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## Routes to Water Rights

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***Abstract.** Increasing competition and conflict over water resources bring pressures to more precisely define rights that are currently implicit and embodied in a complex variety of institutions influencing access to water. This paper explores routes to efficiently developing water rights as a means for improving water resources management. Adaptive strategies that acknowledge and work with legal complexity may be more effective than overambitious policies that ignore or undermine local capacity for self-governance. Examples from Southeast Asia illustrate some of the challenges involved in changing water allocation institutions. Methods for optimizing the transaction costs of reforming water rights are reviewed. Transaction costs tend to increase with expansion in the scope and scale of stakeholders, but may rise or fall along different pathways of institutional change. Development of water rights need not require imposing universal registration and quantification of rights, and could primarily rely on demand-driven processes emphasizing voluntary initiative, local knowledge, self-governance, and negotiation among stakeholders. As an alternative to recommendations that government agencies attempt to administer opportunity-cost water prices, accelerate formation of water markets, or impose uniformly formalized water tenure, adaptive strategies acknowledging and capable of interacting with the legal complexity of existing water allocation institutions may offer more feasible, equitable, and efficient routes to improving water management.*

### Introduction

As water becomes increasingly contested, water users are increasingly affected by the actions of strangers, with whom they have few other links besides sharing the use of a common resource. The success of attempts to resolve conflicts and coordinate collective action in water use depends, among other things, on the ability to find efficient solutions to overcoming problems of collective action. If reaching agreement is time consuming and difficult, and agreements difficult or impossible to enforce, then water allocation is unlikely to be effective, or to occur only through the unilateral imposition of state authority rather than arising from agreement among users. Changes in water resources management are more likely to succeed if new institutional arrangements are efficient in terms of the information, time, expenses and other resources required. This paper explores some aspects of how the transactions costs of institutions for water management might be optimized through better understanding and working with legal pluralism in water governance.

*Developing water rights.* Clearer recognition of water rights in one form or another is required for all three major approaches currently advocated for improving water allocation institutions (Meinzen-Dick and Rosegrant 1997): (1) clarifying agency allocations through more explicit contractual arrangements, e.g. through service agreements for provision of bulk water supplies to irrigators' organizations, (2) promoting markets for transferable water rights, or (3) facilitating development of self-governance institutions (organizations, forums, platforms, etc.)

though which users and their representatives can manage water as common property. In irrigation reform, water rights have been acknowledged as important for enabling better governance, including management transfer to local organizations (Vermillion 1994:17; Burchi and Betlen 2001). However, (with the partial exception of Mexico) relatively little policy attention has been paid to how water rights can be integrated into irrigation reforms.

Water rights and water governance can take many different forms. However in their attention to rights in various forms, whether explicit in shares, turns, licenses, etc., or implicit in distribution practices, approaches emphasizing the development of water rights can be contrasted with approaches that look at water allocation purely as a technical engineering exercise, as a means of maximizing economic productivity from a societal perspective, or as mainly a zero-sum political struggle over entitlements to assets. Instead, this paper focuses on the development of rules for water allocation as a process of governance involving stakeholders who have mixed motives to both compete and cooperate concerning water, and constitute “rules of the game” regarding legitimate claims to water. Such rules furthermore “take on a life of their own,” with emergent properties that are not simply the solution to a technical or economic calculus, nor merely an automatic reflection of the constellation of political and economic power.

Water users’ desire for security, and interest in retaining access, make changes in allocation likely to be a contested process, while the benefits from coordination and differences in needs provide strong inducements to cooperation. The difficulties of developing suitable institutions may be so large as to make it not worthwhile, especially if suitable infrastructure and other technical capacity is not available and opportunities for gains from trade in water are low. However, even when there are few potential gains from trade or these cannot be achieved, water users are still likely to be interested in ways to improve the reliability of their access to water.

*Legal pluralism.* In looking at how water tenure institutions might be improved, this paper builds on the insight that, for water governance as in other domains, a diverse combination of state and local laws, norms and other forms of social ordering may perform much better than overreliance on centralized state law, in terms of criteria such as effectiveness, equity, and efficiency. David Guillet (1998) has argued that reliance on local institutions to handle most allocation and conflict resolution has characterized the evolution of water rights institutions in Spain. More generally, Ellickson’s (1991) *Order Without Law* analyzed gaps between official legal doctrines and local practice, emphasizing the practical and theoretical advantages of relying on local knowledge and self-organization to optimize transaction costs and improve institutional performance. Government regulation that reflects and reinforces local norms and self-governance is likely to be far more successful than attempts to impose state rules at variance with local ideas and practices (Cooter 1997). More simply put, attempting to impose state law in ways that seek to erase or ignore local law is a recipe for failure.

Analysts of legal pluralism have emphasized that for water as in other domains, local laws (norms, customs, etc.) are not only important and interact with state law, but are diverse, dynamic, contested and heavily influenced by local power relations (see for example Spiertz and Wiber 1996, Benda-Beckmann et al. 1996, Spiertz 2000, Benda-Beckmann and Benda-Beckmann 2001). Misguided attempts to crudely codify local law risk not only misunderstanding complexity and “freezing” a dynamic process, but may also reinforce inequities and create new vulnerabilities to abuse by those better able to manipulate legal and bureaucratic systems. The challenge is to

understand how state intervention may interact with the complexity of local law and find routes through which it may be possible to reach better outcomes.

This is a challenge not only for bureaucratic agencies, technical experts, and academic scholars, but also for all water users, local leaders, and other stakeholders concerned with how water is used, as they seek to craft institutions to solve problems they face. Institutional performance matters for irrigators seeking to improve water allocation within an individual irrigation system, and for all stakeholders involved in governance of an entire river basin. Policies in irrigation and water resources management now commonly call for increased participation by “stakeholders” and empowering water users in water governance.

