

Part 1

Introduction

Chapter 1

Risk, innovation and resilience: moving towards mutual supportiveness

The transformation of environmental law and governance

Risk, innovation and resilience

Francesco Sindico, Stephanie Switzer and Tianbao Qin

1. The transformation of environmental law and governance

There is a growing recognition that environmental law has changed and transformed over the last 40 years.¹ Such transformation has occurred due to a myriad of factors, not least of which is the fact that environmental risks are now more global, requiring multilateral solutions. However, such multilateral solutions still require domestic implementation and this is where further transformation has occurred.² While the state and domestic legislation still has a central role to play, the role of non-state actors has increased, leading to broader notions of regulatory governance.³ A further aspect of the emergence of new forms of environmental regulatory governance has been an increased reliance on market-based instruments, either together with or as a replacement for command and control instruments within a country's regulatory mix.⁴ The emergence of

¹ Bridget M Hutter (ed), *Risk, Resilience, Inequality and Environmental Law* (Edward Elgar 2017), 12–17.

² Catherine Redgwell, 'National Implementation' in Daniel Bodansky, Jutta Brunnée and Ellen Hey, *The Oxford Handbook of International Environmental Law* (Oxford University Press 2010).

³ Neil Gunningham, 'Environmental Law, Regulation and Governance: Shifting Architectures' (2009) 21 *Journal of Environmental Law* 179.

⁴ For discussion of the appropriate regulatory mix to employ to achieve particular environmental objectives, see, e.g., Frans Oosterhuis and Marjan Peeters, 'Limits to Integration in Pollution Prevention and Control' in Marjan Peeters and Rosa Uylenburg (eds), *EU Environmental Legislation: Legal Perspectives on Regulatory Strategies* (Edward Elgar 2014), 91–113.

market-based instruments can also be witnessed within the climate change regime,⁵ albeit with different degrees of popularity and success,⁶ together with the rise of non-state actors.⁷

These changes have led to a shift not only in the way environmental law is perceived, but also in how it is defined. In fact, it could be argued that international environmental law has now transformed itself into a new area of law: that of global environmental law and/or transnational environmental law.⁸ One defining factor in this transformation is the fact that referring to international environmental law does not accurately reflect the

⁵ Kyoto Protocol to the United Nations Framework Convention on Climate Change (adopted 11 December 1997, entered into force 16 February 2005) 2303 UNTS 162, art 4 (joint implementation), art 12 (clean development mechanism) and art 17 (emissions trading) and UNFCCC, Decision 1/CP.21, ‘Adoption of the Paris Agreement’, FCCC/CP/2015/10/Add.1, art 6 (cooperative approaches and internationally transferred mitigation outcomes).

⁶ See Richard G Newell, William A Pizer and Daniel Raimi, ‘Carbon Markets 15 Years after Kyoto: Lessons Learned, New Challenges’ (2013) 27(1) *Journal of Economic Perspectives* 123 and Michael Mehling, ‘Governing Cooperative Approaches under the Paris Agreement’ (2019) 46(3) *Ecology Law Quarterly* 765.

⁷ See Peter J Spiro, ‘Non-Governmental Organisations and Civil Society’ in Bodansky, Brunnée and Hey (n 2), Steven R Ratner, ‘Business’ in Bodansky, Brunnée and Hey (n 2), and Russel Lawrence Barsh, ‘Indigenous Peoples’ in Bodansky, Brunnée and Hey (n 2).

