**DORAS - DELTA : research report n°7**

# Water Pricing in Thailand: Theory and Practice

*François Molle*

**DORAS CENTER – DELTA Project**

**Kasetsart University** **IRD**

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# Contents

# Abbreviations, units and terms used

BMA: Bangkok Metropolitan Area

CPBO: Chao Phraya Basin Organisation

EGAT: Energy Generation Authority of Thailand

DS: dry-season

DEDP: Department of Energy Development and Promotion

HYV: High Yield Varieties

MOAC: Ministry of Agriculture and Co-operative

ONWRC : Office of the National Water Resources Committee

PIM : Participatory Irrigation Management

PIS : People's Irrigation Projects

RID: Royal Irrigation Department

WBO : Water Basin Organisation

| | |
|---|---|
| *rai* | 1 ha = 6.25 rai |
| *baht* | 1 US $ = 37 baht (average) |
| $Mm^3$, $Bm^3$ | Million $m^3$ , Billion $m^3$ |
| *cms* | $m^3/s$ (discharge) |

"*Project*": one of the administrative and hydraulic sub-units of the Royal Irrigation Department within the Delta.

# Executive summary

This paper explores the rationale for the implementation of water pricing and water markets in Thailand, and reviews these options within the historical, socio-economic and technical context specific to this country. Despite Thailand's peculiarity, there is little doubt that the problem of water allocation demands regulation and interventions, against the view held by some NGOs that concepts and practices inherited from a situation of open-access resource should continue to prevail. Demographic and economic changes in Thailand will not, in the short run, allow free access to water to last as a sustainable solution.

The analysis of the current debate reveals, however, a certain degree of confusion in the objectives and weaknesses of the justifications put forward. In particular, several axioms, considered as conventional wisdom, were put in context and called into question.

- The first widespread fallacy is that farmers *guzzle* water, and therefore, are the main cause of the water crisis. Such unqualified statements ("efficiency in gravity irrigation is under 30%") do not account for differences in situations (open basin vs. closed basin; rainy season vs. dry season, etc). In the dry-season the Chao Phraya basin is a *closed system* and irrigation efficiency is close to best standards (60%), in particular because most farmers have to use pumps to access water, while the macro level efficiency is close to 85% (little water is lost *out of* the river basin). Thai farmers have been very responsiveness to water scarcity, in particular by developing conjunctive use and pumping capacities.

- The idea that shortages are due to poor efficiency is another misleading and enduring misconception. Because it is believed the efficiency of use is low (which itself is incorrect), water is assumed to be lost and some users to end up lacking water. This is wrong on a purely hydrologic basis but also fails to understand the real nature of shortages: the amount of water released for dry-season cropping is adjusted to the changing water stock in the dams; all other uses are supposed to be satisfied. When a shortage occurs, it is because cropping areas have expanded in an uncontrolled manner beyond what is possible to irrigate; or because insufficient carry-over stocks have been kept in the dams and a succession of exceptionally dry seasons draw water reserves under what is necessary to meet minimum needs. Such shortages are therefore caused by *management failures* and not by the lack of water *per se*. These failures are due to insufficient control, in terms of hydraulic facilities, cropping areas and political interference (altogether, this results in poor *scheduling*). The shortage in itself is therefore independent of whether it has been possible to irrigate one or two

million rai with the water released. Even with good efficiency, demand would remain higher than supply, especially in these years of drought when pressure on water is highest.

- The third main misconception is generated by juxtaposing the alleged water waste and the fact that water is free, as typified by the refrain “water is consistently undervalued, and as a result is chronically overused” (Postel, 1992). It has been shown that the statement that water is free may be acceptable only in a narrow sense. The revenues siphoned off from rice cultivation by the State through the mechanism of the rice premium between 1952 and 1984 correspond to a contribution by farmers to the investment costs, which is far more considerable than in many other countries. On the other hand, water management deficiency has compelled farmers to make considerable investments in pumping devices in order to access water. This, together with the corresponding operational costs, is a financial burden for farmers and shows that “they don’t get it free” in most cases. In addition to both tenets of the proposition being highly dubious, the causality is also debatable.

- A fourth conspicuous and widespread argument is that centralised allocation in Thailand has reached its limits and that water rights and a water market would provide a flexible mechanism to allow the reallocation of scarce resources towards the most economically beneficial (profitable) uses. This is strongly reminiscent of the deadlock experienced in the western US, where water rights are locked in uses of low-productivity and where market mechanisms may constitute one of the ways out of the stalemate. Such ill-placed emphasis fails to recognise that inter-sectorial allocation is precisely the aspect that has been most successfully addressed by centralised allocation, in that it gives effective priority to activities with higher economic efficiency in water use. Ironically, a market might create the difficulties it is supposed to solve, should farmers be reluctant to cede their rights, as is occurring in parts of the Western US.

- Last, the argument of cost recovery was questioned within a context where taxation, subsides, and government interventions are elements of a global policy addressing antagonistic goals. The alleged 'huge drain' that O&M expenditures impose on the national budget amounts to 0.16% of the national income and can be considered as an indirect subside to a heavily taxed agricultural sector. A water charge corresponds to an increase in production costs which cannot easily be passed to the consumer because of the tight dependence of rice prices to the world market.

The practicability of establishing of water pricing is also considered in the context of the Chao Phraya Delta. Establishing a water fee for rice farmers in the actual context seems doomed to failure. It cannot be affixed to volumetric use and will at best have no effect on water use efficiency. In addition, a water fee would likely result in

widespread default the service of supplying water with relative certainty is unlikely to be ensured. This situation will stir farmers' exigencies in a technical and institutional setting, which cannot respond to them under the present conditions. Water rights can be relatively well defined in a context where every farmer's demand is eventually satisfied (and where pricing can be made proportional to the plot area), for example in the lower Delta and in parts of the northern region. In another situation, rights are very hazardous because of the high heterogeneity of access to water (in quantity, timing, quality, level gravity vs. pumping).

Economic-based regulation and participatory management were also shown to be relevant and more likely to be successful in two specific and combined contexts. The first of these is the closed water system, in which demand already offsets supply. This shows that a different approach is needed for *surplus basin* (such as the Mae Klong basin) and *deficit basins* (such as the Chao Phraya basin). The second aspect can be termed "agrarian pressure" and is strongly governing the interest and determination of farmers to act collectively, as well as the heterogeneity of their response and of their strategies. A context of pluri-activity, part-time farming and out-migration is not favourable to strong collective mobilisation.

Doubt was also raised about the impact and the relevance of confronting farmers with users from other economic sectors with higher capital and productivity. The first key question is whether farmers who would give up farming would do so willingly, on account of alternatives offered to them, or whether they would be thrown into bankruptcy, distress and poverty. Reallocation may appear legitimate when "displaced" people can find decent alternatives within the farm sector or outside. The second point relates to political positions on the importance given to food security and more generally on the role of rural activities and rural life in landscape management, aesthetics, cultural preservation and societal equilibrium. Most countries, if not all, are reluctant to jeopardise their rural sector.

Water pricing, as a fixed tax, is consistent with a context of relative stability of income (rice prices) and production (reliability of water supply). It must therefore be addressed within a wider perspective including most particularly rice pricing and marketing, water planning, allocation and reliability, farmers' participation. Defining a 'service' or 'a right' is probably both the most important prerequisite and the major difficulty. The actual lack of control over the system (which includes technical and political aspects) does not allow to ensure a reliable scheduling and causes widespread heterogeneities in the access to water (in terms of quantity, quality, timing, and water level).

A worrying aspect of the water pricing reforms envisaged is that they stem from external pressure rather than from an endogenous awareness of the seriousness of the situation of the water sector. Experience from other countries suggests that limited success can be expected in contexts where both the administration and

politicians are reluctant or passive. It is proposed that political will and commitment could be conveniently tested and observed in the case of the control of underground water extraction in Bangkok Metropolitan Area before moving towards wider and more complex taxation schemes.

Considering, on one hand, the daunting list of pre-requisites to the establishment of water markets and, on the other hand, the specificities attached to the examples of existing markets, it is obvious that the opportunities to expand such markets are more limited than suggested in the literature. The example of Thailand is probably representative of a much larger context, including the bulk of Asian medium-large scale irrigation. Thailand shows that situations with no possible volumetric metering, a very high number of small farms with differentiated and fluctuating levels of access to water committed to wet rice cultivation with severe environmental and market constraints to diversification, weak legal and institutional environments, and significant political meddling, are unlikely to be in a position to benefit from such mechanisms, at least in the foreseeable future.

However, the virtuous links existing between structural, managerial, institutional and financial approaches are recognised. Reforms addressing a single aspect of the system are all the more likely to fail or to turn counter-productive. Although the wholesaling of water is still extremely rare, it may appear as a viable solution if considered within a comprehensive reform framework. In that sense, we view water pricing as a powerful albeit ancillary measure of a contractual binding between RID and users. It can be seen as a reinforcing factor in a participatory process, which could lead to significant gains in equity, rather than in efficiency.

Other justifications based on water saving, cost recovery or inter-sectoral allocation are shown to be largely irrelevant, despite their theoretical appeal. The risk that a bandwagon syndrome could lead to the adoption or the imposition of blue-prints giving insufficient consideration to the Thai context is high. The daunting impositions made to the institutional and political settings should preclude over-enthusiasm and, rather, prudence, gradual reforming, testing in pilot areas and in-depth awareness-building, training, negotiation and discussions with all stakeholders, including politicians, are needed. Concomitantly, this process should be geared towards effective River Basin Organisations giving a say to all users and provided with sufficient power, legal and political backing, and clear mandates to control, allocate and manage water resources.

# 1 Context

Water, rather than land, is the defining element of Southeast Asia, where the human relationship to water has long formed the basis of existence (Rigg, 1992). Its Deltas and main valleys, in particular, were aquatic environments which have been transformed into the rice bowls of the region. In Thailand, water is best seen as a gift, traditionally linked to the good will or power of the absolute king who mediates its supply from supernatural forces. "*Chonlaprathan*", the Thai word for irrigation, embodies a notion of the royal gift. The *Loy Krathong* festival, in November, when offerings are put afloat on the waterways of the kingdom to thank the water spirits for the life that water brings, reflects the relationship between people and water. In a land of relatively scarce population until recent times, water remained an *open access resource*, free for the taking by those who had access to it. While nature may provide water irregularly and with limited timeliness, prejudicial to traditional rainfed rice or flood-prone systems, it is often its excess which is also put in sharp relief, making it difficult to derive a sense of value from a resource which sometimes materialises through devastating floods.

To the layperson, a monsoon tropical country is associated with the image of land made luxuriant with plentiful water. The stark reality, however, is that Thailand has joined the host of countries currently facing water shortages. With the exception of the southern region and some forest areas along the border, hydrologic data show that the yearly average rainfall in Thailand varies between 1,100 mm and 1,600 mm, (ESCAP, 1991). A somewhat attenuated monsoon provides water in excess during about half of the year, while for the remainder of the year water is released from 28 storage dams. After the World War II, Thailand's water resources were largely untamed and lacked storage capacity to regulate the seasonally contrasting water regime. The population was less than 18 million people, and most of the uplands were still covered with forests. The second half of the century, however, would witness dramatic changes in population (62 million inhabitants by 2000), urbanisation (10 million people in the Bangkok Metropolitan Area [BMA]), water resources storage development (28 main dams comprising a volume of 66 billion $m^3$ [$Bm^3$]), cultivated area (52 to 130 million rai) and irrigated area (32 million rai, or 25% of the total agricultural land). However, only 15% of the 200 $Bm^3$ annual run-off remains trapped in the dams (ESCAP, 1991).

Gradually, through the concomitant development of irrigated and urban areas, constraints on water resources started to be felt, particularly in the Chao Phraya basin (Figure 1), where irrigated areas were developed beyond the potential defined by the available water resources. The expansion of BMA gradually extracted a significant share of the basin resources. Increasing competition for water materialised

through recurrent water shortages in the dry season, mostly affecting rice cultivation, but also prompting restrictions in the supply to the capital (in 1994 and 1999). With gloomy prospects for the Thai water sector, four schools of thought developed in response to the water challenges posed.

The first school of thought on water resources, promulgated by NGOs and social activists, considers water as a social good, the free use of which is a human right. As expressed by a scholar at Thammasat University "natural resources — such as water — are essential to all, and should not be managed by market mechanisms. Otherwise, water would not flow by gravity but by purchasing power. Commoditisation of water should not be allowed because the right to natural resources is a basic right all human beings have". This view is echoed by some farmers, who inquire why they would "have to pay for the water that Mother earth and the forest give us" (The Nation, 2000 June 11).

A second viewpoint is spearheaded by international donors, notably the Asian Development Bank (ADB), together with some segments of the public administration who, willingly or not, seem to have rallied to the cause. They have voiced support in favour of the introduction of economic incentives and demand management. Water saving must come from water pricing (users will inevitably be encouraged to reducing their consumption), and improved management. Conflicts between users, in particular different economic sectors, are eventually best regulated by market-based mechanisms.

A third attitude, favoured by most of the Thai public sector, supports an administrative solution rather than one based on demand management[1]. New laws aim at giving more control power to the various administrative bodies concerned by water issues, orientations quite in evidence in the two drafts of the "Water Law" which have been elaborated in the past years (Christensen and Boon-Long, 1994). Emphasis is also placed on co-ordination between agencies and on the idea of basin agencies. The possibility of creating a Ministry of Water has also been debated for a few years.

Finally, the somewhat "traditional" concept put forth by technical bodies (and consultants) which holds that the problem of water shortage can be solved by increasing supply through further water resource developments. These efforts include new dams and transbasin water transfers from the Salaween and Mekong Rivers. This solution faces growing opposition from environmental activists and is loosing its attractiveness for donors because of the increasing costs of tapping an additional $m^3$

[1] The Metropolitan Water Authority's website bears a motto which suggests that agencies can have mixed feelings: "Tap water is not a commodity but something obtained from the management of natural resources, therefore it is a treasure which ownership right must be extended to all people".

of water. However, it tends to be preferred by some governmental agencies for well known reasons, ranging from an engineer-oriented culture, to political and financial direct or indirect benefits (Christensen and Boon-Long, 1994; Repetto, 1986).

While discussions of the opportunity of a water charge are an old story, these conflicting views have been recently put in relief. The issue entered the limelight following the announcement that the granting of ADB funds to the country would be conditional on its subscribing to, and applying, the overall principle of water pricing. The public debate has been obfuscated by the different nature of the economic tools envisaged and of the arguments which can be raised in favour or against these policies. This appears clearly in newspapers articles, interviews, consultants' reports and NGO literature. Representatives of the Royal Irrigation Department (RID), the Office of National Water Resources Committee (ONWRC), the Ministry of Agriculture or from international agencies (in particular ADB) often make conflicting statements and show positions which evolve over time. An examination of official declarations reported in national newspapers gives a measure of the fluctuating argumentation, reflecting both the unsettled nature of the negotiations, the general nature of the arguments and the lack of consensus even within a given administrative body. They show, for example, that fees were expected to be levied, alternatively, from farmers with on-farm development, from those requesting "special deliveries", from commercial farmers and non-agricultural users, from sugar cane planters and shrimp farmers "who are willing to pay", while it is emphasised that "small-scale and poor farmers" will be exempt (leaving ample room for interpretative debates). Justifications, too, fluctuate between cost recovery, fee for service and raising efficiency[2].

[2] It was successively announced that "ordinary farmers would be exempt [of water fee]"; that fees would be "collected from farmers in areas where the irrigation systems are fully available" (Bangkok Post, 1999 January 13); that "only planters of so-called economic crops such as sugar cane and durians who could afford it would be made to pay" (Bangkok Post, 1999 January 15); that "fees would be imposed on farmers requiring special delivery of water above the normal amount they receive through irrigation" (Bangkok Post 1999 February 19); that the "ADB has dropped a requirement that farmers pay for irrigation water in return for agricultural development loans" (Finance Minister Tarrin Nimmanhaeminda in Bangkok Post. 1999 February 23); and that "the Minagri has agreed to start collecting money from sugar cane planters and shrimp farmers who are willing to pay for on-farm delivery of irrigation water. Small scale farmers who already have access to existing public irrigation and water distribution channels will be exempt" (The Nation. 1999 June 10); that "the government and the ADB had agreed that users of irrigation facilities would have to pay the appropriate prices, but it would not be applied to small-scale farmers and the poor" (Agriculture Minister Pongpol Adireksan in The Nation. 1999 June 14); that "farmers might have to pay an additional cost for water after the Water Resources Bill was approved by Parliament" (NWRC director, in The nation, 2000 April 23); that "poor, small farmers struggling to survive are exempt from water charges (…) Only large users of water from the irrigation canals, such as golf courses, housing estates, industrial plants and large commercial farms that make huge profits, would be targeted" (The Nation, 2000 May 6); that "the fee is not a tax on water but a service charge to be paid by those who use the service" (Bangkok Post. 2000 June 11).

This paper attempts to disentangle and gauge the arguments raised by the different parties and to provide insight on how country-specific conditions call for an adaptation or a revision of concepts and solutions that claim either exceptionality or wide applicability. The four sets of arguments discussed above are commonly found in different settings world-wide. A growing number of countries are now experiencing strain on water resources. Very few nations escape the daunting task of establishing legislative frameworks, administrative and technical upgrading, and law enforcement capacities to rule the sharing of this elusive and fluctuating vital resource. In other words, what is at stake is the proper management of the transition of water from the status of common-pool resource in sparsely populated agricultural areas, to the status of collective resource management in a more complex world, respectful both of the environment and of basic equity and efficiency standards.

In the 1960s and 1970s, while little pressure on water was felt, emphasis was placed on infrastructure and technological development. As it became obvious that technique alone was unfit to deal with the growing challenges, attention was shifted to organisational aspects. These approaches included farmers' participation, farmers-agency co-ordination, and capacity-building. Despite some success, it appeared that the diversity of historical, cultural, social, economic and political settings made it difficult to design solutions that could be applied successfully on a large scale and with reduced transaction costs. This led to a growing interest in design and application of economic tools. It was expected that imbalances could be remedied through the market mechanisms and judicious pricing.

All these ideas are reviewed here in the Thai context. Most of the discussion, however, will centre on the Chao Phraya Basin (30% of the country), especially the Central Region, which is the bulk of the irrigated area in the dry-season (75%). Crucial and interconnected issues include the allocation of insufficient water resources in the dry-season, the growing degradation of water quality by urban areas and industries, and the dramatic overdraft of Bangkok aquifer. The first point will be debated at length (§ 2, 3, 4 and 6), while the latter two will be brought into the discussion when touching on intersectorial water allocation and on institutional issues (§ 5 and 7).

