



Designing Institutional Systems for Basin Management Organizations

By Olivier Serrat
Senior Project Economist
Agriculture, Environment, and Natural Resources Division
Southeast Asia Department

2006 Regional Conference on Water Financing

30 May 2006
Manila

Asian Development Bank

The Government of Cambodia is looking at basin-wide management of the Tonle Sap.^{1,2} By means of extensive investigations, it has nurtured agreement in principle on organizational form and function to better drive, coordinate, and streamline infrastructure development and natural resource management to benefit all. Since the structure being formulated preserves connection to Cambodia's involvement in efforts to manage the Mekong River Basin, the steps now being taken can inform other basin-wide approaches. They can also be informed by steps taken elsewhere vis-à-vis basin management financing.

The Tonle Sap. In a few words, the Tonle Sap is (i) the largest freshwater lake in Southeast Asia,³ (ii) a unique hydrological system,⁴ (iii) the largest seasonally flooded forest habitat in Southeast Asia,⁵ (iv) the refuge of the largest colonies of endangered water birds in Southeast Asia,⁶ and (v) the source of one of the most productive fisheries in the world.⁷ The Tonle Sap and its floodplains are also home to about 10% of Cambodia's population. Many plant and harvest on the floodplains in dry months. All join in pursuit of the fishing bounty when the lake rises in flood each year. The fishery is a high-value resource that produces three quarters of the animal protein consumed each day, year-round, by the national population of about 13.0 million. It occupies a deep-rooted place in life and culture, reflecting the lake's long-term environmental, social, and economic importance.

The threats to the Tonle Sap. However, population and development pressures are taking their toll and consumptive use of the lake's resources is intense. Threats include overexploitation of fisheries and wildlife resources, dry season encroachment and land clearance of the flooded forest, and degradation of natural vegetation in watersheds, with associated changes in water and soil quality and siltation rates. Ecological systems such as the Tonle Sap are surprisingly adaptable and resilient. Yet, they do have limits beyond which irreversible damage can be caused.

¹ The Tonle Sap Basin, defined as the catchment of the Tonle Sap River at its confluence with the Mekong River, has an area of 85,000 square kilometers (km²), of which 80,000 km² lies within Cambodia.

² The Tonle Sap is fed by 12 tributaries draining all sides of the Tonle Sap Basin and enclosing 44% of Cambodia's land area. Discharge is through a southeastward gateway via the Tonle Sap River. It joins the Mekong River about 110 kilometers (km) away near Phnom Penh.

³ In the dry season, the Tonle Sap is 160 km long and 35 km wide, has a depth of 1–2 meters (m), and extends over 2,500–3,000 km². Its area is more or less equal to that of Lake Ontario. It is twice that of Lake Titicaca and 25 times that of Lake Geneva. In the rainy season, it is 250 km long and 100 km wide, has a depth of 8–11 meters (m), and extends over 15,000–16,000 km².

⁴ Each year, flow in the Mekong River rises as the large river accepts melting runoff in its distant upper reaches. With further swelling that follows the onset of the rainy season (May–November), the Mekong River's surface elevation at the confluence near Phnom Penh rises until it blocks and then reverses the Tonle Sap's southeastward flow. Water flows back into the Tonle Sap, submerging the surrounding swamp forest and shrub lands to provide seasonal breeding and nursery grounds and forage areas for fish that subsequently migrate to the Mekong River. Remarkably, the inundation in a typical year raises the Tonle Sap's surface by about 10 m and spreads the lake in flood over about 1.2 million hectares (ha), almost five times the dry season's coverage. Flooding over up to 1.6 million ha has been recorded.

⁵ About 200 species of plants have been documented.

⁶ Almost 100 species of water birds, of which at least 16 belong to species of globally threatened birds, live on the lake. Between October and May thousands of pairs of pelicans, storks, ibis, darters, and cormorants nest in the trees.

