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Water and Power

Environmental Governance and Strategies for Sustainability in the Lower Mekong Basin

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Preface

Among the many serious environmental problems the world faces today, those related to freshwater resources are clearly among the most difficult to address successfully. This is particularly true to transboundary waters; for in such cases, more than one polity is involved, which, generally speaking, renders consensus more difficult to reach. Further complicating matters, transboundary water disputes often create or exacerbate divergent interests within each polity. Nowhere today are transboundary water disputes more fraught—or more contested—than in South and Southeast Asia where developments on mighty rivers such as the Brahmaputra and the Mekong are posing severe environmental threats, development dilemmas, and governance challenges to massive groups of inhabitants and their leaders.

It is thus not surprising that such issues and concerns have not only captured widespread attention but also galvanized important and influential constituencies both within South and Southeast Asia and around the world. Despite other pressing environmental concerns in the latter region, the seasonal haze problem in Indonesia-Singapore-Malaysia and threats posed by potential dam building on the Nu-Salween (Thanlwin) River system in China and Myanmar, for example, the varied and complex threats to the Mekong, are increasingly seen as the most important and certainly the most high-profile environmental concerns in the region. Given the profound significance of the Mekong in the region's life, it is easy to understand why.

The Mekong River is, of course, the longest river in Southeast Asia (roughly 4500 kilometers in length) and the twelfth longest in the world. It rises on the Himalayan Plateau and flows through China (where it is known as the Lancang), then between Laos and Myanmar, and, briefly, between Laos and Thailand, before entering Cambodia and connecting with the Tonle Sap (the largest natural freshwater lake in Southeast Asia, whose enormous ecological vitality depends on the Mekong water flow). It then separates into several distributaries to form the Mekong Delta. The two principal distributaries, known as the Bassac and the Mekong, then enter Vietnam, forming various other distributaries, all of which ultimately empty into the South China Sea.

Although the entire Lancang-Mekong system is important, the system as a whole constitutes the largest inland fishery in the world; for people living along the lower

reaches of the Mekong, the river has historically been particularly vital. Not only is the Lower Mekong the most important flow of water in the region, but the river is also absolutely central to the livelihoods of the vast majority of people in Cambodia and Vietnam who reside near its basin. For starters, out of roughly 60 million people who live in or near the Lower Mekong Basin, about three-quarters rely directly on agriculture and the natural resources of the Mekong system for food and livelihoods. The Tonle Sap is the largest freshwater fishery in the region and produces as much as two-thirds of the protein in Cambodia's food supply; the Mekong Delta of Vietnam is one of the most productive agricultural areas and premier rice granaries in the world.

Abundant resources and enormous productivity notwithstanding, nothing has ever come easily in the Lower Mekong. The extremely dynamic environments characteristic of the region—environments marked by drastic differences in seasonal water flows and alluvial soil deposits—have required intense attention to the nuances of environmental change in order for the region's inhabitants to successfully wrest livelihoods from the Mekong's ever varying riparian environments and microenvironments.

A number of changes in recent decades have made the Lower Mekong an even more dynamic and challenging place in which to make a living. For example, alterations in the ways in which the region has been linked to larger flows of commodities and capital have had a huge impact on the region, most notably in the case of Vietnam, whose reemergence as a major rice-exporting country has linked it inextricably to global markets and their vicissitudes. Moreover, dam building along the upper reaches of the Mekong—a key concern in this volume—threatens both rice production in the Lower Mekong and the seasonal surges of water that make the Tonle Sap such a productive fishery. Such decreases in water flows are occurring at the same time as sea level increases because of global warming, adding new threats in the Mekong Delta: droughts, on the one hand, and saltwater intrusion, on the other hand.

While on the subject of global warming, it should be noted, alas, that Cambodians and Vietnamese living in the Lower Mekong region—especially farming and fishing populations with little margin for error in their livelihood strategies—are among the peoples in the world who will be most adversely affected by climate-caused environmental change. Since only a small fraction of global greenhouse gases come from this region, larger environmental justice issues are part of the discussion of policies and adaptations as well.

Even from the brief discussion above, the Mekong's many threats and challenges come through loud and clear. Because the problems posed to, on, and along the river involve numerous nation-states, including the great power, China, the stakes are especially high. In *Water and Power: Environmental Governance and Strategies for Sustainability in the Lower Mekong Basin*, a talented international group of scholars, scientists, policy practitioners, and NGO professionals explores a range of issues relating to the most salient environmental, developmental, and governing challenges on the Mekong. As the volume's title suggests, questions regarding governance loom especially large, for if the Mekong is to survive and the populations

living in the river's basin to thrive, new forms of governance and strategies for sustainability must be developed.