# 2 Water scarcity and its stated causes and remedies

There is a consensus that introducing market-based mechanisms to improve resource allocation, or even levying fees related to water use, makes little sense in an open system, where these factors exert minimal leverage on access to the concerned resource (Smith *et al.* 1997; World Bank, 1993). Therefore, we must first examine how water scarcity in Thailand is experienced, defined, and transformed in common knowledge.

First, there appears to be little scope for water scarcity issues during the rainy season. Although some episodic dry spells are commonly experienced with, irrigated schemes have little difficulty supplementing crops with needed water. In fact, water inflow is mostly coming from rainfall or from uncontrolled (i.e. not captured by reservoirs) natural sideflows in the river basins, upstream of the irrigated areas. Overall, rather than supplying water, water management is often geared towards limiting excess flows and flooding. In other words, water saving is not an issue[3].

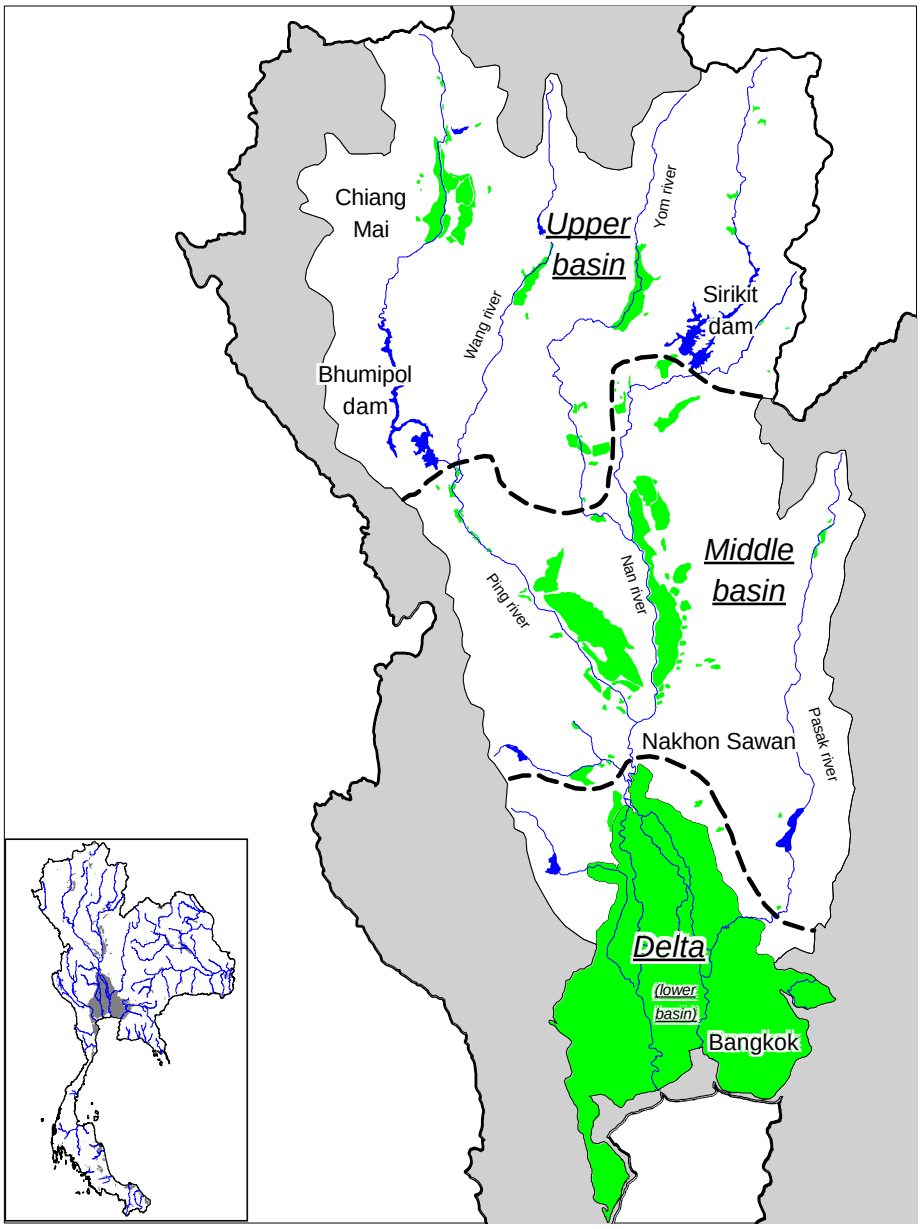
During the dry-season, on the other hand, the potential water demand from all users in a given basin is often higher than the available (stored) resource. This is in particular the case in the Chao Phraya basin and several basins in the northeastern region. In this first basin, the construction of two main storage reservoirs (Bhumipol dam, in 1964, and Sirikit dam, in 1972), and several large scale irrigation schemes since 1952 (see Figure 1), has led to a situation described as “overbuilt” (World Bank, 1990), meaning that the production potential of existing infrastructure far exceeds the water supply potential of the dams. The question of water allocation (when, where, to whom, and how much water is to be supplied) is therefore a critical one, as available resources do not catch up with demand.

The Chao Phraya river basin can be divided into three regions (Figure 1): the *upper basin* (the catchment area of Bhumipol and Sirikit dams, the Wang and Yom rivers), the *middle basin* (downstream of the dams, to Nakhon Sawan), and the lower part (or the *Delta*). The yearly inflow into the dams has declined from 11 to 9 $Bm^3$ in the last

[3] …for agriculture. Nevertheless, water saving is a relevant issue at the level of the basin, especially with regards to the possibility to increase the amount of water retained for the dry season by avoiding wasting water in the wet season (fit between dams release and demand and responsiveness to hydrological change); for more details on this issue, see Molle *et al.* (2001a).

thirty years (Molle *et al.* 2001), because of decreasing precipitation (Bancha *et al.*, 1998), deforestation[4], and growing water abstraction in the North[5].

Figure 1: Layout of the Chao Phraya basin (+ main dams and irrigated areas in Thailand)




[4] Deforestation modifies the yearly hydrograph of rivers (more run-off in the wet season, less in the dry-season) and therefore mostly affects water availability in the dry-season in those areas which divert natural river flows. The overall impact on the total yearly run-off is a subject of debate.

[5] Almost 4 million rai of irrigated area constructed in the last 40 years

Irrigation in the upper basin differs from that of the Delta. It is composed primarily of traditional communal systems (*muang-fai*), often very old, which divert water from rivers in a mountainous environment. These traditional systems now face challenges posed by reduced run-off (forest destruction), pollution from uplands, increased use (conflicts with non-agricultural users) and social change (State interventions, declining group cohesion because of pluri-activity and economic opportunities within the wider economic system) (TDRI, 1994). In the middle reach can be found both medium and large scale projects managed by the Royal Irrigation Department (RID) (totalling approximately 1 million rai), together with group irrigation based on pumping stations along the river. The latter has been fostered by the Department of Energy Development and Promotion (DEDP).

In 1998, 1,894 pumping stations were in operation throughout Thailand, with a total irrigated area of 2,852,700 rai, but only 228 stations were operating in the lower Ping and lower Nan reaches (DEDP, 1999). Private irrigation is believed to be marginal in the middle basin. In the Delta, almost 5 million rai can potentially be irrigated in the dry-season (with a high potential for double or triple cropping).

Demand from urban areas has increased exponentially. BMA's demand rose from 0.46 million $m^3$/day in 1978 to approximately 7.5 million $m^3$/day in 2000 (a sixteen fold increase in twenty-two years). In addition, there is a contribution to BMA of approximately 3 million $m^3$/day from underground water, most of which is used by industries (90% of which rely on the aquifer) (TDRI, 1990)[6].

Water scarcity is acutely experienced in years when the dry season begins with low dams stocks. This leads to curtailment of the cropping area and, in years of crisis, to a rationing of urban supply. A dramatic lack of water materialises when outflow to the sea is insufficient to combat saline intrusion and brackish water damages or destroys the orchards located along the river, as occurred in 1994.

A cursory understanding of the situation in the Chao Phraya river basin can be derived from Figure 2, which presents the evolution of water supply and demand in the basin in broad terms[7], if no additional source of water is tapped. What is strikingly

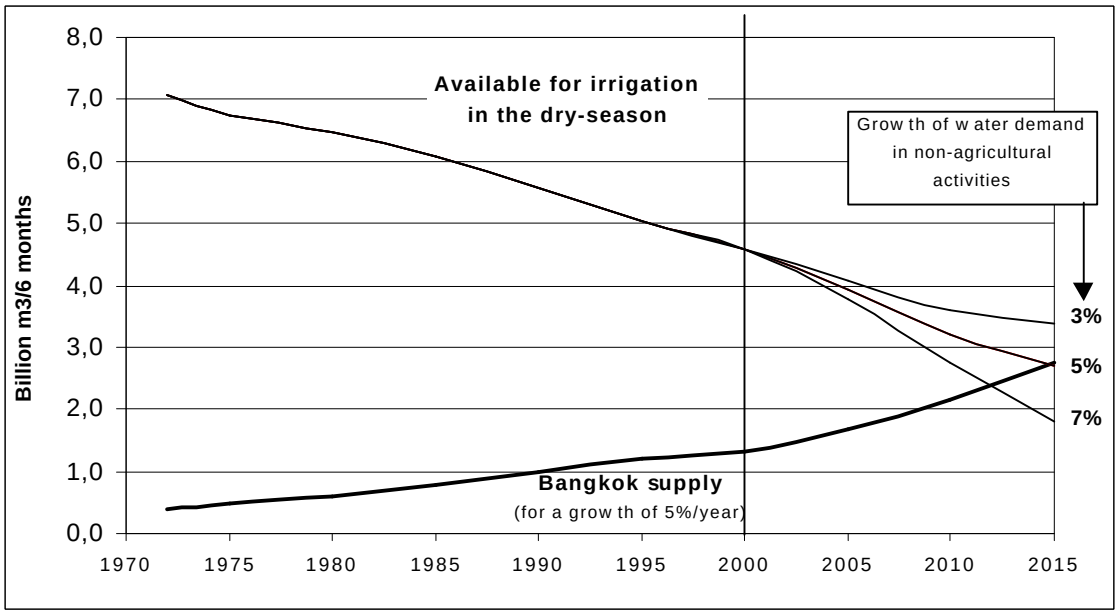
[6] Official estimates (2 $Mm^3$/day are believed to be underrated).

[7] This chart shows average trends rather than year-to-year data which include high fluctuations due to varying water stocks in the dams at the beginning of the dry season. It is assumed that dam water consumption during the wet season will remain unchanged, while agriculture in the dry season is being attributed the remaining share of the water balance. The net dam inflow in the two dams is assumed to continue to decline by 1 Bm3 over the next 25 years (conservative hypothesis) and BMA needs to grow at 5% per year. The gradual diversion of the Mae Klong river to supply Thonburi area, up to a maximum of 45 cms, is also considered, together with a cut of underground water use in BMA by 50% in the next ten years. For details on the assumptions made, see Molle *et al.* (2001a).

evident is both the prevalence of agricultural water use and its shrinking share within a declining overall available stock. With growth of the BMA demand at 5% per year[8], the water available for dry-season agricultural activities will be cut by 45% in 2015. The decrease is highly sensitive to the rate of growth of demand in the upper basin (+0.6 Bm3 over 15 years) and in the BMA. Keeping in mind the almost 10% yearly increases prevailing before the 1997 economic crisis, it can be seen from the chart that even more realistic rates of around 7% would have a dramatic impact on the remaining water available for agriculture. It is notable that demand has levelled off with the post-crisis economy but assuming a few more years of diminished demand only shifts the curve by the same amount and does not invalidate the trend in the mid-term (see more details on those projections in Molle *et al.* (2001a)).

From the evidence that farmers use 85 % of the available water in the dry season (and more generally that a similar percentage can be applied at the national level for all controlled water resources), they are blamed for the overall shortage. If they use so much water then it is likely that: 1) they deprive other users from using the resource, and 2) that, getting it free, they can only squander water, insisting in particular in producing rice, a water-thirsty commodity with little added value (a situation recently compounded by the depressed rice market). International agencies (and sometimes, in their footsteps, local officers) commonly report that farmers are "*guzzling"* water or are showing "*water greed*" (The Nation, n.d).

Figure 2: Evolution of water supply and demand in the Chao Phraya basin in the dry season




[8] This hypothesis is also consistent with NESDB's projections for the 9th Plan (2002-2007), with annual growth rates between 5 and 6%.

A natural consequence of the situation described and of the identification of farmers as villains is to blame the agricultural sector. Farmers should both adopt crops with water requirements lower than those of rice and upgrade their management of water, alongside similar efforts recommended by concerned agencies (most especially RID). From the underlying assumption that improved management is unlikely to occur as a result of only verbalising concerns about water resources, there is a growing interest in attempting some kind of regulation through economic means. The debate, however, is confounded by the fact that several measures are proposed, each with different but overlapping objectives and justifications:

1. The first proposal is to elicit *water-saving* behaviour by charging a usage fee. By raising the costs of a given resource, it is widely believed that users tend to reduce their consumption.

2. A second approach is a *cost recovery* justification. As supplying water is costly (in most cases to the government coffers), it is justified to pass part or all of costs to the concerned users, rather than to the entire population, as is the case with electricity or urban water supply. Cost recovery may include capital cost recovery (sunken costs of project implementation) and/or operation and maintenance (O & M), or recurrent service costs.

3. A third possibility reflects the preoccupation of macro-economists concerned with *allocating water* to the most profitable uses, those which produce a higher added value per cubic meter of water input. Whoever can pay the most for a cubic meter of water is the one who will obtain the highest added value from it, and vice versa. Introducing market-based mechanisms and letting the market's invisible hand reallocate water is believed to lead to a “maximisation of the social benefit” produced. Through this implicit competition, the first objective of water saving is also indirectly attained.

The following sections review these three categories of objectives and analyse the relevance of the different measures proposed, together with their justification and applicability in the Thai context.

# 3 Water waste and irrigation efficiency: a few misconceptions

The most popular proposal for addressing water resource issues is saving water. Common wisdom asserts that waste is widespread because the price is small or nil. A corollary to this view is that large amounts of conserved water could be redistributed to meet expanding needs. As many observers keep harping on, "since water is not appropriately priced, it is used inefficiently, and consumers have no incentive to economise" (Christensen and Boon-Long, 1994)[9]. I will question here both this statement and the capacity of the proposed policies to increase efficiency.

Let us first turn to the evidence that farmers receive and squander the lion's share of Thailand's water resources. Examining the process of water allocation, it is evident that farmers are not getting a larger share through some kind of privilege or preferential treatment but, rather, that they are eventually attributed *the water that is left after other uses* (if any). To some extent, it may be misleading to speak of conflict over water as one may infer that there is a kind of struggle to get water before or instead of other users. Such a situation occurs, in an open-access system when riparian users have the possibility to extract water by themselves, without referring to any collective institution, or despite it. If independent individuals or groups technically have access to means of diversion/abstraction which exceed the available flows within a given river system, then conflicts are likely to arise. This is, by and large, the situation observed in some catchments of the upper basin. In (semi)controlled and centrally managed water systems allocation is partly (or totally) controlled by a public agency. Therefore, conflicts occur *because of the policy* adopted to apportion water among the different users.

[9] This seems to be taken as indisputable evidence. See, for example, declarations of an official of the Ministry of Agriculture "Water should be priced in order to increase the efficiency of its use in the farm sector" (The Nation. 2000. April 21); "Agricultural experts agree that water-pricing measures would help improve efficiency in water use among farmers" (The Nation, 1999 Feb. 17); the Director of the National Water Resources Committee: "In reality water is scarce, and the only mechanism to save water and encourage efficient use is to give it a price" (The Nation, 2000. April 23); the resident advisor for the ADB in Thailand: "International best practices suggest that efficiency in water management can be improved considerably through imposition of nominal water user fees" (Bangkok Post 2000, June 11). This echoes an endless list of similar outright statements: "if water is cheap, it will be wasted" (The Economist, 1992); "Farmers' present water use patterns are very wasteful due to the free of charge system" (Kraisoraphong, 1995); "Currently, most farmers don't have to pay for irrigation water and, thus, have little incentive to conserve water or to use it efficiently on high-value crops. As a result, irrigation efficiency is under 30%" (TDRI, 1990), etc.

In the Chao Phraya basin, for example, releases in the dry season and their spatial allocation are decided mostly by RID[10]. Priority in water allocation is consistently given to the domestic supply of urban areas, to industries, and to controlling salt-water intrusion at the mouth of the rivers. Needs of the agricultural sector are considered last. They use the remaining water, coping with an obvious year-to-year fluctuation and uncertainty in water supply.

For the Central Plain, the amount of water diverted to agriculture commonly varies between 2 to 8 billion $m^3$ for a dry-season of six months (January-June)[11]. In recent years, RID has been challenged by an increasing water abstraction from riparian users in the middle reach of the basin, amounting to up to 35% of that released from dams. However, the negative impact of this loss of control has been passed on to the Delta irrigated area, which has seen its share dwindling, and not to non-agricultural sectors.

It follows that to state that farmers are wasting water just because their share of water is the largest is incorrect. This situation is true only *as long as* other sectors have not raised their demand to more significant levels, and *because* the government has in the past developed infrastructures that allow a productive use of water in irrigated areas. The hierarchy of allocation priorities reflects the higher opportunity costs in non-farm sectors and the evidence that domestic demand has to be ensured in any case, due to the obvious importance of water in daily life.

A second line of evidence to be scrutinised is whether farmers are using water efficiently. Based on common knowledge that efficiency in large state-run irrigated schemes is often found as low as 30%, there is a tendency to stick to this overall vision without questioning it any further[12]. The first point which needs to be emphasised is that such situations are often found in water systems, common in monsoon Asia, that are not closed (i.e which have resources in excess of demand and out of which some usable water supply remains). Open systems are often recalcitrant to improvements because the remaining slack in water stocks is used as a way to minimise managerial input and transactions costs. As a result, there is little

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[10] In the dry-season, EGAT closely follows the release calendar fixed by RID and very seldom makes use (especially in the last 10 years) of its managing role to release issues in excess of irrigation requirements (Molle *et al.*, 2001).

[11] Again, water scarcity or water conflicts are limited to the dry season and it is therefore on water allocation during this season that the debate is focused.

