

Institutional Problems in Water Allocation: Challenges for New Legislation¹

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Thailand is suffering from acute bottlenecks in the allocation of water for agricultural, industrial, and domestic consumption. In hopes of providing a solution to these problems, the National Research Council has drafted a new Water Code, which has now been put to the Cabinet for deliberation. Among other measures, the draft proposes that charges be levied, under specified conditions, on all users for the water they consume.

To be effective, new legislation must be designed with a clear understanding of the particular nature of Thailand's water problem. New legislation should also create incentives which can overcome the shortcomings of existing institutions. On the basis of our diagnostic survey of the institutional framework, the authors argue that the draft legislation in its present form is not likely to repair some of the more critical problems at hand.

DEFINING THE PROBLEM

While the demand for water rises rapidly, the institutions for managing water come under great stress. To fully appreciate the nature of that stress demands that we look beyond the economics of supply versus demand. Supply shortfalls and surges in demand have been addressed elsewhere and will not be repeated in their entirety here.² Critical to our analysis is the fact that for any group of people, water is *always* scarce. Likewise its management always requires institutions which delineate the rules and procedures for its use. It thus becomes necessary to carefully specify the *particular* supply bottlenecks that have arisen. We argue that at the root of the water problem are three fundamental stresses which will need to be resolved through institutional innovations: conflicts regarding dry season allocation, ground water depletion, and water quality problems.

Dry Season Allocation

The most visible and dramatic problem involves providing water for all users during the dry season, roughly November to May each year. This is primarily a sectoral conflict between agricultural and urban consumption. The conflict is centered almost entirely on the Chao Phraya and Ta Chin river basins, which provide most of the country's water supply for irrigation and urban use. It is caused by an increase in irrigation and urban use just as the inter-temporal supply has declined.

Of the total of 33.5 billion m³ of water consumed nation-wide in 1989, agriculture used 30 billion m³, or 90 percent. Despite that astonishing figure, the main bottleneck in allocating water for agriculture comes in the dry season, when second paddy crop irrigators require about 9 billion m³. Most of the 4.5 million rai of irrigated paddy is located in the Central plain river basins, where dry season paddy now competes fiercely with urban consumers for water. Industrial and urban consumption in the Bangkok Metropolitan Region (BMR) now stands at about 3 billion m³, and at projected economic growth levels the BMR's demand could double in 10 years. An additional constraint is the Royal Irrigation Department's (RID) need for about 2.5 billion m³ per year to maintain enough flow in the Chao Phraya for flushing out waste and saline water in

the lower end of the basin.

Resources to meet everyone's demands *in the dry season* have dwindled rapidly. Annual rainfall in the Chao Phraya Basin ranges from 1-1.4 billion m³ per year. Irrigators, industrialists, and domestic consumers in the Central region thus depend almost entirely upon the water stream which is released from the Bhumibol and Sirikit dams in the lower North's main river basins. With a combined capacity to store up to 23.9 billion m³ of water, it seems that these facilities would be adequate to meet the Central region's water needs for some time to come. But rapid growth in consumption further upstream in the North, the destruction of watersheds from deforestation, and recent drops in annual rainfall have reduced the yearly flow into the dams from about 11 billion m³ 10 years ago to just 7 billion in 1993 ([Diagram 1](#)). The consequence is that, with the single exception of 1979, the combined water level in the dams at the beginning of the dry season has been lower in each of the past three years than ever before ([Diagram 2](#)). Moreover, the side-flow into the Chao Phraya Basin's tributaries and irrigation canals has been reduced by deforestation and upland cropping on the fringes of the basin, a trend which also boosts dry-season demand for the water harnessed in the dams.