Studies of legal pluralism offer insights about the perspectives and strategies of different actors, and how differences in knowledge, power, wealth, and other resources influence disputes and other social action. Such understanding may be useful for all those seeking to develop better institutions for water management. Ideas about how to better promote water rights may be of particular interest to those concerned with empowering disadvantaged people to protect and improve their access to water.

*Optimizing transaction costs.* Transaction costs are composed of the time and other resources required to reach and implement agreements (Coase 1990, North 1990, Williamson 1996). Thus, for example, water users may seek to resolve conflicts and coordinate collective action in using water from a stream or other water resource. An agency charged with administering an irrigation system may seek to formulate and implement rules regarding how water should be distributed. Theorists of new institutional economics have highlighted how institutional changes, for example a legal framework of contracts and courts, can facilitate transactions, among strangers. The advantages of enabling strangers to bind themselves to enforceable commitments are not limited to commercial trades, but also apply to the challenges of creating institutions for self-governance of resources such as water.

Where the scope and scale of water conflicts extend well beyond the domain of existing community-based institutions, the challenge for those involved is to craft suitable arrangements for governance. Much research on community-based natural resource management emphasizes the independent capacity of self-governance (Ostrom 1990, 1992, 1999), and dangers of disrupting local institutions. In dealing with problems with wider scope and scale however, there is a need to go beyond existing local institutions.

This paper is particularly concerned with the possibilities for institutional change that include a continuing role for self-governance among stakeholders. Rather than simply imposing agency administration or atomized markets, institutions could be crafted that work with and enhance existing local ideas and practices, while also responding to wider concerns about equity, environment and other issues. While much discourse on water management is still dominated by a top-down technocratic perspective, there is increasing concern to involve stakeholders and pursue democratic processes for improving resource governance, creating more space for initiatives by resource users and those acting on their behalf.

In comparing alternative institutional arrangements, transactions costs are an important characteristic. However, it should be noted that efficiency is only one of many criteria that may be used in assessing the performance of institutions. From the perspectives of various participants, efficiency in lowering transactions costs may well be outweighed by considerations of effectiveness, equity, and other objectives.

Institutional performance matters from the perspective of government and overall social welfare, but also from the perspective of water users interested to take part in collective action to manage water resources, and for those who might take part in transactions to transfer water between uses. This is not to say that everyone necessarily wants changes in institutions, or wants the same changes. Those who benefit from the status quo may well prefer conditions that let them protect and sustain their current access water, rather than institutions that would facilitate efforts to redistribute water in pursuit of goals of equity, environmental conservation, or economic productivity.

*Organization of the paper.* This paper looks at opportunities to optimize the transaction costs of developing water rights, in contexts where legal pluralism is an important part of how water is currently governed. It is particularly concerned with reallocation, and the potential for reallocation to occur through voluntary transactions among water users. The first section presents examples of water conflicts in Southeast Asia that illustrate how legal and institutional complexity poses challenges for improving water management. The second section reviews a variety of strategies that can be employed to reduce the transaction costs of developing water rights systems. The third section discussed how the transaction costs of coordinating water management tend to rise as the scope and scale of competition for water increases, while transformations in water allocation institutions may increase or decrease transaction costs along different trajectories. The paper concludes by emphasizing how better acceptance and understanding of legal complexity, the existence of a dynamic variety of institutions interacting to regulate access to water, offers one way of helping to make water management more effective, efficient, and equitable.

### **Water conflicts in Southeast Asia**

This section presents a series of cases that illustrate some of the challenges involved in trying to improve water allocation institutions in Southeast Asia. The cases cover water distribution among irrigators within a single scheme in western Laos; competition between farmers and factories in Bandung, West Java; basin scale coordination in the Brantas Basin of East Java; groundwater pumping in the highlands of southern Vietnam; and conflicts between upland and lowland water users in northern Thailand. The cases reflect sites with which the author has some familiarity, and were chosen to help portray some but by no means all the sorts of variation present in water allocation institutions in the region. The presentation draws on published literature as well as the author's experience as a consultant in water management. As discussed later in the paper, the cases can be arrayed in terms of the scale of coordination needed to manage water and the scope of heterogeneity between multiple uses of water, with increasing scale and scope tending to raise the transaction costs of collective action in water allocation.

#### *Irrigation rehabilitation and expansion*

Rehabilitation of the Nam Tan irrigation scheme, located in the Laotian province of Sayaboury, restored service to downstream parts of the scheme which had received little or no supply for many years (UNCDF 2000, see also Coward 1980 for discussion of the scheme in an earlier period). State intervention was aimed at increasing rice production, as part of a national program for pursuing rice self-sufficiency. Statutory rules about water allocation were not a significant factor, but project plans and practices, "project law," deliberately sought to give all farmers

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within the irrigation perimeter direct access to water from newly built or improved quaternary canals. This contrasted with the field-to-field flows that had prevailed in many areas, as well as the various reductions in area served and other accommodations farmers had made as the capacity of the canal system declined due to neglect and lack of financial and technical resources. Rehabilitation extended water delivery to many areas that, before rehabilitation, had been poorly served, or not served at all. Rights to water derived from access to land within the irrigation perimeter.

For the rehabilitation project, project staff organized small groups of farmers to participate in planning and implementing rehabilitation of tertiary areas. This approach drew on many of the methods for participatory irrigation development earlier carried out in the Philippines (Korten and Siy 1988). Building on the organization of small farmer groups, a water users association (WUA) was formed to coordinate among the fourteen villages, almost two thousand hectares and some two thousand households served by the system. As rehabilitation proceeded, one of the first achievements of the association in terms of water management came in response to inadequate rainfall during the 1998 rainy season. The association arranged careful rotation among different units in order to distribute available supplies, a process that had become possible using newly rehabilitated canals and gates. The allocation principle was primarily the project-sponsored objective of evenly spreading water over the irrigated land within the perimeter (rather than allocation according to water shares, historic use, household or other basis).