[12] "Currently, most farmers don't have to pay for irrigation water and have little incentive to conserve water or to use it efficiently on high-value crops. Consequently, irrigation efficiency is under 30%. Urban consumers and commercial and industrial users pay only nominal water fees that do not reflect the marginal cost of supply" (TDRI, 1991). If 70% of the water delivered to irrigation areas is assumed to be lost, it should also be shown where does such an amount of water disappear to !

incentive for managers to upgrade their performance and little scope to force them to do so as far as mismanagement does not translate in unacceptable inequity or environmental externalities (waterlogging, salinisation)[13].

Another type of systems is *closed* systems. There has been wide recognition recently of the fact that focusing on relatively low water efficiency at the on-farm or secondary levels could be totally misleading (Keller *et al.*, 1996; Perry, 1999, Molden and Sakthivadivel, 1999). When analysed at the macro and basin level, many systems— river Deltas accounting for the most significant of them— are eventually found to *operate with extremely high overall efficiency*. More generally, what has often escaped the attention of many commentators is that such systems have not been indifferent to growing water scarcity. On the contrary, they have been extremely responsive in recent times and have gradually developed flexible ways to access water in all places *where it can be found*. Currently, no conventional gravity systems is functioning as it has been designed to. Individual pumping capacity has been developed in order to tap water in canals, drains, farm ponds or aquifers and there are generally few unused return flows at the exit of the system concerned.

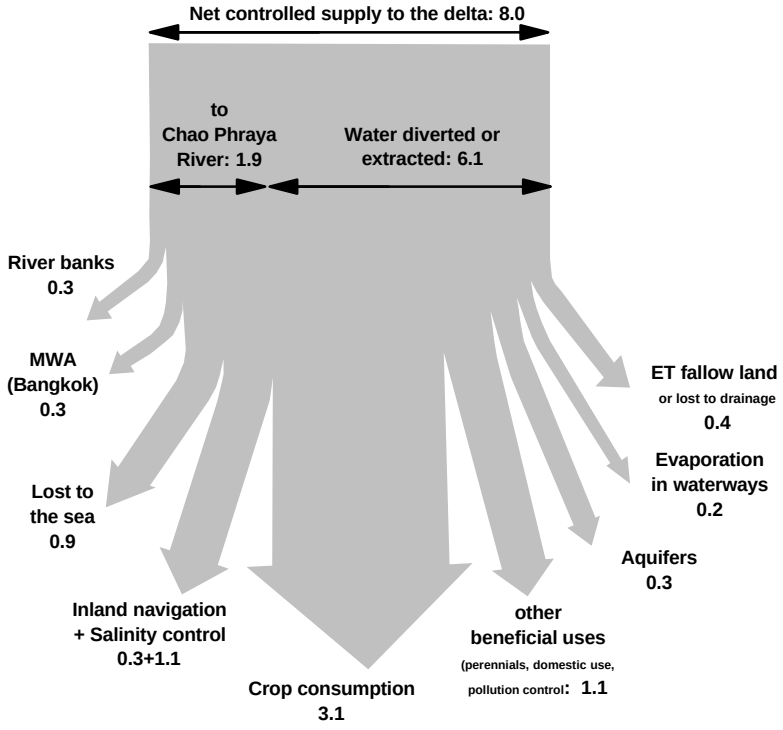
The Chao Phraya Delta in the dry season provides the most illustrative example of such a closed system. First, most of the return flow from fields or canals is reused downstream. Favourable specific locations where double cropping is well established are often found along drains, most of which have been gated to retain or capture superficial and sub-superficial flows. Pumping in drains is often more reliable than depending on canal water as most of this waterways are gated in order to retain water in the dry season. If we consider the efficiency of irrigation at the macro level, we see that the only wastewater is water that evaporates in waterways or fallow land, and that eventually flows out of the Delta system into the sea. As this flow is hardly sufficient to control pollution and salinity intrusion in the rivers mouth (in the dry season), it follows that very little water is lost[14]. The second component of water loss is the infiltration. It occurs that such a loss is channelled either to shallow aquifers or to deep aquifers. In the first case, it is tapped again through tube wells or soon returns to the drainage system where it is reused. In the second case it reaches aquifers which flow to the Bangkok area where they are notoriously over-exploited, resulting in land subsidence and horrendous costs in upgrading flood protection and

[13] The Mae Klong basin, for example, can be considered opened, with supply exceeding demand by approximately 30%.

[14] In past years EGAT may have released water only for the purpose of energy generation, thus resulting in fresh water being lost to the sea. However, this has been extremely rare in the last ten years during the dry season. Whether this should still be allowed to EGAT, even in the wet season, is discussed in Molle *et al.* (2001a). In all cases, such losses are controlled and desired, therefore cannot be considered as decreasing the efficiency.

in flood damages[15]. We may therefore venture to state that *infiltration losses in the Delta are not sufficient* to offset the depletion of the aquifers. A tentative water balance[16] (Figure 3) shows that the overall efficiency of controlled[17] water use is around 88%.

Figure 3: Tentative water balance in the dry season




Even when we examine carefully plot irrigation, it is hard to find the decried pattern of wasteful practices. The main reason is that most farmers access water through pumping. This is true for all the farmers located in the lower Delta and for approximately 60 % of the farmers in the upper Delta (in this so-called flat *conservation area,* water is integrally and individually pumped from a dense network of waterways). Altogether, it follows that about 80% of farmers are resorting to

[15] It is estimated that the damages of the 1995 flood amounted to 50 billion baht, that is 2 billion US $ !

[16] Extracted from Molle *et al.* (2001). Other beneficial uses include the water uptake by close to 160,000 ha of backyard gardens and trees along the rivers. Only 0.9 Bm3 are lost to the sea (this corresponds to the situation in the last decade, with the exception of the year 1996). This simplified balance does not consider rainfall and sideflows generally occurring in May-June: the reader is referred to (Molle *et al.* 2001a) for more details and discussion on the terms of the balance.

[17] Includes water released from the dams, diverted from The Mae Klong basin and extracted from shallow and deep wells.

pumping, the great majority using low-lift axial pumps. Field observations show that, in some cases, farmers may even resort to up to 3 or 4 successive pumping operations, from a remote drain "step by step" up to their plot! Even in the western part of the Delta, which is irrigated by a more modern system constructed on the Mae Klong river and is part of an opened water basin (see Figure 1), studies of water use at plot level have shown that conjunctive use and pumping are widespread (Molle *et al.*, 1998). Although the Chao Phraya and Mae Klong schemes were designed to supply water by gravity, RID experienced difficulties in managing reduced flows in the dry season. To offset this constraint, farmers have, along the years, developed an impressive individual pumping capacity allowing them to tap whatever little flow might appear in the canal. It follows that because of the costs incurred by these water-lifting operations, there is little likelihood that farmers may be squandering water. Recent estimates of water use in the Delta also show that efficiency is high, with only 1,500 $m^3$ used per *rai*, including 200 $m^3$ of rainfall (Molle *et al.* 2001a). Considering all this evidence, it appears that harking back to this erroneous picture of the farmer as a wasteful villain is thoroughly flawed, unfair,[18] and at the least misleading regarding the debate under consideration here.

A corollary of this situation is that, in contravention to official declarations, most farmers *do not get water free*. This applies to numerous small scale irrigation projects developed under RID or DEDP that rely on a collective pump to get access to water and where operational costs are shared between users, as well as for most of the Delta, as explained above, and probably most other large scale schemes in the country. It goes without saying that these investments in pumps, motors and gasoline are not negligible. It has been shown that these pumping costs, because of very long application times caused by poor land levelling, could even be high enough to discourage sugar-cane growers to apply the adequate amount of water, despite water being available in the adjacent ditch (Srijantr *et al.*, 1999). It must therefore be acknowledged that *farmers do pay to use water in the dry-season*, partly as a consequence of the failure to supply them with gravity water. It follows that the argument that farmers tend to ignore the value of water is significantly weakened.[19]

The last point which needs comment here is the possibility to achieve water conservation by inducing a shift away from rice to field-crops, which consume approximately 40% of the amount of water needed for rice. This, ideally, would allow more farmers to benefit from a second crop in the dry season. Evidence of dynamics

[18] Charoenmuang (1994) reports that in some conflicts in the Mae Taeng Canal Project (Northern Region), "villagers urged city dwellers and government agencies to economise on water consumption".

[19] It can also be noted in passing that contrary to conventional wisdom, urban users do not pay for water as a resource but for the cost of its treatment.

of diversification in the Delta (Kasetsart University and ORSTOM, 1996) shows that farmers display great responsiveness to market changes and opportunities (a point definitely evidenced by the recent spectacular development of inland shrimp farming). Good transportation and communications allow marketing channels to perform rather efficiently. The main weak point remains the risk attached to the higher volatility of field crops prices, which discourages farmers from shifting significantly to non-rice crops. As long as the economic environment of field crop production remains uncertain,[20] there is little incentive for farmers to adopt such crops and scope to sustain criticism on their growing rice, as many have incurred in losses by growing field crops (either by will or suggestion from extension services). Inducing shifts in cropping patterns to achieve water saving by means of differential taxes is believed to be unrealistic while such risk remains.

In addition, there are several other constraints (agro-ecology: heavy soil with little drainage, not favourable to growing field crops; labour[21] and capital requirements, skill-learning, development of proper marketing channels, etc.), which condition the process of diversification and it is doubtful that, in addition to public policies aimed at fostering it, its pace may be increased much beyond what is already observed. Contrary to common rhetoric, farmers do not need to have their water priced to shift to other productions. They will increasingly do so if uncertainty on water and prices is lowered. They have time and over shown dramatic responsiveness to constraints on other production factors, such as labour for example, and have already sufficiently experienced the scarcity of water to adapt their cropping patterns, should conditions be favourable.[22]

In the light of these different elements, it appears that the first objective of achieving *water saving* through some kind of water pricing is at best illusory, as farmers in the dry-season eventually use only the leftover water, do it rather efficiently, often indirectly pay (and have paid) for that, and have already experienced and adapted to water scarcity. *Attributing the responsibility of water shortage to poor efficiency is the most widespread and misleading misconception*. Should irrigation gain 10% in efficiency, this would not diffuse any crisis but only raise by the same amount the

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[20] It can be argued that rice marketing is also uncertain. However, the political sensitivity of rice production is such that there are limits which cannot be easily trespassed. In contrast, no one really matters if the price of chili (a very intensive cash crop with heavy capital investment) swings from 30 to 2 baht/kg in one year and scattered growers have little means to voice their distress and limit their loss.

[21] For example, the harvest of mungbean, a typical supplementary crop with no additional water requirement, is often a problem because of labour shortage.

[22] The spectacular endogenous spread of sprinklers in vegetable production observed in the Mae Klong area shows that farmers are not opposed to investing and adopting water saving devices. However, as in the case of Chile (Bauer, 1997), it can be shown that the adoption of this improved technology is driven by considerations of labour availability and easiness of use rather than by water saving purposes.

area that would be irrigated[23], which *in any case would remain well under the overall potential demand*. *Shortages and crises are not due to an hypothetical low efficiency but to the insufficient control over water allocation and distribution*. The lack of strong technical criteria in managing dams and in allocating water to irrigation, and the way they are being challenged by political interventions and farmers' uncontrolled planting [24], incur escalating risk and are conducive to sporadic shortages. This does not dismiss the fact that efficiency gains are desirable but it draws our attention on the inconsistency of the commonly stated relationship between efficiency and water shortage.

Should it be argued, despite such evidence, that a significant tax attached to the amount of water use could still be conducive to some water saving, then three types of water pricing could be envisaged.

The first one, similar to the case of urban tap-water, is to charge users according to the amount of water used. It has long and widely been recognised that volumetric water pricing is incompatible with irrigation water distributed by gravity over tens of thousands of farms, because there is no practical way to measure the amounts of water used (Moore, 1989; Small, 1987). A second alternative is to adopt the wholesaling of water to groups of users (typically those served by a same lateral). This leads us, beyond individual users, to the much more complex socio-technical question of water allocation and management at the Delta and basin levels. This point will be addressed in § 6. The remaining alternative is to price water using proxies such as the area of land and the kind of crop. This totally deals away with the argument that water pricing would allow water saving, as the tax would not embody any incentive to use less water[25]. Eventually, this is tantamount to establishing a tax, within a perspective of *cost recovery* : this takes us to analysing the scope for achieving the second of the objectives listed earlier.

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[23] Although the intensity of the phenomena would much depend on rice prices.

[24] The hopelessness of officials is apparent in public declarations: The Deputy Agriculture Minister reports in early 1998 that "plantations in Nakhon Sawan, Tak and Kamphaeng Phet had increased to more than 670,000 rai from a target of 190,000" (Bangkok Post, 1999, January 13), while the RID director admits that "things are out of control", with 330,000 rai under cultivation, against a limit set at 90,000 rai (The Nation; 1999 Jan 8). "Our major concern is that we have no effective measures to control the use of water by rice growers. The only thing we can do is ask for their cooperation to cut down rice cultivation".

[25] Moore (1989) wittily remarks that the argument "keep farmer aware that water is not a free good, but [that] it has been provided at high cost and must not be wasted" is likely to yield the opposite result of the expected, with farmers' determination to get as much as possible of the thing for which they have been taxed".

# 4 Water charge, taxation, and cost recovery

## 4.1 Taxation and risk

Before examining what guidelines could best determine the level of a possible tax, a point deserves mention. The impact of differential taxes on crop choice or water use (as when individual or group volumetric pricing is possible) will only be significant if the tax represents a significant share of the income, say 10% or more. Perry (1996) found that volumetric charges in Egypt were an unrealistic means of encouraging significant reductions in demand because, in order to have an influence on demand, charges would have to be very high. In addition, if cost-recovery is the main objective, the revenue levied must exceed the cost of collection. Here, our reasoning is implicitly based on average values of farmers' income, despite the fact that in peasant agriculture risk is a much more relevant concern. Scott (1976) has shown that the sustainability of peasant economies was more closely governed by vagaries in yields than by average values, and it was also shown that people resented smaller fixed taxes much more than larger ones indexed on real yields. It is arguable that yields in the irrigated areas discussed in this paper are made stable by the use of irrigation. It must not be overlooked, however, that the risks in production, in any case not negligible (diseases, grasshoppers, etc.), has been replaced by the risk in marketing, and further compounded by the higher requirements of cash input demanded by commercial crops. This situation is significantly different from that of western agriculture, where bottom prices or "intervention schemes" are generally established to compensate for economic losses when they occur (more on that later). In addition, western farmers benefit from the insurance against exceptional yield losses that comes with stronger co-operative and professional structures.

Whether speaking of employment in rural factories or as migrants in Bangkok, it is interesting that it is not the amount of money earned which is cited as the main advantage of these activities, but the regularity and certainty of wages. When asked about the eventuality of a water charge, farmers display limited concern but—almost invariably— immediately question why the government is not guaranteeing the price of rice. Alternatively, farmers appear not to oppose considering the issue *if* it would mean reliable deliveries (Bangkok Post, 2000 July 1; TDRI, 1990; Molle *et al.* 2001b). [26] This emphasises that the principle of a charge for water is acceptable (although,

[26] "I don't mind paying for water service if the government can guarantee delivering us water all year round", a farmer was reported saying (Bangkok Post, 2000, June 11).

nothing is discussed yet on how much the charge could be), but only if the basic economic arithmetic of crop production is stable enough.

The lesson to draw from farmers' opinions is that the two main sources of uncertainty (rice price and, for many farmers, water supply) are deterrents to any efficient use of economic incentives to affect water use. In the current situation, it is to be feared that any significant taxation would not only have little impact on farm water use, but also deleterious effects on economic sustainability by increasing vulnerability to risk and, consequently, raising the rates of indebtedness and economic failure.

Another observation on the reaction of farmers is that it poorly fits the arguments made by social activists that traditional and cultural links between Thai farmers and water are at risk from commercial interests. Although respectable, this view is inconsistent with the fact that in commercialised areas and in particular in the Delta, farmers have not been victims, but active players in the economic scene (Askew, 2000). Unfolding their activities in an economic environment where a scarcity, albeit very relative, of labour, land and capital has long given way to active corresponding markets, paying for water would not be a farfetched matter, within the framework of the economic reservations stated above.

### *4.2 Defining the charge: theoretical and pragmatic approaches*

(a) Pragmatism

There are several academic ways to work out an "optimal" taxation, depending on the approach and criteria adopted. The cost of water can be derived from the cost of supply (investment recovery), to which can be successively added: the O&M cost of supply (full supply cost); the opportunity cost in other alternative uses; and the economic, environmental, and social externalities. The charge also can be calculated based on the opportunity cost of capital (realistic for private goods but unseen for public water development projects), or through marginal price setting (Teerink and Nakashima, 1993). This approach consists of setting rates equal to the cost of producing the last unit of water supply, in an attempt to induce water savings and delay capital expenditures. However, this is of little relevance in a context in which consumers are numerous and are not individually identifiable.

Another way to proceed is to assess the economic value of water. This value should ideally be equal at least to the marginal value of product for industrial and agricultural goods, and based on the "willingness to pay" for domestic use, to which can be added the benefits from return flows and from indirect uses (livestock, improved health, etc.), with a more fuzzy "adjustment for societal objective" (Rogers *et al.* 1997). This full economic valuation is, as a rule, much higher that observed water fees.

All these criteria are consistent with the concept of *demand management*, i.e. policies that "relate the value of water to its cost of provision, and motivate consumers to adjust their usage in the light of those costs". If "there is no disagreement that from a *theoretical* perspective the price should be the full economic price of supply", as argued by Smith et al (1997), then there is some doubt as to whether theoreticians draw good conclusions from the evidence of a dire *scarcity* of examples of water systems in which such prices are applied.[27] One reason is that full economic prices are almost invariably too high to ensure the economic reproducibility of the concerned activites.[28] Even in the United States, Postel (1992) reports that 4 million ha of the West are supplied "at greatly subsidised prices" by the Federal Bureau of Reclamation (see also Anderson and Snyder, 1997). Irrigators of the California's huge Central Valley Project have repaid only 4% of its capital cost. Small (1990) posits that very few, if any, of the irrigation projects built in the western US since 1960 can be justified on rigorous economic efficiency grounds. The second reason is that sectorial clout is often able to preserve a low pricing of water, either for socio-economic reasons (rural poverty alleviation, competitiveness) or for political reasons (clientelism, vote-catching). A last reason is that these calculations are far from being standardised and that there is, in particular, little agreement on how to define and calculate opportunity costs[29] and externalities (Gibbons, 1986).

