THE PRECAUTIONARY APPROACH AND THE INTERNATIONAL CONTROL OF TOXIC CHEMICALS: BEACON OF HOPE, SEA OF CONFUSION AND DILUTION

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I. INTRODUCTION

Toxic chemicals in the environment are a continuing concern. Nearly 80,000 chemicals are on the market in the United States;[1] of those, 200 synthetic chemicals are found in measurable quantities in the bodies of Americans.[2] More than 5 billion kilograms of toxic pollutants are released or transferred each year in North America.[3] Even more alarming, basic toxicological information is lacking for most these chemicals.[4]

Long-range transport of persistent organic pollutants (POPs), chemicals that are persistent and bioaccumulate, is a special concern particularly in the Arctic, which acts as a "sink."[5] Examples of POPs include various pesticides, such as DDT, chlordane, aldrin, heptachlor and toxaphene, industrial chemicals such as PCBs (polychlorinated biphenyls), and unintentional byproducts such as dioxins and furans.[6] Even commonly used chemicals, such as brominated flame retardants and fluorinated compounds (used as stain repellants and as non-

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1. PRESIDENT'S CANCER PANEL, U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES 2008-2009 ANNUAL REPORT, REDUCING ENVIRONMENTAL CANCER RISK: WHAT WE CAN DO NOW ii (2010). Over 100,000 chemicals are used around the globe. *See* UNITED NATIONS DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS, STOCKHOLM CONVENTION AND UNITED NATIONS ENVIRONMENT PROGRAMME, PRACTICES IN THE SOUND MANAGEMENT OF CHEMICALS 27 (2010).

2. NAT'L CTR. FOR ENVTL HEALTH, DEP'T OF HEALTH AND HUMAN SERVICES, FOURTH NATIONAL REPORT ON HUMAN EXPOSURE TO ENVIRONMENTAL CHEMICALS, EXECUTIVE SUMMARY 1 (2009).

3. NORTH AM. COMM'N FOR ENVIRONMENTAL COOPERATION, OVERVIEW OF TAKING STOCK 2006 DATA, *available at* http://www.cec.org/Page.asp?PageID=924&SiteNodeID=641.

4. G. Schaafsma, E.D. Kroese, E.L. J.P. Tielemans, J.J.M. Van de Sandt & C.J. Van Leeuwen, *REACH, Non-testing Approaches and the Urgent Need for a Change of Mind Set*, 53 REG. TOXICOLOGY & PHARMACOLOGY 70, 72 (2009).

5. ARCTIC MONITORING AND ASSESSMENT PROGRAMME, ARCTIC POLLUTION 2009, 14 (2009). Pathways include ocean and atmospheric transport as well as river inputs. *Id.* at 13.

6. ARCTIC MONITORING AND ASSESSMENT PROGRAMME, HUMAN HEALTH IN THE ARCTIC 2009, at 13–14 (2009); *see also* ARCTIC POLLUTION, *supra* note 5, at 6.

stick surfaces on cookware) have found their way into Arctic food webs.[7] In total, about 4300 organic chemicals, most having low or unknown levels of production, are thought to have Arctic bioaccumulation potential, while over 120 industrial organic chemicals and pesticides are considered high-production volume (greater than 1000 tons/year) and have been identified as having POP characteristics.[8]

Elevated levels of POPs in both Arctic wildlife and human residents raise serious health concerns. Polar bears with high levels of contaminants may suffer adverse effects in reproduction and in their immune systems.[9] Inuit mothers have been found to have two to eight times the level of various environmental contaminants in their blood compared to mothers living in the South.[10] While it is difficult to precisely determine the effects on human health due to varying socioeconomic and lifestyle conditions, potential chemical synergies, limited toxicity studies, and a range of other factors, several subtle effects (immunological, cardiovascular and reproductive) have been identified by epidemiological studies in the Arctic.[11]

The precautionary approach, often used interchangeably with the term precautionary principle, has been heralded as perhaps the most fundamental norm of international environmental law to better protect the environment from the threats of toxic chemicals.[12] Precaution captures common sense notions evident in many cultures like "an ounce of precaution is worth a pound of cure" and "better safe than sorry."[13] Precaution provides critical guidance for making environmental decisions where there is scientific uncertainty as to environmental effects of a proposed use or activity. Decision-makers following the

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7. *See Id.* at 6–16.

8. HUMAN HEALTH IN THE ARCTIC, *supra* note 6, at 21–22.

9. ARCTIC POLLUTION, *supra* note 5, at 32.

10. HUMAN HEALTH IN THE ARCTIC, *supra* note 6, at 62–63.

11. *Id.* at xiii.

12. *See, e.g.*, Trip Van Noppen, *International Law Review Symposium – Keynote Speech*, 7 LOY. U. CHI. INT'L L. REV. 1, 3 (2009).

13. David L. VanderZwaag, *The Precautionary Principle in Environmental Law and Policy: Elusive Rhetoric and First Embraces*, 8 J. ENVTL. L. & PRAC. 355, 358 (1998).

precautionary principle are to err on the side of caution.[14] The precautionary principle/approach is well established, as it has been embraced in over fifty international, legally-binding agreements and over forty non-binding instruments.[15]

This Paper, through three images, highlights the rather uneasy relationship between the precautionary approach and the international control of toxic chemicals. First, the "beacon of hope" aspect of precaution is described whereby various strong versions, such as a reversal in the burden of proof, offer to help avoid the shoals of chemical harms to the environment and human health. Second, the "sea of confusion" is briefly navigated with a review of six confusing currents including definitional generalities and variations. Third, the "sea of dilution" reality in global conventions and initiatives, aimed at controlling toxic chemicals, is emphasized, in which precaution is marginalized or adopted in "watered down" forms.

II. BEACON OF HOPE

The precautionary approach, while subject to considerable controversy and even some antagonism over its potential to thwart innovation and a balanced weighing of all risks,[16] has been hailed by many non-governmental organizations (NGOs) and authors as a powerful beacon for avoiding significant harm to the environment and human health.[17] Various strong versions of precaution have been advocated, with one of the strongest

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14. *See* Nicholas de Sadeleer, *Origin, Status and Effect of the Precautionary Principle*, *in* IMPLEMENTING THE PRECAUTIONARY PRINCIPLE: APPROACHES FROM THE NORDIC COUNTRIES, THE EU AND USA 3, 3 (Nicholas de Sadeleer ed., 2007).

15. John S. Applegate, *The Taming of the Precautionary Principle*, 27 WM. & MARY ENVTL. L. & POL'Y REV. 13, 17 (2002).

16. *See, e.g.*, Cass R. Sunstein, *Beyond the Precautionary Principle*, 151 U. PA. L. REV. 1003, 1004 (2003); John N. Hathcock, *The Precautionary Principle – An Impossible Burden of Proof for New Products*, 3 AG BIO FORUM (No. 4) 255 (2000); John D. Graham & Jonathan B. Weiner, *Empirical Evidence for Risk – Risk Tradeoffs: A Rejoinder to Hansen and Tickner*, 11 J. RISK RES. (No. 4) 485, 485–86 (2008).

