

THE RESILIENCE PRINCIPLE

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Studies of resilience have become widespread, in ecology¹ and in human relations.² Societies seek resilience as they experience disruptions. The effects of climate change are becoming evident in extreme storms, such as typhoon Haiyan, which raked over the Philippines in November of 2013, or the acute floods and droughts which societies in all regions of the world face. Human societies seek to enhance their capacity to “bounce back.” Yet the enormity of the damage, in the wake of Biblical floods, such as the Indus River Valley suffered in 2010,³ exceeds the capacity of all governments and intergovernmental organizations to restore what is lost. Rather the stark reality is that each society must adapt to the new conditions and move on.

Resilient self-help is essential in coping with life's upsets. This essay explores the prospect of recognizing Resilience as a Principle of Law. The propositions set forth here were debated at two conferences held in Brasilia, in December of 2013. The first, for legislators, was convened in the Senate of Brazil by the National Congress' Joint Permanent Committee on Climate Change,⁴ and the second, for judges,⁵ was convened by the Federal Judicial Council's Judicial Studies Center (*Conselho da Justiça Federal Centro de Estudos Judiciários*) and the High Court of Brazil (*Superior Tribunal de Justiça*). This *eJournal* of the IUCN Academy of Environmental Law has emerged as a leader in exploring new principles of environmental law, such as the Principle of Non-Regression, framed by Prof. Michel

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¹ See C.S. Hollings, “Resilience and Stability of Ecological Systems,” *Annual Review of Ecological Systems* 4 (1973).

² See The Stockholm Resilience Centre, www.stockholmresilience.org.

³ This was the worst flood in Pakistan's history and eradicated all the social and economic development in the Indus River Valley. See www.cicero.uio.no. Six decades of peaceful socio-economic development in this region of Pakistan represented a great success for the World Bank (IBRD), which in 1960 had provided for the equitable allocation of the waters of the Indus River through the Indus Waters Treaty.

⁴ “International Colloquium on Climate Change: The Post-Warsaw Agenda,” *International Perspectives Panel: Impacts on Law, Biodiversity & Soil*, Brasilia, 6 December 2013.

⁵ “International Conference on Environmental Law,” Panel on *Challenges and Trends in Environmental Law*, Brasilia, 9 December 2013.

Prieur.⁶ Just as courts have begun to recognize the Principle of Non-Regression,⁷ the welfare of both humans and nature requires recognition of Resilience. Many of the jurisprudential foundations for the legal Principle of Resilience are set forth by Lia Helena Monteiro de Lima Demange in her insightful recent article about the Principle.⁸

Resilience is an inherent capacity to react to disruptions of human or ecological systems to sustain their health, wellbeing or integrity. Resilience is found in both individual humans, other species, and in ecosystems. Humans bring their resilience to their socio-economic and cultural systems, such as a local community, a trading network, an educational institution or a health care provider. Humans often provide contingency plans to keep these systems going in the face of disruption. The aim is to anticipate and respond or adapt to disruptive, or changed conditions in order to sustain health, natural integrity, or the social objective of a system.⁹

When a human trips and falls, she or he responds by getting up and walking on. If a bone is broken, it needs time to heal. If a virus attacks us, our bodies struggle to repel the attack and we nurse ourselves back to health. Our bodies have inherent resilience. Our human constitutions, our bodies, have natural capacities to restore health, which seem invisible, until we need them. We can enhance our return to renewed normal conditions by seeking medical care or prescribed rest. We seek to enhance our resilience by taking vitamins and getting exercise.

When ecosystems are disrupted, plants and animals seek to adapt to the changed circumstances. For example, in natural settings, wetlands are great sponges, absorbing floodwaters while serving as huge reservoirs for many species. Wetlands experience floods or droughts as temporary disruptions, after which their natural features continue. When disruptions are extreme, as when a river changes course, wetlands ecosystems reappear in new locations and their ecological functions reappear. Ecosystem integrity has a resilience

⁶ Michel Prieur, "Urgently Acknowledging the Principle of 'Non-Regression' in Environmental Rights," IUCN Academy of Environmental Law *eJournal* Issue 2011(1), available at <http://www.iucnael.org/en/e-journal/previous-issues/157-issue20111.html>.