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[27] This suggests that there is more scope for adapting and enriching prevailing conceptual frameworks than for using them as a convincing guideline for analysis. If such markets depart from ideal ones with such obvious insistence and occurrence of market failures, this might constitute a valid incentive to spend less time in calculating ideal prices and more on understanding possible specificities of agriculture and of the use of water in irrigation.

[28] Calculating optimal irrigation fees for the Mae Klong irrigation system "based on cost of operation and maintenance plus contribution margin, taking into consideration farmers' ability measured by net returns of rice farming", Rasmidatta (1996) obtains values of 661 baht in the wet season and 572 in the dry season, with respective income of 1,707 and 844 baht/rai. However, he does not seem to be shocked by the evident extravagance of these results (and therefore with the irrelevance of the theoretical background used).

[29] In our situation, where agriculture is attributed the water left in the system, the opportunity cost for other users should be nil, except in time of crisis. Generally speaking, the concept of marginal value of irrigation water is unclear. We can try to define it in agronomic terms and to build a production function giving crop output as a function of the water input (Gibbons, 1986). Such an exercise is very hazardous for wet rice, because peculiar cropping techniques impose the consumption of a minimum and rather inelastic amount of water. In addition, such an approach can hardly account for the importance of timing in water supply. The impact of irrigation in some periods is paramount and this can explain why farmers trying to save their standing crops can sometimes buy truck loads of water, or pump water in several successive "steps" from a distant drain up to their plot. This "willingness to pay" is extremely time and location specific; it incorporates, in particular, the importance of the crop in the farm income, the sale price expected by the farmer (itself a complex and judgmental assessment) and the level of capital of the farm. It appears that marginal value reasoning is inadequate and that quantitative optimising exercises may be vain and potentially misleading. As Green (1996) has put it, "any number is not better than no number, unless we know what the number means". A typical example of indiscriminate use of textbook theoretical principles can be found in Israngkura (2000), who states that "as water utilisation increases, its marginal contribution to farm output falls and approaches zero. For this reason, the marginal benefit of water will be low in the absence of effective water demand management." The suggested vision of farm water use runs counter to the most basic reality.

In the real world, things are settled in a much more pragmatic way. A first and overriding consideration is that charges be in accordance with what *users are able to pay*. No government would take the economic and political risks to define fees at deleterious levels only for the sake of conforming to some theoretical abstraction.[30] A second point is that an additional tax is to be considered *within the wider overall context of national taxation*. Asserting that farmers in the Central Plain have never paid for the irrigation system or for water use may be literally acceptable and true in a narrow sense. If we consider, however, the revenues siphoned by the State off rice cultivation through the mechanism of the rice premium between 1952 and 1984, it becomes clear that rice-farmers have indirectly paid back more than it can ever be dreamt of levying through a water fee. Indirect taxation through the control of market prices, export taxes, or exchange rates often significantly accrues to the government revenue as, for example, in Egypt or in Vietnam. In Egypt, the reform of 1986 liberalised agricultural markets at the expense of government revenues (Perry, 1996). This was compensated for by a reduction in farm subsidies and is prompting studies on the establishment of cost-recovery fees (at present restricted to the O&M of the tertiary level).

The crux of the matter for developing countries is to maintain a relative balance between the agricultural and the non-agricultural sectors, so that the transfer of labour from the former to the latter follows a pull rather than a push process. In other words, the issue is one of maintaining the respective basic profitability/reproducibility of the two sectors during this transfer process, in order to avoid major social and political disruptions. State investments, subsidies and taxation are “connected vessels” (what is added here will have to be discounted there) all aiming at sustaining, by and large, this balance, be it in accordance with economic orthodoxy or not.

This point also serves to question the rationale used by ADB to support cost recovery.[31] Subsidies to the farm sector eventually maintain the price of food low, indirectly benefiting the whole non-farming population, and allowing lower wages and higher international competitiveness. This shows that things are more complex than

[30] Even in the United States, realism may lead to adjusting, *a posteriori,* ideal laws to the conditions of the real world: the 1902 Act, in which payments on the basis of cost were originally specified, led to a further legislation (1939) which incorporated explicit considerations of the ability of the irrigators to pay from the benefits derived from irrigation. “Although the ‘beneficiaries should pay’ premise underlying early reclamation policy in the United states was defined rigidly in principle, it could not be enforced in practice” (Cummings and Nercessiantz 1994).

[31] “Thai taxpayers are paying Baht 35 billion a year to run RID. If this is worthwhile to the farmers then why should the taxpayers have to pay for RID?” (Halcrow, 2000c).

what this simplistic arithmetic might suggest[32]. The insistence on having farmers pay the “real” cost of water can also be questioned when European and US agriculture are admittedly heavily subsidised. The US congress, for example, has provided US$ 24 billion since October 1998 to shield growers against low prices and crop disasters and is considering expanding its interventions (The Nation, 2001). Complying with orthodoxy (full operational cost recovery), on one hand, but disregarding it downright, on the other hand (intervention), when benefits get squeezed by declining prices, clearly shows that what really matters at the end is the relative balance of profitability/sustainability. This illustrates the situation of “connected vessels” where special interventions, subsidies or taxes are pieces of the same jigsaw, one that poorly illustrates what a real-cost regulated market is supposed to look like and casts doubt on the interest to withdraw today what might have to be given back tomorrow. The cost-recovery argument is also based on the alleged evidence that O&M costs correspond to a "huge drain on the national budget" (Halcrow, 2001). This argument also needs to come down to earth, as the potential gains from cost sharing represent 0.16% of the Thai national income[33]. It would probably not be difficult to find other "huge drains" with much less economic and social impact on the Thai population.

In addition to the delicate trade-off between farming sustainability and urban food price control, considerations of food security also place the issue in a realm more social and political[34] than purely economic.[35] All in all, a naive and insistent emphasis on theoretical concepts appears of little use and depending on the situation, constraints, and objectives, it becomes “quite legitimate and even optimal in some sense to have the market clearing price different from its marginal price” (Sampath, 1992).

Subsidies, seen from such a view, are a necessary preventive/corrective measure, but the difficulty faced by policy makers is to distinguish the point beyond which they may turn prejudicial. Indeed, subsidies may be expressions of an undue sectorial

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[32] Schiff and Valdés (1992) show how governments are caught up in a web of contradictory goals, including protecting farmers, protecting consumers from high food prices, raising revenues through taxation and ensuring the competitiveness of economic sectors in the world market. Thailand appears in their study as a country where agriculture has been heavily taxed. This may serve to show that in the overall 'communicating vessels' game agriculture has been on the giving end rather than on the receiving one, which implies that the 'free water' subside can be seen as a small compensation for this situation.

[33] O&M costs are estimated at 11 billion US$. If we assume, optimistically, that cost sharing will cover up to 50% of this amount (all the main infrastructures and headworks are to be operated and maintained by RID), this gives 5.5 billions $ to be compared with a national income of 3,317 billion baht.

[34] For examples related to rice production, see Dawe (2001).

[35] The fact that funding agencies have never applied sanctions to countries for their non compliance to covenants stipulating cost-recovery may be regarded as an implicit recognition of the fact that the real world does not easily lend itself to paper principles (see Carruthers and Morrisson, 1996).

privilege (obtained by a lobby) and/or insulate some economic activities from a more competitive context which would otherwise produce efficiency gains (regarding our present concern, for water saving) or call for alternatives (but the costs affixed to moving from one crop to another often poses a problem). This is not the place to enter into extensive debate about the pervasive and complex mix of taxation and subsidies typical of the agricultural sector. For this discussion, we may note that supposedly "free" access to water should be assessed within the larger fiscal framework, where it can be shown that producers are often heavily taxed and consumers subsidised (Jalbani, 1995). Research is needed to determine when interventions are adequate and when they cease to be so, something that may change quite rapidly in changing economic contexts.[36]

The effect of changing economies is well illustrated in the case of Thailand. The decreasing profitability of rice and the crises experienced in the 1970s have called for the gradual abolition of the rice premium. Other taxes, such as the land tax—not raised for decades— are now almost insignificant (3 US$/ha). The charge on groundwater, too, which lends itself with more facility to control and volumetric taxation and mostly concerns industries in BMA, has remained under-priced. This has been the result of a combination of several factors: 1) the fear of political and social consequences (cf. the Minister of Agriculture's declaration in January 1999, "The complete stoppage of farm subsidies would cause political and economic chaos in Thailand because farmers form the largest part of the population")[37]; 2) the concern about maintaining the relative profitability of agricultural and manufacturing activities in a competitive regional context[38]; 3) the attempt to achieve a transition from the former to the latter without too sharp imbalances; and 4) the political clout of both the Federation of Thai Industries and farmers.[39] Whether the fluctuating trade-off between "good" and "bad" subsidies has been managed well or not is another story, far beyond the scope of this paper. Concerning whether indirect subsides of

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[36] One critic to interventionism could be that it proves to be much easier to edict a regulation than abolishing it, partly on account of the fact that it is often realised quite late that conditions have evolved as to make the initial measure obsolete or counterproductive. Touching upon the wide debate on State intervention, we may quote, in passing, Amartya Sen (1999) who holds that a "deliberate combination of state action and use of market economy", was one of the key aspects of Asian development.

[37] And also the declaration by Ampon Kittiampon "Agriculture is about food security, which requires government support just like education and public health. We will try to avoid applying water pricing to the small farmer who produce our food" (The Nation, 2000, April 23).

[38] This also applies to internal and intra-region competition. After the pollution scandal of a pulp factory in the Northeasten region, an official appeared reluctant to get tough with factories and was quoted to say "if we punish them, who will want to invest here ?"

[39] Recently the federation opposed a gradual rise of the groundwater price (from 3.5 to 8.5 baht/m3, in an attempt to catch up with a m3 of tap water at 12.5 baht), stating that a price of 5 baht would "already lead to hardship" (Bangkok Post, 2000, June 28).

rice cultivation should be reduced, it can be noted that this sector cannot not be easily downsized. Alternatives to rice are either agricultural (there is no evidence of a crop that could readily and favourably substitute for rice on a large scale; diversification is a significant trend but it is constrained by several factors, as mentioned earlier) or non-agricultural (the point, again, is the capacity of absorption of the large corresponding labour force of other sectors).

(b) Practical difficulties in defining fees

Even if we adopt the position of defining pragmatic water charges (a "second best choice"), there are other drastic obstacles to its application in medium and large-scale gravity schemes. Urban users agree to pay for water supplied to their house because they know that when opening their tap they will be able to withdraw the amount of water they need. The certainty of being served implicitly embodies a notion of a *right*. In addition, users are served more or less with the same reliability and pressure, so that everyone considers it natural to pay a similar, if not equal, water fee. Irrigation systems are very different from domestic water distribution networks. Farmers located at the head of the canals are in a much more desirable position than those located at the tail end. Farmers whose plots are located along the main canal can access water whenever it flows in it, whereas, in contrast, those who farm plots located at the end of a 2 km ditch will get only an unreliable water supply (and often have to develop their own water sources, such as tube wells). It follows that the *quality of the access to water in most large-scale schemes of Thailand* is so varied that it would be hazardous to define a single fee *per area unit* under such circumstances.

A further difficulty is that this variability cannot be assessed once for all. Access to water depends upon the overall amount of water distributed in the different canals, itself a yearly vagary. In addition, farmers commonly tap water from several sources. Some may use canal water for 80% of their needs and a well for the remaining 20%; for others, sometimes only a few meters away, these percentages will be reversed. This may be true one year, but not the following, when the first farmer will use exclusively canal water by gravity (no cost), while the second will use the same water but will have to pump it from the ditch to his plot, because it is 30 cm higher.[40] A fixed fee per area cropped would obviously lead to injustice, inequity, and widespread disputes over the level of taxation attached to each plot. A variable and adjustable fee would be untenable, given the fluctuating variety of situations and the lack of simple quantitative measurement. Overall, given the limited amount such a fee could

[40] For more details on the complexity and variability of water use at the plot level, see Molle *et al.* (1998)

raise, the odds are high that the transaction costs involved in the collection of both information and fees would offset the final revenue.

In addition, it is also likely that farmers will use shortcomings in water supply or depressed rice prices as a pretext to pay less or no tax. All this would occur because uncertainty and shortages are not equally distributed, not even stable, which, again shows that a water charge cannot be designed independently of questions of service quality.

What precedes chiefly applies to the upper part of the Delta, but also to irrigated areas of the middle basin and to the Mae Klong Project.[41] Things are more homogenous in the lower Delta. In the conservation area, all farmers withdraw water from nearby canals with pumping devices. Keeping in mind that water is not accessed without costs, it is nevertheless easier to apply some kind of taxation based on plot area and crop type. The same can be said from other situations in which the needs of all farmers are evenly met, such as in most cases of People's Irrigation Systems in the North.

Should a tax be charged per year or per season? It would probably be unwise to tax water use in the wet season, as the system is mostly supplied by natural flows, with farmers often incurring in costs to drain water out of their area rather than to irrigate it. Applying a charge for dry-season crops only would therefore be more consistent with an objective claimed to emphasise the relationship between water use and water scarcity.[42]

Returning to the view of economic pragmatism, we may examine the ability of users to pay. The answer is highly dependent on the user itself. Farmers raising shrimp or growing high-value cash crops (fruits, vegetables) could easily cope with a water fee [43] of a few hundred baht. Not fortuitously, most of this production occurs in the conservation area, where water supply is more reliable. Other users include over 40

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[41] The overall satisfaction of needs in the Mae Klong can be considered rather high and homogeneous, lending itself more easily to individual pricing, but this makes light of the fact that many farmers pump water from wells or drains (see Molle et al, 1998).

[42] One additional question will be how to cope with triple cropping, given that areas which practice it are not clearly identified (many farmers who grow a third crop do it only when the price of rice is attractive). Even the question of the definition of what is a rainy season and a dry season crop is likely to pose problem. In the lower Delta, one crop is grown before the flood and a second one after water recedes. However, according to both the magnitude of the flood and the topographical position of the plot, calendars will be staggered over three months. As a result, it is possible to find farmers establishing their crop at any point in time during the year (see Molle *et al.*, 2001a).

[43] The fact that land rents are higher for such land use is meaningful in that respect. While rents for rice average 500 baht/rai, rents for shrimp farming recently skyrocketed in some areas of the Delta, from 1000 or 2000 baht/rai to 5000 or 6000 baht/rai.

golf courses, sugar mills, industries, real estate developments, etc. which, in some rare instances, pay a symbolic fee to RID.[44] These users were recently designated by ADB as the ones who should be taxed first.[45] Regarding sugar cane and rice farmers, however, there seems to be little scope for further depressing their already paltry income (and the point, again, is raising the predictability of prices). Several declarations from officials emphasise that "small-scale and poor farmers" will not be charged, but without clearly defining such categories, speculations are set free. The actual proposal by ADB's consultants is to set a tentative fee of 120 baht/rai in pilot projects. This value is intended as a compromise derived from the total estimated O&M costs: 522 baht/rai, out of which 210 baht are true direct costs (Halcrow, 2000c).

A different situation is found in the communal irrigation of the upper Delta. For a long time, the People's Irrigation Systems (PIS), or *muang-fai* communities, often praised for their endogenous mix of local wisdom and social cohesion,[46] have designed sophisticated social means to create, manage and maintain their irrigation facilities (Surarerks, 1986; Tam-Kim-Yong, 1995). Thus, they have long been accustomed to paying a fee in order to pay for those in charge of the scheme, and to participate with their labour force in tasks of collective interest. It is tempting to capitalise on this mechanism to add a water fee that could be channelled through the *muang-fai* towards the public administration. While the same difficulties arise regarding the definition of how much such a fee should be, there is now no wide support in favour of such a move.

It is tempting to proceed starting from some pilot projects, or from situations where fees can more easily be defined or levied, toward the other projects. However, if there is a failure to recognise that there are drastic difficulties attached to some situations (which do not form, in terms of area, a minor part but rather a major one[47]), the whole process will be jeopardised. In the absence of negotiated standards based on a thorough analysis of the diversity of situations, it would be hard either to explain

[44] Golf courses, in theory, have been prohibited to withdraw water from irrigation watercourses by a resolution dated October 1990 (Wongbandit, 1994).

[45] "Fish farms, large commercial farms and orchards are the group which RID will be going after first in terms of water fee" (Bangkok Post, 2000 June 11).

[46] "People's Irrigation System (PIS) can be viewed as an integrated system consisting of an intricate intertwining of local village technology with human commitment of cooperation, and a supportive philosophy which lends this system its coherence and cohesiveness" (Tan-Kim-Yong, 1995).

[47] Medium and large scale irrigation Projects account for 2/3 of the total irrigated area in Thailand.

why some projects are exempted or to avoid that everyone ends up not paying, when cases of defaulting will grow in number in the most unfavourable situations[48].

(c) Use of the collected fee

An important distinction must first be made between two types of water pricing objectives. Cost recovery goes to the government coffers, while 'irrigation financing', on the other hand, is the provision of funds that are actually used for irrigation costs[49] (Small, 1990). Small also goes on to question the rationale of cost recovery as the common concern of Development Agencies. It seems hard to link it to the repayment of loans, as governments guarantee payment regardless of the fate of the project. It may reflect frustration with projects performing much under expectation, which lack financial autonomy and must be periodically rehabilitated. This concern also stems from the vision and logic of capitalistic investment, with its emphasis on the return on the capital. It fails to recognise that many public investments made in developing countries are aimed at trying to correct, or limit, socio-economic imbalances (or disruptions), not just at generating financial benefits. It also does not make clear, for example, how investments in irrigation differ from other social overhead or public investments. Such investments include those aimed at boosting economic activity as a whole (the government also creates industrial parks with infrastructures, invest in commercial fairs or tourism promotion campaigns, or in port facilities, etc. favouring—or subsiding—other particular sectors of activity).[50]

Despite such evidence, there was even some mention that ADB's policy was partly aiming at cost recovery.[51] It is unclear how this objective is consistent with the Royal Irrigation Act of 1942. The Act makes it legally possible to charge users for water (despite fixing unrealistically low limits), but also stipulates that collected money

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[48] That is the situations described earlier where the quality of access to water are extremely heterogeneous. Pricing is theoretically to be associated with service agreements but there is no evidence that such services can be established so easily.

[49] Kessler (1997) distinguishes between "fees", used for a compensation for special services, such as water supply; a charge, characterised as being earmarked for special services; and a tax, which goes into the general budget without any restrictions in terms of appropriation".

