

**Unravelling the Maze of Multilateral Environmental Agreements:  
A Macroscopic Analysis of International Environmental Law  
and Governance for the Anthropocene**

by

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National  
University



## Declaration

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university. To the best of the author's knowledge, it contains no material previously published or written by another person, except where due reference is made in the text.

With the exception of Chapter 1 (Introduction) and Chapter 6 (Conclusions), this thesis consists of a series of manuscripts that are published in peer-reviewed journals. Each manuscript is presented here as it appears in the relevant journal with the exception of minor changes in style and formatting. Because the key chapters of this thesis are manuscripts developed for independent publication, some repetition between chapters was unavoidable.

- A variant version of Chapter 2, co-authored with Brendan Mackey, is published in *International Environmental Agreements: Politics, Law and Economics* (2013) doi:10.1007/s10784-013-9225-2. (The author's contribution to the material in Chapter 2 is 95 percent.)
- A variant version of Chapter 3 is published in *Global Environmental Change: Human and Policy Dimensions* (2013) doi:10.1016/j.gloenvcha.2013.07.006.
- A variant version of Chapter 4 is published in *Review of European Community and International Environmental Law* (2012) 21:3, 243–258.
- A variant version of Chapter 5, co-authored with Klaus Bosselmann, is published in *Transnational Environmental Law* (2013) 2:2, 285–309. (The author's contribution to the material in Chapter 5 is 95 percent.)

The author's name appears as **Rakhyun E. Kim** in the publications.



Rak Kim

28 September 2013

## Abstract

Earth has entered a new geological epoch, the Anthropocene, where humans have become a major driver of global environmental change. Many believe, however, that current international environmental law is a maze of international agreements, and it is unsuitable for navigating the Anthropocene. It is generally agreed that, for global sustainability, this institutional maze needs to be modelled in ways more appropriately aligned with the functioning of the Earth system itself.

For the purpose of improving the alignment, this PhD thesis explores the structural and functional dynamics of multilateral environmental agreements (MEAs) as a systemic whole in relation to Earth system dynamics. The thesis begins with a preliminary review of international environmental law through the lens of a specific systems theory called complex adaptive systems. It then provides two parallel empirical studies on the macroscopic structure and function of the MEA system. In terms of the structure, I quantitatively analysed and characterized the topological properties of the dynamic web of 747 MEAs as approximated by 1,001 cross-references found in their texts. This network analysis provided novel insights into how MEAs have self-organized into an interlocking network with complex topology and what the emergent order looks like. In terms of the function, I conducted a qualitative case study on ocean acidification to examine whether the networked system of MEAs is autonomously capable of filling the regulatory gap through mutual adjustments. Inherent weaknesses in the polycentric order were observed, which led to the conclusion that a new MEA on ocean acidification is necessary. Despite the interlocking structure, the MEA system is currently limited by its design to a piecemeal approach to global environmental governance.

The conceptual and empirical studies provided several implications for the design of international environmental law in the Anthropocene. In particular, the thesis makes a case that the absence of an international environmental *grundnorm* is preventing a more purposive, systemic continuum of laws, one that would ensure policy coherence across Earth's subsystems. The thesis concludes that international environmental law needs a clearly agreed, unifying goal to which all international regulatory regimes are legally bound to contribute. I suggest that this goal should be about the protection of the integrity of Earth's life-support systems.

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## **List of Treaties and Other International Instruments**

*The following list includes only treaties and other international instruments cited in this thesis. The complete list of 747 multilateral environmental agreements used in Chapter 3 can be found in Appendix B.*

- Agenda 21: Programme of Action for Sustainable Development, UN Doc. A/CONF.151/26, 14 June 1992.
- Agreement between the United States of America and Canada on Great Lakes Water Quality, Ottawa (Canada), 22 November 1978, into force 22 November 1978.
- Agreement Establishing the World Trade Organization, Marrakesh (Morocco), 15 April 1994, in force 1 January 1995.
- Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, New York (United States), 4 December 1995, in force 11 December 2001.
- Antarctic Treaty, Washington, D.C. (United States), 1 December 1959, in force 23 June 1961.
- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, Basel (Switzerland), 22 March 1989, in force 5 May 1992.
- Charter of the United Nations, San Francisco (United States), 26 June 1945, in force 24 October 1945.
- Convention for the Conservation of Antarctic Seals, London (United Kingdom), 11 February 1972, in force 11 March 1978.
- Convention for the Protection of the Marine Environment of the North-East Atlantic, Paris (France), 22 September 1992, in force 25 March 1998.
- Convention on Biological Diversity, Rio de Janeiro (Brazil), 5 June 1992, in force 29 December 1993.
- Convention on International Trade in Endangered Species of Wild Fauna and Flora, Washington, D.C. (United States), 3 March 1973, in force 1 July 1975.
- Convention on Long-range Transboundary Air Pollution, Geneva (Switzerland), 13 November 1979, in force 16 March 1983.
- Convention on the Conservation of Antarctic Marine Living Resources, Canberra (Australia), 20 May 1980, in force 7 April 1982.
- Convention on the Conservation of Migratory Species of Wild Animals, Bonn (Germany), 23 June 1979, in force 1 November 1983.
- Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, London (United Kingdom), 13 November 1972, in force 30 August 1975.
- Convention on Wetlands of International Importance, especially as Waterfowl Habitat, Ramsar (Iran), 2 February 1971, in force 21 December 1975.
- Declaration of the United Nations Conference on the Human Environment, UN Doc. A/Conf.48/14/Rev. 1 (1973), 16 June 1972.
- Global Programme of Action for the Protection of the Marine Environment from Land-based Activities, UN Doc. UNEP(OCA)/LBA/ IG.2/7, 5 December 1995.
- International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto and by the Protocol of 1997, London (United Kingdom), 2 November 1973, in force 2 October 1983 (1978 Protocol), 19 May 2005 (1997 Protocol).