The government's typical response has been to increase the quantity of water by developing untapped resources. Demand management—meaning improving the efficiency of existing systems—has not been widely practiced. But the supply-side approach can no longer be effective as untapped resources quickly disappear. Most of the more suitable sites for dams and reservoirs have by now been used up. And future expansion of these facilities faces a steeply rising supply curve caused by higher financial, environmental, social, and political costs. As the dry season problem worsens, officials have responded with apparently the only means currently at their disposal: limit the flow of water into the Central plain's irrigation canals, and demand that dry-season paddy farmers switch to less water-intensive crops.³

Ground Water Depletion

Estimates of water use by the manufacturing sector range from 1.4 billion to 2.1 billion m³ of water a year (1989 estimates). Of the portion of factories located in the BMR—over one-half of the total in the country, it has been estimated that only 0.5 percent of the water they consumed in 1989 was piped in from the Metropolitan Waterworks Authority (MWA).⁴ The balance was obtained from ground water pumping (95 percent) and other sources, such as rivers and canals (4.5 percent). In addition, the MWA pumped about 43.8 million m³ in 1989, or 4.7 percent of the Authority's total production, from ground wells.

Industrialists in Bangkok and the provincial urban centers have every incentive to deplete ground water wells. The MWA and the Provincial Water Works Authorities (PWAs) in the towns cannot meet the growing urban demand. More importantly, the private cost of ground water pumping is very low—about 1-2 baht per m³, compared with the average piped water rate of 6 baht per m³; well water is cleaner than water pumped from rivers and canals and does not require costly treatment; and ground water pumping is monitored very poorly by the public sector. The consumption rate far outpaces the recharge rate, and the resulting costs to society are very high. Land subsidence in the eastern areas of the BMR is about 5-10 centimeters per year, contributing to billions of lost baht in flood damages.

Water Quality

While wastewater discharges increase rapidly each year, Thailand has only begun to build its capacity for sewage and wastewater management (S&WM). In nearly every municipality nation-wide, almost all waste water is discharged without any treatment at all.⁵ Currently there are four proposed treatment plants for the BMR. Even if these are constructed without delay, they will have the capacity to treat only one-fourth of the one million m³/day of sewage that is discharged by the BMR.

Of the key industrial wastes—biochemical oxygen demand (BOD) loading and hazardous or "toxic" wastes—there is critical need for proper treatment facilities and, more importantly, for water quality

standards. The government currently lacks a data base on industrial wastewater discharges. Private estimates of only nine agro-based industries were that 525,000 tons of BOD loading were discharged in 1991. That figure is projected to double by the year 2001. A study by Engineering Science Inc. estimated there were one million tons of hazardous wastes dumped in 1989.⁶ About 71 percent of that discharge is produced by the BMR, and in 1991 production in that region alone was expected to *triple* by 2001. The decentralization of industry to the provinces can only make matters worse. Damages resulting from pulp factory discharges in Khon Kaen and severe BOD loading into the Nam Pong River are examples of what may well be repeated in the years to come.

Currently, the Department of Industrial Works (DIW) requires factories to install "suitable" water treatment equipment and conform to effluent emission controls, but this regulation is not uniformly followed or enforced. A 1987 survey of 2,000 factories found that just over one-half were meeting the effluent controls, and that many factories lacked the necessary know-how and monitoring capacities. The larger issue is the need to establish an *environmental quality* standard. The DIW's effluent control is based arbitrarily on an emission level for each factory. It is not based on a consideration of the *ambient* level in the water stream.

DEFINING THE MANAGEMENT PROBLEM

When searching for a solution to these problems, many officials point out that rice growers are the largest consumers of water in Thailand and that they use water inefficiently. These same officials have insisted that the amount of water provided for paddy irrigation must be reduced. That response has largely failed, however, because it misses the more fundamental problem of which the farmers' wasteful consumption is a symptom, and because in any case the vast majority of paddy farmers balk at this policy.

Economists argue that the absence of a market for water leads to "rent-seeking" behavior, meaning overuse at low cost to the user. Thai agriculturalists enjoy free access to water, while urban consumers pay a fee which accounts only for the cost of processing or pumping water. The real supply and opportunity costs are borne not by individual consumers, but by society in the form of negative externalities. Correcting this market failure demands intervention by a third party—usually the state, and on occasion local or community institutions. But the lack of a coherent administrative framework can lead to fallibilities in the interventions. These failures can, in turn, reduce a society's ability to repair market failures.

Thailand is currently experiencing a number of fallibilities in its institutional capacity to cope with supply bottlenecks and market failures in water management. These fallibilities are due to the erratic design and behavior of water policy institutions, and to something we have chosen to call "institutional stress." The new legislation would have to relieve this stress if water problems are to be addressed effectively.