⁷ Decision on the Demand of Constantino Gonzales Rodriguez to Declare Null Resolution No AG-0072-2009 of the National Environmental Authority (ANAM), published in the Official Gazette No. 26,221 (11 February 2009), Entrada no. 123-12, Supreme Court of the Republic of Panama, Third Administrative Law Chamber (23 December 2013), available at <http://es.scribd.com/doc/193671950/Setencuia-Bahia-Panama-Principio-No-Regresion>.

⁸ Lia Helena Monteiro de Lima Demange, "The Principle of Resilience," 30 *Pace Environmental Law Review* 695 (2013), available at <http://digitalcommons.pace.edu/pelr/vol30/iss2/11>.

⁹ Andrew Zolli and Ann Marie Healy, *Resilience – Why Things Bounce Back* (Simon & Schuster 2012).

that reasserts itself. The natural design of a wetland is resilient, conserving soils and species alike. Yet when humans drain a marsh, we weaken or destroy its natural resilience. On the other hand, humans have enhanced natural resilience when they create botanical gardens. This socio-biological activity on one level seems to be an attractive conservation of species of plant life, which otherwise might be lost in the wild. But this is more than a scientific study. We know that botanical gardens are also a reservoir of biodiversity, and we restore plants when their habitats are lost or they become endangered with extinction. At this deeper level, botanical gardens are biodiversity health care systems. Similarly, the Global Crop Diversity Trust has created the Svalbard Global Seed Vault, a seed bank deep in Spitsbergen, an island off of Norway, to conserve all the seeds of flora species. We also conserve biodiversity in large protected areas, such as national park.

Why does this matter? Why can we no longer take resilience for granted?

The world has left the Holocene epoch, which lasted 10,000 years, and entered the Anthropocene epoch, the era in which humans shape nature.¹⁰ The International Commission on Stratigraphy, a scientific body of geologists, is studying the indicators that physically exist to show that humans have permanently altered the crust of the Earth, its soils and rocks.¹¹ The key indicators of this Anthropocene are:

- Melting the cryosphere – the loss of frozen glaciers and ice caps
- Sea level rise and new coastlines & coastal sedimentation
- The acidification of the oceans and the increase in carbon dioxide in the atmosphere
- Radioactive rocks and soils from pre-1963 atmospheric nuclear weapons tests
- Synthetic and organic chemical waste that never existed naturally before humans invented them
- Extinction of species and the new fossil record

Each of these new physical markers also reflects on-going interactions of human systems and natural systems. In the Anthropocene, it is expected that storms will be more intense,

¹⁰ Will Steffen, Paul J. Crutzen and John R. McNeill, "The Anthropocene: Are Humans Now Overwhelming the Great Forces of Nature," 36 *AMBIO* 614 (2007).

¹¹ The International Commission on Stratigraphy is the oldest constituent scientific body in the International Union of Geological Sciences (www.iugs.org). Its primary objective is to precisely define global units (systems, series, and stages) of the International Chronostratigraphic Chart that, in turn, are the basis for the units (periods, epochs, and age) of the International Geologic Time Scale; thus setting global standards for the fundamental scale for expressing the history of the Earth. The Commission has constituted a working group to determine, perhaps by 2016, whether Earth has entered a new geological stage: www.inqua-saccomm.org/major-divisions/anthropocene.

droughts more severe, and other shifts in the hydrologic cycle will be unpredictable but are coming. There are feedback loops. For example, impacts will grow as the world population of humans increases by 2 billion more persons in the coming years. How humans behave exacerbates or ameliorates the disruptions of natural patterns, making it more difficult or more likely to achieve a new equilibrium. When one species becomes extinct, other species take over its niche. When the polar icecap melts fully, navigation across the North Pole will increase and new pollutants and new invasive species appear in this region.

As humans experience the more severe disruptions of the Anthropocene, humans strive to learn how to build and sustain “robust resilience.” If humans consciously enhance resilience, they can survive and “bounce back” better. Typhoon Haiyan, which struck the Philippines on November 27th 2013, was then the strongest storm to hit land ever measured. Among its victims was the campus of a school founded in Barangay, near Cebu, by the renowned environmental lawyer, Tony Oposa. Oposa won the landmark decision of the Supreme Court of the Philippines recognizing the right to the environment in the Constitution of that nation, and granting standing for future generations, represented by children, to sue to enforce that right. *Oposa v. Factoran*¹² resulted in the withdrawal of timber concessions that would have denuded the forests of the Philippines, forests key to averting flooding and erosion.