17. Dawn A. Russell & David L. VanderZwaag, *Ecosystem and Precautionary Approaches to International Fisheries Governance: Beacons of Hope, Seas of Confusion and Illusion*, *in* RECASTING FISHERIES MANAGEMENT ARRANGEMENTS IN LIGHT OF SUSTAINABILITY PRINCIPLES: CANADIAN AND INTERNATIONAL PERSPECTIVES 25, 56–58 (Dawn A. Russell & David L. VanderZwaag eds., 2010).

beams reversing the burden of proof. The burden of proof requires those who propose certain risky activities to demonstrate some standard of safety or acceptability, such as no significant damage to the environment or no serious or irreversible harm.[18] Shifting the burden of persuasion and production of scientific information is viewed as leveling the playing field and ensuring a cautious approach is taken in authorization processes.[19] Other strong rays of precaution include banning activities deemed by society to be too risky[20] and adopting a "reverse listing" approach whereby only substances listed as safe can be manufactured or marketed.[21]

Adoption of stronger versions of precaution at the global level has been very limited, but some examples do stand out. In the field of international fisheries, the global community has adopted a precautionary moratorium on the use of long driftnets[22] and has encouraged the precautionary closure of vulnerable marine ecosystems to bottom fishing in areas beyond national jurisdiction.[23] The 1996 Protocol[24] to the London Convention[25] has embraced a precautionary reverse listing

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18. *See* Carl F. Cranor, *Asymetric Information, the Precautionary Principle and Burdens of Proof, in* PROTECTING PUBLIC HEALTH & THE ENVIRONMENT 74–99 (Carolyn Raffensperger & Joel A. Tickner, eds., 1999) (discussing the various evidentiary burdens that may be used for the level of proof required). On the standard for scientific evidence, see Alan Randall, *We Already Have Risk Management – Do We Really Need the Precautionary Principle?* 3 INT'L REV. ENVTL. RESOURCE ECON. (No. 1) 39, 61 (2009).

19. *See* Noah M. Sachs, *Rescuing the Strong Precautionary Principle from Its Critics: The Case of Chemical Regulation*, U. ILL. L. REV. (forthcoming) (discussing the burden of production of data and the burden of persuasion).

20. Daniel Gervais, *The Regulation of Inchoate Technologies*, 17 HOUS. L. REV. 665, 696 (2010).

21. NICOLAS DE SADELEER, ENVIRONMENTAL PRINCIPLES: FROM POLITICAL SLOGANS TO LEGAL RULES 202–03 (Susan Leubusher trans., 2002).

22. David Freestone & Ellen Hey, *Implementing the Precautionary Principle: Challenges and Opportunities, in* THE PRECAUTIONARY PRINCIPLE AND ENVIRONMENTAL LAW: THE CHALLENGE OF IMPLEMENTATION 249, 260 (David Freestone & Ellen Hey eds., 1996).

23. Russell & VanderZwaag, *Ecosystem and Precautionary Approaches to International Fisheries Governance, supra* note 17, at 57–58.

24. Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, Nov. 7, 1996, 36 I.L.M. 1(1997).

25. Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, December 29, 1972, 26 U.S.T. 2403.

approach to ocean dumping.[26] Only wastes listed on a global "safe list" may be considered for dumping at sea, such as dredged material, sewage sludge, fish wastes, and inert, inorganic geological material.[27] Proposed dumping of those "acceptable wastes" is constrained even further by precautionary requirements, such as waste prevention audits to see if reuse or recycling is practical. Another requirement prohibits government officials from authorizing ocean disposal where waste is so poorly characterized that its potential impact on human health and the environment cannot be assessed.[28]

Strong versions of the precautionary principle have been specifically urged for application to chemical regulation. Placing the burden on industry to undertake further toxicological research for existing chemicals and adopting a reverse listing approach to new chemicals have been suggested as the path forward at the global level.[29] Legislating precautionary research requirements and shifting the burden of proof to chemical manufacturers has also been advocated for national implementation in the United States.[30]

III. SEA OF CONFUSION

The precautionary principle, having given rise to extensive and perplexing literature, remains confusing on a range of fronts.[31] Six slippery aspects stand out: definitional generality,

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26. *See* David L. VanderZwaag and Anne Daniel, *International Law and Ocean Dumping: Steering a Precautionary Course Aboard the 1996 London Protocol, but Still an Unfinished Voyage*, *in* THE FUTURE OF OCEAN REGIME-BUILDING: ESSAYS IN TRIBUTE TO DOUGLAS M. JOHNSTON 515 (Aldo Chircop, Ted L. McDorman & Susan J. Rolston eds., 2009).

27. 1996 Protocol, *supra* note 24, Annex 1.

28. *Id.* Annex 2.

29. *See, e.g.*, David VanderZwaag, *International Law and Arctic Marine Conservation and Protection: A Slushy, Shifting Seascape*, 9 GEO. INT'L ENVTL. L. REV. 303, 342–44 (1997).

30. *See* Sachs, *supra* note 19; Richard A. Denison, *Ten Essential Elements in TSCA Reform*, 39 ENVTL. L. REP. NEWS & ANALYSIS 10020, 10022–23 (2009).

31. *See* Arie Trouwborst, *The Precautionary Principle in General International Law: Combating the Babylonian Confusion*, 16 REV. EUR. COMMUNITY & INT. ENVTL. LAW 185, 186–87 (2007); Jaye Ellis, *Overexploitation of a Valuable Resource? New Literature on the Precautionary Principle*, 17 EUR. J. INT'L L. 445, 445 (2006).

definitional variations, uncertainty in terminology, the wide spectrum of precautionary measures available, differing academic views on implications, and limited interpretations by international tribunals.

A. Definitional Generality

Definitions of the precautionary principle are extremely vague and the challenge of generality is exemplified in the most widely accepted international articulation of the principles. Principle 15 of the Rio Declaration[32] provides:

> In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

Such a definition leaves considerable room for differing interpretations. Terms brimming with uncertainty include state capabilities, serious or irreversible damage, lack of full scientific certainty and cost-effective measures. The Rio version has been described as a "utilitarian compromise" and does not represent a clear clarion call for strong measures.[33]

B. Definitional Variations

With the precautionary principle evolving over many decades through scores of international documents and agreements, it is no surprise that wide variations exist in how the principle is framed. For example, some formulations of the precautionary principle suggest triggering precaution when a human activity may cause *significant* harm to the environment,[34] while the Rio Declaration and other international declarations and agreements set a triggering

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32. Rio Declaration on Environment and Development, June 14, 1992, 31 I.L.M. 874, 879 (1992).

33. Russell & VanderZwaag, *Ecosystem and Precautionary Approaches to International Fisheries Governance*, *supra* note 17, at 59.