⁷ Over 200 species of fish occupy the Tonle Sap. Other animals include turtles, macaques, otters, and water snakes.

Establishing the Tonle Sap basin management organization. How to protect the ecological base of the Tonle Sap was put to investigations as long ago as 1993, when a royal decree designated the lake as a multiple-use protected area. Furthermore, the lake was nominated as a biosphere reserve in 1997 under the Man and the Biosphere Program of the United Nations Educational, Scientific, and Cultural Organization.⁸ Nomination led to the definition of ecological zones that were susceptible to current or foreseeable threat and that, justifiably, should be protected from certain forms of neglect or intrusion.⁹ Accountability for the reserve was lodged with the Cambodia National Mekong Committee¹⁰ and a secretariat to support the committee was created and placed within it.

- **Basin-wide management:** As management of the reserve was being made more effective, the Government continued to search for an organizational model for basin management. Although the design of organizations must rely on careful assessment, the process remains an art and is not a science. Matters of existing context must be taken into account and the object is to tie what new forms are needed to what exists, in ways that account for what is possible. The first requirement was the need to involve communities in shaping and applying methods to address the threats to the Tonle Sap. The second was the need to assure that organizational design can both enable response to these threats and promise sustainable development. In the end, the existing institutions were left with their current missions—subject, however, to the requirement to adjust plans as necessary to comply with needs arising from basin-wide considerations. The organizational innovation would thus be particularized to introducing coordinative mechanisms to work both laterally and vertically in ways respectful of basin management.

⁸ The reserve spans almost 1.4 million ha and includes the lake and most of the surrounding area bordered by Highways No. 5 and No. 6. The reserve spans the provinces of Kompong Thom, Siem Reap, Battambang, Pursat, and Kompong Chhnang. About a quarter of the Cambodian population lives in these provinces.

⁹ The reserve consists of three distinct zones: (i) the open lake at its center, (ii) a freshwater swamp forest surrounding it, and (iii) seasonally flooded grasslands at the margins.

¹⁰ The Cambodia National Mekong Committee has a membership of 10 ministries and a linkage to the Mekong River Commission. It is to assist and advise the Government on all matters concerning the water sector and related resources of the Mekong River basin within Cambodia. Together with the Ministry of Water Resources and Meteorology, it is responsible for promoting basin planning and management that recognize the interconnectedness of social, economic, and environmental factors.

- **Form and function:** The Tonle Sap Basin Coordination Committee¹¹ to be set up within the Cambodia National Mekong Committee would have permanent ex-officio membership comprising heads of all existing line agencies of the Government touching or likely to touch the basin and the Governors of the provinces lying entirely or partially within it.¹² It would be served by two secretariats, that established to manage the reserve and a new secretariat to inform the Cambodia National Mekong Committee of developments in the Tonle Sap Basin. Stakeholders invited as needed to join in discussions would provide ad hoc representation for donors, community leaders, project investors, and other groups.
- **Sub-basins:** Finding the best ways to involve communities in defense of the Tonle Sap Basin and to bridge the vertical distances upward to the Tonle Sap Basin Coordination Committee and other branches of government became the next focus of attention. The answer was to return to basin-wide management principles and the flexibilities built in the design of the committee, both applied now, however, to the sub-basins draining to the Tonle Sap.¹³ Each tributary to the lake defines a sub-basin presenting its own opportunities and constraints. Organizing a committee backed by legislation at the sub-basin level and task forces at the district level, within and for each sub-basin, would allow the organizational logic for the Tonle Sap Basin as a whole to be fitted to each watershed. The needs and differences specific to each could be flexibly addressed, without loss of general coherence.¹⁴
- **Community participation:** The vertical structure described is focused on the sub-basins feeding the Tonle Sap.¹⁵ It is flexible at levels closest to the sub-basin populations. Leaders and members of communities with informed interest in sub-basin problems or