Water allocation in the Nam Tan scheme primarily concerned one use, irrigation, within a relatively limited area and among a relatively homogenous set of users. Rice farming was usually undertaken by households as a joint enterprise, usually under the direction of male household heads. The male household heads usually represented the household in community governance activities, such as meetings and other activities that established WUA, devised rules, dealt with disputes, mobilized resources, distributed water, and maintained the irrigation system. Most participants in meetings were male, though women did attend and were vocal at times. Conceptions about membership often did not make a clear distinction between households and individual farmers. Children and younger married couples living in a parental household usually take part in rice cultivation as a household enterprise, but often also engage independently in enterprises such as raising small livestock and cultivation of non-rice crops in the dry season. Some water is used for household use and home gardens. The area includes some ethnic minority people, some of whom had lived in the upstream watershed area until they were required to move as part of government measures intended to protect the watershed. However neither multiple use of water nor ethnic diversity yet plays a major role in water allocation. Upstream of the Nam Tan weir there is little irrigation, while downstream the Nam Tan joins a larger river, with so far few pressures to coordinate water use along the river.

As in many irrigation schemes, water rights were not explicitly framed in terms of shares or written licenses, but were implicit in the infrastructure, rules, and procedures used to deliver water. These were transformed by how the rules and their application changed as a result of project intervention. Rehabilitation of the canal network and construction of field channels to each farmer's plots altered the physical infrastructure, allowing new options. At the same time, project activities emphasized a norm of allocation according to area, which was applied by the newly established association. Repairs to the canals and control structures augmented the water that could be supplied to the system. Installation of field channels and new distribution

arrangements were intended to deliver water in similar amounts to all irrigated land, rather than allowing those upstream to deprive those further down along canals and in other parts of the system. New distribution rules were proposed by the project and ratified by WUAs. Major control structures continued to be operated by technicians, according to the new rules, while WUAs took on responsibility for implementing and monitoring distribution within their areas. With relatively limited scale and scope of water use, the water user association provided a forum for negotiating access to water during seasonal shortages in the wet season and during dry season cultivation, without necessarily requiring any further formalization of water rights.

### *Competition between farmers and factories*

Textile factories take water from canals and fields in the Ciwalengke irrigation scheme, located south of the city of Bandung in West Java, Indonesia (Avianto 1996, Kurnia, Avianto, and Bruns 2000). Factories had obtained permits for abstracting water from the provincial government, issued under authority held by the provincial governor according to national laws and regulations. According to calculations by the provincial government agencies, there should have been enough water for both factories and irrigation. However, factories often installed additional unauthorized intakes, or attached pumps to intake pipes through which water was supposed to flow by gravity. Many fields located further down along irrigation canals experienced water shortages and farmers began to leave some fields fallow. In some cases factories agreed with neighboring farmers to pay for access to water the farmers would otherwise have used for irrigation. However, formal water law did not permit such transactions.

In some cases, factories provided assistance in materials, facilities, and money to communities located in the head end of the scheme, perhaps intended as compensation for the factories' use of water. Farmers located in the tail end of the scheme complained that such arrangements were unfair, but lacked effective ways to voice objections to arrangements that they felt disadvantaged them. In addition to conflicts over water quantity, wastewater from factories seasonally polluted canals and groundwater. Farmers whose fields were hurt by water shortages or pollution had mixed feelings about the problem, since many of their adult children worked in the factories.

The provincial irrigation agency allocated particular volumes of flow for irrigation. The mining agency (which was responsible for regulating groundwater), had approved water use permits which were then issued under the governor's authority. However, the institutional framework did not provide much security for either kind of access, i.e. those affected by problems had no effective way to ensure that abstraction was kept within the permitted limits. An effective procedure for investigating complaints and enforcing licensing restrictions was not in operation. The political and economic power of the factories, and the failure of earlier protests, made irrigators reluctant to challenge the factories. In the case of waste disposal, factories had frequently evaded inspection and enforcement by stopping discharges during periods when senior officials were visiting the area, while discharging at night and after the spotlight of official attention was gone.

The institutional framework for water rights did not provide a way for mutually agreeable trades to be made, nor did it ensure that the impacts on others of water abstractions and transfers between uses would be given due consideration. Overall figures indicated that adequate water should have been available within the scheme for all uses. In the event of shortage farmers were willing to give up water in return

for compensation. However the prevailing institutional arrangements made it hard for such agreements to be reached and enforced. Since trading of water rights was not permitted under the law, such agreements would not be legally enforceable. That situation was further complicated by ambiguities, inconsistencies, and lack of coordination between different government agencies concerning how permits were issued and enforced. Indonesia's national government and the province of West Java were both in the process of revising water laws and regulations, though it was not clear to what extent the new framework would recognize water use rights that would enable or assist users to regulate and reallocate water among themselves, to obtain greater security in their access to water and to enable transfers.

In Ciwalengke the competing demands of farmers and factories expanded the scope of issues involved, although within a relatively limited scale. Many of the factory workers came from outside the area, but enough came from local households to create cross-cutting interests concerning water management. This case illustrates some of the differences between official policies and regulations concerning water allocation and the realities of local practice. The structure of local interests and incentives was not a simple conflict between two major types of uses, but instead included multiple interests on the part of households whose livelihoods depended on both farming and factory labor, and selective cooperation between some factories and farmers.