34. *See* ARIE TROUWBORST, PRECAUTIONARY RIGHTS AND DUTIES OF STATES 44–52 (2006).

threshold of *serious or irreversible* damage.[35] Whereas the Rio Declaration calls for "cost-effective" measures to be taken in the name of precaution, the Convention on Biological Diversity[36] does not include such a cost-effective limitation. The Preamble states: "Noting also that where there is a threat of significant reduction of loss of biological diversity, lack of full scientific certainty should not be used as a reason for postponing *measures* to avoid or minimize such a threat . . ."[37]

C. *Uncertainty in Terminology*

Debate has occurred over whether there is a difference between the terms precautionary principle and precautionary approach. Some writers have treated the terms as interchangeable,[38] and the Rio Declaration itself refers to Principle 15, which calls for application of the precautionary approach. Some States have preferred the term precautionary approach because it is seen as denoting a flexible and non-binding nature.[39] The Food and Agriculture Organization has consistently preferred the term "precautionary approach," as it is viewed as avoiding extreme interpretations (such as burden of proof shifting) that accompany the term "precautionary principle," and better reflects current socio-economic concerns.[40]

D. *Wide Spectrum of Precautionary Measures*

A spectrum of precautionary measures exists beyond strong versions such as a reversal in the burden of proof and precautionary moratoria. Weaker versions include: mandating regulators to apply the precautionary approach; imposing best available technology standards; following an adaptive management approach where learning is encouraged through incremental development subject to close monitoring; and

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35. *Id.* at 53–66.

36. Convention on Biological Diversity, June 5, 1992, 31 I.L.M. 818 (1992).

37. *Id.* ¶ 9, Preamble (emphasis added).

38. *See, e.g.*, DE SADELEER, ENVIRONMENTAL PRINCIPLES, *supra* note 21, at 92.

39. David VanderZwaag, *The Precautionary Principle and Marine Environmental Protection: Slippery Shores, Rough Seas, and Rising Normative Tides*, 33 OCEAN DEV. & INT'L L. 165, 166 (2002).

40. *Id.* at 167.

setting cautious standards or reference points to limit impacts (for example, setting margins of safety to protect children's health).[41] Placing the burden on regulators to justify taking precautionary measures through scientific risk assessment before using precautionary actions has constrained the application of precaution in the international trade context.[42]

E. Differing Academic Views

Wide divergences in academic viewpoints have become obvious over the implementation implications of the precautionary principle.[43] Some writers have enthusiastically embraced precaution and have strongly supported a reversal in the burden of proof approach.[44]

Others, being more guarded and even skeptical of the precautionary approach, have balked at the notion of reverse onus and, emphasizing the political choices to be made among values and interests, have argued for less extreme measures such as strengthening public participation in decision-making processes.[45] A main driver of differing academic viewpoints appears to be clashing philosophical worldviews.[46]

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41. *See* TROUWBORST, PRECAUTIONARY RIGHTS AND DUTIES OF STATES, *supra* note 34, at 165–82; VanderZwaag, *supra* note 39, *The Precautionary Principle and Marine Environmental Protection*, at 168.

42. *See, e.g.*, JACQUELINE PEEL, SCIENCE AND RISK REGULATION IN INTERNATIONAL LAW (2010); Caroline E. Foster, *Precaution, Scientific Development and Scientific Uncertainty Under the WTO Agreement on Sanitary and Phytosanitary Measures*, 18(1) REV. EUR. COMMUNITY & INT. ENVTL. LAW 50 (2009); Sophie M. Clavier, *Food Fight at the WTO: Can the Precautionary Principle Reconcile Liberalization and Public Fear?*, 16 CURRENTS: INT'L TRADE L.J. 3 (2008) (reviewing the tensions between scientific rationality and cultural and ethical perspectives in the regulation of food safety).

43. *See* TROUWBORST, PRECAUTIONARY RIGHTS AND DUTIES OF STATES, *supra* note 34, at 222.

44. *See, e.g.*, Richard G. Hildreth, M. Casey Jarman & Margaret Langlas, *Roles for a Precautionary Approach in Marine Resources Management*, 19 NATURAL RES. & ENV'T 64 (2004).

45. *See* Jaye Ellis & Alison FitzGerald, *The Precautionary Principle in International Law: Lessons from Fuller's Internal Morality*, 49 MCGILL L. J. 779, 784 (2004).

46. *See* VanderZwaag, *supra* note 39, *The Precautionary Principle and Marine Environmental Protection*, at 168–69 (explaining the competing ecocentric and transcendent world views).

F. Limited Interpretations by International Tribunals

Although quite a few international cases have involved arguments over application of the precautionary approach, decisions by tribunals have displayed a conservative approach towards developing the interpretive jurisprudence.[47] Both the International Tribunal for the Law of the Sea (ITLOS) and the International Court of Justice (ICJ) have avoided pronouncing whether the precautionary principle has attained the status of a customary international law norm.[48] The tendency seen in the various cases that only "tangentially touch" precautionary analysis was also evident in the most recent ICJ case addressing the precautionary approach. In the *Case Concerning Pulp Mills on the River Uruguay (Argentina v. Uruguay)*[49] the court summarily rejected Argentina's reversal of onus argument:

> Regarding the arguments put forward by Argentina on reversal of the burden of proof and on the existence vis-à-vis each Party, of an equal onus to prove under the 1975 Statute, the Court considers that while a precautionary approach may be relevant in the interpretation and application of the provisions of the Statute, it does not follow that it operates as a reversal of the burden of proof. The Court is also of the view that there is nothing in the 1975 Statute itself to indicate that it places the burden of proof equally on both Parties.[50]

The Separate Opinion of Judge Cancado Trindade strongly criticized the court's failure to elaborate on the general principles of international environmental law and their possible sources in natural law.[51] He found it inconceivable that the ICJ

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47. *See* TIM STEPHENS, INTERNATIONAL COURTS AND ENVIRONMENTAL PROTECTION 12–13 (2009) (providing a review of key cases); *see also* DE SADELEER, ENVIRONMENTAL PRINCIPLES, *supra* note 21.

48. *See* TROUWBORST, PRECAUTIONARY RIGHTS AND DUTIES OF STATES, *supra* note 34, at 7; *see also* Owen McIntryre & Thomas Mosedale, *The Precautionary Principle as a Norm of Customary International Law*, 9 J. ENVTL. L. 221, 222–23 (1997) (noting that the precautionary principle has "crystallized into . . . customary international law").

49. Case Concerning Pulp Mills on the River Uruguay (Argentina v. Uruguay), 2010 I.C.J. 135 (Apr. 20).

50. *Id.* ¶ 164.

51. *Id.* ¶ 62–96 and 103–113 (separate opinion of Judge Cancado Trinidade); *see*

has, so far, shown so much precaution with the precautionary principle.[52]

IV. SEA OF DILUTION

Applying the precautionary approach to toxic chemical control at the international level may certainly be characterized as "diluted" as only general and weak forms of precaution have largely been adopted.[53] The sea of dilution reality may be seen in the two major global agreements addressing toxic chemicals, the 1998 Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade[54] and the 2001 Stockholm Convention on Persistent Organic Pollutants,[55] and the major international voluntary initiative, the Strategic Approach to International Chemicals Management (SAICM).[56] A brief review of how the precautionary approach has been embraced and implemented under the two treaties and SAICM follows. A critique of other global and regional agreements and arrangements relevant to toxic chemicals management is beyond the scope of this Paper.[57]

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also Bebhinn Donnelly & Patrick Bishop, *Natural Law and Ecocentrism*, 19 J. ENVTL. L. 89 (2007) (explaining natural law theory).

52. Trinidade, *supra* note 51, ¶ 67.

53. *See* VanderZwaag, *supra* note 13, at 358–59.

54. Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, Sept. 11, 1999, 38 I.L.M. 1 (1999) [hereinafter *Rotterdam Convention*].

55. United Nations Environment Programme (UNEP), Stockholm Convention on Persistent Organic Pollutants, May 22, 2001, 40 I.L.M. 532 (2001) [hereinafter *Stockholm Convention*].

56. *See* UNEP, *Strategic Approach to International Chemicals Management*, U.N. Doc. SAICM/EUJ.4/5 (Nov. 18, 2010) (noting that SAICM, which was adopted by the International Conference on Chemicals Management on February 6, 2006 in Dubai, United Arab Emirates, represents an international policy framework encouraging the sound management of chemicals).

57. The sound management of chemicals is addressed by at least seventeen different multilateral agreements and documents. *See Review of Implementation of Agenda 21 and the Johannesburg Plan of Implementation: Chemicals, Report of the Secretary-General*, Commission on Sustainable Development, 18th Session, ¶ 14, U.N. Doc. E/CN.17/2010/5 (May 3–14, 2010); *see also* HENRIK SELIN, GLOBAL GOVERNANCE OF HAZARDOUS CHEMICALS: CHALLENGES OF MULTILEVEL MANAGEMENT 64 (2010) (reviewing the 1989 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal and the 1998 Protocol on Persistent Organic

A. *Rotterdam Convention*

The Rotterdam Convention might be described as "nearly vacuous" regarding precaution. The Convention makes no explicit mention of the precaution approach.[58] The Convention aims at controlling, through a prior informed consent procedure (PIC), the international trade of hazardous chemicals and pesticides rather than prohibiting or phasing out listed chemicals.[59] For chemicals listed in Annex III, a prior informed consent procedure is to apply whereby countries of potential imports are given the option of consenting to or prohibiting imports.[60] States of export are to ensure exporters within their jurisdiction comply with the importing state's decisions.[61] For chemicals not on the PIC list that are banned or severely restricted by a Party, an export notification procedure is required to importing Parties.[62] To date, only forty chemicals have been listed in Annex III and thus subjected to the PIC procedure.[63]

Rather than facilitate the addition of chemicals on the PIC list, non-precautionary and cumbersome procedures are imposed that restrict potential PIC list additions. Notification of final regulatory actions to ban or severely restrict a chemical from at

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Pollutants to the Convention on Long-Range Transboundary Air Pollution); MARC PALLEMAERTS, TOXICS AND TRANSNATIONAL LAW: INTERNATIONAL AND EUROPEAN REGULATION OF TOXIC SUBSTANCES AS LEGAL SYMBOLISM (2003) (providing a review of various legal approaches for controlling toxic emissions to the aquatic environment).

58. *Rotterdam Convention*, *supra* note 54. The Preamble merely recalls the provisions of the Rio Declaration on Environment and Development and thus the precautionary approach is implicitly acknowledged. *Id.*

59. *See* Nancy S. Zahedi, *Implementing the Rotterdam Convention: The Challenges of Transforming Aspirational Goals into Effective Controls on Hazardous Pesticide Exports to Developing Countries*, 11 GEO. INT'L ENVTL. L. REV. 707 (1999) (providing further review); *see also* Paula Barrios, *The Rotterdam Convention on Hazardous Chemicals: A Meaningful Step Toward Environmental Protection?*, 16 GEO. INT'L ENVTL. L. REV. 679 (2004).

60. *Rotterdam Convention*, *supra* note 54, at art. 10.

61. *Id.* at art. 11.

62. *Id.* at art. 12.

63. UNEP, Rotterdam Convention, Annex III, http://www.pic.int/home.php?type=t&id=29& sid=30 (last visited Feb. 2, 2011). Twenty-nine are pesticides (including four severely hazardous pesticide formulations) and eleven are industrial chemicals. *Id.*

least two regions is required.[64] A Chemical Review Committee (CRC) is then tasked with ensuring final regulatory actions are taken to protect human health or the environment and are based on scientific risk evaluations.[65] The CRC is required to develop draft decision guidance documents for further recommended listings.[66] Finally, the Conference of the Parties (COP) must approve any chemical additions to Annex III by consensus.[67]

As a result, adding a chemical to the PIC list has in fact become a major challenge. One of the major battles has been over the proposed listing of chrysotile asbestos in Annex III. Although the Chemical Review Committee recommended listing the chemical to the third COP in 2006 based upon multiple notifications on bans or severe restrictions,[68] no consensus could be reached on listing, and the issue was placed on the fourth COP's agenda for October 2008, where Parties again could not reach consensus.[69] The issue of listing is to be considered once again at the fifth COP scheduled for June 20, 2011, in Geneva.[70] Canada has been severely criticized for continuing to allow the export of asbestos to developing countries[71] and has been opposed, along with other countries such as the Russian Federation, to PIC listing.[72] Getting consensus on the listing of

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64. *Rotterdam Convention*, *supra* note 54, at art. 5(5). Seven Prior Informed Consent regions have been established, pursuant to decision RC 1/2 at the first meeting of the Conference of the Parties; specifically, Africa, Asia, Europe, Latin America and the Caribbean, Near East, North America, and Southwest Pacific. UNEP, Rotterdam Convention, Ratifications, http://www.pic.int/ home.php?type=t&id=63&sid =17 (last visited Feb. 2, 2011).

65. *Rotterdam Convention*, *supra* note 54, at art. 5(6) and Annex II.

66. *Id.* at art. 7.

67. *Id.* at art. 22(5)(b).

68. UNEP, Food and Agriculture Organization of the United Nations (FAO), Inclusion of Chrysotile Asbestos in Annex III to the Rotterdam Convention, 14, U.N. Doc. UNEP/FAO/RC/COP.5/11 (July 6, 2010). Notifications were received from Australia, Chile and the European Community. *Id.*

69. *Id.* at 1.

70. *Id.* at 1–2.

71. *See* Martin Mittelstaedt, *Canada's Cancer-Causing Cargo: Our Gift to the World*, THE GLOBE AND MAIL, Oct. 27, 2007, at F4–F5.

72. *See* IISD, *Summary of the Third Meeting of the Conference of the Parties to the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous*

the pesticide endosulfan has also been problematic, with the fifth COP once again scheduled to consider whether to add endosulfan to Annex III.[73]

At the fourth COP in 2008, Parties highlighted the further listing limitation, which is getting notifications from two different PIC regions of final regulatory actions necessary to trigger a recommendation for listing.[74] The fourth COP noted that some 177 chemicals had been notified by one country as banned or severely restricted and urged Parties to give priority to assessing the 177 notified chemicals so listing could move forward where appropriate.[75]

B. Stockholm Convention on POPs

The Stockholm Convention might be characterized as "thin" on precaution. The Convention explicitly mentions, but only weakly supports, precaution. The Preamble acknowledges that "precaution underlies the concerns of all the Parties and is embedded within this Convention . . ."[76] Article 1, which sets out the overall objective of the Convention provides, "Mindful of the precautionary approach as set forth in Principle 15 of the Rio Declaration on Environment and Development, the objective of this Convention is to protect human health and the environment from persistent organic pollutants."[77]

The Convention is very narrow as to the chemicals targeted for elimination or control and leaves considerable leeway for continued uses and emissions of some POPs.[78] Only an initial

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Chemicals and Pesticides in International Trade: 9–13 October 2006, EARTH NEGOTIATIONS BULLETIN, Oct. 16, 2006, at 4.

