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A. Dan Tarlock

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## What the Report of the World Commission on Dams Might Mean for the United States Water Community

# WHAT THE REPORT OF THE WORLD COMMISSION ON DAMS MIGHT MEAN FOR THE UNITED STATES WATER COMMUNITY

A. DAN TARLOCK<sup>†</sup>

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## I. INTRODUCTION

In the American West and the world, one of the chief functions of water law has been to promote the construction of large multiple-purpose reservoirs. This is especially true in the American West. Prior appropriation detached water from its watershed and allowed acquisition of rights for storage, as well as the transportation of water long distances to areas of demand. The law of equitable apportionment followed the lead of prior appropriation and favored the first state to put the water to beneficial use.<sup>1</sup> Downstream states' fears that they would not be able to use interstate streams led to the negotiation of interstate allocation compacts to facilitate the construction of dams and carry-over storage reservoirs.<sup>2</sup>

International water law, which, in the United States, is based on equitable apportionment, similarly promotes the construction of large dams. The law's core principle of equitable use is not only a universal norm, but also a functional doctrine intended to produce a specific result. The guarantees that all riparian states have a right to a fair share of international rivers functions either to support the unilateral construction of upstream reservoirs or to produce treaties or agreements to permit the construction of reservoirs and distribute the benefits among the riparian states.<sup>3</sup> Water rights and large dams are

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<sup>†</sup> Professor of Law, Chicago-Kent College of Law, A.B. 1962, LL.B. 1965 Stanford University

1. *Wyoming v. Colorado*, 259 U.S. 419 (1922).

2. See Charles J. Myers, *The Colorado River*, 19 STAN. L. REV. 1, 10-13 (1966).

3. This function is carried over to the 1997 Convention of the Non-Navigation use of Watercourses, May 21, 1997, 36 I.L.M. 700 (1997). The Convention promotes dam construction in two basic ways: (1) it allocates each riparian national an equitable share of an international river and presumes that a nation may unilaterally define its share and use it as she chooses; and (2) it provides a weak ineffective legal basis for nations potentially adversely impacted by the construction of a dam to object. The

further intertwined because they backstop water rights and substantially reduce the risk of actual enforcement in times of shortage.

During most of the past century, the need for large dams was an article of faith among proponents of regional development throughout the world. However, in the past four decades, the case for large dams has eroded domestically, and to a lesser extent internationally. Today, the future of existing and new dams is the subject of intense debate within the global water community. The recent Report of the World Commission on Dams<sup>4</sup> ("Report") could have a substantial influence on the outcome of this debate, both nationally and internationally.

The Report is the most comprehensive global assessment of the social, economic and environmental impacts of large dams. The Report is a nuanced but powerful brief against the continued exclusive reliance on large dams to meet the world's water supply demands. Although the World Commission on Dams ("Commission") was a privately funded organization with no official international standing or legal status, the broad based composition of the Commission and the timing of the Report's release make it an extremely significant document for the water community. The Report is essential reading for all students of water policy interested in the broader policy debate about the future of large dams. Much of the Report addresses the problems that large dams have caused in developing countries, but it is relevant to the issues that the United States is now facing, with the exception of post-September 11, 2001 security. These problems include the re-operation of existing dams, the growing pressure to decommission selected dams and the need to construct smarter, smaller scale storage facilities in some areas.

The Report recommends the more rigorous, transparent assessment of proposed new dams and urges focusing attention on the re-operation of existing dams and irrigation systems as well as the promotion of more sustainable water storage and use technologies generally. One can justifiably criticize the Report for paying comparatively little attention to the role of law in promoting the construction of large dams and its proposed reforms.<sup>5</sup> However, it is of interest to water lawyers not only for its recommendations about the process of project assessment, but also because of the possible

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International Court of Justice recognized this right to object in (*Hung. v. Slov.*), 1997 I.J.C. 7 (Sept. 25), but the court held objection must be timely to be effective. Thus the presumption is that the first state to put the water to use will be able to do so and the future claims of other states to the water assume that risk. See Sandra L. Postel & Aaron T. Wolf, *Dehydrating Conflict*, *Foreign Affairs* 2 (Sept.-Oct. 2001) for a discussion of the relationship between unilateral dam construction and regional water conflicts.