Local law was evolving through transactions that demonstrated the potential for water transfers that might benefit both farmers and industries. However, the formal legal framework did not enable, let alone facilitate such arrangements. At the local level, agreements between factories and neighboring farmers appeared to be accepted as legitimate. By contrast, the fairness of selective deals between factories and some groups of upstream water users was questioned by those with fields downstream. Excessive abstraction by factories, using pumps and unpermitted intakes, was criticized as illegitimate in terms of both local norms and state rules, but enforcement institutions were largely absent or ineffective.

#### *Growing urban demands*

Surabaya, Indonesia's second largest city, lies at the downstream end of the Brantas River basin. During the dry season the potential demand for urban water, irrigation and other needs exceeds the available supply, creating challenges for water management in the basin (Sunaryo 2001, Rodgers et al. 2001). The government-owned Jasa Tirta I Corporation manages some major storage reservoirs and provides other services to manage water in the basin. It works under the direction of the national government minister responsible for water resources (previously the Minister of Public Works, currently the Minister for Settlements and Regional Infrastructure), acting in cooperation with the Finance Minister. Within Indonesia's unitary state, the provincial government has the authority to issue water licenses and regulate water resources. Most urban water utilities and some factories have water abstraction permits, while irrigation diversions are not formally licensed.

Irrigators in upstream areas in the basin enjoy a locational advantage and face few effective restrictions on how much water they divert, sometimes growing a third crop of rice during the dry season, while those lower down in the basin suffer from severe water shortage and must leave fields fallow. In some sections of the basin, the government water resources agency sometimes instructs upstream irrigation systems to stop taking water for one day a week in order to help replenish storage reservoirs in the midstream area. There are anecdotal reports that at the local level, those

controlling access to springs and other upstream sources sometimes “sell” water to those a bit further downstream, only releasing flows once they have been paid, even though such transactions are legally prohibited and regarded as illegitimate by irrigation officials.

In lowland schemes, farmers irrigate second and third crops of rice or less water-demanding crops such as soybeans, corn, and peanuts. Profits are low. The higher value of water in urban uses, and potential for diversification into horticulture and for other household enterprises outside of agriculture, suggests the possibility for voluntarily and equitably transferring water rights, if suitable laws and organizations were available. The physical structure of the basin would make intersectoral transfers possible, particularly if it is a matter of reducing abstractions upstream and allowing water to flow downstream. There may also be opportunities to coordinate and reallocate surface and groundwater sources, e.g. shifting groundwater currently used for irrigation to urban water supply and replacing it with alternative sources of surface water for irrigation, which is less sensitive to water quality. The presence of some reservoir storage capacity in the basin, and existence of an agency managing most of those reservoirs and other major structures, also mean that some technical potential does exist for reallocation among uses and locations.

At present the main tool government has to reallocate water lies in control over cropping patterns in large government-managed schemes, whose farmers may be given reduced allocations, and told to grow non-rice crops, often with little opportunity for consultation, and no compensation. National policies and government regulations issued in 2000 and 2001 stated that governance authority over these schemes and secondary units within them would to be transferred to water user association federations, and that, as part of this process, water rights should be clarified. Stakeholders are supposed to be included in provincial and basin water management committees.

The Surabaya basin highlights the challenges involved in a much larger scale of water management, ranging from small irrigation schemes in upper watersheds to large lowland schemes. The scope of issues is complicated by growing urban and industrial use. In some cases, local institutions have allowed the creation of local rights to the point where access to water is sometimes “sold,” even though this is illegitimate in terms of state regulations regarding water. The potential exists for mutual gains in water transactions, at the local and basin scale, but the institutional framework for such transactions is absent from the formal legal system, and informal local institutions only operate at a limited scale.

#### *Expansion of private pumping*

During the nineties, coffee growing expanded rapidly in Dak Lak and neighboring provinces in the southern highlands of Vietnam. Farmers, mostly ethnic Vietnamese moving in from outside the highlands, cleared land to plant coffee and irrigated coffee trees with water pumped from ponds, streams and wells (Ahmad 2000, Andersen 2001). Over time, groundwater tables dropped and dry season stream flows were reduced. Declining international prices for coffee threatened the profitability of coffee cultivation, although the history of past price fluctuations encouraged continued planting of coffee based on speculative hopes that prices would rise again.

Vietnam's 1998 Water Law and subsequent legislation created a new framework for regulating groundwater extraction and surface water diversion. Laws and implementing rules formally required licenses for almost all groundwater extraction.

However, in practice licensing all existing and new wells would have been extremely difficult or impossible, and has so far not been implemented.

Declining groundwater levels created a cause for alarm. However, available hydrological data and capacity for monitoring and analysis were too limited to even determine where groundwater was being extracted within levels of safe yield, albeit perhaps at the expense of users elsewhere, and where it was being inefficiently “mined” with increased costs for pumping and for deepening wells that made all users worse off. Effective collective action to address the problem would need to include not only those served by canal irrigation systems but also state farms and dispersed smallholders irrigating coffee trees using groundwater. A Danish-funded water project supported initial efforts to involve users in participatory management of irrigation and watersheds, however with the exception of a few specific irrigation schemes such efforts were still in a formative stage.

Water management in this area involved wide scale, and competition between older gravity schemes mainly irrigating rice and coffee growers pumping directly from surface and groundwater sources. Urban use was also growing, and competing for surface and groundwater supplies in some areas.

The population of the area included both indigenous ethnic minority groups and a rapidly growing population of ethnic Vietnamese (Kinh) settlers, adding to the cultural complexity of the situation. As one indicator of some of the issues present in the area, in 2001 ethnic minority groups in Dak Lak and neighboring provinces engaged in major protests, with a key issue being their loss of rights to land and livelihoods (Far Eastern Economic Review March 1, 2001). While not directly focused on water conflicts, the protests did take place in a context shaped by increasing competition concerning access to natural resources essential for rural livelihoods. Water was a crucial input for the agricultural practices by all the different groups.