Water and Power begins with a frame-setting introduction by retired diplomat David Brown, who has been writing perceptively about the Mekong for years. The main body of the volume is divided into three substantive sections devoted in turn to historical perspectives on the Lower Mekong; issues relating to livelihood strategies, environmental threats, and adaptation strategies; and various aspects of river governance, with individual authors treating questions of governance at different levels of refraction and in different registers. The 18 individual chapters in these 3 sections treat various parts of the river basin—from Yunnan to the lower delta—and, in so doing, provide readers with empirical depth and theoretical breadth on a variety of issues related to the future economic and environmental sustainability of the entire Lancang-Mekong system. The result, we believe, is a fresh and innovative collection of essays, which, taken together, offer rich detail and much-needed new perspectives on some of the most important and seemingly intractable environmental and development issues in contemporary Asia. As such, it constitutes a worthy successor and complement to the previous collection in Springer's Advances in Global Change Research series, *Environmental Change and Agricultural Sustainability in the Mekong Delta*, edited by Mart A. Stewart and Peter A. Coclanis (New York and Heidelberg: Springer, 2011), which volume has been widely read and has made a number of helpful interventions in ongoing discussions and debates regarding the past, present state, and future prospects of one of the world's greatest river systems.

Like the 2011 volume, *Water and Power* developed out of a stimulating conference convened in the Lower Mekong region. Whereas the first volume grew out of a conference hosted by the Can Tho University in Can Tho, Vietnam, in March 2010, *Water and Power* got its start at a meeting hosted by the Royal University of Phnom Penh in Cambodia in March 2017. In each case, the host institution partnered on the meeting with the editors' home institutions in the United States: Western Washington University and the University of North Carolina at Chapel Hill.

Anyone who has ever organized or co-organized a scholarly conference knows how important the people on the ground are in determining the degree of success achieved. In both cases, Mart Stewart first developed a network of colleagues and institutional connections by way of a Fulbright Senior Scholar and two Fulbright Senior Specialist appointments in Vietnam and Cambodia, as well as many years of curriculum development workshops, teaching, and field research. A talented group of colleagues at the Can Tho University facilitated the first conference, and then an equally talented and hardworking group at the Royal University of Phnom Penh maintained the high standards set 7 years earlier in Can Tho. At RUPP the Department of Natural Resource Management and Development was our principal partner, and we would like to thank Dr. Seak Sophat, who heads this department, not only for playing the lead role in coordinating the proceedings in Phnom Penh but also for his many kindnesses to conference participants (not to mention for his fine, coauthored contributions to *Water and Power*). We would like to acknowledge the important roles played by many others at RUPP, including Phat Chandara, Samet

Sok, Sok Serey, and especially Rathkunthea Rim, along with other colleagues there, and an energetic group of RUPP graduate students, in organizing and conducting the conference. Although the conference was held in Phnom Penh, people and resources at both Western Washington University and UNC-Chapel Hill proved to be instrumental in getting the conference off the ground and, later, in making this book possible. Western Washington University gave Mart Stewart some leave, as a result of which he had the time to organize the conference, solicit research papers, develop the program, connect with a publisher, and coax the conference papers into almost publishable form. The key partner at UNC-Chapel Hill was the Global Research Institute (GRI), part of UNC Global, and the funding they provided made the conference possible. The editors would like to acknowledge the roles played by several people at UNC in particular in moving this project along. Chief International Officer Ronald P. Strauss was supportive throughout. Terry Tamari, coordinator of the Global Research Institute, provided many kinds of support. Narvis Green, director of Finance and Human Resources at UNC Global, was both creative and diligent (even relentless) in finding ways to make the budget work. Speaking of budgets, both the conference and this volume benefited greatly from the generosity of one of the GRI's great friends, Mr. Wang Guangfa, chair of the Fazheng Group (Beijing). We would also like to thank Patricia Watson for her superb copyediting, the expert managers of this project at Springer Scientific, Truptirekha Das Mahapatra and Selvaraj Ramabrabha, and our outstanding editor at Springer, Margaret Deignan.

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Framing the Future of the Mekong When Nothing Is Certain But Change – An Introduction

The Mekong Delta floodplain comprises all the low-lying wetlands from the Cambodian town of Kratie south to the river's nine mouths in southernmost Vietnam, including the Tonle Sap Basin. Over 145,000 km^2 altogether, the area had a population in 2010 of more than 30 million persons, with roughly two-thirds in Vietnam and one-third in Cambodia (Mekong River Commission 2011). The Mekong Delta is extraordinarily productive and hydrologically complex. In many areas a highly engineered system of dikes, canals, and sluices manage the flow and distribution of water. However, the delta faces severe and mutually exacerbating challenges that, taken together, amount to a slowly unfolding environmental disaster that will have enormous impacts on the way delta dwellers have lived for centuries. These changes cannot be avoided; however, bold policies can enable sensible adaptation.

