuelled by CBRN-related activities, which increase the concentration of greenhouse gases (GHGs) in the atmosphere and thus exacerbate climate change. This especially applies to the chemical sector, which is responsible for 7% of global GHG emissions and 20% of industrial GHG emissions;⁶³ whereas nuclear energy is considered relatively 'green', even though assessments vary as to its actual carbon footprint over the whole fuel cycle.⁶⁴

This state of affairs, first of all, requires that States undertake appropriate mitigation action, *ie* that they pursue emission reductions to avoid excessive global warming, including by regulating CBRN activities. According to the most recent binding instrument on climate change, the Paris Agreement, parties must '[hold] the increase in the global average temperature to well below 2°C above pre-industrial levels and [pursue] efforts to limit the temperature increase to 1.5°C above pre-industrial levels' (Article 2(1)(a)). To attain this objective, parties are required to draft ambitious national plans to cut emissions (so-called nationally determined contributions; Article 4).

However, as climate change is already taking place and its effects will increasingly be felt, States are also required to *adapt* to climate change, namely, to address those impacts that are occurring and will occur notwithstanding mitigation efforts. In relation to States' adaptation actions, the prevention of and preparedness for CBRN incidents appear particularly relevant. In drawing up their national adaptation plans (Article 7), States should duly assess and prepare for CBRN risks that might materialise as a consequence of climate change, eg the release of CBRN substances following damage to facilities, changes in soil composition, or chemical and physical alterations of watercourses and water basins.

62 Union of Concerned Scientists, 'The US Military on the Front Lines of Rising Seas', 27 July 2016 <<https://www.ucsusa.org/resources/us-military-front-lines-rising-seas>>.

63 IEA, ICCA and DECHEMA, *Technology Roadmap: Energy and GHG Reductions in the Chemical Industry via Catalytic Processes* (IEA Publications 2013) 6.

64 BK Sovacool, 'Valuing the greenhouse gas emissions from nuclear power: A critical survey' (2008) 36 Energy Policy.

In relation to those impacts that will not be avoided through either mitigation or adaptation – so-called loss and damage (Article 8) – parties are asked to cooperate and facilitate understanding, action and support in areas such as early warning, emergency preparedness, risk assessment and management, and insurance solutions (Article 8(3)–(4)). It is submitted here that loss and damage should be interpreted as including climate-induced CBRN events, so that preparedness for and response to the latter can be usefully included in the cooperation and information-sharing activities that are to take place in the above-mentioned areas.

While private actors are not the direct addressees of obligations under the international climate change regime,⁶⁵ they are subject to the limitations adopted by States to curb their overall emissions; additionally, an increasing number of corporations are voluntarily adhering to stringent climate targets with a view to helping meet the temperature goal of the Paris Agreement. Private entities are further expected to play a significant role in climate finance, as well as technology development and transfer.

Symmetrically to the involvement in climate change mitigation efforts of public and private entities carrying out CBRN activities and to the mainstreaming in States' adaptation actions of the prevention of, preparedness for and response to CBRN events, international norms addressing CBRN hazards should be interpreted in light of the growing threat represented by climate change. Accordingly, environmental impact assessments (EIAs) could be usefully employed to evaluate the impact that CBRN-related projects might have on climate change, eg through direct GHG emissions, deforestation, alteration of surrounding soil or waters; as well as to consider the potential impact of climate change on projects, by assessing the vulnerability of projects to climate variables and thus allowing the adoption of the necessary measures to prevent, or at least minimise, CBRN events.⁶⁶ While the latter function might appear peculiar for EIAs, which are normally concerned with the impact of activities on the environment and not vice versa, the need for incorporating climate change in EIAs in both ways is increasingly recognised in national and

65 But, on 26 May 2021, the District Court of The Hague ordered Shell to cut its emissions by 45% by 2030, relative to 2019, by interpreting the corporation's duty of care in light of the temperature goals of the Paris Agreement: *Milieudefensie et al v Royal Dutch Shell Plc*, ECLI:NL:RBDHA:2021:5337.

66 CW Christopher, 'Success by a Thousand Cuts: The Use of Environmental Impact Assessment in Addressing Climate Change' (2008) 9 *Vermont Journal of Environmental Law*; S Agrawala and others, *Incorporating Climate Change Impacts and Adaptation in Environmental Impact Assessments: Opportunities and Challenges* (OECD Publishing 2010).

supranational guidelines.⁶⁷ The fact remains that these instruments mostly do not specifically deal with CBRN-related activities and risks.

Furthermore, in the context of the preparedness phase of CBRN management, contingency plans drawn up by States and private operators should adequately take into account climate-induced CBRN risks. Finally, climate change is bound to have an impact on the response to CBRN emergencies as well, insofar as it is likely to cause an increase in certain kinds of incidents (eg epidemic outbreaks), as well as affecting the environmental conditions in which the emergency teams operate (eg extreme heat can compromise equipment, droughts can endanger water supplies).

Whereas the nexus between climate change and CBRN activities and events is not often considered, as such, in international legal instruments, it remains the case that obligations in this domain can be derived from both the international climate change regime and IEL and non-IEL norms that specifically address CBRN threats, which should be read in a mutually supportive way and rely on the synergies of the relevant actors from both areas.

5 Conclusions

CBRN activities, substances and events sit at the crossroads of multiple IEL regimes, thus raising several issues in terms of gaps and overlaps. Setting aside any assessment of the feasibility and appropriateness of a Global Pact for the Environment, this chapter has shown that the prevention of, preparedness for, response to and recovery from CBRN events would benefit from greater coordination in the interpretation and application of the relevant norms, both within IEL and at the intersection of IEL and other branches of international law, as well as from enhanced synergies between the competent actors.

Two phenomena have been examined more in depth that provide the litmus test for such an appraisal: zoonotic epidemics and climate change. The COVID-19 pandemic has provided incontrovertible proof of the dangers for human health that lie in the increasing destruction of ecosystems and,

67 See the compilations made available by the Sabin Center for Climate Change Law, respectively at <<https://climate.law.columbia.edu/content/eia-guidelines-assessing-impact-project-climate-change>> and <<https://climate.law.columbia.edu/content/eia-guidelines-assessing-impact-climate-change-project>>. At the supranational level, the EIA Directive – which specifically refers to the incorporation of climate change considerations in EIAs – is particularly significant; see also European Commission, *Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment* (EU 2013).

correspondingly, of the importance of legal instruments that protect biodiversity and of the conceptual and practical need for holistic solutions. On this basis, new approaches have been developed – such as the One Health approach, which, however, has yet to be put to full use.

Climate change is another primary example of the close interrelations between CBRN activities and events and the protection of the environment: CBRN activities exacerbate climate change, while simultaneously being threatened by its manifestations. However, to date, the international climate change regime and the regulation of CBRN emergencies appear to have mainly travelled on separate tracks. Therefore, ongoing discussions within climate fora would benefit from attentive consideration of CBRN hazards, while well-established procedures to avoid, minimise or respond to CBRN events (such as EIAs, contingency plans, emergency assistance) risk becoming fundamentally inadequate if they do not factor in the impacts of climate change.

The CBRN emergency management cycle thus heavily relies for its effectiveness on the harmonious interaction between norms from different IEL regimes and between IEL and non-IEL norms, as well as on the coordinated work of several actors. CBRN, as an inherently cross-cutting area, would therefore undoubtedly benefit from a certain systemisation of the IEL patchwork and could, indeed, offer a valuable perspective – if not an ordering criterion – within such a process.

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