In terms of institutions influencing access to water, there was a gap between ambitious regulations which imply comprehensive registration and regulation of water abstraction, and the realities of dispersed water abstraction, particularly for groundwater that was especially hard to monitor. The transaction costs of actually inventorying existing uses would be high, and effective monitoring and enforcement concerning quantities abstracted even more difficult. Rapid acquisition of rights to land, either individual land rights or subsidiary rights as tenants of state farms, and accompanying de facto open access to water by settlers, was creating growing scarcity.

#### *Highlands and lowlands*

Lowland irrigators in the Chom Tong District of northern Thailand have blocked roads, petitioned authorities, and made a variety of other protests against water use and pollution by vegetable growers in the highlands upstream of their villages (Tankimyong et al. 2002). Ethnic differences between lowland Thais and other ethnic groups, mostly living in the highlands, complicated perceptions and interactions. Irrigated cultivation in highland areas had been backed by various government projects as an alternative to opium cultivation. During the dry season, water for cabbages and other crops was diverted from streams in upper watershed areas. Lowlanders' water use had not been static either, as increasing areas have been planted to lychees and other fruit orchards, perennial trees for which investments were at risk if water is not available. Water from canals and wells was pumped to supply fruit trees. Groundwater levels had been declining. Water were only one point of

contention, as cultivation in highland areas had also been entangled in polarized debates about formalizing land use rights for those living and farming in mountainous areas designated as forest reserves, watershed conservation areas, and parks. These issues were highlighted in controversies over a possible Community Forest Law, including the draft bill debated by Thailand's Parliament in 2001.

Government projects, politicians, non-government organizations and other outsiders became embroiled in the conflicts, pursuing their own goals and seeking to support local actors, justified in terms of a range of concerns such as poverty, national security, conservation of upland catchments, justice for ethnic minorities, habitat conservation and controlling water pollution. Numerous attempts were made to mediate conflicts but it proved difficult to reach workable agreements.

Upstream irrigators were frequently been able to use their locational advantages to take additional amounts of water, leaving those downstream to suffer the consequences. However, in other cases downstream users were able to get government agencies to restrict land use, resettle upland communities or otherwise influence water diversion by those upstream.

The issues were largely framed in terms of competition for irrigation and domestic water use within specific small sub-basins formed by tributaries of the Mae Ping River. Those debates were not closely linked to the larger scale relationships between water use in northern Thailand and the growing water demands of the Bangkok metropolis and overall water management within the Greater Chao Phraya Basin. Efforts had begun to promote the development of sub-basin committees, but the composition and roles of such bodies were still being explored.

In the cases discussed above, formal water rights, such as licenses and permits, have played little role. Even where urban or industrial use was licensed, the ability to monitor and enforce use in accordance with license conditions was limited. Government agencies controlled some irrigation schemes and claimed authority to regulate water, but had very limited capacity to monitor and enforce allocation. The main users of water, irrigators, had long-standing access, mostly for irrigation schemes managed by government agencies, but agricultural access to water was usually not formalized in permits or licenses. Water rights in state law were often vague and contested. The conditions that would enable easy enforcement of agency mandates were absent, as were technical services such as those needed to assess consumptive use and sustainable groundwater yields, as well as courts or other authoritative forums to resolve conflicts. Local institutions for allocating and reallocating water were evolving ahead of formal law, but important aspects of access to water were increasingly contested at the local level and at wider scales. The cases showed legal pluralism in the multiplicity of sources of claims to water, as well as substantial ambiguity and dynamism in water allocation institutions. Local institutions could not be easily ignored or overridden. Attempts to clarify water rights needed to deal with the diversity of challenges created by such conditions.

### **Facilitating the evolution of water rights**

A range of methods is available for making establishment of water rights more feasible and successful. Most of the approaches for facilitating the development of water rights discussed below have already been discussed by various authors (e.g. Rosegrant and Binswanger 1994, Easter et al. 1998, Velasco 2001) but it is useful to review them here in terms of how they may help optimize transaction costs and

facilitate water management in contexts of legal pluralism. These may be part of a toolkit for addressing situations such as those described in the previous section, helping those crafting new institutions.

Much discussion of developing water rights institutions tends to focus on the perspective of experts and government agencies. However the strategies discussed below are also relevant to water users who may undertake initiatives to defend or expand their access to water, and others, such as NGOs and academics, who may seek to help them to defend their interests.

### *Acknowledge existing rights*

Sometimes state law simply disregards local rights, authorizing only those rights already incorporated in state law, ignoring or overriding local institutions that regulate claims to water, acting as if water allocation started with a “blank slate,” easily written and rewritten. In other cases concerns about clarifying rights prompt proposals to document, register and otherwise formalize water rights according to state law and bureaucratic procedures. In practice, existing water use creates a system of implicit or de facto water rights. Such rights are often unwritten, arranged through institutions which do not rely on the impersonal routines of formal bureaucracy, and may well be embodied in operational practices rather than consciously designed to allocate quantities of water.

Rather than having to assign rights from scratch, the pattern of existing use provides a framework that can facilitate the efficient development of a more formalized water rights system. Conversely, failing to recognize or protect existing rights, for example by only allocating water in proportion to land, may increase gaps between state and local law. One illustration of this is that where rights are nominally allocated in volumetric terms, during periods of shortage water may be shared in proportion to the volumetric allocations, with proportional principles being much more similar to customary local practices. In developing suitable means for formalizing local rights, existing access can be protected, while still setting limitations and procedural requirements concerning the extent to which those rights can be transferred, and how to resolve conflicts when existing claims exceed available supplies.