¹¹ The intended functions of the Tonle Sap Basin Coordination Committee, to be recognized in legislation, include (i) measurement of conditions and needs in the basin for baseline definition, (ii) assembly and organized consolidation of data describing the basin for use by the committee, line agencies, and others, (iii) general planning at the regional scale, to encourage protective action and directed development supporting the basin by others, and to measure foreseeable net public benefit from improvement in basin management effectiveness, (iv) continuing measurement and transparent public reporting on the progress of efforts to redress undesirable trends and bring new basin improvements, (v) persuasive defense of and support for basin-wide management in all decisions affecting the basin, at every level, public or private, and (vi) preservation of effective communications everywhere, to facilitate the functions recited here above. In fact, the listed functions do presage a writ of broad scope for the Tonle Sap Basin Coordination Committee, which would meet only at intervals and rely initially on modest staff support.

¹² The provinces are Banteay Meanchey, Oddar Meanchey, Siem Reap, Preah Vihear, Kompong Thom, Kompong Chhnang, Pursat, and Battambang.

¹³ The sub-basins are Stung Mongkol Borei, Stung Sreng, Stung Siem Reap, Stung Chikreng, Stung Staung, Stung Sen, Stung Chinit, Stung Boribo, Stung Pursat, Stung Dauntri, and Stung Sangker.

¹⁴ Where a sub-basin extends into more than one province, the structure would anticipate committees at provincial level to address issues within each, for ratification or consolidated reconciliation by a shared sub-basin committee set above them.

¹⁵ Since communities are likely to identify more positively with local watersheds than with administrative boundaries, the enlistment of their knowledge and enthusiasm to drive sustainable development becomes a more realistic possible result than alternative structures can hold out.

special knowledge concerning them would interact first at the level of the District Task Force, but also as required at the level of the Sub-Basin Committee.

- **Pilot testing:** There are 5,200 villages, 490 communes, 95 administrative districts, and 8 provinces in the Tonle Sap Basin and pilot testing will try out the organizational design recommended for legislation in a selected provincial setting. Under a proposal drawn for approval and implementation, the Cambodia National Mekong Committee will introduce basin-wide management principles in Pursat Province.

Financing basin management. Basin management organizations have broadly defined functions and operate in the public interest. Their tasks must be organized and their funding in investment and operation must be mobilized and guaranteed given specific conditions.

- **Developed countries:** For example, basin authorities in Texas—of which 15 are established under the Texas Water Code¹⁶—are given powers to conserve, control, and utilize to beneficial service the storm waters and floodwaters of the rivers and streams of the state. They also have the authority to discover, develop, and produce groundwater.¹⁷ Obviously, there is great scope for cost recovery in this milieu of services and financing is provided through issuance of revenue bonds guaranteed by the government. Means are available for calculating user charges to replenish sinking funds, generally with a 50% excess, which guarantees sufficient cash flow for repayment of the bonds. The authorities exist without the benefit of a direct tax base or state and federal appropriations.¹⁸ They provide services only to parties requesting service and charge for services only to the degree that service is actually delivered. If the revenues for an operating project exceed the expenditures, the surplus is returned to the customer entities served by that project in the form of cash or credit toward the next year's billings. Numerous other approaches to financing basin management can be found in developed countries.
- **Developing countries:** But, what of developing countries? In their contexts, revenue flow is most commonly generated from user fees for surface water or from potable water provided to municipalities. Fees for sustainable use of other resources, such as fishery, mineral, and forest resources, may also be used to support operations, the sought-after financial equation being that the sum total of receipts from user charges or from sale of

¹⁶ Available: <http://www.capitol.state.tx.us/statutes/wa.toc.htm>

¹⁷ In addition, they may exercise all the rights and powers of an independent governmental agency, a municipality, and a body politic and corporate to formulate plans deemed essential to their operation and for their administration in the control, storing, preservation, and distribution for all useful purposes of water and may provide, through all practical and legal means, for the control and the coordination of the regulation of water. This may involve preservation of equitable rights; storing, controlling, and conserving water; preventing the escape of water without the maximum of public service; conservation of water; provision of water supplies for municipalities and wastewater treatment; provision for the irrigation of lands; conservation of soils; and numerous additional specific acts aimed at protection and beneficial use.