73. *See* UNEP and FAO, *Inclusion of Endosulfan in Annex III to the Rotterdam Convention, as recommended by the Chemical Review Committee at its second meeting following notifications of final regulatory action from the Netherlands and Thailand*, U.N. Doc. UNEP/FAO/RC/COP.5/12 (2010).

74. *See* FAO, Report of the Conference of the Parties to the Rotterdam Convention on Prior and Informed Consent for Certain Hazardous Chemicals and Pesticides in International Trade on the work of its fourth meeting, ¶ 59 and Annex IV, U.N. Doc. UNEP/FAO/RC/COP.4/24 (Oct. 31, 2008).

75. *Id.* ¶ 21.

76. *Stockholm Convention*, *supra* note 55, Preamble.

77. *Id.*

78. *See* MARCO A. OLSEN, ANALYSIS OF THE STOCKHOLM CONVENTION ON

"dirty dozen" chemicals were initially targeted for control actions.[79] While nine chemicals were listed in Annex A for elimination, various exemptions were allowed, such as an option for countries to register initial five year exemptions allowing specific uses for six pesticides e.g. using chlordane, heptachlor and mirex for fighting termites.[80] For DDT, listed in Annex B as a restricted substance, countries may continue producing and using DDT for disease control purposes in accord with World Health Organization guidelines.[81] For unintentional byproducts listed in Annex C—dioxins, furans, hexachlorobenzene and PCBs—countries pledge to minimize and, when feasible, eliminate releases and develop action plans for release reduction.[82]

A rather weak version of precaution is adopted for adding POPs to the Annexes. A Party wishing to list a chemical must submit extensive scientific data including evidence of persistence, bio-accumulation, possible adverse effects, and potential for long-range transport.[83] Before a listing recommendation can be given, the Persistent Organic Pollutants Review Committee (POPRC) must prepare a risk profile in accord with Annex E and a risk management evaluation complying with Annex F.[84] If the POPRC decides that a chemical is likely, as a result of its long-range transport, to lead to significant adverse human health and/or environmental effects such that global action is warranted, "lack of full scientific certainty shall not prevent the proposal from proceeding."[85] The Conference of the Parties is granted the

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PERSISTENT ORGANIC POLLUTANTS (2003).

79. *Stockholm Convention*, *supra* note 55, Annex A, at 551. They were: under Annex A for elimination (aldrin, chlordane, dieldrin, endrin, heptachlor, hexaphlorobenzene, mirex, toxaphene and polychlorinated biphenyls); under Annex B for restriction (DDT); and under Annex C to address unintentional production (dioxins and furans, hexachlorobenze and PCBs). *Id.*

80. *Id.* at art. 4 & Annex A; *see also* Stockholm Convention on POP's, Exemptions, http://chm. pops.int/Programmes/Exemptions (last visited Jan. 14, 2011).

81. *Stockholm Convention*, *supra* note 55, Annex B.

82. *Id.* at art. 5.

83. *Id.* at art. 8

84. *Id.* at art. 8(6)(7).

85. *Id.* at art. 8(7)(a).

discretion to list additional chemicals, although such discretion is to be exercised "in a precautionary manner."[86]

A non-precautionary "loophole" exists for a Party not wishing to be bound by a new chemical listing. A Party can declare that it will be bound by new listings only through express consent to "opt in."[87]

The addition of chemicals to the Convention's Annexes has been quite slow. Nine additional POPs were added to the lists at the fourth COP in May 2009.[88] At the POPRC meeting in October 2010, the Committee reviewed three more chemicals nominated as substances to be added to the Convention but only endosulfan, a widely used pesticide, received a finalized recommendation to the Conference of the Parties.[89] Hexabromocyclododecane (HBCD), a flame retardant, was reviewed, a risk profile adopted, and the Committee decided HBCD should proceed to the risk management phase of the review process.[90] The Committee reviewed the risk profile for short-chained chlorinated paraffin (SCCP), a group of industrial chemicals, and decided to postpone any decision-making.[91]

C. Strategic Approach to International Chemicals Management

The Strategic Approach to International Chemicals Management (SAICM), a voluntary global initiative launched in

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86. *Id.* at art. 8(9).

87. *Id.* at art. 22(4), 25(4).

88. *See* Stockholm Convention on Persistent Organic Pollutants, *Recommendations of the Persistent Organic Pollutants Review Committee of the Stockholm Convention to amend Annexes A, B or C of the Convention* (May 4–8, 2009). The chemicals added are chlordecone (pesticide), hexabromobiphenyl (flame retardant), alpha hexachlorocyclohexane and beta hexachlorocyclohexane (by-products of lindane production), lindane (insecticide), tetrabromodiphenyl ether and pentabromodiphenyl ether (flame retardants), hexabromodiphenyl ether and heptabromodiphenyl ether (flame retardants), perfluorooctane sulfonic acid (PFOS), its salts and perfluorooctane sulfonyl fluoride (PFOSF) (stain repellants and fire fighting foams) and pentachlorobenzene (unintentional production during combustion and industrial processes). *Id.*

89. Stockholm Convention on Persistent Organic Pollutants, *Report of the Persistent Organic Pollutants Review Committee on the Work of its Sixth Meeting*, 10–12, U.N. Doc. UNEP/POPS/POPRC.6/13 (Oct. 23, 2010).

90. *Id.* at 12–13.

91. *Id.* at 23–24.

2006 to further better management of chemicals, also promotes "diluted precaution" through its three components. Those components are the Dubai Declaration on International Chemicals Management,[92] the Overarching Policy Strategy[93] and the Global Plan of Action.[94]

1. Dubai Declaration

The Dubai Declaration highlights the need for concerted action to increase the capacity for managing chemicals in developing countries and countries with transitioning economies[95] and emphasizes the insufficient progress in international chemicals management.[96] The Declaration avoids any explicit reference to the precautionary approach. It does, however, express ongoing commitment to various documents and declarations, including the Rio Declaration on Environment and Development and its weak articulation of the precautionary approach.[97] General commitments are made to protect vulnerable groups, such as children, from hazardous chemical exposures.[98]

2. Overarching Policy Strategy

The Overarching Political Strategy (Strategy) as a policy document offers many promising dimensions. It establishes an overall objective of achieving the sound management of chemicals throughout their life cycle so that by 2020, chemicals are used and produced in ways that minimize significant adverse effects on human health and the environment.[99] The Strategy promotes mobilization of additional financial resources

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92. International Conference of Chemicals Management, Dubai, U.A.E., Feb. 4–6, 2006, *Strategic Approach to International Chemicals Management: SAICM Texts and Resolutions of the International Conference on Chemicals Management*, at 6–9 [hereinafter *Resolutions*].

93. *Id.* at 10–30.

94. *Id.* at 31–106.

95. *Id.* ¶ 6, at 6.

96. *Id.* ¶ 5, at 6.

97. *See id.* ¶¶ 11, 13, at 7–8.

98. *Id.* ¶¶ 23–24, at 9.