It should be noted that acknowledging local water rights institutions need not be predicated on an assumption that such rights constitute a fully integrated, consistent, and consensus-based system. The allocation institutions may well be based on principles that are conflicting, with inconsistencies that become more apparent as water becomes scarcer. There is sometimes a tendency to idealize local knowledge and practices, rather than recognizing the extent to which they may be incomplete, inconsistent and incoherent. By virtue of their role in regulating access to a finite shared resource, there are physical linkages and constraints in how water flows and is diverted. Even if perceptions may differ widely about claims and their validity, these are influenced by the patterns of where water actually flows. Nor need there be an assumption that such local practices are inherently “equitable,” particularly given the prevalence of many forms of inequality, and often widely differing views regarding equity. Even within formal law systems, conflicts exist between different laws and regulations, which may persist until some particular case or issue draws the attention of a legislature or court to the need to provide greater consistency.

Acceptance of traditional water rights, even when these have not been formally registered, has been a key principle underlying river management in Japan (Sanbongi 2001, IDI 1997: Article 87). Existing users were not forced to register merely to

defend their access. Instead the law established the principle that they have legal standing to protect their interests when necessary. The River Laws of 1896 and 1964 provided a formal basis in state law, through which agencies and courts could take account of existing rights. It is worth noting that this is the case even though in general the development of Japanese law was deliberately designed to rely on civil law, not common law principles. The provisions of the River Law mainly focus on actions by bureaucratic administrators, not judges. The principle of being “*deemed to have obtained permission*” illustrates one way to reduce conflicts between state and local law, without forcing local rules to explicitly conform to the criteria and formulations of state law.

Such state acceptance of existing use need not require immediate registration, formalization, comprehensive inventorying of uses, or other deliberate interventions to “recognize rights.” Rights can still come into play in the event of disputes or other conflicts, e.g. in response to plans for water resource development. Such an approach of accepting existing rights, without insisting on any comprehensive formal registration, can maintain the legitimacy of existing users thus drastically reducing the transaction costs involved in regulating water allocation. This may sound like an obvious approach, but the examples of Indonesia and Vietnam discussed above illustrate the problems that may arise where such existing use is not acknowledged. In the case of Thailand, existing use by communal irrigation systems is at least arguably recognized by the People’s Irrigation Act of 1939, but other water allocation for irrigation does not have as clear a basis for accepting water rights. Such an approach need not mean that local rights are always accepted uncritically, or forgoing any possibility of state intervention to promote greater equity in water allocation and reallocation, only that this is done in ways that acknowledge and interact with local institutions, rather than just acting to ignore or erase them.

*Promote subsidiarity*

The subsidiarity principle emphasizes allowing problems to be dealt with at the lowest suitable level. Water is managed at multiple scales. Rules regarding access to water are constituted and enforced through a variety of local institutions. Many aspects of water rights, for example transactions among irrigators within a single irrigation scheme, may well be left up to local social institutions, rather than having to be processed through a formal water rights registry or other state procedures. Similarly, local organizations may be able to handle most conflicts, rather than having to assume that all disputes must be dealt with through agency or court procedures. This approach can draw on the strengths of local institutions, local social capital, to lower transaction costs.

A commonly recognized example is the potential for a water user association to hold water rights, either in its own right as common property or acting on behalf of its members. Under such an arrangement outsiders need not get involved on a regular basis in dealing with tens, hundreds or even thousands of individual farmers, but instead can deal with one organization that aggregates the interests of its members. Individuals may still have legal rights and be able to seek recourse if they feel their rights have been infringed by the organization, but this can be the exception rather than the rule. By not insisting on initial imposition of state rules within schemes, while still allowing recourse in the event of disputes, transaction costs may be reduced while still obtaining the advantages of local institutions and of potential state intervention to promote equity and other goals.

### *Allow gradual formalization*

It is not necessary that all rights be immediately inventoried and formally registered. Instead this can be a gradual process, which may largely happen one stream or sub-basin at a time as water resource development projects, conflicts among users, and other factors encourage users to organize themselves, voice their concerns in the media and other forums, and seek formal registration to clarify and protect their claims. One claim may generate a cascade of claims along a particular stream or basin, as others along the same stream seek to defend their rights, but still not impel the immediate demarcation of rights within other subbasins and basins.

Discussion of developing water rights often seems to assume that all rights must be formalized, and that in countries with long histories of formal water rights all rights are already registered. However, even in countries with well-established legal institutions to regulate water rights, such as Spain, Chile, or parts of the western United States such as New Mexico, it turns out that many, and even the majority of water rights are not formally registered. Guillet (1998) reports that many of the water rights in Spain are not formalized, despite its long history of state regulation of water rights. A similar situation exists in Chile with many water users not having registered rights, both in earlier periods of the 19<sup>th</sup> and 20<sup>th</sup> centuries and during the past few decades (Brehm and Quiroz 1995). Some basins in New Mexico are in the process of having rights formally adjudicated, to clearly determine rights, but the adjudication process has taken decades and it is not clear when it may finish (NNMLS 2000 and personal communication). Fully adjudicating rights in a basin is a complex, information intensive, and time-consuming process. As long as informal mechanisms are sufficient, there is no need to impose formalization from outside. Allowing a gradual, selective process of registration, and accepting that many rights will be unregistered, dramatically reduces the transaction costs involved in establishing and operating a water rights system.

### *Develop forums for resolving conflicts*

In many cases courts may be unavailable or ineffective. Where the number of disputes which disputants take to outside authorities is relatively small, ad hoc arrangements by water agencies or local administrative and political officials may suffice. Beyond this it is possible to develop forums, along streams, in subbasins and in basins, which can help mediate conflicts. Agency officials may be given limited judicial powers, or special water courts might be developed whose judges have better technical understanding and familiarity with the special issues involved in water conflicts.