Erratic Institutions

The institutional landscape for water management is littered with some 30 department-level agencies under seven different ministries. Two national committees attached to the prime minister's office—the National Water Resources Committee and the National Rural Development Committee—are responsible for drafting water guidelines and coordinating these agencies. In practice, the relationships among the agencies often respond to the bottlenecks outlined earlier.

Water management agencies are not legally obligated to inform the others of their activities, and thus the existence of national committees does not guarantee coordination. Another consideration is that some agencies, e.g., the Electricity Generating Authority of Thailand (EGAT), the National Energy Administration (NEA) and the MWA, also consume water free of charge. The lack of effectively defined property rights for the agencies leads to competing claims and bottlenecks within the government itself. The key competition has occurred in the Chao Phraya Basin among the RID, EGAT, and the MWA. To date, conflicts have been resolved by assigning low priority to agriculture.⁷

The authority to charge consumers for water is provided in numerous legislative Acts. The State Irrigation

Act of 1942 and its subsequent amendments allow the RID to impose a charge of up to 0.50 baht (\$0.02) per rai for irrigators, and the same charge per cubic meter of water for all other users. The Dykes and Ditches Act of 1962 and the 1974 Agricultural Land Consolidation Act authorize the RID to impose charges on land owners and other irrigators for Operations and Maintenance (O&M) and the capital costs of land improvements. The laws have proven difficult to enforce, and often their enforcement has simply not been attempted. The actual subsidy paid to farmers in the form of charges waived or deferred has depended on farmers' ability (or willingness) to pay.⁸ Moreover, water processed by the MWA and PWA is often drawn from RID canals. These agencies do not pay the RID any fees, though the water they use can reduce the quantity available for farmers.

Problems of coordination and enforcement only contribute to overuse. For example, the Ground Water Act of 1977 introduced a one baht/m³ ground water charge. Ostensibly the charge was to account for the social cost of pumping. The Department of Mineral Resources, which oversees groundwater use, lacks the administrative capacities to issue permits and enforce this charge on industry. Moreover, the ceiling charge of one baht in real terms is equal only to one-half baht in 1977 prices. When considering the nominal piped water rate of 6.1 baht/m³ levied by the MWA in 1989, industrialists have every incentive to overuse the aquifer in the BMR.⁹

Apart from formal public sector agencies there are informal community institutions, mostly in the rural areas where they manage village-level irrigation. These institutions exist autonomously, outside the boundaries of RID projects, though there are no legal guarantees that they would be protected by the law. Should a water user or even the RID decide to divert the flow of water upstream, existing water laws provide no recourse. Many of the traditional *muang fai* (community irrigation schemes) in the Northern region have been disrupted in this fashion.¹⁰

Institutional Stress

Institutional stress occurs when the institutions for managing a resource are not adjusted to address the bottlenecks that arise as the supply of the resource declines. If the supply of institutional innovations falls short of the need to manage the supply constraint, then the level of institutional stress rises, leading possibly to increased social conflict over resource allocations.

One source of stress involves the RID. It arises from the fact that, while this agency is the primary water allocation authority, its capacity to manage water is severely limited by external and internal constraints. Historically the RID's role has been to provide water for everyone. Under that mandate the RID has very little power to dictate its policies to other government agencies. Instead it must honor the supply requests of other agencies first. These decisions have been formalized into an agreement which is struck on the eve of every dry season by EGAT, the MWA, and the RID. As the water level in the Chao Phraya Basin's dams has fallen in recent years, demand from the two former agencies has increased and the RID has been squeezed.¹¹

To mitigate conflicts, EGAT and the RID for several years have improved their coordination by having the RID submit weekly demand estimates to EGAT in the dry season. In the short term this has enabled the RID to cope with the stress caused by the refusal of paddy farmers to follow RID planting restrictions. But as the water level in the dams has declined, this method cannot address demand-side inefficiencies.

Internal organizational constraints in the RID help to limit the attention that is paid to the efficiency of the agency's services. First, for long there has been an institutional bias within the agency in favor of construction over O&M. Professional reputation is rooted firmly in construction, and the tenure security and educational backgrounds of O&M staff are generally poorer by comparison.¹² Second, because the already low user charges are not enforced, there is no connection between the revenues the RID collects and the services it provides, and hence the agency has no incentive to concern itself with the productivity of its infrastructure. Third, there is very little coordination between the RID's water allocation and the decisions

of other Agriculture Ministry agencies that provide important inputs into irrigated agriculture.¹³ The result is that very little attention is paid to demand-side management of irrigation services.

