Utah OnLaw: The Utah Law Review Online Supplement

Volume 2013 | Number 1 Article 5

2013

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DESALINATION AND INTERNATIONAL WATERCOURSE LAW

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Abstract

This is a response to Rhett B. Larson, Innovation and International Commons: The Case of Desalination Under International Law, *2012 UTAH L. REV. 759. In this response, Professor Schwabach agrees with Professor Larson as to the economic, human, and environmental importance of desalination technology, and as to the possible disruptive impact of rapid technological change on an international legal regime not yet equipped to deal with widespread large-scale desalination. Next, Professor Schwabach points out that, while Professor Larson addresses primarily brackish-water desalination within drainage basins, the greatest potential use of desalination technology may eventually lie in ocean-water desalination, making drainage basin concepts less relevant. Finally, Professor Schwabach examines Professor Larson's proposed collaborative and adaptive management (CAM) approach, and welcomes this important contribution to this emerging area of international environmental law.*

I see Professor Larson has chosen to begin his article on desalination[1] with the same quote from John F. Kennedy I used to begin an article on the subject[2] in 1999: "[I]f we could ever competitively, at a cheap rate, get fresh water from salt water, that would be in the long-range interests of humanity [and] would really dwarf any other scientific accomplishments."[3] President Kennedy's better-known ambition—"that this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the moon and returning him safely to the Earth"[4]—proved in the end the easier of the two. Eight years later, in July 1969, Neil Armstrong and Buzz Aldrin became the first humans to walk on the moon.[5] But the achievement, while impressive in the abstract and useful as a Cold War

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[1] Rhett B. Larson, *Innovation and International Commons: The Case of Desalination Under International Law*, 2012 UTAH L. REV. 759, 759.

[2] Aaron Schwabach, *Using International Law to Prevent Environmental Harm from Increased Use of Desalination*, 34 TEX. INT'L L.J. 187, 187 (1999).

[3] President John F. Kennedy, News Conference, at ¶ 13 (Apr. 12, 1961), *available at* http://www.presidency.ucsb.edu/ws/index.php?pid=8055/.

[4] President John F. Kennedy, Address Before a Joint Session of Congress (May 25, 1961), *available at* http://www.jfklibrary.org/Asset-Viewer/Archives/TNC-200-2.aspx.

[5] *Apollo: Humankind's First Steps on the Lunar Surface*, NASA, http://www.nasa.gov/mission_pages/apollo/missions/apollo11.html (last updated July 8, 2009).

deimatic display, turned out to be an empty one. Despite Kennedy's claim that "[n]o single space project in this period will be . . . more important for the long-range exploration of space," [6] less than three and a half years after Neil Armstrong's "giant leap for mankind," Eugene Cernan and Harrison Schmitt became the last humans to walk on the moon, as the U.S. abandoned the moon and manned space exploration.[7]

Desalination, despite its far greater potential benefit, has gotten off to a slower start. To simplify things, there are two ways to desalinate water: Thermal distillation and non-distillation (membrane) methods.[8] Distillation is simple, and has been understood for millennia. It requires energy to boil water, and unless that energy is waste heat or sunlight, it's expensive. Energy costs have been brought down by such measures as co-location and solar heating, but the practical limits of benefits obtainable by such measures may already have been realized by more recent desalination plants.[9] Non-distillation methods require varying amounts of energy and expense, but so far none is cheap enough for large-scale use other than in severely water-stressed areas such as the Arabian Peninsula or southern California.[10] The low-cost breakthrough may never come. But if it does, whether directly through new desalination membrane technology or indirectly through new energy technology, the environmental consequences will be profound.

Improvements in desalination membrane technology are potential gold mines, and research is ongoing. Perhaps one of the latest promising technologies—forward osmosis, charged carbon nanotubes, or biomimetics[11]—will be the magic bullet. If change comes gradually, the legal system can adapt as it comes. But if it comes suddenly—if that magic bullet is found—U.S. and international

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[6] Kennedy, *supra* note 4.