99. *Id.* ¶ 13, at 14–15.

to support capacity-building for chemicals management and emphasizes that the Quick Start Programme, a specific funding initiative to move SAICM objectives forward, is central to meeting the 2020 goal.[100] The development of safer chemical alternatives and even non-chemical options is encouraged.[101] The Strategy attempts to ensure implementation will be appropriately monitored and to facilitate international coordination in addressing chemicals by calling for the International Conference on Chemicals Management to convene on a periodic basis with sessions proposed for 2009, 2012, 2015 and 2020.[102]

But the Strategy fails to adopt a strong precautionary approach. The Strategy aims to ensure by 2020:

> That chemicals or chemical uses that pose an unreasonable and otherwise unmanageable risk to human health or the environment based on *science-based risk assessment* and taking into account the costs and benefits as well as the availability of safer substances and their efficacy, are no longer produced or used for such uses.[103]

The document urges the application of the precautionary approach as set out in Principle 15 of the Rio Declaration.[104] The Strategy suggests a cautious approach to precaution through a firm endorsement of scientific risk assessment as the key to taking management actions.

3. Global Plan of Action

The Global Plan of Action, suggesting over 250 activities for addressing chemicals management, is not "thick" on precaution. While numerous activities are suggested, such as the

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100. *Id.* ¶ 19, at 21. Donors to the Quick Start Programme Trust Fund have been recently reported as enabling 117 capacity-building projects in 95 countries. *See* Strategic Approach to International Chemicals Management, Paris, Fr., Nov. 18, 2010, *Report of the Fourth EU-JUSSCANNZ Countries Meeting on the Strategic Approach to International Chemicals Management*, ¶ 24, SAICM/EUJ.4/5 (Dec. 21, 2010).

101. *Resolutions*, *supra* note 92, ¶ 14(j), at 16.

102. *Id.* ¶ 25, at 26.

103. *Id.* ¶ 14(d)(i), at 15 (emphasis added).

104. *Id.* ¶ 14(e), at 14–15.

development of national action plans for the sound management of chemicals[105] and promotion of further development of international agreements relating to chemicals,[106] only one proposed activity explicitly refers to the precautionary approach. Under the work area theme of risk assessment, management and communication, the Plan of Action takes into account the precautionary approach by proposing the further development of "methodologies" using transparent science-based risk assessment procedures and science-based risk management procedures.[107]

V. CONCLUSION: ENVISIONING PRECAUTIONARY FUTURES

Although the precautionary approach offers potentially powerful avenues to avoid environmental degradation and the adverse effects of toxic chemicals, the principle of precaution is engulfed in a sea of confusion and dilution with weaker versions of precaution generally prevailing. In light of conflicting academic and political viewpoints toward the meaning and implications of the precautionary principle, the future course of international law and policy developments is difficult to predict. Nevertheless, two main precautionary futures may be envisaged—evolutionary and revolutionary.

An evolutionary future seems obvious at least as a near-term track. Progressive steps can continue to be taken under the existing fragmented array of agreements and initiatives targeting chemicals.[108] For example, further chemicals can be added in a precautionary manner for controls under the Rotterdam and Stockholm Conventions. SAICM may continue to

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105. *Id.* Table B, Activities 1, at 38.

106. *Id.* Table B, Activities 176, at 83.

107. *Id.* Table B, Activities 133, at 71.

108. Such an evolutionary future might be described as "fragmented incrementalism." *See* David VanderZwaag, *Transboundary Challenges and Cooperation in the Gulf of Maine Region: Riding a Restless Sea Toward Misty Shores*, *in* LAW OF THE SEA: THE COMMON HERITAGE AND EMERGING CHALLENGES 265, 281 (Harry N. Scheiber ed. 2000); *see also* UNITED NATIONS, ECON. & SOC. COUNCIL [ECOSOC], Comm. on Sustainable Development, *Report on the Eighteenth Session*, ¶ 103, at 30, U.N. Doc. E/CN.17/2010/15 (May 15, 2009 & May 3–14, 2010) (focusing on the need for full and effective implementation of existing global chemical conventions) [hereinafter Comm'n on Sustainable Development *Report*].

foster dialogue and facilitate actions to address emerging policy issues like the risks of nanotechnologies[109] and chemicals in products.[110] Scientific, technical and legal capacity-development can be increased pursuant to the chemical conventions and SAICM.[111] Establishing a Panel of Scientific Chemical Experts along the lines of the Intergovernmental Panel on Climate Change could better coordinate and expand toxicity testing and the dissemination of chemical risk and management information.[112] Further cooperation through multilateral environmental agreements targeting chemical management could be promoted under the "clustering concept."[113] Harmonizing national legislative approaches to shift the burden of proof from the government to the manufacturers and to promote safer substitutes for hazardous chemicals are also evolutionary trends.[114]

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109. *See generally* Robert Lee & Elen Stokes, *Twenty-First Century Novel: Regulating Nanotechnologies*, 21 J. ENVTL. L. 469 (2009) (discussing regulatory challenges posed by nanomaterials).

110. *See* Strategic Approach to International Chemicals Management, Geneva, Switz., May 11–15, 2009, *Report of the International Conference on Chemicals Management on the Work of its Second Session*, Resolution II/4 at 34–38, SAICM/ICCM.2/15 (May. 27, 2009) [hereinafter *Report of the Second Session*]. SAICM's second session addressed four emerging issues—namely, lead in paint, chemicals in products, hazardous substances in electronic products and nanotechnologies. *Id.* Conference Resolution II/4 supported various initiatives including a project to review regulations and standards for chemicals in products and a report to investigate the potential benefits and risks to human health and the environment associated with nanotechnologies and manufactured nanomaterials. *See id.* at 35.

111. *See Report of the Secretary-General*, *supra* note 57, ¶¶ 76–83 (discussing the need for firmer financing to achieve capacity development relating to chemicals management).

112. A number or representatives at SAICM's second international conference supported such a suggestion. *See Report of the Second Session*, *supra* note 110, at 6.

113. Enhancement of cooperation among the Basel, Rotterdam and Stockholm conventions is an ongoing process and was substantially moved forward by the simultaneous extraordinary meetings of the Conferences of the Parties where decisions were reached on a number of fronts including joint activities and joint managerial functions. *See* Conferences of the Parties to the Basel, Rotterdam and Stockholm Conventions Simultaneous Extraordinary Meetings, Bali, Indon., Feb. 22–24, 2010, *Report of the Simultaneous Extraordinary Meetings of the Conferences of the Parties to the Basel, Rotterdam and Stockholm Conventions*, UNEP/FAO/CHW/RC/POPS/EXCOPS.1/8 (Apr. 7, 2010).

