

SYMPOSIUM FOREWORD

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Global Environmental Risk Governance under Conditions of Scientific Uncertainty: Legal, Political and Social Transformations

Oren Perez* and Reut Snir**

One of the prominent features of contemporary society is an increased anxiety over risks. The potentially adverse effects of industrial development and technological innovation are the subject of widespread social concern, leading to a surge in the number of ‘risk disputes’ that involve novel technologies and projected environmental catastrophes.¹ These ‘risk disputes’ are taking place against a diverse institutional background, involving multiple voices and a plethora of discourses, which reflects a continuing struggle over epistemic authority and the control of the policy-making process.² Policy-makers find themselves perplexed about how best to balance the multiple voices and logics involved in these diverse ‘risk disputes’. The policy dilemma is exacerbated by the deep scientific uncertainty underlying the disputes. A particular point of tension is the interaction between experts (specifically scientific experts) and lay citizens. Regulators, at both the national and transnational levels, rely on the epistemic

* Faculty of Law, Bar Ilan University, Ramat Gan (Israel).
Email: oren.perez@biu.ac.il.

** Faculty of Law, Bar Ilan University, Ramat Gan (Israel).
Email: reut@ehs-policy.com.

¹ P. Brown, *Toxic Exposures: Contested Illnesses and the Environmental Health Movement* (Columbia University Press, 2007); J. Corburn, *Street Science: Community Knowledge and Environmental Health Justice* (MIT Press, 2005); J. Janka & F. Maldarelli, ‘Prion Diseases: Update on Mad Cow Disease, Variant Creutzfeldt-Jakob Disease, and the Transmissible Spongiform Encephalopathies’ (2004) 6(4) *Current Infectious Disease Reports*, pp. 305–15; Royal Commission on Environmental Pollution, *Novel Materials in the Environment: The Case of Nanotechnology* (London, 2008) available at: <http://www.officialdocuments.gov.uk/document/cm74/7468/7468.pdf>; S.S. Ho et al., ‘Value Predispositions, Mass Media, and Attitudes Toward Nanotechnology: The Interplay of Public and Experts’ (2011) 33(2) *Science Communication*, pp. 167–200; and T.O. McGarity, ‘Federal Regulation of Mad Cow Disease Risks’ (2005) 57(2) *Administrative Law Review*, pp. 289–410.

² S. Frickel & K. Moore, ‘Prospects and Challenges for a New Political Sociology of Science’, in S. Frickel & K. Moore (eds.), *The New Political Sociology of Science: Institutions, Networks and Power* (University of Wisconsin Press, 2007), pp. 3–31; D.M. Kahan, ‘Nanotechnology and Society: The Evolution of Risk Perceptions’ (2009) 4 *Nature Nanotechnology*, pp. 705–6.

capital of science in articulating new policies. This reliance draws on the belief in the privileged access of science to reality and on its inherent objectivity.³

One of the most prominent manifestations of this deference to science is the extensive use of computational models in the regulatory process, which implicitly depicts them as ‘truth machines’.⁴ But the belief that science has privileged access to reality comes under pressure as we enter the domain of ‘regulatory science’, where scientists are expected to deliver ‘truths’, even absent sufficient evidence.⁵ Furthermore, regulatory science not only stretches the epistemic limits of science in the manufacturing of facts, it also requires science and policy-makers to exercise considerable subjective judgment (which is not purely scientific) in interpreting and extrapolating specific research results to policy issues.⁶

In areas of great scientific uncertainty, the manufacture of facts increasingly becomes a matter of exercising subjective (and policy oriented) judgment, beyond purely scientific considerations. This intermingling of policy considerations and scientific judgments could undermine the epistemic authority of science, which remains a crucial resource in the governance of risk dilemmas.

Several significant incidents of regulatory failures in the area of environmental and health regulation in the last decade have fuelled the debate about the way in which society should cope with the problem of regulating uncertain risks.⁷ This problem challenges the traditional separation between scientists who should, presumably, provide policy-relevant information without being policy prescriptive, and policy-makers who, drawing on this data, should make decisions. However, if the manufacturing of facts is no longer taken to be as objective and policy-neutral as regulators traditionally claimed, it is no longer clear that this traditional institutional separation is real or justified.

This raises the question of the optimal design of institutions that cooperate in the creation of regulatory policies. Should we maintain the traditional separation between science and policy? Or should we encourage cross-penetration between the domains, leading to the creation of hybrid authority structures? And if we move towards more complex decision-making structures, could we still draw on the classic bases of legitimacy (epistemic, political) that underscored the separatist view?⁸

³ T. Allen et al., ‘Dragnet Ecology – “Just the Facts, Ma’am”: The Privilege of Science in a Postmodern World’ (2001) 51(6) *BioScience*, pp. 475–85.