⁸ For a discussion on transnational environmental law see: Olaf Dilling and Till Markus, ‘The Transnationalisation of Environmental Law’ (2018) 30(2) *Journal of Environmental Law* 179; Jolene Lin and Joanne Scott, ‘Looking Beyond the International: Key Themes and Approaches of Transnational Environmental Law’ (2012) 1(1) *Transnational Environmental Law* 23; and Veerle Heyvaert and Thijs Etty, ‘Introducing Transnational Environmental Law’ (2012) 1(1) *Transnational Environmental Law* 1. On global environmental law and governance, see Kati Kulovesi, Michael Mehling and Elisa Morgera, ‘Global environmental law: context and theory, challenge and promise’ (2019) 8(3) *Transnational Environmental Law* 405.

new modes of regulation as well as the emergence of multi-level governance, and the new normative power relationships that now permeate international society.⁹

The Strathclyde Centre for Environmental Law and Governance (SCELG) organized the 2018 IUCN Academy of Environmental Law (IUCN AEL) Annual Colloquium from 4 to 6 July 2018. This was, by far, the largest IUCN AEL ever with over 400 participants and 66 parallel sessions over three days.

The papers presented at the colloquium and the chapters in this book all center upon deepening our enquiry into the transformation of environmental law. In so doing, this book attempts to interrogate some of the reasons behind this transformation. It asks specifically; to what extent are issues of risk, innovation and resilience at the heart of the transformation of environmental law and governance? Can conceptualizations of risk, innovation and resilience be mutually supportive? As a first step, before we can answer such questions, or at least attempt an answer, we need to discuss what we mean by risk, innovation and resilience.

2 Risk, innovation and resilience

According to Hutter ‘... environmental risks are threats of actual or potential harm to the environment and consideration of the probability of these adverse consequences occurring’.¹⁰ A key consideration from a legal perspective when approaching risk is whether we should confront risk as a trade-off, or as an absolute imperative that must be protected against. In other words, if a government identifies that its people or the environment are facing a risk, what level of harm is nevertheless acceptable? Or should any risk lead to an immediate ban on the activity causing such harm? Accordingly, policy makers, confronted with specific risks, will oftentimes be required to balance

⁹ On the increased turn to ‘multi-level governance as well as by new forms of rules, standards and procedures emerging from non-traditional actors involved in the law-making process’ within international environmental law, see Owen McIntyre, ‘Changing patterns of international environmental law-making: addressing normative ineffectiveness’ in Sandrine Maljean-Dubois (ed), *The Effectiveness of Environmental Law* (Intersentia 2017).

¹⁰ Hutter (n 1) 4.

diverse and multiple voices as well as ‘logics’.¹¹ This may also result in something of a tension between the views of the general public and those of the scientific community.¹² Certain risks are also shrouded in scientific uncertainty, with such uncertainty resulting in the application in many countries of a risk-based regulatory approach underpinned by the adoption of the precautionary principle or precautionary approach.¹³ The latter can be seen as a trade-off mechanism whereby countries are asked to weigh the potential negative effects of an activity in light of existing scientific uncertainty.¹⁴ While the role of science and of epistemic communities is seemingly crucial in order to apply the precautionary principle in the context of risk-based regulatory approaches,¹⁵ certain scholars have called for a wider array of voices and stakeholders to be included within such decision-making processes, resulting in broader questions of the role of expert knowledge in risk regulation.¹⁶ In relation, it is clear that processes of risk

¹¹ Oren Perez and Reut Snir, ‘Global Environmental Risk Governance under Conditions of Scientific Uncertainty: Legal, Political and Social Transformations’ (2013) 2(1) *Transnational Environmental Law* 7, 7.

¹² *Ibid.*

¹³ Antônio Augusto Cançado Trindade, ‘Principle 15: Precaution’ in Jorge E Viñuales, *The Rio Declaration on Environment and Development, A Commentary* (Oxford University Press 2015); Malgosia Fitzmaurice, *Contemporary Issues in International Environmental Law* (Edward Elgar 2009) ch 1; and Jonathan B Wiener, ‘Precaution’ in Bodansky, Brunnée and Hey (n 2).

¹⁴ UNGA, ‘Report of the United Nations Conference on Environment and Development’ (14 June 1992) UN Doc A/CONF.151/26, Annex 1: Rio Declaration on Environment and Development, principle 15. For an inventory of the inclusion of the precautionary principle in multilateral environmental agreements and relevant disputes, see ‘Precautionary Principle’ (*InforMEA*)

<<https://www.informea.org/en/terms/precautionary-principle>> accessed 24 May 2021.