Kyoto Protocol to the United Nations Framework Convention on Climate Change, Kyoto (Japan), 11 December 1997, in force 16 February 2005.

Montreal Protocol on Substances that Deplete the Ozone Layer, Montreal (Canada), 16 September 1987, in force 1 January 1989.

North American Free Trade Agreement, Washington, D.C. (United States), Ottawa (Canada), Mexico City (Mexico), 17 December 1992, in force 1 January 1994.

Plan of Implementation of the World Summit on Sustainable Development, Report of the World Summit on Sustainable Development, UN Doc. A/CONF.199/20, 4 September 2002.

Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean, Barcelona (Spain), 10 June 1995, in force 12 December 1999.

Protocol on Environmental Protection to the Antarctic Treaty, Madrid (Spain), 4 October 1991, in force 14 January 1998.

Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, London (United Kingdom), 7 November 1996, in force 24 March 2006.

Rio Declaration on Environment and Development, UN Doc. A/CONF.151/26/Rev.1 (Vol. I), 14 June 1992.

Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, Rotterdam (The Netherlands), 10 September 1998, in force 24 February 2004.

Stockholm Convention on Persistent Organic Pollutants, Stockholm (Sweden), 22 May 2001, in force 17 May 2004.

The Future We Want, UNGA Resolution A/RES/66/288 (Annex), 11 September 2012.

United Nations Convention on the Law of the Sea, Montego Bay (Jamaica), 10 December 1982, in force 16 November 1994.

United Nations Framework Convention on Climate Change, New York (United States), 9 May 1992, in force 21 March 1994.

Universal Declaration of Human Rights, Paris (France), 10 December 1948.

Vienna Convention for the Protection of the Ozone Layer, Vienna (Austria), 22 March 1985, in force 22 September 1988.

Vienna Convention on the Law of Treaties, Vienna (Austria), 23 May 1969, in force 27 January 1980.

World Charter for Nature, UNGA Resolution A/RES/37/7, 28 October 1982.

## List of Acronyms and Abbreviations

Basel Convention	Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal
CaCO <sub>3</sub>	Calcium carbonate
CAS	Complex adaptive system
CBD	Convention on Biological Diversity
CCAMLR	Convention on the Conservation of Antarctic Marine Living Resources
CMS	Convention on the Conservation of Migratory Species of Wild Animals
CO <sub>2</sub>	Carbon dioxide
COP	Conference of the Parties
CS-SSGF	CO <sub>2</sub> Sequestration in Sub-seabed Geological Formations
Global Programme of Action	Global Programme of Action for the Protection of the Marine Environment from Land-based Activities
Kyoto Protocol	Kyoto Protocol to the United Nations Framework Convention on Climate Change
LBSMP	Land-based sources of marine pollution
London Convention	Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter
London Protocol	1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972
Madrid Protocol	Protocol on Environmental Protection to the Antarctic Treaty
MARPOL Convention	International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto and by the Protocol of 1997
MEA	Multilateral environmental agreement
MEPC	Marine Environment Protection Committee
OSPAR Convention	Convention for the Protection of the Marine Environment of the North-East Atlantic
PhD	Doctor of Philosophy
ppm	Parts Per Million
Ramsar Convention	Convention on Wetlands of International Importance, especially as Waterfowl Habitat
Rotterdam Convention	Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade
SCAR	Scientific Committee on Antarctic Research
Stockholm Convention	Stockholm Convention on Persistent Organic Pollutants
UNCLOS	United Nations Convention on the Law of the Sea
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change

UNFSA or  
United Nations Fish Stocks  
Agreement

Agreement for the Implementation of the Provisions of the  
United Nations Convention on the Law of the Sea of 10  
December 1982 relating to the Conservation and  
Management of Straddling Fish Stocks and Highly Migratory  
Fish Stocks

UNGA

United Nations General Assembly

VCLT

Vienna Convention on the Law of Treaties