Following an earlier destructive typhoon, Tony Oposa had built a building at his School to show local people how a two-story structure could survive typhoons, with waters passing through an open ground floor and safeguarding a second floor. At his School of the SEA (Sea, Earth, Air), this building survived.¹³ The homes of all his neighbors were traditional one-story buildings, which were destroyed by the Typhoon. Oposa’s water well, which deliberately is not operated by electricity, survived and now provides the only potable source of water for the people living around his school. Their wells depended on electricity, and the typhoon destroyed all electrical grids.

Oposa is teaching his community, by example, how to design stronger, more robust resilience into their lives. We can all learn from this environmental lawyer to design with nature¹⁴ in our homes, neighborhoods, our utilities and transport systems, and all human-

¹² *Oposa v. Factoran, Jr.*, G.R. No. 101083, Supreme Court of the Philippines (1993-07-30).

¹³ <http://opinion.inquirer.net/66901/filipino-name-for-storm-surge>.

¹⁴ Ian McHarg, *Design With Nature* (1969; 1992 Edition, J. Wiley & Sons).

built infrastructure. Architectural designs that enmesh together human and nature enhance the integrity and resilience of both.¹⁵

In order to ensure that everyone can survive disruptions, it is important to recognize the Principle of Resilience as a legal principle. The Principle of Resilience is reflected already implicitly in other legal principles, such as the Precautionary Principle.¹⁶ Because this Resilience Principle inheres in each human being and in each natural system, it is rather too easy to take resilience for granted. We expect ourselves to be resilient and do not think about how to ensure stronger resilience.

If human society is to effectively “bounce back” in coping with the disruptions of the Anthropocene Epoch, more will be needed than a voluntary effort to enhance resilience. Everyone should follow the lead of Tony Oposa. Governments will need to acknowledge formally the legal Principle of Resilience in its own right.

There are several rationales for doing so. One is because the Resilience Principle is universal, operating throughout all living systems.¹⁷ It is perhaps also a reflection of what Edward O. Wilson has called Biophilia.¹⁸ Another rationale is more utilitarian: humans see that they are better off by anticipating trouble and avoiding it. Elsewhere, I have argued also that resilience is an evolved norm, which all societies naturally already accept; *A Rule of law for Nature*¹⁹ presents this rationale.²⁰ I have found generalized support for the recognition of resilience when presenting this thesis to the some 500 scholars gathered at the 11th Conference of the Nordic Environmental Social Sciences in Copenhagen in June of 2013, and to a conference of international lawyers at the University of Denver a year ago²¹, and in Waikato, New Zealand, to environmental law professors from developing and developed

¹⁵ Stephen R. Kellert, Judith H. Heerwagen, and Martin L. Mador, *Biophilic Design: The Theory, Science & Practice of Bringing Buildings to Life* (2008, Wiley).

¹⁶ See <http://www.precautionaryprinciple.eu>. The Precautionary Principle has been defined as follows: “When human activities may lead to morally unacceptable harm that is scientifically plausible but uncertain, actions shall be taken to avoid or diminish that harm. Morally unacceptable harm refers to harm to humans or the environment that is threatening to human life or health, or serious and effectively irreversible, or inequitable to present or future generations, or imposed without adequate consideration of the human rights of those affected.”

¹⁷ It should be acknowledged that both medical researchers and biological sciences such as ecology are still studying this proposition, and while environmental lawyers should accept that resilience is a general principle of law, other fields of endeavor still debate this proposition. See the Resilience Alliance’s references at www.resalliance.org or the Transition Network, www.transitionnetwork.org.

¹⁸ Edward O. Wilson, *Biophilia – The Human Bond with Other Species* (Harvard, 1984).

¹⁹ Christina Voigt, *A Rule of Law for Nature* (Cambridge University Press, 2013).

²⁰ Nicholas A. Robinson, “A Canon for the Anthropocene,” in *A Rule of law for Nature*, Chapter 4.