Such forums need not require that rights be formally registered. In addition to resolving specific disputes such forums may have a wider impact than previous ad hoc dispute management by local authorities and others, if such institutions help establish precedents that guide others, influencing processes of self-organization and mutual adjustment. Without requiring full formalization, the precedents established by such bodies can influence many others, parallel to the way court rulings guide the resolution of many cases settled “in the shadow of the law” (Mnookin 1979). Formation of forums need not wait for or depend on formalization of rights.

### *Simplify calculations*

Various simplifying rules can make rights easier to understand and manage. Proportional shares may be both consistent with local principles, and more flexible in adjusting to varying flows than rights defined in terms of absolute quantities. In

deciding what portion of diversions are consumed and so might be transferable, standard rates for consumptive use may be set using average figures, avoiding the need for detailed calculations as to what proportion of current flows is actually lost or returned (Theobani 1998). Conversely, Schleyer and Rosegrant (1996) point out that under arid conditions in which return flows are less important and traditionally regarded as not having any secure right, such as in parts of Chile, then irrigators can simply be assigned rights to the full amounts diverted, again reducing the need for complicated calculations. Using such simplifying rules may seem obvious, but often is forgotten in discussions that talk about water allocation in terms of detailed engineering calculations, and the complexities of consumptive use, return flows, and lag times. At the same time, such rules point toward ways to make water allocation based on water rights workable even in the face of severe limitations in hydrological data and technical capacity. Again this is relevant not just for government agencies but also for users organizing ways to coordinate their actions.

*Prepare for sparse transactions*

As Young (1986) and others have pointed out, water trades, especially permanent transfers, may be relatively rare. Temporary transfers, within a single scheme and season, can usually proceed with little formality, even to the point of enabling relatively efficient “spot markets.” Water is bulky. Transfers are limited by the available network of rivers and canals. Physical, financial, and transaction costs may be relatively high, particularly for permanent transfers across long distances. Urban water supply expansion occurs only sporadically. Therefore large investments in developing formal registries, building capacity to scrutinize potential third party impacts, and other costly measures, may not be justified by the potential level of transfers. Colby (2000) stresses that markets for water and other rights associated with resource flows can develop and offer substantial gains in the long run. However initial transactions tend to encounter opposition and relatively high transaction costs, proceeding not like simple trades but instead resembling complex negotiations.

*Enable institutions to adapt*

In combination, the strategic principles outlined above show how it may be more efficient to allow institutions for water transactions to evolve, as users seek to clarify and defend their access to water and as those who would like to make transfers do so. Institutions can then be developed efficiently in accordance with demand, rather than pushing premature institutional development that burdens water transactions with unnecessary overhead. Acknowledging existing rights and allowing transfers need not mean that rights are immediately registered and quantified, nor that extensive trading results immediately and perhaps not even in the long term.

Enabling water transfers need not imply that huge initial investments must be made in the institutions to allow trading. Recognizing that transactions may be sparse and allowing institutions for transfers and trading to evolve in response to demand from rights-holders can thus further reduce costs and enhance the feasibility of an adaptive approach to water management. The principles outlined above could support the feasibility of a gradual, evolutionary approach to developing water allocation institutions, optimizing transaction costs through better integration of state law with existing norms, internal regulations of common property organizations, and other forms of local law.

### **Scope, scale and transaction costs**

In general, increases in scale and scope of conflict over water can be expected to increase the transaction costs of managing water. Geographic scale and scope of multiple use are distinct dimensions, capable of varying independently. The ways in which institutions may change do not necessarily follow a single path, e.g. of increasing transactions cost, but instead may follow different paths under different circumstances.

Scale concerns the number of users and geographic areas involved. Coordination across longer distance tends to increase transaction costs even when uses are relatively homogenous, as for example between different groups of irrigators. Interaction between different kinds of uses and users expands scope. This may both bring new concerns, e.g. water quality, and create new opportunities for mutually beneficial agreements, building on the differences in interests.

Transaction costs may take many forms, from time spent traveling to and attending meetings, to money spent paying agents to monitor water use, to legal fees. Transaction costs may come from procedures mandated by government, for example requirements for environmental impact assessments and public consultation, as well as being influenced by the increasing capability and willingness of different stakeholders to pursue their interest in available forums, including courts and the media. Transaction costs may rise as the opportunity cost of time increases, while on the other hand changes in information and communication technologies may tend to reduce costs.

Strengthening and formalizing water rights is one possible response to increasing competition over water. Institutional changes to formalize rights may help efficiently solve problems and optimize overall transaction costs of water management. However, initial investments, with substantial transaction costs, may be necessary to put in place new arrangements that ultimately may be more efficient. Changes in institutions may emerge as a response to increasing scale and scope of competition over water and the rising value of water in competing uses, but also may be driven by other processes, such as the expansion of bureaucratic agencies or increasing reliance on laws and courts. Institutions and transaction costs may follow various trajectories over time.

Transaction costs may tend to keep on rising, as water users spend increasing amounts of their time and other resources trying to acquire water and protect their access against competitors. Transaction costs of acquiring and protecting access to water may rise slowly or steeply over time. This could take the form of an escalating “arms race” where each person’s efforts cause others to work harder, with most or all ending up as net losers. Increasing transaction costs of monitoring, guarding, litigating, etc. could diminish, or even extinguish, the value of existing access to water, even if users nominally were allocated the same volumes. Thus transaction costs could rise to the point where they induce some users to stop using water or seek other sources. Institutional changes, such as those discussed in this paper, are often undertaken in response to the increasing time, effort and other resources required to secure access to water.