A second source of stress involves emerging conflicts between upland farmers who draw from side-flow streams and farmers in the lowland areas. Many of the lowland farmers are located within the RID's irrigation projects, whereas many upland farmers have devised their own institutions to manage water allocations in their communities. As watersheds disappear in the upland areas, farmers there face greater constraints in the dry season. These constraints cannot always be mitigated by community innovations alone. Occasional RID interventions in these areas have not proven uniformly effective, as the agency is not obligated to incorporate local participation into the design of facilities, or to contribute to their maintenance. Areas where these upland-lowland conflicts occur, for example the Chiang Mai valley, require more effective third-party interventions which can balance the needs of RID irrigators with the very different needs of more autonomous community-based irrigators.

A third source of stress arises from the great need to replace industrial groundwater pumping, particularly in the BMR, with piped water services. In light of the social costs incurred by depletion of the aquifer, the government promulgated a new Groundwater Act in 1985 which mandated that pumping be phased out in the BMR by 1998. But even if we assume there will be more effective demand management through higher industrial water charges, fewer leakages, or an increase in recycling, there would still be a huge supply shortfall in the BMR. This would need to be supplemented by water from the Chao Phraya Basin, which would probably require conveyance from the Maeklong Basin, the Mekong River, or from the Kok Basin in the North as well. A reduction in urban ground water pumping, deemed essential to avoid massive social and environmental costs, could make sectoral conflicts between agriculture and industry more acute in the Central river basins, and would most certainly create allocation conflicts *between* the Central basins and other basins upstream.

A fourth point of stress in the institutional framework involves the enforcement of water quality standards. The Environmental Act of 1991 authorizes that ambient standards for the water stream be established. Currently the Department of Pollution Control (DPC) is creating a database on wastewater production which would provide the basis for setting those standards. Enforcement, however, would rest with the DIW. That the DPC and the DIW are located in different ministries which compete with one another over budget allocations for environmental projects does not make this achievement an easy one. Currently the Budget Bureau lacks its own information and know-how regarding water quality issues. It has not yet fully separated environmental quality control from industrial policy issues in its criteria for project approvals, and it has not always understood the need for a separate data base so long as the DIW has a legal mandate in this area.¹⁴ Furthermore, the enforcement of ambient standards will require more effective practices on the part of the key monitoring agency, the DIW. One necessary ingredient will be a professional and independent auditing system. While provided for in the new Environmental Act, such a system would rest upon the DIW's willingness to relinquish some of its authority.

THE DRAFT LEGISLATION

Shortly after the National Research Council (NRC) produced its draft Water Code, the Law Faculty of Thammasat University drafted a rival Code. Officials in the prime minister's office are now considering merging these drafts into one piece of legislation.

Institutional Adjustments Proposed

Three aspects of these drafts warrant scrutiny: the conception of property rights, the new authorities established, and the new policy instruments thus introduced.

The NRC draft does not change the "open access" nature of Thailand's water resources. It defines water as "*sombat phaendin*," which translated means "belonging to the country," but which in the civil law code provides the civil service authority to determine which user groups have ownership and utilization rights.¹⁵

The text of the draft states that every Thai has a "right" to use water so long as they do not impose any "negative effects" on other users. But it allows the civil service the authority to declare a "crisis" in the event of a shortage and thereby to charge all users according to their volume consumption. The Thammasat version is more extreme. In it all water belongs to the state (*khong rat*), and the state grants citizens the right to use but not own water.

The new administrative entities in each draft are "Basin Committees" which would oversee water allocation in some 25 major river basins. These committees would report to the National Water Resources Committee, the supreme policy-making body with regard to water. The National Committee would draft a water "plan" defining national allocation priorities in accordance with Thailand's five-year development plans. Basin "sub-committees" would report to the Basin Committees about the water situation in each river basin. The Basin Committees are then empowered to declare a "water shortage zone" in the event of a supply bottleneck. In each version, the Basin Committees would coordinate all the government agencies concerned and would solicit input from user groups about how best to manage and allocate water. The Thammasat draft's committees have wider mandates, as they would prepare plans for the management of water resources within each river basin. Both drafts propose a national Water Ministry which would implement the policies of the Basin Committees. In absence of that, policy implementation would rest with the numerous existing agencies and would be coordinated by the National Committee.