When I set out to write about the delta's future in 2016 (see Brown 2016a, b, c, d), I imagined a story about adaptation to climate change. I knew that I should also mention the impact of the dam construction upriver. I learned that there is a third threat to the well-being of the people who live in the Mekong floodplain: unsustainable and inappropriate agricultural practices.

Climate change impacts are becoming evident in the delta (and so becoming less controversial). In 2007, the World Bank judged Vietnam's portion of the Mekong Delta, as well as the deltas of the Ganges (Bangladesh) and the Nile (Egypt), to be an area "most threatened" by climate change. The World Bank's analysts primarily considered sea level rise and population density (Dasgupta et al. 2007). And indeed, the sea level is rising and may rise a full meter in this century. That's significant in Vietnam's delta, an area where the average elevation is just 2 m. Climate change is also bringing significant change in weather patterns. The monsoon rains seem already to be less regular and to arrive later in the year. Temperature is expected to rise to levels that stress current crop varieties.

In addition, and perhaps of greater significance, are the impacts of dam construction upstream. There is, first of all, the Lancang cascade, high dams in Yunnan province that in the rainy season impound large amounts of water and in the dry season release it slowly to produce electricity. Second, there are roughly 200 dams built, under construction, or planned on the tributaries of the Mekong. Many of the

largest projects are on the so-called 3S system—the Sekong, Sesan, and Sepong Rivers, which arise in Vietnam's central highlands and join the Mekong mainstream in Cambodia near Stung Treng. Like the Chinese cascade, these tributary dams impound great quantities of water during the rainy season and release it slowly during the dry season.[1] Third, there is the Mekong mainstream dam cascade, the human interventions that have captured most of the attention, particularly because these dams will impede the migration of many species of fish from spawning grounds in the Tonle Sap and lower down the Mekong.

Under even the most optimistic scenarios—assuming that many migratory fish will be able to climb fish ladders and their offspring will survive, and that nonmigratory "blackfish" will fill some ecological niches left by less adaptable migratory species—there will still be a huge impact on the diet of delta dwellers. Further, all of the dams trap river-borne sediment, which has for eons enriched farmers' fields downstream. In a word, the more dams, the less available calories, either from fish or from vegetables. The good news about the mainstream dams is that they will not impound much water. They are "run of the river" dams that rely on a fairly steady (rather than seasonal) flow to drive their turbines. Even so, say Vietnamese scientists, the combined impacts of climate change and upstream dam construction already amount to a more than 50% reduction in the amount of nutrient-laden silt that is reaching Vietnam's Mekong Delta (Thanh Nien News 2016). A weaker flood pulse and rising sea level combine to increase salt intrusion there in the dry season. Early in 2016, during the worst drought in 90 years, salt concentrations lethal to rice were measured as far upstream as Cần Thơ, Vietnam's delta metropolis, 90 km from the river mouth.

And yet, the Mekong Delta's problems are not just a matter of climate change and dams. Particularly in the delta area in Vietnam, unsustainable farming practices have been the norm. Ever since they migrated into the Mekong Delta in the eighteenth century, the Vietnamese have been transforming its landscape, digging canals and draining swampy areas. The French colonial authorities brought in machines, and the work went faster. The greatest changes took place after 1975, however, when engineers from Hanoi built dikes to transform two very large wetland areas, the Plain of Reeds and the Long Xuyen Quadrangle. By perfectly controlling the water level, they made it possible to grow three or even three and a half crops of rice there each year. Lower down the Mekong's many branches, the Vietnamese elaborated a system of dikes and sluices to prevent saline intrusion. This huge project of hydrological engineering aimed at increasing rice production to ensure Vietnam's food security. By the mid-1990s, Vietnam had an annual rice surplus of three million tons. By 2012, Vietnam was briefly the world's number one rice exporter; that year it supplied over 8 million tons of rice to the world market.

For years, however, some experts had questioned the sustainability and real costs of the absolute priority Hanoi gave to rice production. Many farmers were unhappy because they were required to grow rice year round, even though they could earn

[1] When all present and proposed dams on the Mekong's main tributaries are considered, dry-season flows will increase by 63% over baseline, and wet season flows will decline by 22% (Piman et al. 2013).

more growing other crops. The warehouses of the state-owned marketing company filled up with low-quality rice that was difficult to sell at a profit. Each crop required increasing inputs of fertilizer and pesticides. Further, near the seacoast, where brackish water is a growing seasonal problem, the land was sinking as great quantities of freshwater were withdrawn from aquifers deep underground. In some places the land has been subsiding faster than the sea level has been rising. Thus, it is increasingly difficult to keep saltwater from invading coastal areas during the dry season and to flush out salt and alkaline minerals when the monsoon rains come.