[7] *Image of the Day Gallery: Apollo 17*, NASA, http://www.nasa.gov/multimedia/imagegallery/image_feature_979.html (last updated Mar. 23, 2008).

[8] Robert F. Service, *Desalination Freshens Up*, SCIENCE, Aug. 25, 2006, at 1088, 1088 (noting that two technologies are "at the heart of desalination," thermal distillation and reverse osmosis).

[9] *E.g.*, Akili D. Khawaji et al., *Advances in Seawater Desalination Technologies*, 221 DESALINATION 47, 47–51, 54–57 (2008).

[10] *Id.* at 58–62.

[11] *See generally* JAMES E. MILLER & LINDSEY R. EVANS, FORWARD OSMOSIS: A NEW APPROACH TO WATER PURIFICATION AND DESALINATION (2006), *available at* http://prod.sandia.gov/techlib/access-control.cgi/2006/064634.pdf (discussing forward osmosis); Soumitra Kar et al., *Carbon Nanotube Membranes for Desalination and Water Purification: Challenges and Opportunities*, 7 NANO TODAY 385 (2012), *available at* http://xa.yimg.com/kq/groups/19679329/1646218610/name/ramji.pdf (discussing carbon nanotube technology use in desalination); C.Y. Tang et al., *Desalination by Biomimetic Aquaporin Membranes: Review of Status and Prospects*, 308 DESALINATION 34 (2013), *available at* http://www.aquaporin.dk/UserFiles/aquaporin.dk/file/DesalReview.pdf (discussing biomimetic desalination technology).

environmental law will find themselves as poorly prepared to deal with the consequences as copyright law was to deal with broadband Internet.[12]

Or perhaps they will be even less prepared. In the past few years there has been an increased interest in desalination,[13] with a perhaps not disproportionate focus on a single water-stressed U.S. state—California.[14] But desalination law remains a sparsely studied field, which makes Professor Larson's article all the more welcome. The fact that I may not agree with everything he proposes in no way diminishes my appreciation of his contribution to this emerging field. Actually, it may be too strong to say that I may not agree; rather, I might have placed the emphasis somewhat differently, and perhaps with less optimism.

First, the emphasis: Professor Larson focuses almost exclusively on desalination within drainage basins—that is, inland desalination of brackish groundwater or surface water.[15] He uses three regions as examples: the Colorado River basin, shared by the U.S. and Mexico; the Jordan River basin, shared by Israel, Jordan, and the Palestinian territories; and China as an upper riparian with regard to multiple watercourses.[16] This suits the article's exploration of desalination within the context of transboundary watercourse law; however, a great deal of desalination is seawater desalination. This, too, has environmental consequences, which for the most part do not directly affect watercourses.[17] For

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[12] *See, e.g.*, AARON SCHWABACH, INTERNET AND THE LAW: TECHNOLOGY, SOCIETY, AND COMPROMISES 50–51 (2006).

[13] *See generally* Robin Kundis Craig, *Water Supply, Desalination, Climate Change, and Energy Policy*, 22 PAC. MCGEORGE GLOBAL BUS. & DEV. L.J. 225 (2010); Larson, *supra* note 1; Michael Pappas, *Unnatural Resource Law: Situating Desalination in Coastal Resource and Water Law Doctrines*, 86 TUL. L. REV. 81 (2012); Ken Ramirez & Patrick Lee, *Desalination: Opportunities and Constraints*, 67 TEX. B.J. 194 (2004); Schwabach, *supra* note 2.

[14] *See generally* Tim McRae, *Coastal Desalination, "Coastal-Dependency" and the California Coast: How Today's Desalination Proposals Could Affect Tomorrow's Coastline*, 31 ENVIRONS ENVTL. L. & POL'Y J. 103 (2008); Symposium, *Desalination in California: Should Ocean Waters Be Utilized to Produce Freshwater?*, 57 HASTINGS L.J. 1343 (2006); Angela Haren Kelley, Comment, *A Call for Consistency: Open Seawater Intakes, Desalination, and the California Water Code*, 4 GOLDEN GATE U. ENVTL. L.J. 277 (2011); Matthew C. Lewis, Comment, *Thirsty for Change: Desalination as a Practical and Environmentally Friendly Answer to California's Growing Water Shortage*, 44 U.S.F. L. REV. 933 (2010); Juan-Carlos Ortiz, Comment, *International Trade Agreements and Private Desalination Plants: Is California's Coast Safe?*, 30 WHITTIER L. REV. 671 (2009).