[50] As concerns of equity are often cited by officials and Bank officers ("60% of the budget of the Ministry of agriculture went to 20% of farmers" provided with irrigation), this should be put in context, showing the government support for different sectors of the economy. Differentiated levels of investments in irrigation structures can be justified on the basis that locations with lower costs and higher potentials are chosen first.

[51] ADB's representative specified that "water pricing is not water charge. Technically, it is a charge for the construction of irrigation infrastructure…only 20% of Thailand's total farmland is located in irrigated areas. The rest of the agricultural land is not affected by the cost recovery arrangement" (The Nation, 2000 June 9). This statement seems to have been invalidated by subsequent ones, in particular from consultants in charge of the reform. It remains that the last proposals made mention a contribution of 30% of total direct capital costs for new and rehabilitation projects (Halcrow, 2000c).

cannot be considered as state revenue and must constitute a special fund to be put back into the development of irrigation. Emphasis on investment cost-recovery also appears misplaced when one considers the past indirect recovery through the rice premium and when one recalls that even in the United States, recovery of public irrigation schemes is estimated at 4%.

There is wide recognition of the fact that the success of implementing charges is contingent on users being aware of the usefulness of the money levied. If users perceive that their financial contribution is initiating a “virtuous cycle” of improvement in management and maintenance, they will be all the more likely to pay. If irrigation agencies are gradually made financially autonomous, with a high degree of income coming from water fees, they will also be committed to reform and improvement. International experience suggests that many reforms, which have failed to go that far, were eventually undermined by high costs in fee collection and high rates of defaulting.

# 5 Reallocation of water resources through market mechanisms

The third objective listed earlier is the concern to reallocate water to more productive uses. This can be attempted by differentials in the level of taxation, or by the establishment of a water market, an issue addressed in this section. The main advantage of water markets over water pricing is that they may allow flexibility and adaptability to respond to temporal and spatial changes in supply and demand, and may reallocate water from low-value to high-value uses. Assuming an efficient market, economists stress the gains derived for letting "users' expert knowledge" determine the "right" price of water, that which reflect the marginal value of water in the different uses.[52]

Although the literature emphasises the theoretical potential of water markets in achieving increased overall economic efficiency, it also recognises that such markets are often marred with a high occurrence of market failures and externalities (Smith *et al.* 1997; Perry *et al.* 1997; Meinzen-Dick and Rosegrant,1997). Even proponents of market-based mechanisms often admit that "tradable property rights does not imply free markets in water" and favour a system of "*managed trade*, with institutions in place to protect against third-party effects" (Meinzen-Dick and Rosegrant,1997).

It is recognised that water markets demand a background of legal consistency, administrative accountability and law enforcement that are rarely found in developing countries (Sampath, 1992), where, on the contrary, "the social and environmental risks of getting it wrong are considerable" (Morris, 1996). In the Thai context, few venture to make proposals that go that far[53], but this eventuality seems to pervade the debate, as NGO leaders express concern "that small-scale farmers will be deprived of water because bigger farms will have the ability to buy it" (Bangkok Post, 2000 June 11). Analysing to what extent Thailand relates to or differs from countries where such policies have been attempted, or where water trading is observed is not devoid of interest. Several different examples drawn from a number of contrasting

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[52] According to Michelsen *et al.* (2000), "empirical studies have shown that in a number of markets, observed water-right transaction prices have varied considerably from the capitalised production value", and he shows that in the Colorado Big-Thompson water rights are being used as investment assets.

[53] There are isolated examples of consultants not short of extravagant recommendations such as a system in which all farmers in Thailand would "each season, depending on how much water was in storage " receive "shares" and would exchange them on a market, a system "currently being tried in New Zealand" (TDRI, 1990). More recently, TDRI (2001) returned to working on adapting a theoretical framework on water markets to Thailand. What appears to be a vision at best suitable for small scale basins is readily proposed as a policy for Thailand without due consideration to the constraints of the real world (in particular technical in large scale projects, but also institutional and political).

contexts have been raised and discussed in the literature. Some of their commonalities are first emphasised here.

### *5.1 Context for establishing water markets*

Classical examples from the United States, Australia, or Chile, generally have in common a strong legal background and law enforcement capability.[54] They also come from contexts where users are well identified and in relatively low number. Water abstraction is generally measurable and most of the time done by pumping devices. Distribution facilities are modern and allow a good control of possible water transfers. This is in stark contrast to the context of Asian wet-rice small-scale farming, where irrigation is done by gravity and the simple identification of the users is hardly feasible.

The impetus to water markets in Western United States is given by a specific historical context. The region's prevailing water legislation hinges on "prior allocation rights" which granted the first settlers with "senior" rights (defined as 'water duty' related to the area put under beneficial use), whereas later ones were only given "junior" rights on the water (possibly) remaining after the former are served (being therefore dependent upon the hydrologic variability). As many of the senior rights are historically held by irrigation districts, this legal system now entails drastic constraints to the reallocation of water to thirsty towns (Frederik, 1998, Huffaker *et al.* 2000). Water markets appear as one of the tools proposed to get out of this peculiar historical legal stalemate.[55]

In Thailand, access to water is based on a mix of riparian rights and centralised allocation. In small basins, with no regulation dams, riparian rights prevail[56] and are increasingly obsolete, as diversion starts to exceed supply. In larger regulated

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[54] Even though, in the United States the complexity and the interconnectedness of uses and rights have entailed the heavy involvement of courts in lengthy and numerous litigations, showing that the definition of rights and their tradability are not enough in themselves to regulate water issues. Consequently, it calls for much caution in the application of such principles in settings with weaker judicial and legal systems.

[55] In any case, it appears that experience with water-markets in California is still very limited, and is faced with difficulties stemming from the intricacies and contradictions from the State and Federal laws and respective roles, and with the opposition of several political, agriculturist or environmentalist groups (Wahl, 1993). The 1991 Drought Water Bank in California, a much publicised example of water trade (in this case government initiated, not a free market) only resulted in the reallocation of 2% of the amount of water consumed state-wide (Bauer, 1996).

[56] Even though, *muang-fai* systems located along the same waterway have long designed common mechanisms to "share deficit", that is to adapt their respective diversion of water to the available flow.

basins, such as the Chao Phraya Basin, the amount of water that riparian users[57] are in a position to—privately and individually—abstract is still small in light of the volumes centrally released and allocated. The allocation policy of the State gives priority to urban areas and no deadlock is experienced. The problematic is not one of finding a way to make farmers releasing their rights for non-agricultural users but, rather, to minimise the impact on farmers of the effective and gradual dispossession of their access to water.

Other classical references, *a priori* closer to the Thai context, come from South Asia. In irrigated areas of Pakistan, India, or Bangladesh, groundwater markets have emerged alongside the development of private tube-wells, spurred by insufficient and/or unreliable superficial water supplies. In almost all cases, it must be noted that: 1) these markets have developed spontaneously, with little or no public intervention (although policies such as subsiding electricity may have had indirect influence); 2) they are informal (socially controlled and with little legal environment or regulation); 3) they allow an increase of yields and income for purchasers. What should be noted, however, is whether these contracts are best described by the term of "water markets". In fact, they are more germane to the leasing of irrigation equipment than to water marketing (as water does not belong to the pump owner). They are equivalent to contracts made with operators for land preparation, harvesting or milling and follow the same logic: the lumpiness of the equipment concerned makes it natural for those who can acquire them to rent out the remaining working capacity of their machines to those who cannot afford purchase. In most Asian contexts with a majority of small farms, the possibility to sell services is even the *sine qua non* condition of the profitability of such investments. In other terms, once served, the marginal value of the water in the well is nil for its owner and selling results.

To recognise this fact leads to considering these contracts as so many examples of arrangements devised by farmers and other operators to allow a degree of reallocation of production factors and economies of scale. In that, they differ from other arrangements not by their nature (no one is surprised to find tractor or land rental contracts and should not be so to find pump leasing) but, if anything, by the fact that they mediate the transfer of scarce public or common-pool resources to private individuals.

If we now come back to the case of Thailand, we see that the situation significantly differs. Shallow wells have also developed, for similar reasons, in all locations where water could be accessed by suction pumps, often powered by the engine of the two-

[57] Riparian use subject to "reasonable use", as defined by Section 1955 of the Civil and Commercial Code: "a riparian landowner has no right to withdraw water in the amount exceeding his reasonable need to the prejudice of other land abutting the same waterway" (Wongbandit, 1997).

wheel tractors.[58] In the upper part of the Chao Phraya Delta, for example, there is an estimated total of 30,000 wells (Kasetsart University and ORSTOM, 1996). Cases of farmers paying neighbours to supply their plot are commonplace and did not raise particular interest from anyone; nor was it felt necessary to consider them as water markets.[59] On the whole, given the rather low cost of such wells, there has been a tendency towards over-equipment. In some dry years, this has been conducive to overdraft and to the dropping of the water table.[60] Informal arrangements emerge naturally when needed and are both flexible and socially controlled, as is common in most of the Thai countryside.[61] Another example is provided by the act of collective pumping at the head of secondary canals in periods when the water level in the primary canal does not reach the sill level of the lateral. Up to 6 to 10 axial low-lift pumps can be set to ensure a flow of water into the secondary. Some farmers pay neighbours to pump for them, or they ensure the second pumping operation often needed from the canal to the ditch or to the plot. There is little scope for and benefit to expect from any formalisation of these diverse arrangements.

Another kind of water transaction, this one more akin to the idea of marketing, is that of superficial water in irrigation scheme. Examples from the Asian context also centre on arrangements found in schemes managed through the *warabandi* system, or other forms of rigid allocation principles. This is no surprise, although seldom emphasised, because such systems implicitly define a *right* to water. In the *warabandi*, this right is generally defined by a frequency (lowered in case of shortage) and fixed duration of water supply. This right may be more or less reliable, in particular the discharge in the tertiary canal may differ significantly from the nominal theoretical value (Strosser, 1997), but this does not prevent some farmers to cede their right to others. Indeed, there are indications that the higher the unreliability, the more farmers who can have access to other sources (mainly tube-wells) are inclined to trade their water turn. What *warabandi* also implicitly has, is an “automatic” way to share deficit over all users. This provides a great strength in that the uncertainty of supply affixed to the fluctuation in the available water is more or less accounted for. In that, it can be related to run-of-the-river systems, which often have proportional dividing weirs to achieve the same objective, like in Bali, Nepal or Chile. These transactions are

[58] These tube-wells, typically, are 10 to 20 meter deep, 3 to 4” in diameter, cost approximately 6000 baht (150 US$) and allow the irrigation of 20 rai (3 ha).

[59] Similarly, in the Mekong Delta, for example in Ang Giang Province, a variety of contracts exist between groups of farmers and pumping operators, most often mobile (on boats).

[60] In order to retain the (cheap) advantage of water abstraction with suction pumps, many farmers had to excavate a one-meter diameter hole in order to lower the pump body over 1 or 2 meters.

[61] For a comprehensive analysis of the land market and rental arrangements in the Chao Phraya Delta, see (Molle and Srijantr, 1999).

usually done among farmers of the same watercourse (tertiary) and are more accurately referred to as trading rather than marketing (Reidinger, 1994).

Many examples suggest that short-term "spot" bartering or trading of superficial water are likely to appear endogenously wherever local conditions make them possible. Conversely, the absence of such arrangements in the Thai and Asian context of large irrigation schemes is clearly indicative of their irrelevance in such conditions.[62] The simple reason for this is that there are no such pre-defined water turns, as found in the *warabandi* system, nor any other form of definition of *what* could be traded. Water is supplied under a continuous flow regime and there is, by and large, no right beyond that of who gets the water first, be it by pumping or not.

The Northern region of Thailand offers a different picture. In contrast with the centrally managed schemes of the middle and lower basin, conflicts occur in smaller catchment where stakeholders and trespassers are in limited numbers and easily identifiable. Irrigation users may be in great number but they are originally pooled in *muang-fai* schemes, which can be considered as units and share rules collectively crafted and agreed upon. The increasing occurrence of conflicts within these catchments is due to decreasing run-off (caused by deforestation), encroachment of outsiders in the territories of the *muang-fai* groups (hotels, golfs, housing estates, etc) and weakening of the social cohesion of the group (Charoenmuang, 1994). There is an urgent need to design mechanisms of conflict prevention/resolution based on a clear legal basis and definition of rights within a given catchment. Whether these rights could be tradable is a subsidiary question, albeit of importance, but realism enjoins us to admit that institutional, political and legal settings make such an option unrealistic for the foreseeable future (Anukularmphai, 2000b). An obvious difficulty is that a right given to a *muang-fai* group could be but collective and that it would be a hard task to reach a consensus among villagers (some of which predominantly farmers, others with main activities out of agriculture, and/or often out of the village) about ceding part of the right to potential buyers.

The PIS, as occurs in the case of Chile and in most run-off-the-river systems, also have both technically and socially tested ways to "divide deficit" among users, often through the use of fixed partitioning weirs and negotiated rules between groups which divert water from the same stream. This greatly offsets the difficulty to incorporate the hydrological variability into the fee and lends itself to a formalisation of rights. Other classic examples of water markets in Alicante (Spain), Mexico or elsewhere, confirm that they have preferably developed in small areas (a few

[62] As a recognition of the fact that changes are very much demand-driven, rather than the product of planned scenarios (Winpenny, 1994)

thousands ha at the most), where rights could technically be defined in terms of volume (or discharge), where traditional practice pre-existed (Easter and Hearne, 1994) and/or social groups were homogeneous and cohesive (Reidinger, 1994). Reallocation at the macro, basin or inter-basin levels, are so far restricted to a few examples, mostly from the United States and Australia.

### *5.2 Context and impact of water re-allocation*

The concept of water market implies possible reallocation of water, both within the agricultural sector and from agricultural activities to non-agricultural ones.

Within the agricultural sector, giving more water to those who produce crops with higher value added would be tantamount to strengthening areas which are favoured with locational or land-resources advantages, or with greater capital endowment, and can afford to grow these crops, at the expense of those which grow rice or sugar cane and are not in a position to shift away from them. In the Delta, this would be exemplified by orchard growers and aquaculture farmers who would secure their access to water thanks to their higher purchasing power. While there is some economic justification for this, there is a risk that the alleged principle to give "due attention to the poor" remain purely cosmetic under such logic.

It must be noted that these differences are already incorporated implicitly in the current centralised allocation policy. The 250,000 ha of raised bed systems in the lower Mae Klong area are given priority over other crops in case of water shortage, although the rationale for that is more the high immobilisation of capital in the orchards than the fact that the value added per hectare is higher.

Cases of reallocation of water away from agriculture to other sectors are scarce and limited to some experience in the United States and Australia. In Chile, too, this is theoretically possible, but Bauer (1997) has shown that this case is exceptional[63], dampening the enthusiasm of earlier analysts (Thobani, 1997; Rosegrant and Binswanger, 1994; Schleyer, 1994). A few comments can nevertheless be made on the applicability of the principle to the context considered here. The idea is basically that "if an irrigator can earn more by selling water to a nearby city than by spreading it on alfalfa, cotton, or wheat, transferring that water from farm to city use is economically beneficial" (Postel, 1999a). Two distinct cases must be considered. The first is an occasional reallocation, while the second is a permanent one.

[63] The Chilean experience shows that "many people continue to believe instinctively that water rights should not be bought or sold separately from land, nor treated as simply another commodity (Bauer, 1997).

Occasional re-allocation is difficult to achieve because it not only requires accurate definition of individual rights, but also a very high degree of control on water and transportation facilities required to transfer water from one user to the other. This appears clearly in the case of the "drought bank" set in 1991 in California, where networks of canals and pumping stations allowed the reallocation of water among a few (30) big contractors (see Wahl, 1993; Teerink and Nakashima, 1993). In contrast, the assertion that "if the price of rice is low, [Thai] farmers would be happy to cede their right to industrialists" (Wongbandit, 1997), runs counter to the most basic evidence. Industrialists or cities are served first and would do nothing with more water attributed to them when the price of rice is low, let alone the fact that the physical constraints of the distribution network make such a reallocation impossible. How would the "rights" of a group of farmers in, say, Kamphaeng Phet (middle basin) be transferred to a given golf court or factory in the suburbs of Bangkok?

The question of permanent reallocation is beset with the same juridical difficulties but may be less demanding in terms of physical flexibility. Should a given group of users collectively agree to give up its right to a volume of water, just to have this water made available within the system for the benefit of others? Obviously, with regards to Thailand, this is only a mind game. The first daunting step would be to identify the million of users, or alternatively pool them in consistent collective entities, to find an accepted criteria to attribute a right to them, say a specific volume, and to define how this right varies with the water stock.

Notwithstanding these difficulties, if we follow this line of reasoning we may accept that golf courts, recreational areas and factories gain preferential access to water resources because they can afford to pay more for it. That such an example of "the maximisation of benefits for the society" is compatible with equity and poverty alleviation is not straightforward. The theory works as long as the reallocation of factors occurs between activities that constitute alternatives for investments and between users who also have a range of opportunities and compete in a perfect market. In other words, this holds for the logic of capitalistic investment, which constitutes the underpinnings and driving force of the proposed economic mechanisms. The small peasant distinguishes himself by a lack of choice or, rather, by an alternative which is quitting, willingly or not, the farm sector.[64] If farmers who

[64] Similarly, it is often inferred from the observations that some farmers, in particular contexts (such as Pakistan), are led to pay high amounts of money for secure water, that "farmers are *willing* to pay" (Postel, 1972; World Bank, 1993). A less optimistic view would be to assume that many of these farmers do so because they have no choice and because survival, indeed, entails a high "willingness-to-pay"… This would be consistent with observations that these informal markets are sometimes not competitive, and the prices charged higher than theoretically expected.

are unduly exposed to the competition of sectors with a much higher profitability[65] were eventually led to let their land fallow (or to sell it to big farmers) they could ultimately swell the ranks of the unemployed and slum population in the capital. It is hard to see how the overall benefit of the society would be maximised by such a scenario, despite the fact that macro indicators would deceivingly suggest an overall gain. Political consequences of the reallocation of water away from agriculture are potentially high. Price (1994) noted that [in South Asia] "the cost of foregone agricultural production, multiplier effects regionally, and the resulting social problem of large pockets of poor rural residents are possible results that are politically unacceptable to governments and present little incentive to promote open water markets". The impact of the diversion of water out-of agriculture is a complex issue (Rosegrant and Ringler, 1998) but in developing countries with large agricultural sectors and percentage of rural poor there is often little room for manoeuvre[66].