²¹ Nicholas A. Robinson, “Keynote: Sustaining Society in the Anthropocene Epoch,” 41 *Denv. J. Int’l L. & Pol’y* 467 (2012).

nations to the IUCN Academy of Environmental Law's annual Colloquium.²² Last month, I explored the principle of resilience with environmental diplomats and lawyers in Germany.²³ In each of these debates I have found that there is general acceptance of the proposition that Resilience may be usefully stated to be a principle of law.

A general principle of law must be acknowledged to inhere in human nature, such as the duty to cooperate. Resilience is similarly such a basic trait. To encourage cooperation, humans invoke an ethical norm to do so, and in turn restate that norm as a legal duty. States shall cooperate in public international law, in the UN Charter,²⁴ in the Law of the Sea Convention²⁵ and the many multilateral environmental agreements,²⁶ such as the Convention on Biological Diversity.²⁷ To promote cooperation for enhancing socio-biological resilience, it is important to recognize our duty to do so as a general principle of law.

Principle of Resilience: “Governments and individuals shall take all available measures to enhance and sustain the capacity of social and natural systems to maintain their integrity.”

How would this legal principle be reflected in law? Here are some concrete examples, both for legislative enactments and for judicial decision-making.

Judicial Rules of Interpretation and Decision - Affirming Resilience is the preferred option when the choice either to do so or not to do so is presented in a judicial setting. Courts recognize this in following the interpretive guides of *in dubio pro natura*, since when natural systems are left intact, their integrity naturally supports resilience.²⁸ The Supreme Court

²² IUCN Academy of Environmental Law Annual Colloquium, 25-28 June 2013, at the University of Waikato.

²³ *Elizabeth Haub Award Laureates' Symposium*, Murnau, Germany, 15-16 November 2013, under the auspices of the International Council of Environmental Law. Paper by Nicholas A. Robinson “Fundamental Principles of Law for the Anthropocene,” to appear in *Environmental Policy & Law* (Wolfgang E. Burhenne, Editor) in 2014.

²⁴ 1 UNTS XVI www.un.org/en/documents/charter/index.shtml

²⁵ 1833 UNTS 397

www.un.org/depts/los/convention_agreements/convention_overview_convention.htm.

²⁶ L. Kurukulasuriya & N. Robinson, Training Manual on International Environmental Law (UNEP, 2006).

²⁷ 1760 UNTS 79, 31 ILM 818 (1992); www.cbd.int.

²⁸ The applications of this rule are explored in *In Dubio Pro Natura* (the proceedings of the Brazilian Association of Magistrates' First International Conference on Environmental Law, 8-11 August 2011, Manaus (published by the *Associação dos Magistrados Brasileiros (AMB)*, 2013, with the support of the Konrad Adenauer Stiftung, ISBN 978-85-7504-178-9).

Procedural Rules in the Philippines,²⁹ and the Writ of *Kalikasan* (Nature), provide for an automatic injunction to stop actions harming the environment, and thus leave natural systems intact pending adjudication of a matter. Judicial decision-making thus can sustain natural resilience. In final adjudications, remedies to enhance resilience can be mandated to reverse past acts of environmental degradation. Finally, when statutes covering the matters below are in force, courts can give full effect to their remedial purposes when called upon to interpret such statutes.

Insurance for Casualty Losses – Cooperative insurance systems can provide the financial means to bounce back and adapt to post-disaster conditions. These are self-insurance programs organized locally. Farmers already use “Crop Index Insurance” in parts of Africa and India and other states are experimenting with micro-insurance regimes for poor communities. Most of the world lacks the statutory framework for communities to organize cooperative insurance systems. These statutes need to be enacted. There will not be adequate governmental finances for adapting and building new more sustainable living systems. Self-help is required. That is resilience.

Legal Frameworks Mandating Distributed Energy and Other Services – It is possible for local communities to generate their own electricity, supply clean water, provide for local foods, and build self-sufficiency into their living conditions. This must be replicated locally in all countries. The result is robust resilience. Electricity supplied from centrally located power generating facilities through electrical power grid distribution lines is efficient but brittle. It is too easily disrupted by storms and other events. Technology no longer requires such a centralized system. It is now possible to produce and store electricity locally, as needed. When local communities, and sites within them, produce their own electricity they become self-reliant. When some local sites lose power, micro-grids can share locally generated power, and also feed a wider grid. These systems do not depend on external supply chains, such as imports of energy or resources, which can be interrupted. Legislation is needed to mandate that new electricity will be supplied through distributed systems, and that such systems also be installed to replace central systems and build redundancy, and thus resilience in to those systems. Similar distributed systems will be needed for water supplies and other essential utilities.