[15] *See* Larson, *supra* note 1, at 761–64.

[16] *Id.* at 762; *see also Desalination: Costly Drops*, ECONOMIST (Feb. 9, 2013), http://www.economist.com/news/china/21571437-removing-salt-seawater-might-help-slake-some-northern-chinas-thirst-it-comes-high (discussing desalination efforts in China).

[17] *See* Sabine Latteman & Thomas Höpner, *Environmental Impact and Impact Assessment of Seawater Desalination*, 220 DESALINATION 1, 3–10 (2008) (identifying potential environmental impacts of seawater desalination, which include adverse effects on water and sediment quality).

example, the largest desalination plant in the U.S. (and the largest seawater desalination plant in the Americas) is set to open in Carlsbad, California in 2016, eventually providing seven percent of the San Diego region's freshwater needs.[18] Professor Larson also mentions two additional plants being built in Mexico, partly to supply water to the San Diego region.[19] Seawater desalination poses many of the same problems as inland desalination. Concentrated brine waste must be disposed of in a way that causes minimal harm to coastal ecosystems and areas beyond national jurisdiction. Discharged on land, it may affect watercourses or even create an artificial lake, as in the case of Lake Zakher in the United Arab Emirates.[20] Facilities built in one country for the benefit of another raise additional externality questions. In addition, increased water use in coastal areas leads to increased runoff. The increased availability of fresh water may also encourage migration to the coasts. The problems of siltation and eutrophication of coastal wetlands,[21] already all too visible in San Diego County, can be expected to intensify if these desalination measures lead to increased use of fresh water for everything from lawn irrigation to car-washing.

Second, the optimism: Professor Larson divides approaches to watercourse environmental and water law into two categories: rights-based adversarial management (RAM) and collaborative and adaptive management (CAM). At the risk of some oversimplifications, the RAM approach seems to be, or at least to be an analogue of, our old friend limited territorial sovereignty, with its roots in the *Trail Smelter*[22] and *Corfu Channel*[23] cases, the Helsinki Rules,[24] and the Rio[25] and

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[18] *See* Press Release, The Carlsbad Desalination Project, S.D. County Water Authority Board Approves Agreement to Purchase Carlsbad Desalination, *available at* http://carlsbaddesal.com/s-d-county-water-authority-board-approves-agreement.

[19] Larson, *supra* note 1, at 761–62.

[20] *See* Leone Lakhani, *Man-Made Desert Lake: Ecological Paradise or Disaster?*, CNN (Mar. 14, 2013, 10:41 PM), http://www.cnn.com/2013/03/14/world/meast/desert-lake-zakher-emirates.

[21] *See generally* BIGHT'08 ESTUARIES & COASTAL WETLANDS COMM., COASTAL WETLANDS AND ESTUARIES EUTROPHICATION ASSESSMENT WORKPLAN (2008), *available at* ftp://ftp.sccwrp.org/pub/download/DOCUMENTS/BightPlanningDocuments/Bight08/Bight08_CoastalWetlandsEstuaries_Workplan.pdf (outlining planned eutrophication assessment procedures for the San Diego County area).

[22] Trail Smelter (U.S. v. Can.), 3 R. Int'l Arb. Awards 1905, 1965 (1941), *reprinted in* 35 AM. J. INT'L L. 684 (1941).

[23] Corfu Channel (U.K. v. Alb.), 1949 I.C.J. 4, 21–22 (Apr. 9, 1949) (making a determination on the merits).

[24] INT'L LAW ASS'N, HELSINKI RULES ON THE USES OF THE WATERS OF INTERNATIONAL RIVERS, ch. 2, arts. IV & V (1967), *available at* http://www.internationalwaterlaw.org/documents/intldocs/helsinki_rules.html.