Meinzen-Dick and Rosegrant (1997), while supporting the introduction of market-based mechanisms, recognise that "pursuing efficiency through market allocation may not be politically or socially acceptable if equity considerations are not met." Such a statement is perhaps tantamount to admitting that market based allocation might be, by nature, inequitable,[67] and to accept the necessity of corrective measures. They also remark that "markets are likely to be more appropriate where there are opportunities for those who give up water to either invest in more efficient water uses, or earn income from other sources." In other words, when these opportunities are too limited people who cannot afford to pay for water will face bankruptcy and unemployment. In the highly praised water markets of Chile, Hadjigeorgalis (1999) showed that "many small farmers are liquidity-constrained and often have sold rights to pay off large debts"; as "land is of little value without water…it is not expected to observe farmers selling water rights unless they were exiting agriculture or facing liquidity constraint". Bauer (1997) also found that "people willing to sell water rights separately tend to be getting out of agriculture, disposing of

[65] Only very capital and labour intensive agricultural production (aquaculture, horticulture) can provide farmers with incomes which can stand comparison with non-agricultural ones.

[66] This is not peculiar to developing countries. In the Western USA, Frederik (1998) reports that "when farmers want to sell water to cities, irrigation districts resist, fearing the loss of agricultural jobs that accompany rural water use", while Wahl (1993) acknowledges that "most agricultural water districts have viewed the potential for water transfers only very tentatively out of concern over the security of their water rights and potentially adverse effects on the districts and local communities".

[67] Noting that the value-in-use is much lower than the economic full cost for which the "classical economic model indicates that social welfare is maximised", Rogers *et al*. (1997) believe that "this is often because social and political goals override the economic criteria". This suggests that complying with the classical model and "maximising the aggregates" is detrimental to those who, in the reallocation process of factors, cannot afford to compete.

inheritance, or economically desperate. It appears an irreversible move."[68] This takes us back to what has been said earlier about the trade-off faced by developing countries. If conditions for a pull-driven shift from agriculture to other sectors are not met, then the odds are high that free market mechanisms will compound inequalities, and deprive farmers of their access to water *without* ensuring descent alternatives to them. This concern is also echoed by World Bank's economist W. Price (1994): "In time, markets in water may expand, but only in locations with extreme scarcity of resources and where municipal or industrial users can afford to pay large amount per unit of water to an agricultural user—enough for a farmer to invest in another business or to become economically independent. The conditions in South Asia are a long way from this".

Contenders of free-markets may place excessive emphasis on aggregated economic values and tend to ignore differences among actors. Schiller and Fowler (1999), for example, stress that "Ag-urban transfers allow California *as a whole* to use water more efficiently. Because they are *voluntary*, such transfers constitute positive sum, or "win-win", situations in which both parties come out ahead" (emphasis added). The point is that "as a whole" and "voluntary" might in fact conceal situations of "no choice", or "win-lose" situations with no other alternative for one party in the transaction.[69] The seductive perspective to reach an automatic and optimal "match of supply and demand" is, again, a macro-level aggregated vision that ignores how the demand is characterised, and what happens to those who cannot even formulate their demand because they cannot compete with bigger players.

This macro bias is paralleled by another common fallacy. Many optimistic commentators insist that in both Chile and Mexico, for example, secure and tradable rights have aided in the reduction of poverty (See Schiller and Fowler 1999; Thobani, 1997; Schleyer, 1994[70]). This is acceptable in a narrow —yet not negligible—sense, in that the sale of rights provides some kind of compensation. But that "many small Mexican farmers were able to sell some of their water in order to remain on their land" may either suggest that some water can be saved and a part of the right sold (something not compatible with non-metering small-scale situations), or that the agriculture considered is feasible (even if probably not sustainable) without irrigation.

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[68] On the contrary, it can be hypothesised that the Texas farmers who have given up irrigation because of growing pumping costs (see Postel, 1992), had enough capital to reorient their activity in conformity with the new context of water scarcity (cattle breeding, etc.).

[69] Similarly "users" is a neutral word which tells us little about their heterogeneity in terms of strategies and factor endowment. See, for example, (World Bank, 1994): "Reliance on the price mechanism is in the interest of *users* because it directs provision towards preferences determined by users rather than bureaucrats".

[70] "Perhaps the most important achievements of Chilean water policy are social benefits through redistribution of wealth and eradication of poverty".

It is hard to imagine such a situation in the setting considered here (and even in Chile there is evidence that the sale of rights is tantamount to bankruptcy, as noted earlier). In wetland rice cultivation, it strains the imagination to envisage reverting to a non or half-irrigated situation.

A last classic point must be mentioned concerning the difficulties in establishing markets; namely, the so-called third party effect. Hydraulic river and irrigation networks are much more complex than the representation suggested by the more familiar tap-water network. Another downstream user may tap any return-flow of water from a given use, either to the drainage system or to the aquifers. The likelihood is that this practice will increase with the overall pressure on water resources. Such user (who in the case of the western US may even be defined as a use-dependent appropriator and have a right) may therefore be directly affected by any reduction in return flows, what occurs for example when one tries to increase efficiency.[71] Such a phenomenon is of particular concern in a Delta where the re-use of water occurs on a wide magnitude. The high overall basin efficiency in the dry-season mentioned earlier has already suggested that any hypothetical improvement in irrigation efficiency would be detrimental to those who are already tapping the return flow (either superficial or underground).

Despite all these drastic difficulties, and staying in the virtual world of theory, the often emphasised advantage of a water market system, beyond the macro-economic gains, is that by being granted rights, farmers, either pushed or pulled to sell them, would at least get some compensation for relinquishing their right to water. This may be seen as a clear gain from the current prevailing inequity of the centralised system. Where farmers have well-established customary or legal rights to the use of water, reallocation allow them to receive some compensation and not just being stripped of their water by other users. However, because rights can by no means be individual due to the high number of irrigators, decisions on the relinquishment of rights would have to be made collectively, which in most cases would be highly problematic[72]. All in all, it is also legitimate to wonder whether the actual system of indirect subsidising

[71] See the example of the Snake River, in which such improvement eventually proved adverse by drying up the water used by use-dependent appropriators (Huffaker *et al.* 2000). More generally, Keller *et al.* (1996) have shown how "attempts to increase irrigation efficiency at the micro level often lead to reduced irrigation efficiency at the macro level".

[72] Because of the heterogeneity of farmers and of their respective strategies, it will be impossible to cope with the fact that those with other activities and/or poorer access to water will be inclined to sell the groups rights and the other not.

(free water[73]) is not easier to sustain than the daunting task of creating marketable rights which will eventually have to be relinquished. In the first case there is an indirect support to farmers' endeavour to maintain farming (*now)* as a sustainable economic activity, while in the second case farmers would pay a water charge and get a 'bonus' (later) to jump out of the boat…[74]

In the Chao Phraya Delta, in contravention to common wisdom that casts farmers as the main *guzzlers* and beneficiaries of water, farmers have few rights to water, or rather, their right is mostly confined to the "leftover water." In case of shortages, water is centrally and unilaterally allocated to other uses and they are the ones to be prejudiced. If there were a market, with user rights formally defined, their share could be bought by other users. Put another way, they would be compensated for their non-growing a crop, something they may be compelled to in the future [as experiences from Israel, United States, India or China indicate (Postel, 1992); in all cases agriculture's share was decreased to the benefit of cities].

There is some irony in the evidence that if the Thai legal system had been based on prior-appropriation rights, like in the western US, the Delta would have been granted senior rights on water since the sixties or earlier and Bangkok would now be trying to buy these rights from farmers. *In such a case, farmers would at present not be asked to pay but, on the contrary, courted to accept money as a compensation!* Reallocating water toward a more efficient use is a problem that is especially acute in the western US (see Huffaker *et al.*, 2000) and may be for this reason has become a major issue. The claim that central agencies have failed in properly allocating water has become a refrain supporting the idea of markets as an alternative.

In the Thai context, commentators do not hesitate in incorporating this concern into their rationale, asserting that the State has proved inefficient in centrally allocating water to the most beneficial use.[75] It is interesting to see that the ubiquity of this

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[73] The point here is that, at the moment, this 'subside' goes to all users (with no difference between those, in the southern part of the Delta, who always get water, and the others who seldom do) and every year (regardless of whether the supply is normal or reduced).

[74] There is an understandable concern on the economists' part to see factor prices reflecting their marginal use, as a way to avoid market distorsions and outright subsidisation. Whereas in most markets a change in input prices is readily passed on to the consumers (if the electricity charge to a given factory is raised, then, by and large, this surcharge translates in a similar hike of the sale price), this does not happen for commodities tightly linked to export markets. In the case of rice, the farm price elasticity relative to the world market price is 0.8 (Sombat Saehae, pers. com.). It follows that farm gate prices are predominantly driven by the world market and that internal balancing mechanisms to reflect changes in factor prices are critically constrained.

[75] A typical example is provided by Christensen and Boon-Long (1994): "a concern which could raise problems in the area of basin management involves the authority of the basin authorities to impose allocation priorities… The burden of proof for such an initiative is to show that command and control could result in better allocations and less market failure". Israngkura (2000), for his part, considers that "the returns on the irrigation dam investment

argument, even outside its 'natural' context, permeates debates even in settings where this problem has been handled relatively successfully. Contrary to the alleged government failure in allocating water resources, sectorial allocation in Thailand has been driven by a clear priority in use, which mirrors the economic return of all activities. Cases of industries with activities that would have been constrained or impeded by the lack of water are unheard of and it's hard to see how criticism of central allocation can fly in the face of such evidence. *The deadlock experienced in western US is unknown here and establishing a water market might create exactly the kind of problems it is assumed to solve, should, as is apparent in the US, the rural sector will be reluctant to relinquish its established right.*

Despite the current unfortunate impracticability of a water market, could we nevertheless keep the idea of compensation? Could the system remained centralised and the collected water fee partly used to achieve a kind of cross-subsidisation and compensate farmers when they get no water? If we admit that farmers are eventually, within the prevailing bureaucratic allocation system, the ones with least priority, and who suffer from being allocated a fluctuating share of water (with poor quality distribution), the *financial logic can be reversed* and some justification for a farmers' indemnification can be put forward (they have an implicit right, but the most precarious one). If farmers were to be charged, as well as other users, the fund thus constituted could be used to compensate them in years of non-allocation. Is not, after all, the current indirect subside of free water equivalent to a compensation for the lowest priority given to agriculture and for their having to constantly adjust to fluctuating water supply? Again, we are in a situation of communicating vessels.

Despite the real appeal of water markets in peculiar historical situations where they have emerged (of which the bidding system used for centuries in some small catchments of Spain provide a fascinating example), the small holder Asian context under consideration here does not appear to be 'market-prone' and attention should rather be focused on improving the different elements which a are still far from allowing the implementation of such economic devices. This should not be limited to establishing a wish-list (TDRI, 2001) of factors which are by and large already identified (Meinzen-Dick et al., 1994; Geiger, 1995; Vermillion, 1996). It requires a thorough analysis of the interplay of technical, socio-economic and institutional

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have been low due to the lack of effective water demand management that could prevent less productive water utilisation." This suggests that irrigation assumed low return has deprived other potentially more productive use, whereas irrigation is in fact allocated the leftover in the system. TDRI (2001) posits that "the current command and control system is unable to meet structural and cyclical changes in the demand and supply of natural resources, including water", while for Kraisoraphong (1995) "Past experience has shown the government's role to be ineffective and thus an alternative proposed by economists and the academic circles has been to use economic instruments such as water pricing". What may be right regarding large-scale irrigation areas is incorrectly applied to inter-sectorial basin wide allocation.

factors in order to overcome the difficulties of both identifying all users and knowing/controlling the amount of water they get every year.

# 6 Water rights and water management

Several segments of the preceding sections have hinted at the crucial link between the establishment of water fees (let alone water markets) and the notion of quality of service, or the control over supply which comes together (in other words, some type of perceived *right*). The declarations of farmers mentioned earlier are consonant to Postel' s claim that "irrigators have shown time and again that they are willing and able to pay more for water that is reliable and over which they can exercise control". In irrigation, water has little value if its quality in terms of timeliness is not specified.

While, to use the parallel with domestic water, a few users are more or less ensured to receive water all year long (those located along main waterways in the lower part of the Delta, as mentioned earlier), this is by no mean the case for the great majority of farmers in large scale systems. Levying a yearly fee is contingent upon ensuring a corresponding service. A part of RID's officers foot-dragging in considering the issue is probably linked to the fact that establishing a water charge may eventually backfire, in that farmers will be given "the legal standing to bargain forcefully with the water conveyance bureaucracy for timely and efficient service" (Rosegrant and Binswanger, 1994).

The difficulties mentioned earlier attached to individual pricing and to the estimation of the quality of service received by each farmer, plus the impossibility of establishing rights or fair fees without improving the control on supply, often points out an intermediate solution. A solution would be that water rights, or at least estimated amounts of water, could be allocated to groups of users ["water management blocks", for TDRI (2001)], for example to those farmers who are served by a same lateral (thus lowering the exigency on service improvement by ensuring only the inflow into laterals), while a collective fee could be levied (transferring the burden of its definition and collection to the groups).

What would be expected is that binding farmers together by granting them a collective right could be a way to "force" them to act collectively in order to (a) achieve greater efficiency/equity within the command area of their canal; (b) to constitute a bargaining power to obtain from RID the water supply they are entitled to; (c) to internally solve the problem of differentiated qualities of access to water and define individual charges accordingly; (d) to instil some formalised notion of water rights that could later be conducive to some form of tradability; (e) to constitute autonomous bodies that could take over a part of the managerial tasks attributed to RID and could further federate at the Project or basin level; (f) to foster, in return, a corresponding improved performance on RID's (and EGAT's) part. The potential benefits are so sweeping that one may be tempted to gloss over the prerequisites to such moves.

We must first investigate what is meant by “improved performance”, what are the constraints experienced by these agencies, both those which may lie beyond their reach, and those which offer significant margin for progress. At the other extreme, it must be determined whether farmers are able or willing to respond as expected. Such an overall analysis, to be fair, would require much more space than available in this report. A few important points can be noted for the sake of our present concern as regards to efficiency, timeliness and equity in distribution (for a full discussion on the issue, see Molle *et al.* 2001a), and to farmers’ collective dynamics.

### *6.1 Constraints to the improvement of the quality of water supply*

At the basin level, a first constraint is the coordination of dams management and irrigation supply. It has been shown that in the past ten years, contrary to common criticism, the right of EGAT to release water in excess of users’ requirements has not occasioned widespread water waste.[76] Scope for improving management lies rather with a higher responsiveness to hydrologic events in the rainy season (so that an increased use of rainfall and sideflows may translate into lower dam releases), and in a stabilisation of the water level upstream of Chai Nat diversion dam. Water allocation and distribution in the dry season are faced with two difficulties. The first one is the partial lack of control of RID on the system. This includes: (a) a growing uncontrolled water abstraction in the middle basin (representing up to 35% of dams release), which impacts on the water available for the Delta; (b) a difficulty to ensure proper hydraulic conveyance with low flows and a low upstream level at the Chai Nat diversion dam; (c) a loss of control on farmers’ cropping calendars, who may use secondary water sources to start planting crops which must later be supported by canal water. In order to deliver water with certainty, RID needs to increase control over the inflow at Chai Nat, at the apex of the Delta. The lack of reliability and timeliness is at present dealt with on an *ad hoc* basis, with in-season adjustments or, in more critical cases, “emergency” ancillary measures (setting RID’s pumps to withdraw water from rivers, releasing water in drains, farmers resorting to wells, etc).

What must be underlined here is that regaining control over water use is far from being a problem of purely technical nature. It goes together with identifying users and controlling their use, but it also goes with the setting of institutional arrangements[77]

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[76] This may be raised as an example of the fact that growing national scrutiny raised by increasing water scarcity, does produce adjustments and changes in behaviour which are not always fully recognised. In contrast, this “margin of flexibility” is still high in the Mae Klong basin, where it can be shown that EGAT still enjoys a slack of 30% of the average yearly inflow in the dams which it can use for generating energy when needed (Satoh 1998, Ekasit *et al.* 1999).

[77] Bandaragoda (1998) recalls that scheme modernisation impacts on water supply availability and distributional patterns and must therefore be accompanied by corresponding negotiated changes in institutions.

for sharing and managing water at the different relevant levels[78]. This adds support to the obvious and urgent necessity of having a strong legally-backed body controlling and allocating water at the basin level.

Achieving equity in allocation is also made difficult by the fact that available water stocks vary, for each dry-season, between 2–8 billion $m^3$. As a result, it has proved unsustainable to stick to the "rotational" allocation policy established in the early 1980s in which each hydraulic unit was to receive water one year out of two, because this "right" could not be ensured. In some years water was not sufficient while, in others, relatively abundant supplies triggered cultivation in larger non-target areas. If a more even and predictable year-to-year pattern of allocation is to be adopted, the regulation capacity of the dams is to be made use of. Releasing a more or less constant water supply each year would have the negative consequence to increase the evaporation and spill loss in the dam, as the water stock will be on the average higher than it is under present conditions. This policy would also be at odds with the responsiveness of farmers to high rice price. In years of both high water stocks and rice prices, it will be extremely difficult to resist the pressure from farmers, emulated by politicians, for more water release. This, again, shows how things are intimately inter-linked and how success is likely to be dependent upon several parameters.

In short, it is far from certain that infrastructures and management skills would allow RID to significantly respond to a growing demand for better performance.[79] Several sweeping technical and institutional improvements must be achieved beforehand and simultaneously. We may now turn to the question of the participation of farmers, under which conditions it can be achieved and how it relates to what precedes (this relates chiefly to medium/large scale gravity areas, including the upper Delta, as farmers of the lower Delta pump individually and independently in adjacent waterways).

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[78] Molle *et al.* (2001a) distinguish 6 different levels of water allocation in the Chao Phraya basin: 1) the basin level (upper, middle and lower basin); 2) the Delta level (share of each main canal); 3) the main canal level (share of each Project along a given main (or trunk) canal); 4) the Project level (share of each lateral within the Project); 5) the Lateral level (share of the different canal reaches); and 6) the ditch level (farmers sharing water at the ditch level).

[79] A mention must be made about the link between uncertainty in water supply and possible rent-seeking behaviours. It has been postulated, and supported in particular by some Indian cases, that managers were willingly maintaining a context of unreliability in order to extract bribes from farmers willing to ensure preferential allocation. This argument does not have significant explanative power in the context discussed here: if, in some cases, gate operators may receive some gifts to turn a blind eye on a surreptitious night opening of a gate which should be closed, such practices are generally limited and account for very little of the overall malfunctioning.

