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Karen Hyun, Ecosystem-Based Management in the Colorado River Delta

parties cannot alter Congress' determinations, but they do have authority to terminate the Compact.¹⁹⁷ Thus, the hope is that this ability to terminate would give Congress pause and provide an incentive for Congress to pay close attention to the possible effects on the Compact on any proposed legislation.¹⁹⁸

CONCLUSION

The Compact is an excellent example of thoughtful and scholarly collaboration produced by legal and scientific experts in the field of transboundary water resources. Ultimately, like any model statute, its wholesale import or piecemeal adoption of desirable provisions by the states engaged in interstate disputes will remain unknown until significant interstate water allocation renegotiations occur.

As the introduction notes, while compact disputes are increasing, general interstate allocation disputes between states are also increasing, but at a higher rate. The antiquated and cumbersome legal frameworks of the original compacts are approaching obsolescence and proving unworkable in lieu of today's scientific understanding of the hydrological connectivity of the water basins. Therefore, the Compact's learned integration of conservation and ISF into its basic principles will provide persuasive evidence to future interstate agreement drafters of the Model Compact's possible effectiveness. The authors hope to provide a powerful incentive to those engaged in interstate allocation disputes to turn to compacts, and to avoid Constitutional litigation.

Ultimately, "compact and interstate allocation issues are never truly resolved, they are only managed over time."¹⁹⁹ What is clear, however, is that the Compact provides a readily adoptable and comprehensive approach for the states, the federal government, and tribal nations in managing their increasingly scarce water supplies.

Daniel Snare

Karen Hyun, *Ecosystem-Based Management in the Colorado River*

Delta, VDM Verlag Dr. Muller Aktiengesellschaft & Co. (2009); 242 pp; \$105.00; ISBN 978-3-639-11717-2; paperback.

Karen Hyun has a Ph.D. in Marine Affairs from the University of Rhode Island and a M.S. and B.S. in Earth Systems from Stanford. Her dissertation is the basis for *Ecosystem Based Management in the Colorado River Delta*. The book explores and promotes Ecosystem-Based Management ("EBM") in the Colorado River Delta ("CRD").

The first chapter, *Introduction*, discusses the demise of the Colorado River Delta and the subsequent cultural and environmental consequences. The CRD has shrunk to less than ten percent of its

197. *Id.* at 94.

198. *Id.*

199. Interview with George William Sherk, author, MODEL INTERSTATE WATER COMPACT, in Denver, Colo. (Apr. 8, 2010).

original size and continues to see an annual increase in use. Hyun suggests that EBM has emerged as the “dominant management paradigm” to address the degradation of the CRD. EBM is the process of controlling human activities to protect, conserve, and enhance ecosystems to meet current and future needs. The remainder of the introductory chapter outlines the topics that Hyun discusses in the book, and reminds readers that instituting a sustainable solution to the CRD’s overuse is necessary to maintain the CRD.

Chapter two, *Nested Ecosystems in the Colorado River Watershed*, describes the impact that legal and engineering decisions have on different spatial scales within the Colorado River watershed, especially within nested ecosystems. A nested ecosystem is a small, distinct ecosystem that exists within a larger system. Changes in the larger system affect the nested ecosystem. The Rio Hardy-Colorado River Complex serves as an example of a nested ecosystem that has dramatically changed in response to alterations in the larger ecosystem. The chapter goes on to outline the three main drivers of change: climate change, population, and the governance system that manages nested ecosystems. While there is no consensus about the exact consequences of climate change, there is agreement that even the slightest changes will increase the variability of the fragile CRD ecosystem because of increases in evaporation rates, a decrease in precipitation, and uncertain run-off rates. Population increases also intensify the demands on water. This is especially apparent in the American Southwest where there is housing growth, influx of “baby boomers” seeking sunny retirement homes, and a youthful population that will undoubtedly remain in their hometowns.