The policy instruments introduced by each draft feature a water "permit." The permit would be purchased by all water users from the government. In the NRC version the permits would be issued by the Basin Committees only in the event of a water "crisis" as announced by the committee. Thammasat's version authorizes that permits be issued to *all* water users at all times. In both drafts water users may transfer and sell these permits to other users. The NRC draft authorizes that water charges be based on the local MWA or PWA rates, while the Thammasat draft does not specify how charges would be determined. An additional instrument in the Thammasat draft is a permit for wastewater discharges. That permit, too, is transferable. The NRC draft does not address water quality, leaving the issue instead to be governed by the 1991 Environmental Act.

Benefits and Drawbacks of the Draft Codes

In addition to the very large administrative costs associated with creating all of the proposed authorities, each of the drafts will leave critical institutional problems unresolved.

Property Rights: In our view, the precedent that water should be provided virtually free of charge in Thailand creates certain cultural constraints that will not be overcome easily. The NRC draft is perhaps more feasible with regard to the property rights issue than is the Thammasat version. Practices associated with water management in Thailand do not lend themselves to command and control, and thus the introduction of comprehensive permits and the enforcement of charges on everyone at once is not likely to be achieved without incurring severely high administrative and political costs. The drawback of the NRC code, however, is that it leaves the open access aspect of water virtually intact. The existing incentive structure would not change, and the enforcement of permits during "crisis" periods would thus depend on the strong administrative resolve of the state, again a significant departure from past practice. A redeeming feature of the Thammasat draft is the creation of comprehensive property rights for wastewater. The enforcement of those rights, however, would depend on the capacity of the various committees to solicit the cooperation and compliance of the existing enforcement agencies.

Inter-basin Management: It is not clear in the NRC version whether a Basin Committee's perception of a crisis would coincide with the perceptions of water users. What is established is an entity which would serve to address the bureaucratic conflicts among existing agencies and to enforce national allocation priorities. For many users in a given basin, in particular agriculturalists, they already face supply constraints which constitute a "crisis" in their view. The draft as it stands does not specify how the Basin Committees are to distinguish among the needs of different users.

Constraints on the Basin Committees would arise from the fact that they have only limited authority in their

domains. While the Basin Committees are charged with enforcing water allocation criteria, they are not entitled to the fees which would be collected should permits be issued. With only partial authority allocated to these committees, they may well lack the incentives to boost the improvement of water efficiency in a given basin. A more preferable alternative might be the creation of basin water authorities, which would have full power to manage irrigation, oversee urban consumption, and collect charges for their services in their basins. Such an authority would have an incentive to address the institutional issues which are raising the level of stress in the current framework.

Between Basins: It is striking that neither draft addresses the conflicts that would inevitably arise between basins. Presumably the various Basin Committees would be obliged to follow the country priorities laid down by the National Committee, or the Water Ministry if one is created. If so, each Basin Committee would lack the authority to sell water to another basin. This national constraint could plausibly act as an impetus for improvement in demand-side management within a basin. But given the limited authority of the Basin Committees, it is hard to imagine where the incentives to economize within a basin would arise. Improved demand-side management would require changes in irrigation practices and management of infrastructure. It would also demand that the policy enforcement problems with regard to groundwater pumping and S&WM be addressed independently of the new legislation.

CONCLUSION

Our emphasis on supply-side management serves to demonstrate that, short of significant institutional innovations in the existing water management and enforcement institutions, the introduction of any new policy instruments will not offer a solution to Thailand's water problems. While both drafts do offer various measures that are necessary to begin addressing water problems, in themselves they are not likely to correct the many glaring government failures that are currently causing institutional stress and raising the level of conflict over water use. It would be unfortunate if the passage of any new legislation would distract from these fallibilities. Institutional reforms which could address the stresses identified above are a necessary ingredient in new legislation for changing the incentives facing water users.

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