¹⁵ See Peter Haas, ‘Epistemic communities’ in Bodansky, Brunnée and Hey (n 2) and Jacqueline Peel, *Science and Risk Regulation in International Law* (Cambridge University Press 2010).

¹⁶ Perez and Snir (n 11) 9.

identification, risk assessment and risk control,¹⁷ all of which carry with them a panoply of possible regulatory measures and responses,¹⁸ raise a variety of questions as to the type of knowledge that should be privileged in such processes.¹⁹

Of course, questions of risk are particularly germane in respect of innovation of new technologies such as nanotechnologies and genetic engineering. As we will see in this book, while we generally conceive of innovation as pertaining to the development of new, cutting-edge products, services or processes, it is also the case that innovation can be conceived of in terms of ‘hard’ and ‘soft’ innovation. The former (hard innovation) includes what we usually conceive of as innovation as it involves the deployment of technology such as Geographical Information System (GIS) or blockchain. This inevitably raises questions as to the appropriate role of law in governing, but also potentially promoting, such new (and also not so new) technologies. The latter (soft innovation) involves new innovative ways of thinking about environmental law and governance.²⁰ Decentralized governance, the development of more privatized forms of environmental regulation, recognition of the rights of nature or the strengthening of procedural law can all be labelled as soft innovation. When it comes to hard innovation

¹⁷ Jacqueline Peel, ‘Changing Conceptions of Environmental Risk’ in Viñuales (n 133) 77.

¹⁸ See Neil Craik, *The International Law of Environmental Impact Assessment* (Cambridge University Press 2010) and Robert B Gibson, Meinhard Doelle and John Sinclair, ‘Fulfilling the Promise: Basic Components of Next Generation Environmental Assessment’ (2016) 29 *Journal of Environmental Law and Practice* 257, 251.

¹⁹ Perez and Snir (n 111) 9.

²⁰ See: “‘Soft’ Innovation Just as Important as ‘Hard’ Innovation” (CBS, 2 January 2001)

<<https://www.cbs.nl/en-gb/news/2001/01/soft-innovation-just-as-important-as-hard-innovation>> accessed

24 May 2021; Paul Stoneman, *Soft Innovation: Economics, Product Aesthetics, and the Creative*

Industries (Oxford University Press 2010) ch 2; and ‘Meanings and Examples of “Hard” and “soft”

Innovation’ (*Best Assignment Service*, 9 October 2013)

<<https://bestassignmentservice1.wordpress.com/2013/10/19/meanings-and-examples-of-hard-and-soft-innovation/>> accessed 24 May 2021.

in particular, the public perception and the acceptance of such innovation/technology by the wider public can often be crucial for its success.²¹ Such hard innovation may also raise questions of risk, as particular innovations such as climate geoengineering invite complex questions that need careful assessment and balancing of potentially competing interests. In addition, there may be a tension between different forms of innovation. By extension, both hard and soft innovation require a close connection with public participation and access to information provisions.²² The latter have increased in number and in quality over the past years,²³ both at the domestic and international level, becoming in many areas a key normative component that enables substantive provisions

²¹ This was realised already 40 years ago by Lord Flowers in the context of civil nuclear power; see Ian Havercroft, Richard Macrory and Richard Stewart (eds), *Carbon Capture and Storage: Emerging Legal and Regulatory Issues* (Hart Publishing 2011) 4.

²² On public participation, see Uzuazo Etemire, *Law and Practice on Public Participation in Environmental Matters: The Nigerian Example in Transnational Comparative Perspective* (Routledge 2015) and Jonas Ebbesson, 'Principle 10: Public Participation' in Viñuales (n 133); on access to information, see Uzuazo Etemire, 'Access to Environmental Information under EU Law' in Marjan Peeters and Mariolina Eliantonio (eds), *Research Handbook on EU Environmental Law* (Edward Elgar 2020).