¹⁸ Available: <http://www.trinityra.org/default.htm>

resources is used to support resource management. Any other equation would not be equitable. An example of payments used to finance enhancement has been proposed for the Nam Ngum watershed in the Lao People's Democratic Republic.¹⁹ This involves a fund mechanism that utilizes hydropower royalties to finance watershed improvement. Hydropower projects benefit from improved watershed management and so should be willing to pay for this in the form of a royalty on sale of power.²⁰ Many such balance-of-payment conditions can be set up to finance actual costs of administering water and natural resources at the basin level. As demonstrated at Nam Ngum, financial models can be set up to calculate with fair accuracy the costs associated with services, the charges to users, and the application of funds for enhancing the natural resource base. A mistake would be made if revenues were diverted for other purposes.

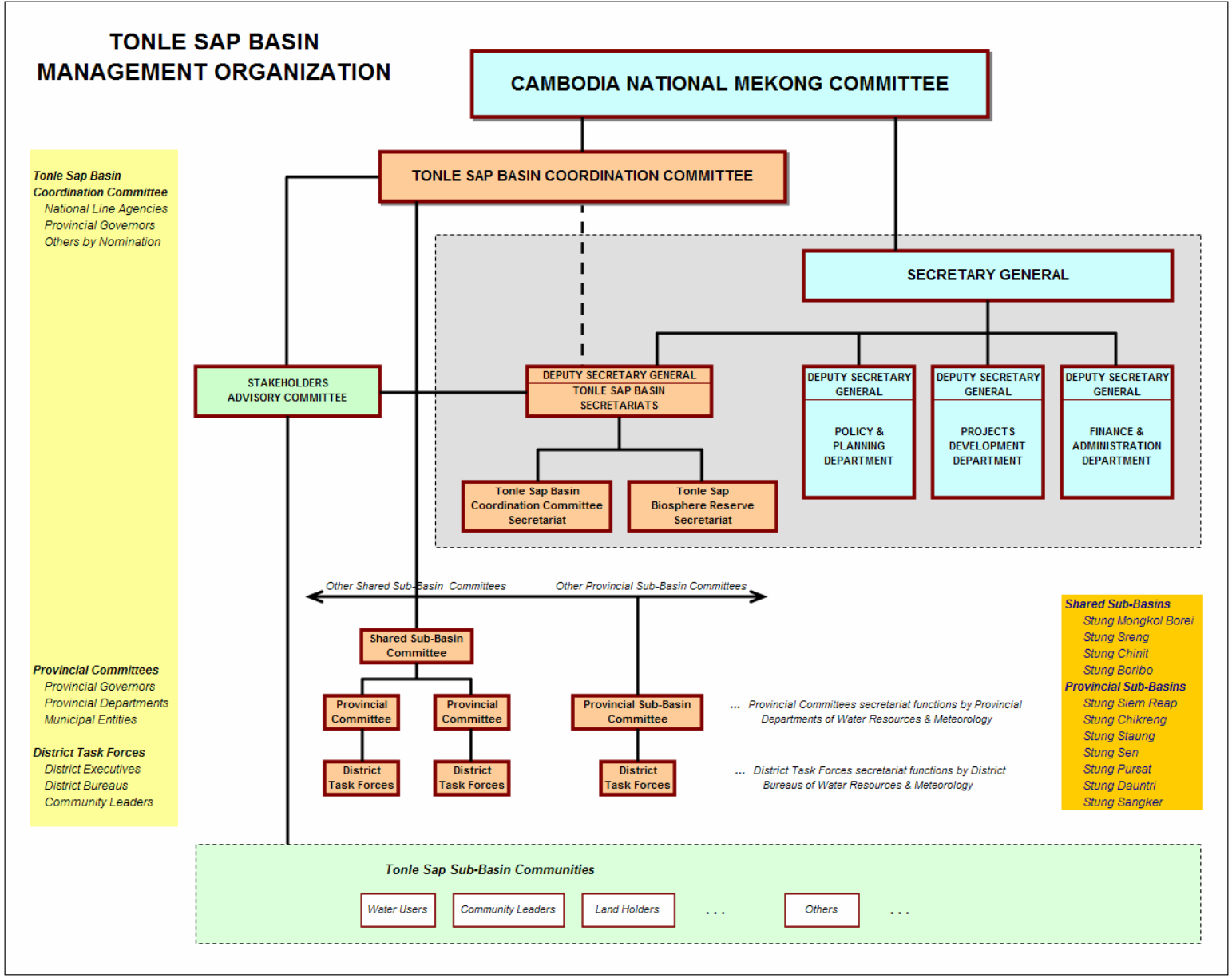
- **A comparison of basin realities:** Even so, it must be emphasized that models for basin management often break down when transferred from developed to developing countries. They must be made congruent with physical conditions, cultural traditions, and the stage of development reached, both generally and in terms of the level and manner of exploitation of water and related resources. This is indeed what drives establishment of the Tonle Sap basin management organization. An entirely new organization might have caused duplication and competition or distorted and weakened budget allocations. Its establishment would also have called for financial resources. The inclination to look first to coordinative mechanisms is a thoroughly Cambodian turn. It avoids the play of the divisive influences that might arise if a new organization were attempted. Rather, the approach followed leaves existing authorities, mandates, and programs in place but requires their modulation. It acts on the perceived advantage of doing less rather than more to achieve equal or even better net result with less potential disruption, delay, and cost. Other advantages are also peculiar to the national context. Cambodia is a small country, without significant differentiation of climate, land forms, culture, or economic prospect, and having few people. Public administration there spans small lateral distances within and between line agencies and much business is resolved face-to-face in meetings. The chance to work through coordinated modulations can be effective because the country's characteristics conduce to this.