[25] United Nations Conference on Environment and Development, Rio de Janeiro, Braz., June 3–14, 1992, *Rio Declaration on Environment and Development*, Princ. 2, U.N. Doc. A/CONF.151/26/Rev.1 (Vol. I), Annex I (Aug. 12, 1992), *reprinted in* 31 I.L.M 874 (1992).

Stockholm[26] Declarations, as well as, perhaps, the United Nations Convention on the Non-Navigational Uses of Transboundary Watercourses.[27]

The CAM concept is more than just the community approach to drainage basin management.[28] It is meant to be flexible enough to accommodate rapid technological change such as a major breakthrough in desalination technology.[29] The means by which this flexibility is to be achieved include "inclusive and cooperative governance at the appropriate level, legitimacy through participation and shared benefits, and adaptive management."[30] The first two items on the list may, like community drainage basin management, prove surpassingly difficult to achieve. Even within the U.S., among states sharing language, culture, history, and most of all an overarching national government, drainage basin management works somewhat less effectively than might have been hoped.[31] Among nations, especially those not already closely linked through other agreements (as in the case of the European Union member states), such close cooperation may never become possible. To some extent this concern is counteracted by an emphasis on fairness;[32] efficiency is better at protecting the environment, while fairness is better at protecting sovereignty.[33]

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[26] United Nations Conference on the Human Environment, Stockholm, Swed., June 5–16, 1972, *Declaration of the United Nations Conference on the Human Environment*, Princ. 21, U.N. Doc. A/CONF.48/14/Rev.1 (June 16, 1972), *reprinted in* 11 I.L.M. 1416 (1972).

[27] United Nations Convention on the Non-Navigational Uses of Transboundary Watercourses, G.A. Res. 51/229, U.N. Doc. A/RES/51/229 (July 8, 1997). Of course, the normative weight to be accorded the Convention is subject to question. *See, e.g.*, Gabriel Eckstein, *A Hydrogeological Perspective of the Status of Ground Water Resources Under the UN Watercourse Convention*, 30 COLUM. J. ENVTL. L. 525, 525–26 (2005); Larson, *supra* note 1, at 781; Aaron Schwabach, *The United Nations Convention on the Law of Non-Navigational Uses of International Watercourses, Customary International Law, and the Interests of Developing Upper Riparians*, 33 TEXAS INT'L L.J. 257, 258 (1998).

[28] The community approach has not found widespread acceptance in the practice of states. *But see* Economic Commission for Europe Declaration of Policy on the Rational Use of Water, Apr. 14, 1984, art. 17, ECE/DEC/C(XXXIX); Case Relating to the Territorial Jurisdiction of the International Commission of the River Oder (U.K. v. Pol.), 1929 P.C.I.J. (ser. A) No. 23, at 27 (Sept. 10) (expressing the elements of the community theory). It remains largely aspirational, at least at the international level. *See, e.g.*, Bellagio Draft Treaty Concerning the Use of Transboundary Groundwaters, 1989, 1 BASIC DOCUMENTS OF INTERNATIONAL ENVIRONMENTAL LAW 42 (Harald Hohmann ed. 1992).

[29] Larson, *supra* note 1, at 795.

[30] *Id.* at 795–96.

[31] *See generally* Robert W. Adler, *Revisiting the Colorado River Compact: Time for A Change?*, 28 J. LAND RESOURCES & ENVTL. L. 19 (2008) (explaining problematic aspects of the Colorado River Compact).

[32] *See* Larson, *supra* note 1, at 795–800.

[33] *See, e.g.*, Shi-Ling Hsu, *Fairness Versus Efficiency in Environmental Law*, 31 ECOLOGY L.Q. 303, 305–08 (2004).

Desalination may turn out to be the disruptive technology that forces the maturation of a fair, efficient, and workable international legal regime. Whether that regime is ultimately based on the CAM model or not, Professor Larson's article is an important step forward in understanding the problem of transboundary water resource management and the ways in which it might be addressed and improved.