### *6.2 Linking water charges, improved allocation and farmers participation*

Despite the constraint made to irrigators to achieve collective actions, the past record of the failure of the Water User Groups (WUG) shows that there is no room for over-enthusiasm. Contrary to the PIS in the upper part of the basin, there is no congruence between the hydraulic units and the administrative or social spatial units [80]. Large irrigated schemes in the basin are best known for the established wide scale failure of the attempt to set up WUGs in the past. There are a number of anthropological and cultural considerations that can be raised to explain the perceived difference between the Central Plain and other regions, and the failure of these groups (Molle *et al.*, 2001b). However, the failure can also be ascribed to the weakening of the exigency of a collective maintenance of tertiaries (mechanical means are now available at low costs), to the drastic strengthening of individual strategies allowed by the spread of wells and of cheap, private and mobile pumping devices, and to the irrelevance of pre-established organisational patterns in a context of fluctuating inflow and uncertainty.

It is less than certain that the establishment of groups along hydraulic boundaries would be sufficient to ensure the homogeneity of strategies within it. Social groups are cut across by several types of collective networks (kinship, politics, administrative, religious, etc) with different spatial spread and are far from uniform, in particular regarding leadership. The possible reaction of head-enders, in particular, who are widely favoured under the prevailing conditions brings in much uncertainty. Put it another way, the “wholesaling” of water to groups of farmers is tantamount to shifting the burden of quantitatively determining the benefit to the different individual farmers (i.e. the fee, together with its collection) to communities or groups supposed to be homogenous and responsive, after being shown “their interest”.

Let us turn to the question of stabilised and planned allocations to hydraulic units, (assuming here that RID is technically and politically in a position to achieve this level of control). What could be the response of an idealised farmers group being attributed a volume V of water, for a price P. V being fixed, the corresponding area S is likely to be lower than the potential irrigated area (and the N farmers benefited, less than the total of farmers). Would there be a possibility to see farmers on the margin pressuring their fellow farmers to save, say 10% of water, in order to increase S by the same percentage (internal pressure for more equity generating gains in efficiency)? This is doubtful, first because, again, there is no evidence that much efficiency can be gained; second because in practice things are not as simple as this

[80] Even in the case of the PIS, the overlapping is often only partial. *Muang fay* systems, in particular, often encompass more than one village.

arithmetic might suggest. In reality S and N are not fixed, not only because in present times some uncertainty is attached to V, but also because it is not known for sure what value of S relates to a value of V. At present, the practical adjustment is done through the risk-taking of farmers in most unfavourable locations [they may experience some limited shortage; in case of crisis, if their crop is already well established, they may request extra water].[81] This flexibility has its own merits and the adjustment capacity of farmers, based on a mix of passed experience and of collaboration from RID to respond to emergency cases will not easily be substituted by a more efficient system.

An important consequence from the above difficulty is that assuming that the hypothetical right attributed to a group of farmer could change each year blithely deals away with the fact that this group will have to find a way to establish a socially acceptable allocation of water. It is not clear how the burden to achieve basic equity in a context where the group's 'right' varies can be handled by the farmers. This also applies to the collection of the water fee which may lead to widespread disagreements if all farmers are not served with similar standards (which is likely to happen if the water allotted can serve only part of the group or if it tends to be less than expected).

This shows that it is of paramount importance to establish allocation 'rights' which allow the full irrigation of the different hydraulic units. However, how such rights, in a context of fluctuating water stocks in the dry season, can be defined and activated in an equitable manner over the years still remains to be seen. Any mechanism is contingent upon adopting a process of allocation at the Delta level based on constant, or at least more regular, yearly supplies, instead of one in which supply is defined each year based on available water stocks. Such complex arrangements need not be defined arbitrarily but should emerge as an outcome of users' participation in the allocation process.

In any case, it is all the more likely that improvements brought about by the whole-selling of water would be on the side of equity concern, rather than efficiency. Regarding the latter, there is another disturbing point. There are strong incentives to believe that much of the water losses occur as a consequence of poor supply control rather than because of an excessive demand in the absence of water prices (Small, 1987). But effective supply control over the system is a prerequisite to the establishment of a water charge based on a defined right, or at least a quantifiable service. In other words, water pricing aimed at reducing wastage only makes sense if

[81] Hence the preoccupation of project managers to avoid full-supply deliveries in laterals which would spur immoderate expectations and excessive crop establishment, even if they are receiving momentarily enough water from the main canal to ensure them.

the reasons for which it is desired are first solved! Conversely, water pricing would be an indirect way (through the pressure put on RID) to improve supply but can the principle of the former be accepted without the benefit of the latter having materialised and been appreciated by the users?

In practical terms, it still remains to be defined how such drastic changes could be brought into the system with the acceptation and participation of both farmers and agencies. The costs of establishing such a policy, defining sound hydraulic units, involving farmers in the conception phase, co-ordinating uses at the basin level and reducing political interference, controlling and applying penalties on unauthorised abstraction, etc. are obviously huge. They not only require improved management skills and facilities, capacity building and deep institutional reforms, enforcement capacity and political commitment, but also that these changes be phased, as an eventual success will be conditional on their concomitant establishment.

### *6.3 Scenarios*

This takes us to imagine a few scenarios in which the potentially powerful linkages between water pricing (by group), institutional reforms and water management improvement could be activated (Small and Carruthers, 1991).[82] Under its ASPL Action Plan[83] (Agricultural Sector Program Loan), ADB envisages to indulge into a wider turn-over process, although this point is surprisingly little publicised and seldom presented as a coherent segment of a wider strategy.

As noted earlier, the rationale to establish a water fee is poorly supported by considerations of efficiency, or even of cost recovery, and only gains relevance when considered as a piece of a wider jigsaw which includes institutional change, scheme modernisation and turnover, the latter statement being also recognised by consultants (Halcrow, 2001). The ASPL does consider the phased establishment of Water User Groups (WUGs) at the tertiary and secondary levels, followed by two years of joint management of lateral canals with RID, and two years of joint management of the scheme (Project). A water fee is expected to be levied[84] and used to constitute an Incremental Repair and Improvement (IRI) Fund for Irrigation, which would further be used to improve O&M, through actions to be decided by the

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[82] A more detailed description of recommendations and scenarios can be found in Molle *et al.* (2001a).

[83] The ASPL loan is a $ 600m loan half provided by the ADN and half by the Japan's Overseas Economic Cooperation Fund.

[84] The level of the fee to be collected is tentatively set at 120 baht/rai in the Pilot projects to be implemented by ADB. It would be wise, upon consideration of the 5 baht/rai frozen by the 1943 irrigation Act, and following the convincing arguments provided by Small and Carruthers (1991), to adopt a fee indexed on the price of rice, rather than a nominal amount which must be frequently actualised.

farmers concerned. A Participatory Irrigation Management (PIM) is advocated and attention is rightly directed to generating enough benefits to farmers, in order to compensate for the increased costs and participation involved, and to changing the RID's traditional view of farmers as beneficiaries to one of farmers as clients.

The IRI fund is to be managed by WUGs at the Project (or regional) level, where the requested actions will be examined under different criteria (relevance, percentage of cost sharing proposed, etc). If such a local control of the fund and of its use is laudable, it ignores the fact that many maintenance works, especially of ditches and drains at the tertiary level, are already achieved by farmers and by local administrative levels (Molle *et al.* 1998). With the recent decentralisation process and the emergence of *Tambon* (district) Administrative Organisations (TAOs), local budgets are increased and much of the farmers' demand already centres on such operations. This dramatically lessens the interest that farmers would have to build up and contribute to the IRI fund, as they already have (and have had for some years) another mechanism to cope with such needs.

What may also be overestimated is the uniformity of farmers' awareness of the individual and collective costs of the accumulating negative impact of the scheme deterioration. Such a deterioration is very relative (RID's maintenance in the Central Region can be considered quite good if compared with other countries), its impact is offset by the use of pumps in case of poor delivery, and ditches are already taken care of when really needed. There is no evidence of a drastic impact of degradation on performance at the moment (in part because of the importance of the individual pumping capacity). If repair and rehabilitation must become demand driven ("i.e. rather than RID deciding where to improve the works, farmers' interest and willingness to pay become the driving force" [Halcrow, 2000c]), it is likely that some "delayed maintenance" will occur. The perception of the impact of a damaged piece of canal lining or of a sliding embankment may not be uniform and not lead to a consensual demand for works for which farmers would be expected to pay 30%.

The crucial weak point of the reform is that there is no provision to ensure that RID will deliver water following standards of service agreed upon. By failing to link RID's financial income to such service, no drastic pressure is put on RID to reform its management and it is highly doubtful that raising their awareness of the necessity of change by seminars, capacity building, etc. will be sufficient to ensure this *sine qua non* aspect of the reform. 'Service agreements' are supposed to be established between users and RID but little is said about whether the existing human and physical capacity needed to achieve this exists or not (which would yield a rather variegated answer as no two systems are alike). Instead, emphasis and binding financial mechanisms are directed to maintenance, which appears a secondary issue (albeit of importance).

What “managing (jointly) the lateral canal” means is not clear. Rather than managing the flow within the lateral, something that is already being done, the fulcrum point is the inflow at the head regulator of the lateral. This inflow, in turn, depends, for both planning and operational distribution, on what happens at the higher levels: the Project, the Delta, the basin. This means that if WUGs at the lateral level are not represented since the beginning at the project level, and very quickly at the Delta level, there will be little matter to “jointly manage” and the reform will fail to effectively integrate farmers in the management process.

The timing of the different actions and effects supposed to occur is of paramount importance. It must be reminded that the setting of WUGs is doomed to face the same fate of earlier attempts *if* it is not concomitant (rather than followed) to clear and perceived new benefits for farmers, in terms of amount, reliability and timing of supply. This involves, in particular, technological issues (improved facilities and modernisation of hydraulic regulation), basin-wide control and institutional co-ordination, the devising of sound and negotiated allocation plans at different levels and guidelines to meet demand of equity in a context of year-to-year fluctuating water stocks.

# 7 Institutional deadlocks

The measures outlined in the preceding discussion translate into crucial exigencies directed to the Thai institutional and political setting. The deadlock reflects the inadequacy of current laws to address the problems experienced; the confused definition and scattered attribution of roles and power to the different ministries and strata of the government; and a context of political interventionism and laxity in law enforcement.

## *7.1 Existing laws and regulations* vs*. the problems faced*

Most of the Thai legal provisions regarding water issues are widely regarded as outmoded (Wongbandit, 1995). Waterways belong to the public domain (public property or/and public use), but the government cannot bar anyone from using water from them, as is typical in open-access resources systems. Water already taken from the river belongs to a person or entity taking the water. Section 1355 of the Civil and Commercial Code imposes restrictions on use: “a riparian landowner has no right to withdraw water in the amount exceeding his reasonable need to the prejudice of other land abutting the same waterway”. Wongbandit (1995) stresses that, for example, there is no provision to prevent golf courses from taking water at times of water shortage. The Royal Irrigation Act of 1942 addresses issues of canal management and prohibits the obstruction of flows. Gates are to be operated only by officers, who are authorised to prohibit any person from withdrawing or using water from irrigation canals, if it is perceived that such a withdrawal or use would cause damage to other persons (Wongbandit, 1997). This is subject to interpretation and gives little power to RID. The act was amended in 1964, allowing an increase in the maximum water fee from 0.50 to 5 baht/rai.

The Groundwater Act of 1977 was also largely obsolete and was extensively amended in 1992. It applies to groundwater below earth, but unfortunately only to a distance which shall not be less than 10 meters (fixed in 1992 at 15 m in BMA, 20 or 30 in others regions). Therefore, it does not cover the tens of thousands of tube-wells exploiting shallow aquifers. Although the Act refers to a water charge (not to be fixed higher than tap water charge), Ministerial Regulations are unable to update the fees in a timely manner. The legislation regarding water quality and environmental protection as a whole has been upgraded by the 1992 Environmental Act, which permit penalties and incorporates the “polluter pays principle”, but the means of control and law enforcement are still inadequate for requirements.

With regards to devising a wider legislation, encapsulating the different and inter-related aspects of water resources, a Water Law has also been considered, together

with the creation of a "Water Ministry". Ill-fated drafts of the Water Law have been stalled in bureaucratic processes for almost 10 years and the law does not draw consensus or enthusiasm from analysts[85] (Christensen and Boon-Long, 1994). Consultants are currently proposing different patterns of organisation of the water sector but besides the fact that they do not agree with each other[86], there are wide interrogations on whether the current degree of political commitment is compatible with the reforms proposed.[87]

### *7.2 Administrative interplay and confusion*

There is a notorious fragmentation of responsibilities and roles regarding water resources among the different segments of the Thai administration (a point shared, besides, by many countries). There is a list of 30 Departments concerned with water issues that belonging to seven different ministries (Arbhabhirama *et al.*, 1988).[88] Decision-making regarding projects of water use, for example, shows how the right hand can ignore what the left hand is doing. While water resource supplies in many basins is already much lower than demand, it can be observed that several Departments nevertheless continue to develop irrigation areas (Anukularmphai, 2000a). The Department of Energy Development and Promotion (DEDP) is promoting pumping stations for group of farmers along main rivers already over-exploited. RID's offices at the provincial level also engage in expanding the irrigated area on the sides of the Delta, diverting water from the very irrigation canals that already provide insufficient supply to the Delta proper. The debate on inland shrimp farming also recently showed the Fishery Department supporting a trend which was opposed by other services of the Departments of Land Development (DLD) and Pollution Control (PCD).[89]

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[85] However, it must be noted that this situation is not peculiar to Thailand. Countries like Sri Lanka or some States of India have been debating water laws for 30 years without effectively enacting a law (Shah *et al.* 2000).

[86] The River Basin Commission proposed in 1997 by Binnie (1997) is "now not considered to be the most appropriate model for the Chao Phraya" (WRCS, 2000).

[87] "It will just not be sufficient to develop sound institutional options for the Chao Phraya Basin Organisation itself if the surrounding arrangements—upwards to the NWRC (National Water Resources Committee) and downwards to the tributary basin sub-committees—are not supportive and complementary. An ineffective NWRC will almost certainly hinder the performance of the CPBO whilst lack of community participation at the grass-roots level will inevitably lead to poor input at the CPBS level" (WRCS, 2000).

[88] This is repeatedly mentioned by all studies on the water sector. However, the corresponding lack of co-ordination affects issues of water resources development, and secondarily allocation, more than distribution, for which RID and EGAT are the two main players.

[89] International agencies are also not exempt of such contradictions, as shown by the World Bank's funding of the Pitsanulok Project or examples from Algeria, where the Bank supported both projects irrigation and urban water supply networks in competition for the same scarce resource (Winpenny, 1994).

Political interventions in the Ministries, in particular that of Agriculture, are also a factor that works against the application of measures of general interest. A high ranking officer of the Ministry of Agriculture summarised the situation admitting that "the agencies were unable to co-ordinate their policies because they were *supervised* by different parties in the ruling coalition" (The Nation, 2000 June; emphasis added). Political and technical points of view are often at loggerheads, most often at the expense of the latter. This was illustrated by the dry-season 1999 when, on one side, RID officers militated for a "zero area target", because of extremely low available stocks in the dams, while, on the other side, politicians claimed and successfully obtained water releases for 300,000 ha of rice. What is at stake, in such instances, is the *level of risk* incurred, in the absence of negotiated standards. Fortunately, rainfall was abundant in the year 1999 and replenished the dams. The crisis, with rationing of tap water in Bangkok, which might have occurred in the following year had this not been the case, has been avoided. What was also circumvented was the necessity to establish sound technical guidelines of risk management, which seem unlikely to be accepted without the do-or-die injunction to be brought by a future non averted, crisis (see full analysis of the water crises causes in Molle *et al.* (2001a)).

The only consensus at present is that of the necessity of basin organisations, but this has so far failed to translate into concrete measures and legislation. The government and international agencies are supporting several pilot experiences of water basin organisations (WBO), but it remains unclear if and how they will be able to operate satisfactorily in the absence of strong political backing and legal empowerment.[90] Even if quality service in water distribution can be ensured, it cannot be inferred that the participation of farmers will be smoothly incorporated in the decision process. What is known about the resilience of the Thai 'bureaucratic polity' (see for example Arghiros, 1999; Nelson, 1998) should preclude enthusiasm about the extent of the decentralisation and the propensity of the administration to hand over its power swiftly and willingly. Therefore, the odds are high that these pilot WBOs will remain formal institutions with no real power and little degree of people empowerment[91]. A positive way to look at on-going processes is to view these initiatives as part of a

[90] Shah *et al.* (2000) remind that "the implicit assumption being that mere formation of the appropriate organisation will result in Integrated River Basin Management, an assumption whose validity has been repeatedly refuted".

[91] The examination of the 8 existing WBOs shows that farmers are grossly under-represented. The WBOs of the upper and lower Ping rivers, for example, have only two farmers representatives, against 22 and 20 officials respectively… To some extent, WBO might suffer from the same lack of political/institutional support and formalisation which affects, 'upstream' of them, the ONWRC and, downstream, the WUGs.

learning process. However, there is a risk that their part failure would also make the participation of farmers increasingly difficult in the future[92].

### *7.3 Law enforcement*

Legal provisions are obviously useless without a basic capacity of law enforcement and penalties, an aspect in which Thailand admittedly has an unimpressive record (Flaherty *et al.*, 1999; Christensen and Boon-Long, 1994; Wongbandit, 1995; Kraisoraphong, 1995[93]).

The question of groundwater in BMA provides the most glaring example of mismanagement with dramatic consequences. A first Groundwater Act was issued in 1977 (fixing a charge of 1 baht/$m^3$) at a time in which excessive pumping was giving way to land subsidence as high as 10 cm/year in the East of Bangkok. With the continuation of the problem, a new Groundwater Act was issued in 1985, mandating that groundwater pumping in critical areas be substituted by raw superficial water in 1987 and that prices be gradually equated to that of piped water (TDRI, 1990). In 1989, the private cost of groundwater abstraction was around 2 baht/$m^3$ (including a one baht tax), whereas piped water charged to industrials was around 6 baht/$m^3$. In the late 1990s, the failure to control water abstraction and land subsidence was reaching alarming proportions, with horrendous costs in flood damage and in upgrading flood protection.[94] In 2000, the city still sinks by an average 2 cm/year (The Nation, 2000 June 25) and the Ministry of Industry called for a rise from 3.5 to 8.5 baht/$m^3$, while piped water is priced at 12 baht. For the last 15 years or so, daily water abstraction in BMA was around 3 $Mm^3$, while sustainable rates (compatible with replenishment) are estimated at 1 $Mm^3$. To crown it all, the Ministry recently requested a budget of 5 billion baht to build 50 stations designed for recharging aquifers by injection[95].