²³ Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (adopted 25 June 1998, entered into force 30 October 2001) 2161 UNTS 447 (Aarhus Convention); United Nations Environment Programme, 'Guidelines for the Development of National Legislation on Access to Information, Public Participation and Access to Justice in Environmental Matters' (2010) <<https://www.unenvironment.org/resources/publication/guidelines-development-national-legislation-access-information-public>> accessed 24 May 2021 (Bali Guidelines); and Regional Agreement on Access to Information, Public Participation and Justice in Environmental Matters in Latin America and the Caribbean (adopted 4 March 2018, opened for signature 7 September 2018) UNTS XXVII:18 (Escazú Agreement).

to operate.²⁴ Both hard and soft innovation may also result in difficult issues in respect of the involvement of non-state actors in environmental regulation.

In addition to risk and innovation, this book also focuses on resilience. It attempts to develop a working definition of what resilience means. However, we do not reach a clear-cut definition of resilience, and it is likely that such a definition is neither possible nor desirable, at least from an environmental law perspective.²⁵ Resilience as a concept emerged in other disciplines,²⁶ and it has only recently come to be commonly used by environmental law scholars.²⁷ From a policy perspective, resilience has been prominent in the disaster risk reduction landscape.²⁸ However, key characteristics, from an environmental law and governance perspective, are fleshed out in this book. These include the ability to cope, to adapt, to move on from failure and to anticipate change.

²⁴ The dynamics between substantive and procedural provisions is a central feature in the development of the law of international watercourses; see Stephen C McCaffrey, *The Law of International Watercourses* (3rd edn, Oxford University Press 2019).

²⁵ See a similar conclusion on the usefulness, or lack thereof, of a definition of resilience in Jan McDonald, 'Risk, resilience and environmental regulation: using law to build resilience to climate change impacts' in Hutter (n 1) 33: '[t]he definition [of resilience] itself is not terribly helpful, and it is the broad approach to resilience 'thinking' that holds greater value for law'.

²⁶ CS Holling, 'Resilience and Stability of Ecological Systems' (1973) 4 *Annual Review of Ecology and Systematics* 1.

²⁷ Margherita Pieraccini, 'Towards Just Resilience: Representing and Including New Constituencies in Adaptive Governance and Law' (2019) 31 *Journal of Environmental Law* 213; Robert L Fischman, 'Letting Go of Stability: Resilience and Environmental Law' (2019) 94 *Indiana Law Journal* 689; and Ajhond Garmestani et al, 'Untapped Capacity for Resilience in Environmental Law' (2019) 116(40) *Proceedings of the National Academy of Sciences* 19899.

²⁸ See, e.g., Marta Simoncini and Alexia Herwig (eds), *Law and the Management of Disasters: The Challenge of Resilience* (Routledge 2017). Also see the Sendia Framework for Disaster Risk Reduction 2015–2030 (UNGA Resolution A/RES/69/283, 23 June 2015).

These characteristics chime with the core elements of resilience, which have been described by Hutter in the following way:

“[a]t the core of most definitions [of resilience] is the ability of ecosystems, societies, cities, communities, organisations and individuals to survive disturbances, shocks and surprises to reorganize and reassemble so as to persist and maintain core systems.²⁹”

More importantly, the book highlights the need for resilience thinking in environmental law and governance. Legal systems need to be resilient and adaptive – and experimentalist governance,³⁰ itself a form of ‘soft innovation’ – arguably needs to be at the heart of environmental law. This perspective of resilience in the context of environmental law and governance aligns with approaches, such as the one put forward by Folke,³¹ which emphasize the importance of adaptive capacity when dealing with resilience. The latter becomes ‘an approach, a way of thinking’,³² a cognitive frame we consider particularly useful when dealing with resilience.