The financial plan for the Tonle Sap basin management organization will be fleshed out during pilot testing. The important point is that this will be effected in ways that are that are authentic, indigenous, self-reliant, sovereign, civilized, and creative.

¹⁹ ADB. 1996. *Technical Assistance to the Lao People's Democratic Republic for Nam Ngum Watershed Management*. Manila (TA 2734-LAO).

²⁰ The benefits include reduction of siltation and settled highlands communities.

TONLE SAP BASIN MANAGEMENT ORGANIZATION



A COMPARISON OF BASIN REALITIES

Developed Countries	Developing Countries
Temperate climates; higher river-stream densities	Low rainfall; climatic extremes; higher mean temperatures; lower river-stream densities; water scarcity is an emerging constraint
Population is concentrated in valleys	High population densities in both valleys and uplands; high population densities both upstream and downstream of dams
Water rights are based on riparian doctrine and prior appropriation	Water rights are based on rights to rainfall or groundwater; notions of ownership relate more easily to rain than to large-scale public diversions
There is a focus on blue surface water: water is found in rivers and lakes	There is a focus on green water: water is stored in the soil profile; blue water is stored in aquifers
Most water users obtain water from service providers; most water provision is in the formal sector, making water resources governance feasible	Most water users obtain water directly from rainfall and from private or community storage without much mediation from public agencies or organized service providers; most water provision is in the informal sector, making it difficult to pass enforceable legislation
Small numbers of large-scale stakeholders	Large numbers of small-scale stakeholders
Low transaction costs for monitoring water use and collecting water charges	High transaction costs for monitoring water use and collecting water charges

Source: Adapted from International Water Management Institute. 2006. *The Challenges of Integrated River Basin Management in India*.