114. *See* Noah M. Sachs, *Jumping the Pond: Transnational Law and the Future of*

Furthermore, regional efforts in chemical management could be bolstered. For example, chemicals for phase-out or elimination could be added under the 1998 Protocol on POPs to the Convention on Long-Range Transboundary Air Pollution (CLRTAP).[115] Additional regional actions for the sound management of chemicals could be forged under the auspices of the North American Commission for Environmental Cooperation (CEC).[116]

Getting key countries to ratify the existing chemical conventions remains a challenge. For example, the United States is neither a Party to the global chemical conventions nor the CLRTAP POPs Protocol.[117]

A revolutionary future involving a "legal leap" to a new comprehensive chemicals convention with strong precautionary

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Chemical Regulation, 62 VAND. L. REV. 1817, 1819 (2009); *see also* Monique Lee Hawthorne, *Confronting Toxic Work Exposure in China: The Precautionary Principle and Burden Shifting*, 37 ENVTL. L. 151, 155–56 (2007); *see also* Fazal Khan, *Preserving Human Potential as Freedom: A Framework for Regulating Epigenetic Harms*, 20 HEALTH MATRIX 259, 277, 284–88, 299 (2010) (commenting on the inadequacy of legislatures and courts to force manufacturers to develop and disclose epigenetic safety information in relation to possible hereditary effects).

115. United Nations, Econ. & Soc. Council [ECOSOC], U.N. Econ. Comm'n for Europe [UNECE], *Draft Protocol to the Convention on Long-Range Transboundary air Pollution on Persistent Organic Pollutants*, 37 I.L.M. 505, 516 (Mar. 31, 1998). Adopted under the auspices of the UN Economic Commission for Europe (UNECE), the Protocol might be described as a regional counterpart to the global POPs Convention and the Protocol addressed sixteen substances initially with seven additional substances added through decisions by Parties on December 18, 2009. UNECE, *Protocol on Persistent Organic Pollutants (POPs)*, http://unece.org/env/lrtap/pops_h1.htm (last visited Jan. 30, 2011).

116. *Id.* CEC's Sound Management of Chemicals (SMOC) initiative helped forge a number of North American Regional Action Plans for specific chemicals, such as DDT, chlordane, PCBs and mercury. CEC, *Sound Management of Chemicals*, http://www.cec.org/Page.asp?PageID=1225& SiteNodeID=595 (last visited Jan. 30, 2011).

117. *See* UNECE, *Status of Ratification of the 1998 Aarhus Protocol on Persistent Organic Pollutants (POPs) as of 01 March 2011*, http://www.unece.org/env/lrtap/status/98pop_st.htm; *Rotterdam Convention*, *supra* note 54; *see also* Stockholm Convention on Persistent Organic Pollutants, *Status of Ratifications*, *available at* http://chm.pops.int/Countries/StatusofRatifications/tabid/252/language/en-GB/Default.aspx (last visited Jan. 30, 2011). U.S. policy needs to undergo revision to align with the international community; *see also* Danielle Brim, *The Roles of Precaution and Political Accountability in the Regulation of Polybrominated Diphenyl Ethers*, 38 VAND. J. TRANSNAT'L L. 791, 793–94, 807–08 (2005).

provisions can also be envisioned.[118] Key precautionary elements might include a reverse listing approach for new chemicals whereby only chemicals listed on a global "safe list" would be allowed on the market[119] and requiring registration of existing chemicals on a global registry. The registration process might mandate the chemical industry provide toxicity and safety data within a stated timeframe and prohibit marketing of chemicals where such data is not provided (no data, no market).[120] Establishment of an International Chemicals Agency might be considered also, with possible chemical evaluation and registration functions.[121]

The "revolutionary option" can be supported on various grounds. A more proactive and comprehensive approach is essential to keep abreast of the rapid rate of potential chemical introductions. On September 7, 2009, the Chemical Abstracts Service (CAS), a division of the American Chemical Society, announced the recording of the 50 millionth substance in the CAS Registry.[122] A novel substance is estimated to be isolated or synthesized about every three seconds.[123] Global registration, along with required toxicity and safety data by industry, might be viewed as a logical "next step" in light of the EU's precautionary leadership through its Registration, Evaluation

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118. Other revolutionary approaches, of course, also exist, such as the possibility of forging a new UN or World Environment Organization with delegated regulatory powers. *See* ADIL NAJAM, MIHAELA PAPA & NADAA TAIYAB, GLOBAL ENVIRONMENTAL GOVERNANCE: A REFORM AGENDA (2006) (reviewing various global environmental governance reform models proposed and reasons why getting political agreement on real change has been difficult).

119. *See* VanderZwaag and Daniel, *supra* note 26, at 550 (suggesting a global "reverse listing" approach modeled on the 1996 Protocol to the London Convention).

120. *See* Marcos A. Orellana, *Europe's Reach: A New Chapter in International Chemicals Law*, 6 SUSTAINABLE DEV. LAW & POL'Y 21, 21–28 (2006) (analyzing the European Union's REACH regulation).

121. Such an agency might be modeled after the European Chemicals Agency, based in Helsinki. European Chemicals Agency, http://echa.europa.eu/home_en.asp (last visited Jan. 30, 2011).

122. CAS, *50 Millionth Unique Chemical Substance Recorded in CAS Registry*, Sept. 8, 2009, http://www.cas.org/newsevents/releases/50millionth090809.html.

123. *Id.* About 1,000 new chemicals are estimated to enter the market each year. *Report of the Secretary-General*, *supra* note 57, ¶ 10.

and Authorization of Chemicals (REACH) Regulation,[124] which has imposed a no data, no market approach.[125]

But prospects for a comprehensive chemicals convention do not look bright because of various "dimming factors." There appears to be considerable political faith in the sufficiency of existing legally-binding agreements and voluntary initiatives for addressing chemicals.[126] Opposition to strong ecocentric versions of precaution continues.[127] Countries remain guarded over the prospect of losing sovereignty to a global regulatory framework.[128] Political champions pushing the idea of a comprehensive convention are lacking.[129] Considerable

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124. Regulation (EC) No. 1907/2006 of the European Parliament and of the Council, Dec. 18, 2006, 2006 O.J. L396.

125. However, substances produced or imported in quantities of less than 1 ton/year by any single manufacturer or importer are not covered by REACH. *Id.* at art. 6(1). Various critiques of the complex provisions and procedures under REACH exist. *See* Steffen Foss Hansen, Lars Carlsen & Joel A. Tickner, *Chemicals Regulation and Precaution: Does REACH Really Incorporate the Precautionary Principle*, 10 ENVTL. SCI. & POL'Y 395 (2007) (assessing REACH's limitations regarding administrative oversight and legislative interpretation); Christina Rudén & Sven Ove Hansson, *Registration, Evaluation, and Authorization of Chemicals (REACH) Is but the First Step – How Far Will It Take Us? Six Further Steps to Improve the European Chemicals Legislation*, 118 ENVTL HEALTH PERSPECTIVES 6 (2010) (analyzing how much data will in fact be generated within REACH); Leslie E. Kersey, *Trans-Atlantic REACH: The Potential Impact of the European Union's New Chemical Regulation on Proof of Causation in U.S. Federal Courts*, 36 B.C. ENVTL. AFF. L. REV. 535 (2009) (summarizing REACH's process of regulation over chemicals and shortcomings); Søren Løkke, *The Precautionary Principle and Chemicals Regulation: Past Achievements and Future Possibilities*, 13 ENVTL. SCI. POLLUTION RES. 342 (2006).

126. *See, e.g.*, Comm'n on Sustainable Development *Report*, *supra* note 108.