In chapter three, *Ecosystem-Based Management Principles*, Hyun begins by discussing past norms, values, and the positives and negatives associated with other management systems. Next, Hyun explains the historical background surrounding the definition of Ecosystem-Based Management. She concludes that EBM, like the Ecosystem Management, focuses on the interconnectedness of the system, but seeks to manage human activity rather than the ecosystem itself. EBM is important because the governing institutions reflect management of human action. Hyun identifies and explains the nine principles that inform the analysis of EBM and governing institutions throughout the remainder of the book: (1) ecological scales and dynamics; (2) sustainability; (3) interdisciplinary knowledge; (4) precautionary approach; (5) adaptive management; (6) monitoring; (7) ecosystem valuation; (8) participation; and (9) international responsibility. The first principle, ecological scales and dynamics, accounts for the space, time, and dynamic attributes that affect an institution’s ability to manage an ecosystem. The second principle, sustainability, investigates whether the present generation’s needs are achievable without harming future generations’ abilities to meet their own needs. The third principle, interdisciplinary knowledge, examines whether an institution includes scientific and non-scientific research. The fourth principle, precautionary approach, addresses the concerns of environmental

hazard uncertainties. The fifth principle, adaptive management, examines whether the institution integrates design, management, and monitoring into a way of managing the environment. The sixth principle, monitoring, determines whether the institution monitors changes in the ecosystem. The seventh principle, ecosystem valuation, examines whether the institution places market value on the ecosystem. The eighth principle, participation, examines whether the public participates in the ecosystem's management. The final principle, international responsibility, looks at whether the institution considers international law, treaties, and boundaries.

Chapter four, *Methodology – Gap Analysis*, explains the method of gap analysis and previews how the following chapters employ the analytical strategy. Gap analysis establishes the difference between present reality and the desired future. Hyun uses this methodology to examine the differences between the current state of governance in the CRD and an idealized state of EBM. Most significantly, this methodology demonstrates the steps necessary to reach the ideal outcome.

Chapter five, *Governance Baseline*, is the most substantial and comprehensive chapter in the book. Through the nine principles, the chapter assesses whether the current state of governance of the CRD ecosystem applies EBM principles. Hyun begins by exploring international cooperation between the United States and Mexico through the International Boundary and Water Commission ("IBWC"). She concludes that while the IBWC has potential to make significant change and is a model organization for bi-national resource management, an emphasis on sustainability and implementation of EBM is noticeably absent.

Next, Hyun scrutinizes national, regional, local and Non-Governmental Organization ("NGO") management of the CRD. She explains the history of each organization and its role in management and application of the EBM in the CRD. At the national level, Hyun examines the Bureau of Reclamation in the United States and Comisión Nacional de Agua ("CONAGUA") in Mexico. Hyun examines each of these institutions through the application of the nine principles. She concludes that the Bureau of Reclamation and in particular, the "Guidelines for Lower Basin Shortages" and "Coordinated Management of Lake Powell and Lake Mead" fail to truly consider the environmental impact on the CRD. Hyun conjectures this is the case because the CRD is only within Reclamation's jurisdiction incidentally and not a top priority. Additionally, CONAGUA continually fails to enforce the 2004 National Water Law reforms that would dedicate water for environmental uses. Hyun believes, however, that the 2004 National Water Law has great potential to allow groups to purchase water rights for ecological purposes.

At the regional level, Hyun examines the Research Coordination Network ("RCN") and Environmental Non-Governmental Organizations within the context on the nine principles. The RCN is a network of scholars that focus on researching how natural and human

influences affect the CRD. In addition to scholarly research, the RCN proposed the "Mini-Estuary Experiment," which would examine the possible creation of a mini-estuary with poor quality agricultural tail water. The proposed project utilizes many of the EBM principles, however, at this time the project is only theoretical and without cooperation from national organizations the project will have little influence over management decisions. A consortium of Environmental NGOs including Defenders of Wildlife, Environmental Defense, National Wildlife Federation, Pacific Institute, Sonoran Institute, and Pronatura lead the effort to conserve and restore the CRD. Hyun cites the Pronatura Fish Study as an example of NGO implementation of EBM principles. The Pronatura Fish Study examined the El-Tapon dam's impacts on biodiversity. Although this smaller organization does a good job of implementing EBM principles, Hyun finds that it has little tangible power to influence the existing system of governance.