An institutional change could reduce transaction costs. New institutional arrangements may make it possible to gradually reduce, or even jump or “tunnel through” to a new arrangement with much lower transactions costs, for example where water distribution is handed over to a trusted third party. A simple example would be shifting from having each irrigator draw water from canals into their own

field to having a single common irrigator distribute water. This might not only reduce time spent traveling to and from fields, but also time spent monitoring whether others were taking too much water. The general argument for institutional reform is that it can lead to such changes, whether at a local scale within a single irrigation system or within a large river basin. This could be the case whether such changes are crafted through self-governance among users or promoted by government action.

In other cases substantial resources and time may be needed to devise and implement new arrangements, and these may be subject to much testing and tension before working more efficiently. Establishing new institutions is likely to be costly, especially if new arrangements must be formulated and then accepted by a diverse range of stakeholders. Thus, transaction costs may initially rise, but then later drop over time as new institutions are accepted and begin to operate more smoothly. A major question for many proposed reforms is whether the initial costs may be so high as to make change very costly, perhaps to the point whether change is impossible, or not worth the effort.

Institutional changes may not always lower transaction costs, and the amount of impact may vary. Users may be willing to invest more time and expense in protecting their access to water if their use of water is valuable enough. Minimizing transaction costs is rarely an overt goal, but rather a form of efficiency preferred subject to achieving some other objective, so that even after an institutional change, transaction costs may still be higher than before.

In general, increases in scope and scale of competition could be expected to induce institutional innovations that allow water transfers. However, as North (1990), Olson (2000) and others have stressed, the paths by which changes actually occur are strongly influenced by the structure of interests, organizations and property rights. Among other things, these factors help explain why potentially beneficial changes may not occur, if they are blocked by those who would lose out, or if property rights are not strong enough to allow potential beneficiaries to capture the gains from changes.

In some cases the cultures and values of the different groups involved may be so different, so incommensurable, that the time and effort needed to reach agreement would be extremely high or infinite, making solutions very difficult or out of reach (Blatter and Ingram 2001, Espeland 1998). In other cases rivalry, distrust, and strategic manipulation may greatly raise the threshold of costs needed to reach agreements.

Within particular localities, transaction costs for allocating water may be lowered by shared understandings and practices concerning water and by the ways in which management of water is embedded in other relationships. Where groups competing for water do not share common practices or conceptions concerning water, its use and allocation, then the transaction costs of resolving conflict may be high. Crafting new agreements may require extensive efforts to interpret different understandings and translate them into mutually agreeable arrangements.

Unwise attempts to impose uniform external definitions, based on government authority or market pressures may either evoke rigid resistance, paralyzing the potential to constitute new solutions, or shatter the social capital which has facilitated local water allocation, breeding confusion, conflict and disruption. Poorly designed or premature institutional changes create risks of having rights taken over by those with better skills, knowledge and political connections, perhaps regressively redistributing rights. A key implication is again that formalization is not always necessary or inevitable, but may be seen as a choice, one of several ways to address water

conflicts. An understanding of legal complexity can help to clarify the extent to which conflicts are pursued through different forums, and how efficient alternative arrangements may be in terms of various criteria.

Transaction costs capture some, but certainly not all, of the important factors affecting water management. A major incentive to solve conflicts over water comes from the potential gains to the parties, particularly from more reliable access to a secure quantity and quality of water. However, stakeholders may also be influenced by values concerning entitlements to water (either currently or as part of what they consider a better justified allocation), by sacred beliefs concerning particular water sources, and by other ideas, some of which they are unwilling or unable to negotiate. Gains in status by being taken seriously as a stakeholder may facilitate resolution of conflicts, while conversely resentments about being disrespected or taken advantage of may make it difficult or impossible to even begin discussing possible agreements.

### Routes to the future

This paper points out some of the ways in which facilitating the evolution of institutions for water allocation may offer ways of equitably increasing water productivity with lower transaction costs and risks than the alternatives of strengthening direct allocation by government agencies, universally formalizing all rights, or establishing fully-commoditized water markets. Examples from Southeast Asia illustrate the legal complexity of water conflicts, conditions that make it difficult to achieve better water management solely through agency-controlled allocation or commoditized water marketing. Evolutionary strategies can reduce the costs of establishing new institutions and facilitate voluntary transactions to allocate and reallocate rights to water. A better understanding of legal complexity, of the many ways in which rights are constructed and pursued, can be useful in identifying ways to make institutional development of water rights more feasible and successful.

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### Notes

- <sup>1</sup> Japan's River Law (Law 167 of 1964, as amended in July 1997), in Chapter VI. on Miscellaneous Provisions (Transitory Measures) Article 87., states that (Sanbongi 2001, IDI 1997) [*italics in original, underlining added*]:

A person who, on the basis of the competency and as of the day of the designation of a *class A river, class B river, river zone, river conservancy zone, projected river zone, spatial river conservancy zone* or *projected spatial river zone* is doing an act for which permission according to the provisions of this Law must be obtained or setting up a structure for which permission according to the provisions of this Law must be obtained shall be deemed to have obtained the permission according to this Law concerning the act or the setting up of the structure on the same condition as before. The same shall apply to a person who, on the basis of the competency and as of the day of the enforcement of a Government Ordinance referred to in Article 25,

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Article 27 Paragraph 1, Article 55 Paragraph 1, Article 57 Paragraph 1, Article 58-4 Paragraph 1 or Article 58-6 Paragraph 1 or a Government Ordinance to amend or abolish such a Government Ordinance, is doing an act or setting up a structure for which it becomes necessary to obtain new permission as a result of the enforcement of the Government Ordinance.

Concerning (Article 23.) Permission for River Water Use, Article 88. on Notification by De Facto Permittees states that [*italics in original, underlining added*]:

Upon the designation referred to in the preceding article, those who are designated by Government Ordinance out of the persons who, according to the provision of the article, are deemed to have obtained the permission referred to in Article 23 through 27 shall notify the *river administrator* of the necessary matters as may be provided for in detail by Government Ordinance. .

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