⁴ W. Wagner et al., ‘Misunderstanding Models in Environmental and Public Health Regulation’ (2009) 18(2) *New York University Environmental Law Journal*, pp. 293–356.

⁵ S. Jasanoff, ‘Procedural Choices in Regulatory Science’ (1995) 17(3) *Technology in Society*, pp. 279–93; W.E. Wagner, ‘The Science Charade in Toxic Risk Regulation’ (1995) 95(7) *Columbia Law Review*, pp. 1613–723.

⁶ Wagner et al., n. 4 above, at pp. 308–9.

⁷ P. Harremoes et al. (eds.), *Late Lessons from Early Warnings: The Precautionary Principle 1896–2000* (European Environment Agency, 2001); D. Vogel, ‘The Hare and the Tortoise Revisited: The New Politics of Consumer and Environmental Regulation in Europe’ (2003) 33(4) *British Journal of Political Science*, p. 557–80.

⁸ O. Perez, ‘Precautionary Governance and the Limits of Scientific Knowledge: A Democratic Framework for Regulating Nano-Technology’ (2010) 28(1) *UCLA Journal of Environmental Law & Policy*, pp. 29–76; G. Yohe & M. Oppenheimer, ‘Evaluation, Characterization, and Communication of Uncertainty by the Intergovernmental Panel on Climate Change: An Introductory Essay’ (2011) 108(4) *Climatic Change*, pp. 629–39.

In recent years, more and more scholars have called into question the conventional conceptualization of the science-policy interface, calling for a more reflexive governance approach. This approach would be more transparent and experimental, and would involve a wider range of stakeholders in the decision-making process.⁹ This process of reflection was also accompanied by a new understanding of the role of the state in the regulation of environmental and health risks. Governments are no longer the sole source of decision-making authority within the domain of risk regulation, which has been transformed from a state-centred into a polycentric transnational structure. Within this new polycentric structure, the role of diverse non-state actors in the regulatory process has become much more important.¹⁰ Yet the impact of incorporating more voices in the regulatory process on the quality of consequent policies remains an open question.

The challenge of making collective policy decisions on risk under conditions of deep scientific uncertainty and increasingly globalized society raises several questions:

- How has the concept of scientific uncertainty been conceptualized by different regulatory institutions?
- Who has the epistemic and political authority to make decisions in global and national ‘risk disputes’ under conditions of scientific uncertainty? How should such authority be allocated and maintained in the transnational context?
- Should the privileged role given to scientists in risk regulation be maintained and what are the possible alternatives?
- What sources of knowledge should be used in regulatory decision-making and how should the validity of different kinds of knowledge be evaluated?
- Who should take part in regulatory processes and what roles should different stakeholders play? How should that question be determined?

These questions were addressed in a workshop on ‘Global Environmental Risk Governance under Conditions of Scientific Uncertainty: Legal, Political and Social Transformations’, which was held at Bar Ilan University (Israel) in May 2012 under the framework of European COST Action IS0802 on the Transformation of Global Environmental Governance.¹¹ The purpose of the workshop was to bring together

⁹ O. Lobel, ‘The Renew Deal: The Fall of Regulation and the Rise of Governance in Contemporary Legal Thought’ (2004) 89(2) *Minnesota Law Review*, pp. 342–470; Perez, *ibid.*; J. Zeitlin, ‘Pragmatic Transnationalism: Governance across Borders in the Global Economy’ (2011) 9(1) *Socio-Economic Review*, pp. 187–206; R. Snir, ‘Governance by Disclosure: Transnational Convergence in the Field of Nanotechnology’ (2013) 2(1) *Transnational Environmental Law*, pp. 69–94.

¹⁰ C.F. Sabel & J. Zeitlin, ‘Experimentalism in Transnational Governance: Emergent Pathways and Diffusion Mechanisms, Conference paper presented at the Panel on Global Governance in Transition, Annual Conference of the International Studies Association, Montreal (Canada), 16–19 Mar. 2011, available at: [http://www2.law.columbia.edu/sabel/papers/experimentalismtransnationalgovernancelSApaper%20\(2\).pdf](http://www2.law.columbia.edu/sabel/papers/experimentalismtransnationalgovernancelSApaper%20(2).pdf); C. Overdevest & J. Zeitlin, ‘Assembling an Experimentalist Regime: Transnational Governance Interactions in the Forest Sector’ (2012) *Regulation & Governance*, first published online 29 Mar 2012, doi:10.1111/j.1748-5991.2012.01133.x.