127. *See* Sachs, *supra* note 19 (reviewing the utilitarian critics attacking the precautionary principle as extreme and paralyzing).

128. *See* Douglas M. Johnston, *The Challenge of International Ocean Governance: Institutional, Ethical and Conceptual Dilemmas*, *in* TOWARDS PRINCIPLED OCEANS GOVERNANCE: AUSTRALIAN AND CANADIAN APPROACHES AND CHALLENGES 349, 349–52 (Donald R. Rothwell & David L. VanderZwaag eds., 2006) (outlining the continuing centrality of state sovereignty and limited international cooperative arrangements).

129. The reality of the lack of champions stands out from the Commission on Sustainable Development's review of chemicals management at its 18th session in May 2010, where various groups did not discuss possible strong precautionary paths forward and the contribution by workers and trade unions only called for a general shifting of the burden of proof for chemical safety on to manufacturers. *See* U.N., Econ. & Soc. Council [ECOSOC], Comm'n on Sustainable Development, *Discussion Papers Submitted by Major Groups: Contribution by workers and trade unions*, ¶ 51, U.N. Doc.

negotiation energies are presently being expended at the international level for a new legally-binding instrument on mercury,[130] demonstrating a political preference for incrementally tackling pollutant issues.[131]

How long the world can wait for a legal leap in international chemicals management is as much an ethical question as it is a political, social and economic one.[132] One thing is certain, a rough and arduous voyage lies ahead in the global quest for effective chemicals management. Faith in "science-based" decision-making and political confidence in scientific risk assessments are likely to be increasingly challenged from human rights[133] (including indigenous rights),[134] environmental

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E/CN.17/2010/11/Add.6 (Jan. 13, 2010).

130. UNEP's Governing Council at its 25th session in February 2009 through decision 25/5 called for the convening of an intergovernmental negotiating committee to prepare a global legally-binding instrument on mercury, commencing in 2010 with a goal of completion in 2013 and the Intergovernmental Negotiating Committee (INC) is scheduled to convene a second session in Chiba, Japan, January 24–28, 2011. *See* United Nations Environment Programme, *Intergovermental Negotiating Committee*, http://www.unep.org/hazardoussubstances/Mercury/Negotiations/INC2/tabid/3468/Default.aspx (last visited Jan. 30, 2011).

131. *See id.* (UNEP's website focuses only on mercury and not other heavy metals).

132. *See* Douglas M. Johnston & David L. VanderZwaag, *The Ocean and International Environmental Law: Swimming, Sinking, and Treading Water at the Millennium*, 43 OCEAN & COASTAL MGMT. 141, 151–53 (2000). The world movement of environmental ethicists and continued tensions between following a policy of regulation versus a policy of prohibition are prime examples of these ethical questions. *See id.*

133. The emerging human right to a clean and healthy environment including the right to be free from pollution continues to be debated. *See, e.g.*, Sumudu Atapattu, *The Right to a Healthy Life or the Right to Die Polluted?: The Emergence of a Human Right to a Healthy Environment Under International Law*, 16 TUL. ENVTL. L.J. 65, 74–78 (2002); Barry E. Hill, Steve Wolfson & Nicholas Targ, *Human Rights and the Environment: A Synopsis and Some Predictions*, 16 GEO. INT'L ENVTL. L. REV. 359, 362 (2004); LAURA WESTRA, ENVIRONMENTAL JUSTICE AND THE RIGHTS OF UNBORN AND FUTURE GENERATIONS: LAW, ENVIRONMENTAL HARM AND THE RIGHT TO HEALTH, 5–6, 135 (2006). For the view that Parties to the Stockholm Convention on POPs, by allowing DDT as an anti-malarial intervention, are infringing the right to health obligations under Article 12 of the International Covenant on Economic, Social and Cultural Rights, *see* Nikki Kumar, *Public Health or Public Harm: DDT, Malaria and the Right to Health*, 23 WINDSOR REV. LEGAL & SOC. ISSUES 85, 89 (2007).

134. *See* LAURA WESTRA, ENVIRONMENTAL JUSTICE AND THE RIGHTS OF INDIGENOUS PEOPLES: INTERNATIONAL AND DOMESTIC LEGAL PERSPECTIVES, 241–42 (2008). Aboriginal rights may include a state obligation to take proactive actions within international forums to prevent significant biocontamination. *See* Constance McIntosh,

rights[135] and legitimacy perspectives.[136]

VI. POSTSCRIPT

Three recent developments are worthy of note. The Seabed Disputes Chamber of the International Tribunal for the Law of the Sea on February 1, 2011 handed down its Advisory Opinion on "Responsibilities and Obligations of States Sponsoring Persons and Entities with respect to Activities in the Area", where the Chamber noted in paragraph 135 that the Rio Declaration has initiated a trend towards making the precautionary approach part of customary international law.[137] At the fifth meeting of the Conference of the Parties to the Stockholm Convention, held in April 2011, a decision was reached to list endosulfan in Annex A.[138] At the fifth meeting of the Conference of the Parties to the Rotterdam Convention, held in June 2011, Parties reached agreement to add aldicarb, alachlor and endosulfan to Annex III of the Convention but consensus could not be reached on listing chrysotile asbestos with Canada, Kazakhstan, Kyrgyzstan, Ukraine and Vietnam opposing the addition.[139]

On Obligations and Contamination: The Crown-Aboriginal Relationship in the Context of Internationally-Sourced Infringements, 72 SASK. L. REV. 223, 230–31, 233, 236 (2009).

135. The right of wildlife to be free from significant threats associated with toxic chemicals is a further likely normative current. *See* Judith E. Koons, *Earth Jurisprudence: The Moral Value of Nature*, 25 PACE ENVTL. L. REV. 263, 286–93 (2008) (discussing the need to value and protect nature beyond human health interests); LAURA WESTRA, AN ENVIRONMENTAL PROPOSAL FOR ETHICS: THE PRINCIPLE OF INTEGRITY, 205–13 (1994).

136. *See* Roger Berkowitz, *Democratic Legitimacy and the Scientific Foundation of Modern Law*, 8 THEORETICAL INQ. L. 91, 93–94, 101 (2007) (discussing the social and ethical nature of legitimacy); KERRY H. WHITESIDE, PRECAUTIONARY POLITICS: PRINCIPLE AND PRACTICE IN CONFRONTING ENVIRONMENTAL RISK, 150 (2006) (concluding that the precautionary principle questions the distribution and legitimacy of regulatory power throughout society).

137. Seabed Disputes Chamber of the Int'l Trib. for the Law of the Sea, Responsibilities and Obligations of States Sponsoring Persons and Entities with respect to Activities in the Area, ¶ 135, ITLOS/PV.2010/1/Rev.1 (Feb. 1, 2011).

138. *Summary of the Fifth Meeting of the Conference of the Parties to Stockholm Convention on Persistent Organic Pollutants: 25–29 April 2011*, EARTH NEGOTIATIONS BULLETIN (IISD Rep. Servs., New York, N.Y.), May 2, 2011.

139. *Summary of the Fifth Meeting of the Rotterdam Convention on Prior Informed Consent: 20–24 June 2011*, EARTH NEGOTIATIONS BULLETIN (IISD Rep. Servs., New York,

N.Y.), June 27, 2011.