²⁹ *Rules of Procedure for Environmental Cases*, A.M. o. 09-6-8-SC (Phil.) available at http://www.lawphil.net/courts/supreme/am/am_09-6-8-sc_2010.html . See also the discussion of these rules in Hilario G. Davide, Jr., “The Environment as Life Sources and the Writ of *Kalikasan* in the Philippines,” 29 *Pace Environmental law Review* 592 (2012).

Design with Nature - As sea levels rise worldwide, communities will retreat from the coastlines, and in anticipation all countries need to design to protect natural systems that will protect human communities. Trees on hillsides and upstream in watersheds will conserve water and avert flooding; wetlands should be re-established and expanded. Protected natural areas need to buffer human communities. Many nations need to enact legislation to enable wider use of natural systems to protect human settlements. The trends currently are to sacrifice the natural areas, and make human settlements less resilient.

Resilience Preparedness Planning – More thorough and diligent use of the procedure mandating Environmental Impact Assessment (a duty of States provided for in Principle 17 of the Declaration of Rio de Janeiro on Environmental Development).³⁰ Each EIA should identify and specify how natural resilience can be sustained or enhanced when governments act, or approve actions of others, that have an adverse environmental impact. This can also be made clear through ensuring that there is full public participation in environmental decision-making and access to environmental information, as mandated in Rio Principle 10. The public invariably identified issues of resilience when they speak up.³¹

Adaptation Through Revised Land Use Laws – Climate change requires everyone to begin adapting to the new environmental conditions on the Earth. All land use activities will need to adapt. This becomes evident in the current rise in sea levels along all coasts worldwide. As local authorities plan to retreat from the coastal areas to higher ground, they have opportunities to restore wetlands as buffers between storm surges and the land, and to enhance the food chain for coast fishing resources. All local land use laws need to launch “smart” planning activities.³²

Providing Back-Up Systems and Redundancy - It can no longer be taken for granted that one social system will provide all necessary services. In the past, there was an interest in designing very efficient systems. Excessive efficiency can make for a brittle system. When Bangkok was flooded in a typhoon, the assembly of computers in other countries had to stop, since the last-minute efficiency of ordering computer chips from Thailand, rather than having the costs of a supply on hand, resulted in closing down manufacturing around the

³⁰ A/Conf.151/26 (vol I, 12 August 1992); www.un.org/ga/conf151/aconf15126-1annex1.htm.

³¹ See for example, *Scenic Hudson Preservation Conference v. Federal Power Commission*, 354 F. 2 608 (Second Cir., 1965), where citizens preserved Storm King Mountain and stripped bass fish spawning areas in the adjacent Hudson River, by pressing for a holistic weighing of environmental impacts and alternative means to supply energy without a new hydro-electric facility.

³² See the publications and programs for smart land use planning and climate change prepared by the Land Use Law Center of Pace University School of Law in New York. www.law.pace.edu.

world. To build resilience, all social systems should design redundancy and back-up procedures.

Adaptive Planning – Spatial planning has traditionally imposed human development upon the natural environment. In the future, effects induced by climate change will disrupt the built environment. In adapting to the changed conditions, it will be essential to anticipate environmental impacts and design in light of that knowledge. New physical development will need to design sympathetically with natural systems, and ensure that natural resilience is sustained. Each society has its own cultural and social ways of learning how to adapt to the Anthropocene. Each society already has its cultural resiliencies. The Principle of Resilience will call upon governments at all levels to give this adaption priority.

Conclusions

None can claim to know with certainty how anthropogenic climate change is impacting on Earth and humanity. The Fifth Assessment Report of the UN Intergovernmental Panel on Climate Change, when released officially in 2014, will offer some guidance. Analysis of the previous four Assessment Reports³³ makes it amply clear that human society will need to rethink “business as usual,” in light of the changing inter-dependencies of humans and nature.

The extraordinary benefit of the Principle of Resilience is that it already exists and can be applied in all present and future circumstances. Resilience is a characteristic of humans and nature alike. Human legal systems will themselves be more resilient, when they embrace the Principle of Resilience.

³³ See www.ipcc.ch.