4. WORLD COMMISSION ON DAMS, DAMS AND DEVELOPMENT: A NEW FRAMEWORK FOR DECISION-MAKING (2000) [hereinafter DAMS AND DEVELOPMENT].

5. The Report does have a brief discussion of the need to share international rivers consistent with the principle of equitable use and the other principles reflected in the United Nations Convention on the Non-Navigable Uses of International Watercourses. *Id.* at 251-56.

implications for the future of domestic and international water law implicit in it.

## II. THE RISE AND FALL OF LARGE DAMS

After World War II, the progressive conservation-socialist vision of large-multiple purpose dams as the engines of sustainable regional development was exported by the United States and Russia to the rest of the world. In 1949, there were 5000 large dams worldwide; by 2000, there were over 45,000.<sup>6</sup> The biggest dam builder was China, which went from 22 to 22,000 after the Communist revolutionaries took complete control of the country in 1949. The rapid increase in construction fueled controversies that continue today. Each country, depending on its geography and stage of development, has a different dam story, but there are common elements to the debate. Worldwide, many dams have under performed and have produced unacceptably high social costs. Dams have transformed rivers from free-flowing to regulated, and as a result there are growing threats to the ecological integrity of watersheds worldwide. Additionally, dams have removed large populations, often indigenous.

In the United States, we care about large dams primarily because the environmental movement has changed our perception of the earth and the value of unmodified landscapes.<sup>7</sup> As a result, we now value free-flowing rivers, their connected corridors, and the ecosystem services that they provide. The debate about environmental sustainability and the processes and standards used to make construction and operation decisions helped facilitate the rise of powerful environmental Non-Governmental Organizations ("NGOs"). The economic and social performance of large dams, especially as it relates to the delivery of irrigation benefits, has long been questioned. The failure of the 1944 Pick-Sloan Plan to deliver irrigation benefits to the Upper Missouri Basin is a case in point.<sup>8</sup>

The above criticisms are the crux of the debate about the future of large dams addressed by the Commission. After a survey of the promised performance of a cross-section of dams and their social and environmental impacts, in large measure, the Report endorses many environmental and social critiques of large dams, especially in developing countries. The Commission's findings illustrate the difficulties of generalizing about the performance of dams because of the variety among functions and contexts. But, this said, some important general conclusions can be drawn with respect to both the economic and social performance of dams.

Four conclusions about the economic performance stand out, although they will be familiar to United States critics of many of the

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6. *Id.* at 8.

7. Gilbert White, *Reflections on Changing Perceptions of the Earth*, 19 ANNUAL REVIEW OF ENERGY AND THE ENVIRONMENT (1994).

8. JOHN E. THORSON, RIVER OF PROMISE, RIVER OF PERIL: THE POLITICS OF MANAGING THE MISSOURI RIVER 76-98 (1994).

large projects built on manipulated benefit-cost calculations. First, dams with significant hydroelectric capacity, initially an add-on to pay for the real benefits of the dam, flood control and irrigation, perform the best. Second, the Commission found that irrigation dams "have typically fallen short of physical targets, did not recover their costs and have been less profitable in economic terms,"<sup>9</sup> and they displace large populations. Third, the story is more dismal and universal for ecosystem effects. Dams inundate large areas and kill terrestrial plants and displace fauna; reservoirs may account for between 1 percent and 28 percent of all green house gas emissions.<sup>10</sup> Large dams "compromise the dynamic aspects of rivers that is fundamental to maintaining the character of aquatic ecosystems."<sup>11</sup> Fourth, the flood control benefits are at best mixed. The role of dams in preventing flood damage has long been controversial because dams encourage irresponsible flood plain behavior. The Report finds considerable evidence that dams are moral hazards because they exacerbate rather than alleviate the risks of flood damage.<sup>12</sup> In addition, the Report notes that global climate change may increase the ineffectiveness of flood control dams. Existing dams may not have the storage capacity to reduce the projected increased flood levels.