At the local level, Hyun examines Asociación Ecológica de Usuarios de Rios Hardy Y Colorado ("AEURHYC"), using the nine EBM principles. AEURHYC began as a group of individuals who sought to promote conservation in the CRD. The Mexican group has blossomed into an official NGO, has created wetlands, and has raised funds to install spillways. Hyun finds that AEURHYC's efforts reflect many of the EBM principles; however, it lacks member participation in management decisions, interdisciplinary knowledge, and international relationships.

Chapter six, *Scenario Analysis*, begins by explaining "scenario analysis" as a method of defining a future where the CRD management uses EBM principles. Hyun proposes four scenarios: *Dry Future*, *The Market Rules*, *A Delta and Estuary Once More*, and *Powell's Prophecy*. Hyun chooses to elaborate on *Powell's Prophecy* because environmental NGOs prefer that scenario and it is also the most plausible example of CRD and EMB management. This scenario envisions successful management of urban growth and anticipates that enforcement of water conservation will cause an increase in quality of life in the CRD. Examples of successful management techniques include tiered water pricing systems, strict groundwater replenishment procedures, and a greater appreciation of the CRD. Hyun believes these and other measures will result in restoration of the CRD, including habitat restoration for wildlife, indigenous communities, and ecotourism. Hyun also hopes these measures will foster community organizations that ensure ecological use of the water.

Chapter seven, *Gap Analysis*, investigates how institutions can achieve *Powell's Prophecy*, given the limitations described at length in chapter five. Hyun finds that the Bureau of Reclamation can make strides by extending Intentionally Created Surplus ("ICS") to Mexico, which would encourage contractors to take steps toward conservation. Additionally, Hyun believes that CONAGUA must push for an amendment to their Mexican National Water Law that would dedicate water to the environment. Hyun also argues that local and regional organizations must nurture ecosystem valuation, precautionary approach, and adaptive management principles in their institutional

practices. Finally, Hyun advocates for the creation of the Colorado River Delta Restoration Institute ("Institute"). The Institute would implement EBM principles, support local CRD restoration projects through bi-national cooperation, and facilitate ecological management of the CRD.

Chapter eight, *Conclusion*, succinctly recaps the book's findings and urges politicians and administrators to take ecosystem considerations into account during CRD management. Without EBM, Hyun fears that the CRD will continue to experience degradation.

Ecosystem Based Management in the Colorado River Delta extensively covers the governance of the CRD in an approachable manner. While the subject matter is dry at times, Hyun clearly states important aspects of her arguments and proposals. Although legal practitioners may find this book theoretical and policy orientated, someone interested in the ecological aspects of river management would likely find this book intriguing and enjoyable.

Jennifer Berg

Philippe Cullet, *Water Law, Poverty, and Development: Water Sector Reforms in India*, Oxford University Press, New York (2009); 241 pp; \$120; ISBN 978-0-19-954623-7; hardcover.

As Philippe Cullet, the Director of the University of London's International Environmental Law Research Centre, explains in *Water Law, Poverty, and Development: Water Sector Reforms in India*, most societies have given water a special status under the law because of the unique nature of water. Using India as a case study for water law and water reforms in the developing world, Cullet examines the connection between both domestic and international water law and reforms, as well as their effect upon environmental, economic, and human rights issues. In *Water Law, Poverty, and Development*, India serves as a microcosm of the world, and India's experiences with water issues provide valuable lessons for other developing nations.

Broken into six chapters, the book provides a general background and context on the worldwide water situation, and the uses and history that inform the development of domestic and international water law. Cullet also examines the main water reforms currently proposed and implemented throughout various Indian states. Cullet then addresses the specific situation of drinking water in India. He concludes with a proposal for an alternative basis for water law reforms to ensure that water law focuses primarily on the social and human rights aspects of water law instead of its economic elements. *Water Law, Poverty, and Development* aims to contribute a better understanding of the context, impact, reaction, and potential alternatives to recent reforms in water law.

Chapter one, *Context for Water Law and Water Sector Reforms*, provides the important context for both the current international and Indian water situations. Freshwater constitutes only 2.5% of all water on