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[92] Consultants reckon that the institutional setting is not favourable but that waiting for a change in laws and institutions is not appealing because of the time this might take. Therefore, at the obvious risk of putting the cart in front of the horse, pilot WBOs initiatives are seen as a way to make things move and to gain experience for the future. With a still inadequate political and institutional context, and technical difficulties in water distribution precluding the definition of rights, these exercises may be disappointing and may lead to farmers passivity and distrust.

[93] "Thai society has not been known to be a legally conformative one…[and] is built on personal relationships, not on principle or laws."

[94] In a seminar suggestively entitled "We Must Rethink About the Concept of Water Before It Is Too Late," held at Chulalongkorn University, academics and conservationists have urged the government to increase water fees to a realistic level to ease a water shortage which is worsening every year (Bangkok Post, 1997 October 12).

[95] Therefore focusing on the treatment of symptoms rather than on their cause.

The Acts Controlling the Rent of Paddy Land of 1950 and 1974 are other well known examples of legislation pieces turned dead letters (Molle and Srijantr, 1999). Bans on sand dredging in riverbeds, or logging, have also been little effective. More recently, the ban on inland Tiger Prawn farming, or the prohibition to use irrigation water in golf courses, have also been widely ignored.

It seems a bit premature, and all in all anachronistic, to quarrel about charging rural water fees whereas the taxation and regulation of underground water abstraction in BMA—both easier to measure and highly detrimental to the nation because of its impact on the capital—are still ineffective. This stresses again the sense of urgency to have institutional reforms first building up and modifying the administrative and political landscape before indulging in sporadic specific actions doomed to failure.

# 8 Conclusion

This paper explored the rationale for the implementation of water pricing or water markets in Thailand, and reviewed these options within the historical, socio-economic and technical context specific to this country. Despite Thailand's peculiarity, there is little doubt that the problem of water allocation demands regulation and interventions, against the view held by some NGOs that concepts and practices inherited from a situation of open-access resource should continue to prevail. Demographic and economic changes in Thailand will not, in the short run, allow free access to water to last as a sustainable solution.

The analysis of the current debate reveals a certain degree of confusion in the objectives and weaknesses of the justifications put forward. In particular, five axioms, considered as conventional wisdom, were put in context and called into question.

The first widespread fallacy is that farmers *guzzle* water, and therefore, are the main cause of the water crisis. Such unqualified statements ("efficiency in gravity irrigation is under 30%") draw on general journalistic affirmations that tend to appear as truth as they are repeated and do not account for differences in situations (open basin vs. closed basin; rainy season vs. dry season, etc). We have shown elsewhere that dry-season irrigation efficiency in the Delta was at best standards (66%), in particular because most farmers have to use pumps to access water, and much higher at the macro level (85%). It is our contention that Thai farmers' responsiveness to water scarcity is not crippled by a supposed lack of awareness attached to the non-pricing of water. There is a pervasive feeling that the rhetoric on poor efficiency obscures the fact that, in reality, closed systems have (already) significantly responded to water scarcity. In particular, by developing conjunctive use and pumping capacities, most farmers pump water in the dry season and do not engage in wasteful practices. More generally, all studies show farmers to have an impressive adaptability to factor constraints and an efficient response to endogenous markets and collective arrangements (in particular for land and labour). In any case, the efficiency at the macro level can be considered very high and gains from reforms cannot be as high as expected.

The idea that shortages are due to poor efficiency is another misleading and enduring misconception. Because of the assumption that the efficiency of use is low (which itself is incorrect), it is believed that water is lost and that some users end up lacking water. This is wrong, on a purely hydrologic basis owing to the fact that macro-efficiency is high, therefore little water is lost *out of* the system. It is also incorrect because it fails to consider the real nature of shortages: the amount of water released for dry-season cropping is adjusted to the changing water stock in the dams; all other uses are supposed to be satisfied. When a shortage occurs, it is

because cropping areas have expanded in an uncontrolled manner beyond what is possible to irrigate; or because insufficient carry-over stocks have been kept in the dams and a succession of exceptionally dry seasons draw water reserves under what is necessary to meet minimum needs. In that case, it can even be necessary to curtail Bangkok water supply. Such shortages are therefore caused by *management failures* and not by the lack of water *per se*. These failures are due to insufficient control, in terms of hydraulic facilities, cropping areas and political interference (altogether, this results in poor *scheduling*). The shortage in itself is independent of whether it has been possible to irrigate one or two million rai with the water released. Even with good efficiency, demand would remain *higher than supply*, especially in these years of drought when pressure on water is highest.

The third main misconception is generated by juxtaposing the alleged water waste and the fact that water is free, as typified by the refrain "water is consistently undervalued, and as a result is chronically overused" (Postel, 1992). It has been shown that the statement that water is free may be acceptable only in a narrow sense. The revenues siphoned off from rice cultivation by the State through the mechanism of the rice premium between 1952 and 1984 correspond to a contribution by farmers to the investment costs, which is far more considerable than in many other countries. A second point is also frequently glossed over; namely, that water management deficiency has compelled farmers to make considerable investments in pumping devices in order to access water. This, together with the corresponding operational costs, is a financial burden for farmers and shows that "they don't get it free" in most cases. In addition to both tenets of the proposition being highly problematic, the causality is also debatable.[96] If it applies more frequently to urban tap water, for which convincing experiences of seepage control and regulation through pricing exist, it is often inappropriately extrapolated to other sectors and situations, not the least being those in which efficiency is already high.

A fourth conspicuous and widespread argument is that centralised water allocation in Thailand has reached its limits and that water rights and a water market would provide a flexible mechanism to allow the reallocation of scarce resources towards the most economically beneficial (profitable) uses. This is strongly reminiscent of the deadlock experienced in the western USA, where water rights are locked in uses of low-productivity and where market mechanisms may constitute one of the ways out of the stalemate. Such ill-placed emphasis fails to recognise that inter-sectoral allocation[97] is precisely the aspect that has been most successfully addressed by

[96] Formally, "A implies B" does not mean that "non-A implies non-B"…

[97] This does not apply to allocation within the agricultural sector. See Molle *et al.* (2001) for a complete analysis.

centralised allocation, in that it gives effective priority to activities with higher economic efficiency in water use.

Last, the argument of cost recovery was questioned within a context where taxation, subsides, and government interventions are elements of a global policy faced with antagonistic goals. The alleged 'huge drain' that O&M expenditures impose on the national budget amounts to 0.16% of the national income and can be considered as a subside to a heavily taxed agricultural sector. A water charge corresponds to an increase in production costs which cannot easily be passed to the consumer because of the tight dependence of rice prices to the world market.

The practicability of establishing of water pricing was also considered. Establishing a water fee for rice farmers in the actual context seems doomed to failure. It cannot be affixed to volumetric use and will at best have no effect on water use efficiency. In addition, a water fee would likely result in widespread defaulting, as the service of supplying water with relative certainty is unlikely to be ensured. This situation will stir farmers' exigencies in a technical and institutional setting, which cannot respond to them under the present conditions. Water rights can be relatively well defined in a context where every farmer's demand is eventually satisfied (and where pricing can be made proportional to the plot area), for example in the lower Delta and in parts of the northern region. In another situation, rights are very hazardous because of the high heterogeneity of access to water (in quantity, timing, quality, level gravity vs. pumping). To avoid the "second best solution" turning out to be the first bad one, it must be acknowledged that sweeping and far-reaching institutional and technical reforms of the water sector are first needed.

Considering, on one hand, the daunting list of pre-requisites to the establishment of water markets (as stressed even by their proponents) and, on the other hand, the specificities attached to the examples of existing markets (as reviewed in the text), it is obvious that the opportunities to expand such markets are more limited than suggested in the literature. The example of Thailand is probably representative of a much larger context, including the bulk of Asian medium-large scale irrigation. Thailand shows that situations with no possible volumetric metering, a very high number of small farms with differentiated and fluctuating levels of access to water, committed to wet rice cultivation with severe environmental and market constraints to diversification, weak legal and institutional environments[98], and significant political meddling, are unlikely to be in a position to benefit from such mechanisms, at least in

[98] If we observe the environmental damages inflicted to the Everglades natural paradise in Florida, mostly by highly subsided sugar cane cultivation, or the drying up of the Colorado Delta, it becomes apparent that even in strong legal and democratic environments issues of water resources management are less simple that what might be suggested (Postel, 1992).

the foreseeable future. In other words, if the institutional gridlock, political interference, mismanagement and farmers' lack of cohesion are as many signals of an "imperfect" setting, it would be unwise to expect that anything close to a "perfect" market emerge from it in the short run.

One cannot avoid pondering the paradox of having farmers vilified on the grounds that they use 85% of controlled resources (again, not what they take away from other users, but what is left on average), while in the same time the collapse of Bangkok (between 50 cm and 200 cm) is dealt with as a collateral, with no special opprobrium laid on industrials, or on the administration, for their responsibility in the mammoth costs imposed to the nation for flood protection and flood damages. When considering that (a) the externalities of underground water use are huge, (b) volumetric control and collection of charges are relatively easy, and (c) their financial potential is greater, the picture suggests that political will and commitment could be conveniently tested and observed in this case before moving towards wider and more complex taxation schemes.

Economic-based regulation and participatory management were also shown to be relevant and more likely to be successful in two specific and combined contexts. The first of these is the closed water system, in which demand already offsets supply. This shows that a different approach is needed for *surplus basin* (such as the Mae Klong basin[99]) and *deficit basins* (such as the Chao Phraya basin). The second aspect could be termed "agrarian pressure". The political and social commitments needed to adopt and enforce sweeping reforms are more likely to build up in a context where farmers are highly dependent on agriculture for their livelihood. If the transfer of labour force from agriculture to non-agricultural sectors is rather strong and predominantly a "pull" process, then the commitment of farmers, and their will to cope with the transactions costs affixed to higher organisational levels, will be weakened by the heterogeneity of farmers' strategies. Those with outside opportunities, pluri-activity or remittances from relatives working in Bangkok or elsewhere, will obviously have fewer incentives to participate in the process, as is already apparent in the weakening of the *muang-fai* system in the north reported by Charoenmuang (1994). Collective mobilisation, for example, appears much stronger

[99] For example, it can be observed that farmers' practices in the Mae Klong area are not geared towards conserving water and that significant water flows to the drain, even in the dry season. This must be understood as a result of an abundant water supply by gravity (there is still an approximate surplus of 30% of the storage dams capacity at the basin level) and should not be misunderstood: these outflows are not damageable to the system because drain water flows to the Tha Chin River where it is pumped in order to supply the West Bank (by the same token, 50 cms are dumped to two main drains near Vajiralongkorn diversion dam for this same purpose). As for infiltration loss, they contribute to recharging the shallow aquifer, which is intensively tapped by farmers.

in the context of agrarian pressure observed in the Red River Delta, Vietnam, than in the Chao Phraya Delta.

Doubt was also raised about the impact and the relevance of confronting farmers with users from other economic sectors with higher capital and productivity. The first key question is whether farmers who would give up farming would do so willingly, on account of alternatives offered to them, or whether they would be thrown into bankruptcy, distress and poverty. Reallocation may appear legitimate when "displaced" people can find decent alternatives within the farm sector or outside. The second point relates to political positions on the importance given to food security and more generally on the role of rural activities and rural life in landscape management, aesthetics, cultural preservation and societal equilibrium. Although preference for or support of rural activities that extend farther than economic rationality dictates are often discarded as "Jeffersonian" arguments or romanticism, most countries, if not all, are reluctant to jeopardise their rural sector.

If no more water is tapped into the system and no formal rights granted to farmers beyond using the water that is left, would an inevitable agricultural decline result? An optimistic (pull) scenario is that this situation would be paralleled by a sustained growth of non-agricultural sectors; therefore the demise of agriculture would have less economic consequences. A pessimistic (push) scenario is one of an agrarian crisis in which rural stagnation could not be avoided. It is all the more likely that such a situation would create the political conditions for more water resource development (trans-basin transfers and more dams for storage). Reality might well be something in between, combining more productive use of water (diversification), reduction of rice cropping areas, and a degree of water resource development.

Most obstacles to the introduction of market regulation already identified in other countries were, not surprisingly, also found in Thailand. We showed that much of conventional wisdom on water waste, ineffective economic efficiency and cost recovery, although constituting at first sight a consistent framework of analysis, was significantly flawed and misleading. It was also argued that while the urgency of reform and the weaknesses of the institutional and political settings is to be emphasised, building sweeping reforms on the basis of generic ideas may at the end be very costly: admittedly, "water is far too important to its users to be the basis for socioeconomic experiments" (Perry *et al.* 1997). In this regard, the stance that "markets should be given a chance", only because centralised administration is supposed to show its limits, appears a bit short. The risk is high for economists with an unqualified enthusiasm for virtual markets to come under the same criticism as previously directed to engineers: devising unrealistic and discipline-oriented visions

and solutions[100], while the complex issue to be addressed demands a sound site-specific understanding and consideration of the interplay between the elements of the system considered.

Most conclusions of papers written on the virtues and the difficulties of implementing economic regulation offer an ubiquitous caveat[101] : the need to take into consideration the diversity of situations and contexts (historical, cultural, physical, social, political, etc) with an adaptive and flexible thinking, patience and realism. There is a sense that, in practice, this recommendation is not being given due consideration and that blueprints based on rationales derived from developed countries are applied with insufficient discernment. Furthermore, there is a risk of the *bandwagon syndrome*, evidenced by an increasing use of sentences like "best international practices suggest that…", implying that there are a general consensus on how to proceed and a minimalist blueprint which can safely be applied.

In a similar fashion, Shah *et al.* (2000) warn that "uncritical 'copycat' replication of successful institutional model—either by enthusiastic national governments or at behest of enthusiastic donors, is the sure formula to failure. The history of institutional reform in developing country water sectors is dotted with failures of such copycat reform…imposing institutional models uncritically in vastly different socio-ecological contexts can be dysfunctional and even counter-productive." This also shows the difficulty to make adequate use of general principles, such as the 4th Dublin principle

[100] The fascination of some economics for "perfect world" economic theory can be assimilated to that of engineers for sophisticated technological solutions which soon appear to be totally out of context and fail.

[101] Examples include: "Each country has unique water options and the choice whether to apply economic instruments in water policy will depend on its level of development, hydrological situation, political and social institutions, management skills, financial resources, popular attitudes to water and other factors." (Smith *et al.* 1997); "The costs and benefits from alternative institutions, and policies, to remove constraints on water transfers are likely to vary across underlying conditions and regions, in terms of agroclimatic zones, relative water supply, level of agricultural intensification and degree of intersectorial competition for water." (Rosegrant and Binswanger, 1994); "This emphasises how much market mechanisms in water and other natural resources depend on the wider contexts and preconditions. How they work influenced by legal rules, political choices, institutional arrangements, economic and geographic conditions, and cultural practices—they are in short, unavoidably complicated. For the same reason, they can never be neutral, automatic or self regulating as some of their proponents claim." (Bauer, 1997); "The precise nature of water policy reform and the policy instruments to be deployed will vary from country to country depending on the underlying conditions such as the level of economic development and institutional capability, the relative water scarcity, and the level of agricultural intensification… No single recipe for water policy reform can apply universally" (Rosegrant and Ringler, 1998); "In proposing changes, however, one should be extremely careful, since the systems for allocating and pricing irrigation water that exist in most countries have developed over a long period of time as a compromise among several conflicting tendencies, interests, needs and objectives. So before adopting changes, it is desirable and even necessary to study the likely sociopolitical and institutional impacts of alternative strategies and methods" (Sampath, 1992); etc.

[102], and the ambiguous nature of their perception either as useful guidelines or as normative principles.

A worrying aspect of the water pricing reforms envisaged is that they stem from external pressure rather than from an endogenous awareness of the seriousness of the situation of the water sector. Experience from other countries suggests that limited success can be expected in contexts where both the administration and politicians are reluctant or passive. Although some signals for change are already visible (Prechawit, 2000), it is doubtful that the degree of awareness of stakeholders and of their understanding of the complexity of the issue are, in present time, compatible with a wide scale and far reaching reform.

Water pricing, as a fixed tax, is consistent with a context of relative stability of income (rice prices) and production (reliability of water supply). It must therefore be addressed within a wider perspective including most particularly rice pricing and marketing, water planning, allocation and reliability, farmers' participation. Defining a 'service' or 'a right' is probably both the most important prerequisite and the major difficulty. The actual lack of control over the system (which includes technical and political aspects) does not allow ensuring a reliable scheduling and causes widespread heterogeneities in the access to water (in terms of quantity, quality, timing, and water level[103]). This may not be true for all irrigation systems, particularly the smaller ones, but probably applies to most medium and large scale projects in Thailand (which make up two thirds of the irrigated area).

However, we must recognise the virtuous links existing between structural, managerial, institutional and financial approaches (Small, 1990). Reforms addressing a single aspect of the system are all the more likely to fail or to turn counter-productive. Although the wholesaling of water is still extremely rare (Moore, 1989), it may appear as a viable solution if considered within a comprehensive reform framework. In that sense, we view water pricing as a powerful, albeit ancillary, measure of a contractual binding between RID and users. It can be seen as a reinforcing factor in a participatory process, which could lead to significant gains in equity, rather than in efficiency (see Molle *et al. 2001a*). Other justifications based on water saving, cost recovery or inter-sectoral allocation proved to be largely irrelevant, despite their theoretical appeal. The daunting impositions made to the institutional and political settings should preclude over-enthusiasm and, rather, prudence, gradual reforming, testing in pilot areas and in-depth awareness-building, training, negotiation and discussions with all stakeholders, including politicians, are needed.

[102] Water has an economic value in all its competing uses and should be recognized as an economic good

[103] allowing the use of water by gravity or not.

Concomitantly, this process should be geared towards effective River Basin Organisations[104] giving a say to all users and provided with sufficient power, legal and political backing, and clear mandates to control, allocate and manage water resources.

[104] This term does not refer here to any kind of specific institution; this subject lies beyond the scope of this paper.

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