Just as the economic performance of dams has caused speculation, so has their social performance. The Report endorses the argument that one should consider the social performance of dams equally with their economic performance. Much of the Report deals with the well-documented problems of the displacement of large numbers of local populations and indigenous peoples. Although population displacement has occurred in the United States, it has been less of a problem compared to countries such as China and India. However, the displacement of Native American tribes along the Columbia and the Upper Missouri to construct Grand Coulee Dam and the Pick-Sloan Project continues to factor in the current politics of the future of these rivers. Dams also have major off-setting benefits (quantified and unquantified), but the Report identifies two problems to carefully considered in any final accounting of the costs and benefits of a large dam. First, the costs of the dam are often borne by those who do not enjoy the benefits and are thus often inequitably distributed. Second, the Report underlines, but unfortunately does not elaborate on, the need to carefully consider the extra net welfare justifications for large dams such as national flood security.

### III. THE FUTURE OF LARGE DAMS

What is the future of large dams? The Report projects two. One,

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9. DAMS AND DEVELOPMENT, *supra* note 4, at 68.

10. *Id.* at 75.

11. *Id.* at 77-78.

12. *Id.* at 60-62. See also INTERAGENCY FLOODPLAIN MGMT. REV. COMM., ADMINISTRATION FLOODPLAIN MGMT. TASK FORCE, SHARING THE CHALLENGE: FLOODPLAIN MANAGEMENT FOR THE 21ST CENTURY (1994).

which is already in place in the United States, is to build fewer large new dams and decommission an increasing number of existing ones.<sup>13</sup> If fewer large-scale dams are constructed, alternative methods of allocation such as the use of water markets, smaller-scale rain fall harvesting and the reuse of irrigation drainage water become much more important.<sup>14</sup> Similarly, we will have to make greater use of non-structural flood control alternatives. The second possibility, continued construction of new dams, especially in developing countries, with China and India leading the way. However, the Report recommends that if countries continue to rely on dams for energy and water supply, they must create a much more rigorous transparent and inclusive assessment of procedure for new dams.

The Report's major relevance to the United States is to reinforce the need to improve the processes of dam construction and operation that have evolved since the 1960s. Dam planning was historically a narrow, technical exercise dominated by engineers,<sup>15</sup> but this changed in the 1960s and 1970s. The requirement of an environmental impact statement, ("EIS"), mandated by the National Environmental Policy Act of 1969, ("NEPA"), has forced agencies to move beyond the traditional technical considerations. NEPA came at the end of the dam building era and helped to hasten its decline, but EIS requirements tend to become rote exercises in data assembly and seldom seriously consider alternatives that depart substantially from existing management protocols. Environmental impact assessment functions more as a procedural barrier than an actual review of viable alternatives. The restriction of the EIS process to procedural rather than substantive duties means that the most likely outcome of EIS compliance is a minor modification in project design or operation to overcome some of the worst environmental problems. This outcome, as the Report notes, is not consistent with the principles of sustainable development adopted at the 1992 Rio Conference and the protection of human rights.

To address this problem, the Report recommends greater NGO and local stakeholder participation, full transparency, and a new rights and risks approach to facility planning. The last suggestion is intended to force planners and decision makers to better understand and assess more fully the social and economic impacts of dams on local communities, including indigenous peoples, and the environment. The Report specifically recommends a more comprehensive options assessment to determine "whether a dam was the most appropriate response to a development need or objective, and whether these were correctly identified in the first place."<sup>16</sup> The two most interesting

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13. See WESTERN WATER POLICY ADVISORY REVIEW COMMISSION, *WATER IN THE WEST: CHALLENGE FOR THE NEXT CENTURY* 2-35 (1998).

14. *Id.* at 157-60.

15. See Symposium, *Reflections on a Century of Water Science and Policy*, 116 *WATER RESOURCES* (2000), for a collection of short essays by many of the key participants in expanding the range of factors to be considered in water resources planning.