There are, of course, significant links between innovation, risk and resilience. Climate change, for example, poses significant risks to both the environment and human health. Resilience thinking, conceptualized as the ‘capacity to respond to change’³³ has come to infuse climate adaptation law in particular³⁴ and environmental law in general. Clearly, climate change will also require innovation, both in terms of ‘hard’ innovation in the form of technological innovations, but also ‘softer’ forms of innovation, such as the

²⁹ Hutter (n 1) 21.

³⁰ Charles F Sabel and Jonathan Zeitlin, ‘Learning from Difference: The New Architecture of Experimentalist Governance in the EU’ (2008) 14 *European Law Journal* 271.

³¹ Carl Folke, ‘Resilience: The emergence of a perspective for social-ecological systems’ (2006) 16(3) *Global Environmental Change* 2253, 2259.

³² *Ibid.*

³³ See discussion in Joseph Wenta, Jan McDonald and Jeffrey McGee, ‘Enhancing Resilience and Justice in Climate Adaptation Laws’ (2019) 8(1) *Transnational Environmental Law* 89, 97.

³⁴ See generally *ibid.*

introduction of new ways of thinking about the law as well as processes of adaptation. Indeed, while resilience thinking is underpinned by an openness to change in order to adapt, law is often conceptualized as bringing certainty and stability and so questions have been raised about the capacity of traditional legal processes to adopt a more adaptive mindset.³⁵ In essence, '[l]egal structures typically do not support iterative decision-making processes that encourage change.'³⁶ There may also be risks inherent in moving towards a more adaptive approach with recent scholarly work, for example, seeking to underscore the need to further interrogate the relationship between resilience, fairness, equity and, of course, legitimacy.³⁷ In this sense, we may also conceptualize risk as having a softer dimension, requiring us to also think about, among other things, how particular processes influence the distribution of risks across global society.³⁸

3 Are risk, innovation and resilience mutually supportive?

Against this background of risk, innovation and resilience, a follow-on question we need to interrogate is whether risk, innovation and resilience can be mutually supportive.

As set out above, on the one hand, risk and innovation have a threefold relationship. When society has to deal with a risk, it often reacts by innovating. However, a regulatory environment that puts too much emphasis on avoiding risk may stifle innovation.³⁹ This is where a balanced application of the precautionary principle becomes crucial. At the same time, innovation and new technologies can create new

³⁵ Ibid.

³⁶ Ibid 97.

³⁷ Ibid.

³⁸ Ibid 98.

³⁹ Havercroft, Macrory and Stewart (n 211) 1: '[d]eveloping an effective regulatory regime for any new technology is not easy. An unduly precautionary approach may unwittingly stifle innovation, and there are pressing time-scales'.

risks that need to be properly addressed and regulated, with new regulatory tools potentially required to be developed to adequately deal with such risk.⁴⁰

On the other hand, risk and resilience have been conceptualized as pathways, approaches to deal with uncertainty, which could be embedded in innovation. Risk based approaches would be preferred when there is some level of certainty whereas an approach based on resilience thinking is likely to be preferable when there is no such certainty.⁴¹ However, we should not put too much emphasis on such a division since much of our discussion on risk, resilience and innovation turns on particular understandings of these concepts, with such understandings oftentimes having a disciplinary bias.

The book puts forward the argument that risk, innovation and resilience are potentially mutually supportive. A socio-ecological risk requires innovation (hard and/or soft) in order for society and the environment per se to become more resilient. For example, in order to deal with environmental degradation, we may move towards awarding rights to nature itself.⁴² The legal innovation (i.e. awarding rights to nature) needed to deal with the identified risk may make society and the environment per se more resilient. The challenge is to identify, develop and implement normative frameworks that encourage the mutual supportiveness of risk, innovation and resilience. Meeting this challenge will ultimately lead to the continuing transformation in environmental law and governance.