¹¹ Conference report available at: <http://transformation-geg.org/news/2012-05-29-cost-event-report-global-environmental-risk-governance-under-conditions-scientific-u>. We would like to thank, in that context, Philipp Pattberg of the Institute for Environmental Studies (IVM) of the VU University Amsterdam (the Netherlands), who supported this workshop as chair of the COST action.

scholars grounded in different academic disciplines to discuss some of the theoretical and practical challenges underlying the project of Global Environmental Risk Governance under Conditions of Scientific Uncertainty. The main goal of this special symposium is to present some of the issues explored at the workshop that have a particular relevance for the development of transnational environmental law. The selected articles look critically at some of the main precepts of risk regulation: the privileged role of scientists and scientific institutions; the linkage between global scientific institutions and global regulatory institutions; the emergence of new regulatory approaches to uncertainty (disclosure); and the very feasibility of controlling new technologies through regulation.

The first two articles – by Adi Ayal, Ronen Hareuveny and Oren Perez¹² and by Timothy Meyer¹³ – examine the production of knowledge, focusing on the notions of epistemic authority and legitimacy, as well as on the institutionalization of hybrid regulatory-scientific international organizations. The production of knowledge and how this comes to bear on the policy-making process is a critical cornerstone of the regulation of risks. A better understanding of the institutional context in which knowledge production is undertaken is crucial for the development of better risk-regulation structures. Ayal, Hareuveny and Perez explore the legitimization dynamic of what they term regulatory scientific institutions (RSIs) in the context of three global institutions: the International Commission on Non-Ionizing Radiation Protection (ICNIRP), the Intergovernmental Panel on Climate Change (IPCC), and the International Competition Network (ICN). They argue that RSIs have a hybrid structure, situating them at a mid-point between science and the law. The need to make immediate regulatory decisions with respect to risks (for example, in the case of emerging technologies) generates a demand by regulators for mediating institutions that could act as the authoritative voice of science. There is, however, a deep tension between the regulatory need for authoritative scientific voice and the non-hierarchical nature of scientific praxis. Scientific truth is supposed to emerge through the uncoordinated process of scientific inquiry and deliberation – not through a hierarchical decision-making process culminating in authoritative ‘truth-proclamations’. The tension between the hierarchical and policy-driven structure of RSIs and the ethos of objectivity, parallelism, and non-centralism that characterizes science, generates continuous demand for innovative institutional mechanisms that can respond to the conflicting expectations of the legal, political and scientific communities.

Ayal, Hareuveny and Perez explore the varied responses of the IPCC, ICNIRP, and the ICN to this tension. They show that in some contexts – such as questions of representation, transparency and participation – collisions tend to occur between the values of political legitimacy and scientific credibility. They further explore how this tension has affected the way in which these institutions have coped with the problem of

¹² A. Ayal, R. Hareuveny & O. Perez, ‘Science, Politics and Transnational Regulation: Regulatory Scientific Institutions and the Dilemmas of Hybrid Authority’ (2013) 2(1) *Transnational Environmental Law*, pp. 45–68.

¹³ T. Meyer, ‘Epistemic Institutions and Epistemic Cooperation in International Environmental Governance’ (2013) 2(1) *Transnational Environmental Law*, pp. 15–44.

scientific uncertainty. They conclude that the optimal design of RSIs requires a delicate balancing of the trade-offs between epistemic credibility and political legitimacy, highlighting also the need to create a more competitive global epistemic environment.

Tim Meyer's article explores this last issue. His contribution examines the question of how best to integrate international scientific institutions into rule-making institutions. Meyer argues that the most effective way to organize epistemic cooperation depends on the incentives that drive transnational cooperation in the production of scientific knowledge. In situations in which resolving scientific uncertainty helps to overcome obstacles to decentralized regulation – for example, better transnationally produced information on the impacts of ionizing radiation triggers domestic regulation to control the risks of exposure to radiation – the independence of scientific institutions from rule-making institutions is desirable. But where resolving scientific uncertainty does not create incentives for states to regulate unilaterally – for example, newer predictions on climate change do not solve the collective action problem that disincentivizes unilateral state action – greater hierarchical control of scientific institutions by rule-making institutions may be necessary to ensure the credibility and availability of a usable scientific record, and thus the effectiveness of international lawmaking as a coordination tool, even at the expense of the autonomy of the scientific process. By emphasizing the contingent value of institutional independence, these findings run counter to the views expressed in much of the scholarship on international scientific cooperation, which focuses on the way in which scientific institutions can be integrated into rule-making institutions to maximize the development and impact on policy of usable scientific information.