Beginning in 2011, senior officials from concerned Vietnamese ministries and Vietnamese scientists met with experts from the Netherlands to discuss foreseeable impacts on the Mekong Delta area out to the year 2100. From these talks emerged a strategy of strategic retrenchment on a large scale: the Mekong Delta Plan (Socialist Republic of Vietnam and the Kingdom of the Netherlands 2013). Vietnam's government is moving to implement elements of the plan. In coastal areas, conversion to brackish-water aquaculture is well advanced. In this area it will rely mainly on "soft" barriers, chiefly mangrove forests, to limit coastal erosion. The dike and sluice system will be refocused on defending higher elevations in the central and upstream areas of Vietnam's delta. Even on prime rice land, farmers will be allowed to grow other crops in the dry season. And finally, efforts will be made to restore functionality of the Plain of Reeds and Long Xuyen Quadrangle as aquifers that can store freshwater during the flood season and release it during dry months.

Upstream in Cambodia, there's a very big but so far less studied worry: the Tonle Sap Basin. The lower Mekong floodplain is one continuous environmental region. What happens upstream in Cambodia impacts Vietnam as well as Cambodia, so farmers and fishermen in both nations ought to be very worried about the Tonle Sap's future ability to store freshwater and then release it. The mechanics of the great lake's seasonal filling and flushing are well understood. When the Mekong floods, water flows into the Tonle Sap via the Sap River. Swollen also by local monsoon rains, the volume of the Tonle Sap grows by 30 times. It is a remarkably fecund ecosystem. And then, as the Mekong water level falls, the flow reverses and the Tonle Sap empties, releasing freshwater to nourish crops in the areas downstream.

So far, there appears to have been little system wide modeling focused on the possibility that the multiplication of dams upstream could compromise the great lake's filling and flushing mechanism. According to a 2013 review, "No studies have predicted how hydrological alterations may permanently compromise the role that existing floodplain wetlands play in reducing flood peaks and providing storage that can naturally supply streams with water during periods of low or no rainfall" (Hecht and Lacombe 2014). Dr. Alan Potkin (2017) reached a similar conclusion: "The question … is whether [dry-season] flows will remain sufficiently low that the Mekong stage at the Tonle Sab river confluence continues to enable the extraordinary flow reversal upon which the hydroecology of the [floodplain] certainly depends, and perhaps the fisheries far upstream as well." Studies by Cochrane, Arias et al. (2014) provide evidence that current and proposed construction of dams upstream, particularly on the Mekong's major tributaries in Laos, Thailand, and Vietnam, foreshadows "drastic alterations to the hydrological pulse

and subsequent ecological features in the Tonle Sap." According to Dr. Sok Saing Im, he and colleagues are working on "a study to identify effective counter measures to reduce impacts of flow regime changes by considering diversion of early Mekong flood … to the Tonle Sap" (personal communication, March 13, 2017). And since 2012, a team of scientists has been at work on what may, in the sphere of public policy, prove to be the definitive assessment of development impacts in the Mekong River Basin, the "Council Study."

Until now, almost all attention has focused on prevention: persuading Laos and its enablers to give up building dams on the Mekong mainstream. It now seems likely that, for economic reasons, after Pak Beng and Don Sahong, only one or two more mainstream dams will be built (Cronin and Weatherby 2015). Still, negative impacts are already huge, particularly on fish migration and the volume of silt transported downstream. Ironically, these lower Mekong mainstream dams will not much alter the hydrology of the Mekong Delta. As discussed above, it is dam construction on tributaries and in the Yunnan gorges, which impound far greater volumes of water in the wet season and release it in the dry season, that is altering the flood pulse and thus impacting the annual rhythm of life.

Now in Cambodia and in Vietnam, the focus must shift to adaptation to new realities. There is a vital need for closer cooperation between Vietnamese and Cambodian experts, between Vietnamese and Cambodian government officials, and between Vietnamese and Cambodian journalists. The problems impacting the lower Mekong are not "solvable" in the conventional sense. However, bold policies can enable sensible adaptation. With a long-range vision, for example, an expanded version of Vietnam's Mekong Delta Plan, determined national and local leadership, and the backing of aid donors like the World Bank, the delta's future may at least be manageable.

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