4 Plan of the book

The book has 15 chapters and its structure reflects the colloquium streams and crosscutting themes. However, risk, resilience and innovation permeate the entire book and can be found in all chapters. The first set of chapters focus on ‘innovation’, ‘risk’ and ‘resilience’. The second chapter, authored by Patryck Ayala and Mariana Coelho,

⁴⁰ Elen Stokes and Diana M Bowman, ‘Looking Back to the Future of Regulating New Technologies: The Cases of Nanotechnologies and Synthetic Biology’ (2012) 3 *European Journal of Risk Regulation* 235

⁴¹ Hutter (n 1) 21–23.

⁴² For an overview of where rights have been awarded to nature, see ‘Timeline’ (*The Rights of Nature*) <<https://therightsofnature.org/timeline/>> accessed 24 May 2021.

addresses how the law can promote resilience and ecological integrity when regulating technologies, such as fracking. The normative dimension of ecological integrity is discussed as a move towards a much-needed transformation in environmental law.

Anna Berti Suman, in the third chapter, analyses another example of hard innovation: a citizen sensing initiative aimed at monitoring radiations in response to institutional inertia in tackling the post-Fukushima nuclear risk. She makes a case for a decentralized governance of radiation risk based on grassroots actors' ability to adapt and move from system failure to innovation and resilience. The case study also shows a transformation of environmental law and governance as it indicates a technology-enabled assertion of people's right to live in a healthy environment. Risk is also at the heart of the fourth chapter by Elodie Le Gal. Her chapter discusses the robustness of the European legal framework for pharmaceuticals in managing public health and environmental threats in the context of imported pharmaceutical active ingredients from third countries, and antimicrobial resistance, biosecurity and biosafety risks. It also highlights potential for hard and soft innovations to improve pharmaceutical pollution management.

The fifth and sixth chapters take us more directly into the field of resilience. Stellina Jolly discusses groundwater management and community resilience by means of exploring the Plachimada struggle in India. She analyses the basic framework and mechanisms used by communities to build resilience and to steer the transformation of innovative environmental law and governance towards improved and resilient community and legal systems. In chapter six, Gift Dorothy Mkanje engages in the often unanswered question of what form should participatory environmental governance take. Her chapter explores the nature of local community participation in Malawi, highlighting current risks and proposing resilient and innovative ways of making participatory environmental governance more effective.

While keeping a strong focus on innovation, risk and resilience, the book turns its attention to specific sectoral streams, starting with climate change. In chapter seven, Meinhard Doelle considers one particular governance tool, impact assessment, with a focus on climate mitigation. Impact assessment offers an interesting governance tool for the consideration of risk, innovation and resilience. The impact assessment process itself offers the opportunity to consider whether proposed undertakings are designed to

maximize innovation and resilience, while minimizing risk. In addition, the legislative requirements of the impact assessment process, and the signal they send to proponents, can serve as important motivation to minimize climate risk, while maximizing innovation and resilience, leading to better planning and design long before undertakings are registered for assessment. Chapter eight, authored by He Xiangbai and Alexander Zahar, undertakes a robust analysis of the periodic reports prepared pursuant to the United Nations Framework Convention on Climate Change in order to identify what kind of innovation is being promoted. The authors argue that state legislatures engage in soft innovation, developing their legal systems to promote mitigation and adaptation. At the same time, they also make claims to hard innovation, even though they do not directly control it themselves. This chapter demonstrates that, when it comes to hard innovation, states are less innovative than they claim to be. In fact, they limit their support in that respect to mature climate technologies. Laura Lynes authors the last chapter on climate change. Her chapter provides a practical example of how the rights of nature are a soft innovation in environmental law and governance. Specifically, it illustrates how the rights of nature, when applied to ecological and cultural keystone species, could be an innovative approach to achieving climate change goals. Laura focuses on Canada and she discusses the interconnectedness of humans, nature and resilient futures by discussing a hypothetical ‘Bison person’ whose legal standing would enable Indigenous peoples to build adaptive capacity to climate change.