The third article, by Reut Snir,¹⁴ critically examines the legal structures of risk management schemes at the national level. This perspective offers a valuable complement to the discussion of knowledge production and the epistemic authority of scientific expertise in a regulatory process under conditions of scientific uncertainty. Snir's contribution focuses on the emerging regulation of nanotechnology, a novel technological domain characterized by many unknowns. Her article offers a different interpretation of the strategies used by regulators on either side of the Atlantic to cope with the uncertainties underlying nanotechnology.

Contrary to much of the prevailing scholarship on the approaches to transatlantic environmental risk management, which assumes there to be a divergence between the European Union's (EU) precautionary-based approach and the United States' (US) risk-based approach, Snir finds greater similarities between the two. She argues that, while the US and the EU are indeed dominated by distinct policy visions (or rhetoric), these allegedly different approaches ultimately generate similar regulatory outcomes that reflect an underlying adherence to a technical, evidence-based conception of risk. This, she argues, represents a process of transatlantic regulatory convergence. Examining the current 'light-touch' disclosure-based regulatory approach of both the EU and the US, manifested through data-gathering initiatives, Snir further argues that the differences that do exist between the two approaches – especially with respect to

¹⁴ Snir, n. 9 above.

disclosure along the value chain – arise out of minor variations in the sufficiency thresholds for scientific evidence in support of risk regulation. Yet, under both approaches, governments are unlikely to require disclosure without a scientific cause for concern. Snir's article thus points to the existence of a 'catch 22' that is triggered by the application of an evidence-based approach to the regulation of emerging technologies under conditions of scientific uncertainty. She furthermore highlights the adverse democratic implications of a regulatory approach which defers to science as the authoritative source of knowledge, with the ultimate authority to guide the regulation of emerging technologies.

Having reviewed the three articles in succession, we are now able to highlight some of the key findings and to identify future research needs in the area of global environmental risk governance. The articles provide a picture of varied institutional reactions to the problem of scientific uncertainty. The articles offer differing explanations for this phenomenon. Ayal, Hareuveny and Perez argue that the approach taken by an organization is largely a function of its internal solution to the hybrid dilemma (how to balance the competing values of political legitimacy and scientific reliability), as well as the organizations' perception of the magnitude of the risks at stake. Thus, for example, the IPCC has taken a more politically oriented position with respect to its internal decision-making procedures, which in turn has driven it to adopt a more nuanced approach to scientific uncertainty, based on a ranking of epistemic confidence. Another factor behind the IPCC's approach was its assessment of the gravity of the risks associated with climatic transformations. In contrast, ICNIRP, which views itself as a more 'scientific-expert' body, has adopted a more conservative approach that recognizes risks from non-ionizing radiation only if they are judged to be well established.

Meyer, on the other hand, proposes that the differences derive from the incentives that Member States have to coordinate policy based on scientific data. Accordingly, in areas where resolving scientific uncertainty would lead by itself to a coordinated policy, institutions will focus on achieving robust scientific consensus; whereas in areas in which resolving the scientific uncertainty will not be enough to generate a coordinated policy, coping with scientific uncertainty will require political intervention and control.

Coming from a different angle, Snir suggests that organizations may deal differently with scientific uncertainty based on the way in which they conceptualize a 'risk'. Organizations that follow technical, evidence-based rationalities are likely to require more rigorous scientific support for risks to human health or the environment before developing regulation, whereas organizations that emphasize social, cultural or political rationales may develop regulation even if there is no robust scientific support for potential physical harm, primarily based on other social risk.

The contributors agree that scientists continue to hold significant influence over processes of environmental risk governance at the transnational realm, but they question the legitimacy and credibility of scientific authority in areas dominated by conditions of scientific uncertainty. Ultimately, as Ayal, Hareuveny and Perez argue, in such areas the process of fact production cannot be clearly distinguished from the process of policy formation, whether empirically or normatively. But this condition

of immanent hybridity creates persistent policy dilemmas, relating both to the epistemic credibility of emerging regulatory structures and to their political legitimacy. The articles in this symposium offer several insights in that direction by highlighting the importance of creating a competitive epistemic environment (Ayal, Hareuveny and Perez) and the need to embed risk governance in a general democratic framework (Snir). Another point shared by all three articles is that the governance of risk under conditions of scientific uncertainty cannot be left to scientists alone – for both epistemic and political reasons. The findings of the articles underline the need for more research into the question of the optimal design of transnational risk regulation under conditions of scientific uncertainty. This research has to be sensitive to the deep linkages between the ‘scientific’ and the ‘political’ and the ways in which these linkages have already become institutionalized in contemporary transnational institutions. In a world where the borders between local and global are blurred – with risks being transported across borders through transnational commerce and politically blind ecological processes – the question of designing transnational regulatory structures that meet the dual requirements of political legitimacy and epistemic trustworthiness will continue to require pragmatic innovation and research attention undertaken through globally coordinated effort.