16. DAMS AND DEVELOPMENT, *supra* note 4, at 221.

recommendations for the United States are the environmental protection and reoperation recommendations. The Report endorses the need for environmental baseline studies to more accurately measure adverse environmental impacts and to establish restoration targets.<sup>17</sup> It also endorses the idea that there are large benefits available from the re-operation of existing dams to improve their efficiency, environmental, and social performance.<sup>18</sup>

The Report's reinforcement of the need for large-scale river restoration experiments has important implications for the United States. In the United States, we now recognize that one of the largest unaccounted for costs of the Reclamation Era is the degraded ecosystems on the Colorado, Columbia, Missouri,<sup>19</sup> and many other rivers. In addition, there is a growing scientific and political consensus that restoration of these systems is the best option.

A series of influential studies in the United States, Europe and the Middle East<sup>20</sup> has recently led to a more radical ecological ideal of managing river systems to maximize ecological functions. This vision is less clearly articulated than multiple use because it rests on a more complex view of the human role in the functioning of natural systems, including floods. It starts from the premise that we must try to integrate human uses of the entire river system with the maintenance or restoration of the ecosystem services that the pre-dam or normative river provided.<sup>21</sup> The current focus is on river restoration because so many large systems have undergone modification. The newly developing science of conservation biology furnishes the scientific underpinnings for the vision. In brief, all river systems, modified and "natural," are dynamic, ever-changing functioning ecosystems that serve a variety of functions from the maintenance of consumptive uses to the provision of valuable ecosystem services.<sup>22</sup>

#### IV. THE LEGAL IMPLICATIONS OF THE REPORT

The Report does not directly suggest the legal changes necessary to implement its recommendations, but several follow from its primary

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17. *Id.* at 293.

18. *Id.* at 225.

19. NATIONAL RESEARCH COUNCIL, THE MISSOURI RIVER ECOSYSTEM (forthcoming 2002).

20. *See, e.g.*, COMMITTEE ON SUSTAINABLE WATER SUPPLIES FOR THE MIDDLE EAST, WATER FOR THE FUTURE: THE WEST BANK AND GAZA STRIP, ISRAEL AND JORDAN (1999).

21. Jack A. Stanford et al., *A General Protocol for Restoration of Regulated Rivers*, 12 REGULATED RIVERS: RES. & MGMT. 391 (1996).

22. *See* Judy L. Meyer, *Changing Concepts of System Management*, in PROCEEDINGS: SUSTAINING OUR WATER RESOURCES 78 (1994); Judy L. Meyer, *The Dance of Nature: New Concepts in Ecology*, 69 CHI.-KENT L. REV. 875 (1994). REED F. NOSS & ALLEN Y. COOPERIDER, *SAVING NATURE'S LEGACY: PROTECTING AND RESTORING BIODIVERSITY* (1994) is a good introduction to modern ecology and its influence on resource management. The book discusses the legal implications of the substitution of a non-equilibrium for an equilibrium paradigm in ecology. *See also* A. Dan Tarlock, *The Nonequilibrium Paradigm in Ecology and the Partial Unraveling of Environmental Law*, 27 LOY. L.A. L. REV. 1121 (1994).



call for a comprehensive project rights and risk assessment, and the desirability of a negotiated development and mitigation plan. The Report reinforces the argument that all river basins are a shared resource and should be managed and used cooperatively by a wide range of stakeholders. This recommendation tracks the increasing use of what the noted western water law observer David Getches has called “outside-the-box” water settlements.<sup>23</sup> In brief, these ad hoc solutions substitute long term, monitored, management regimes for the traditional enjoyment and enforcement of prior rights. More generally, they slouch toward the three centuries old dream of the progressive water management community of comprehensive, cooperative river basin management.

To date, these ad hoc settlements do not directly change the underlying system of water rights. However, to be successful, these bioregional solutions must produce some redistribution of the risks of supply failure among water users and other stakeholders. Many of these settlements involve the re-operation of existing projects. Re-operation will force the water community to recognize that all entitlements contain a temporal risk element to insure that shortages are absorbed fairly among co-riparian states. International entitlements vary from fixed amounts to percentages of a yearly flow.