Closely connected to climate change, chapter ten of the book, authored by Richard Ottinger, Tom Bourgeois, Robert Habermann and Achinthe Vithanage, focuses on energy. In particular, the chapter focuses on the laws required to achieve a global transformation from fossil fuel energy to renewable energy laws. One of the most effective ways to drive this transformation is through laws that enable the development of community renewable energy. A key element advocated in the chapter is the capacity to provide reliable and affordable electricity regardless of grid outages.

The book then turns its attention to freshwater. In chapter eleven, Monica Ribeiro, Izabela Zanotelli Collares and Danuta RN de Souza Calazans discuss the impacts of the construction of the Três Marias dam in Brazil and the absence of public participation in respect of the development of policies applicable to the flooding of land. The high-level risk situation associated with the dam construction required necessary innovations for

the survival and resilience of the local population that remained there. Such innovation did not occur, reminding us of the need to balance technical innovation and so-called ‘progress’ against the needs, and moreover rights, of local communities. Indeed, this chapter reminds us of how the risks of innovation are not always spread equally across society.

The book then presents two chapters that focus on biodiversity and traditional knowledge and land, food and agriculture. In chapter twelve, Thomas Gils and Christine Frison frame blockchain technology as a hard innovation to mitigate the ongoing constraints and risks in global seed conservation and sustainable use and to foster resilience in food and agriculture systems. By analysing whether blockchain could serve as a tool to facilitate the implementation of the multilateral system of access and benefit-sharing of the International Treaty on Plant Genetic Resources for Food and Agriculture, the authors explore possible technological solutions to secure an adequate balance between social and environmental benefits. In chapter thirteen, David Leary explores risk and innovation in the context of revolutionary technologies of synthetic biology, gene drives and clustered regularly interspaced short palindromic repeats (CRISPR). The chapter highlights law’s inability to keep pace with innovation in technology and associated risk. The author also makes the point of how bias towards ‘inherited regulatory regimes’ stifles law’s resilience, thus exposing the limits of its transformative potential.

The last sectoral theme included in the book touches upon oceans. In chapter fourteen, Simone Borg explores climate change and the ocean as two core planetary boundaries. The author maintains that, in order to promote their resilience, innovative procedures are required to circumvent the fragmented nature of international law-making. Adopting an ecologically integrated approach when assessing the effectiveness of norms will help prevent risks and remedy harm.

The last two chapters in the book open up the discussion to the cross-cutting themes that were identified throughout the colloquium: human rights and litigation. Chapter fifteen focuses on human rights and the authors, Michel Prieur and Mohamed Ali Mekouar, make a strong case for a third international covenant embedding environmental human rights, which the authors consider as an example of soft innovation. The covenant

would achieve the long-overdue legal recognition of environmental human rights at a global level, thereby fostering humanity's resilience to ever-increasing environmental risks, in harmony with nature and without regression for present and future generations. The last chapter of the book by Morgan Harris takes us into the increasingly overloaded domain of litigation. In her chapter, Morgan argues that climate change challenges the resilience not only of social and ecological systems, but also of the law and fundamental rights. Outcomes in recent climate cases suggest how soft innovation in domestic rules on access to justice, including through greater implementation of the 1998 Aarhus Convention, could support litigation as a tool for building the resilience of the law and systems that depend on it.

Overall, the book presents a framework where risk, innovation and resilience are indeed present in the evolving tapestry of the law in the fields of energy, climate change, oceans, freshwater, land, food and agriculture and biodiversity. At the same time, the tapestry has threads of litigation and human rights throughout. The tapestry of environmental law and governance is in constant evolution and transformation. It is the role of environmental lawyers to be bold and to understand the challenges in the transformation of environmental law and governance. However, and more importantly, it is also their role to embrace the opportunities that this complex tapestry gives us in order to push the boundaries of law and practice towards a less risky, more innovative and more resilient future.