Many of the proposed solutions build on the traditional idea that water rights are correlative, and expand this idea to recognize that water rights are both commodities and heritage resources that support a variety of human consumptive and non-consumptive use that we now characterize as ecosystem services.<sup>24</sup> This will not be easy because the object of water law has always been to create firm, perpetual entitlements. Firm entitlements are an essential element of any allocation regime, but they mask the inevitable uncertainty of such regimes. Both the traditional security enhancement purpose of water rights as well as pre-dam river functions accord equal respect in decisions about the use and management of these resources. But, it is not impossible to do this. Water law provides the conceptual foundation to promote new and fair reallocation regimes. The inherent uncertainty of a water right makes it easier to expand the category or risks such as those by new demands on the system. The focus should be on the actual expectations that lie behind a use, rather than the perpetual enforcement of the entitlement, in order to find alternative ways of satisfying those expectations in ways that fairly accommodate new uses. The more frank recognition that water rights have always contained risks will make it easier for users to cooperate to

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23. David H. Getches, *The Metamorphosis of Western Water Policy: Have Federal Laws and Local Decisions Eclipsed the States' Role?*, 20 STAN. ENVTL. L.J. 3 (2001).

24. In the course of its discussion on the need for shared use of international rivers, the Report concludes that “[a] more equitable and sustainable solution may be possible by shifting from a primary focus on the allocation of the water resource, to a focus on the benefits to be derived from the use of the water, encompassing consideration of wider development objectives and the options available to meet them.” DAMS AND DEVELOPMENT, *supra* note 4, at 254-55.

devise creative solutions that promote both efficiency and equity and produce acceptable compromises. In some cases, it will be necessary to trade firm rights for a risk-based physical solution that provides an adequate margin of safety in water-short years. These new regimes will depend upon greater reliance on physical solutions, which include adaptive management, and water markets, rather than the anticipated enforcement of priorities.

Adaptive management came about in the late 1970s as a criticism of static or deterministic environmental assessment. The basic argument was that a fixed review of a policy designed independently<sup>25</sup> was inconsistent with the experience of resource managers worldwide and with what is now known as non-equilibrium ecology. The need for rigorous but flexible decision making procedures under conditions of uncertainty has a long intellectual pedigree including decision theory. Many resource decisions include an experimental component as well as monitoring procedures. Basically, adaptive management makes the experimental nature of a decision and the need for information collection the primary components of management.

While adaptive management requires a continuous process of acquiring and evaluating scientific information, it also requires the practice of regulatory science. Regulatory science is designed to answer, to the best extent possible, causal questions about management choices and a socially desired outcome such as the preservation of a species from extinction, or an ecosystem that functions more like it did prior to human intervention. Once baselines and targets are set, scientists must assess whether they are being maintained. This usually requires a high level of cross-disciplinary integration and informed speculation. It is not enough to collect data and decide what inferences can be drawn from that data. Scientists must often draw inferences about the likely impact of a management policy from less than ideal data.

## V. CONCLUSION

The Report helps to undermine the case for the continued reliance on traditional multi-purpose large dams. It reinforces the argument that existing dam operations require modification to redress the adverse consequences of their construction. More creative, balanced methods to meet expanding demand and to serve the original purpose of the dam will have to be found. These changes will require more intensive, stakeholder-driven basin management. Moreover, the Report underlines that managers must recognize the need for the careful and fair incorporation of new temporal risk elements into existing water entitlements to allow more flexible management of river systems to accomplish these objectives.<sup>26</sup>

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25. See generally ADAPTIVE ENVIRONMENTAL ASSESSMENT AND MANAGEMENT 136 (C.S. Holling ed., 1978).

26. I discuss these ideas at greater length in A. Dan Tarlock, *Prior Appropriation: Rule, Principle, or Rhetoric?*, 76 N.D. L. REV. 881, 907-10 (2000).