17 Reform of the Thai Irrigation Sector: is there Scope for Increasing Water Productivity?

François Molle[1]
International Water Management Institute, Colombo, Sri Lanka

Abstract

Most major water basins in Thailand, especially the Chao Phraya River basin, are now nearing closure. An increasing amount of water is being diverted out of agriculture, and intrabasin allocation generates tensions. Water productivity can be potentially raised by two economic measures with three possible effects. The measures are water pricing and reallocating water away from agriculture. Water pricing may: (i) elicit water saving and the adoption of water-saving technologies; and (ii) encourage shifts toward non-rice crops with a higher economic return per unit of water consumed. Reallocating water out of agriculture to other uses, possibly through market mechanisms, may also be conducive to overall economic gains.

This chapter shows that, in the case of Thailand, the benefits of such reforms are much fewer than expected and that transaction costs and political risks probably outweigh the possible gains. The case of the Chao Phraya River basin suggests that the closure of a basin is accompanied by several endogenous adjustments to water scarcity and that the scope for significant productivity gains is reduced. It is stressed that the current physical, institutional and legal settings do not allow the implementation of such economics-based regulations. While emphasis is placed on the gap between the rhetoric of economic tools and the conditions of the real world, the chapter also sketches guidelines for reform of the water sector.

Introduction

> A water tax could be levied, in a manner similar to the paddy land tax, over the whole area at present cultivated and the future extension of this area, as far as the fields are benefited by the [irrigation] system . . . water rates could in general be assessed in some proportion to the quantity of water utilised, and would most probably be a suitable taxation for dry season crops and garden cultivation.
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> (van der Heide, 1903)

The hindsight provided by history, though often neglected, is sometimes the best short cut to understanding that what may appear as desirable is not always feasible or even logical when seen from a different perspective. The above statement is issued not from a recent consultant report, as one might easily believe, but from the *General Report on Irrigation and Drainage in the Lower Menam (Chao Phraya) Valley* submitted in 1903 to the government of Siam by H. van der Heide, a

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Dutch engineer. Clearly, all the calls for pricing water issued during the 20th century were, until recent years, mostly motivated by a concern for cost recovery.[2] Early legislation on water also included some provisions on pricing. The Royal Irrigation Act of 1942 was the first to allow for the collection of a fee that was to remain under ceilings of 5 baht rai^{-1} (1 rai = 0.16 ha)[3] and 0.50 baht m^{-3} for factories, but these rates have not been revised hitherto (Wongbandit, 1997). At present, only a few non-agricultural users using canal water are paying a fee.

It was only recently that water pricing was proposed as a way to regulate water use, in terms of volume or allocation. Such a proposal was the consequence of growing water scarcity in the country, as well as the interest of donors and some academics in the water sector to initiate measures of 'demand management'. In fact, despite being a tropical country with a monsoonal season, Thailand has joined a host of countries currently facing water shortages. With the exception of the southern region and some forest areas along the border, hydrological data show that the annual average rainfall in Thailand varies between 1100 mm and 1600 mm. During the 6 driest months of the year, from December to May, the country relies chiefly on the water available in 28 main storage dams. However, only 15% of the 200 billion m^3 (Bm^3) annual runoff remains trapped in the dams (ESCAP, 1991).

Gradually, due to the concomitant development of irrigated and urban areas, constraints on water resources started to be felt, particularly in the Chao Phraya River basin, where irrigated areas have been developed beyond the potential expressed by the available water resources (a situation qualified by the World Bank as 'overbuilt'). The expansion of the Bangkok metropolitan area (BMA) led to the gradual extraction of a significant share of the basin resources for urban and industrial water uses. Increasing competition for water materialized through recurrent water shortages, occurring principally in the dry season and mostly affecting rice cultivation and prompting restrictions in the water supply of the BMA (in 1994 and 1999). Solutions proposed to solve the current water-shortage situation span a wide ideological range, from those supporting the development of more water resources (new dams, diversion from the Mekong River or Salaween River) or the reform of the concerned administrations to those advocating a gradual privatization and commoditization of water. This issue recently entered the limelight following an announcement that the granting of Asian Development Bank (ADB) funds to the country (presented as being crucial to the country's economic recovery following the 1997 crisis) would be conditional on its subscribing to and applying the overall principle of water pricing. The public debate has been significantly obfuscated by the conflicting and often confusing views on water pricing, as reflected in newspaper declarations, interviews, consultants' reports and non-govermental organization (NGO) literature.[4]

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[2] See, for example, De Young (1966):

> 'The light taxation affects any large scale government programme to improve conditions for the peasants. It is evident that not until the government has assurance of steady and increased income from local taxes can it expect to support large scale farm improvement projects … As yet the government has not come to the conclusion that at least a partial support of such a project should come from equitable taxation of the peasants. Any program designed to aid the farmer, such as large scale irrigation, is recognised now only as a national investment and a responsibility of the government. That this policy sooner or later must change is self-evident, for without local taxation the peasants' demands for agricultural, educational, health, and transportation improvements cannot be met.'

[3] US$1.00 = 40 baht in 2000.

[4] An examination of official declarations reported in national newspapers gives a measure of the fluctuating argumentation, reflecting the unsettled nature of the negotiations, the general nature of the arguments and the lack of consensus even within a given administrative body (see Molle *et al.*, 2001a).

Increasing water productivity covers several meanings. First, it means that the output (say, in t ha^{-1}) of a given crop per m^3 of water applied is raised. This is tantamount to achieving water savings (while maintaining yields), which can occur at the plot level and/or at the irrigation-system level, with or without adopting new technologies. Secondly, it means that the economic productivity of irrigated agriculture can be increased by shifting to crops with a higher benefit (in baht ha^{-1}) per unit of water used (m^3). This implies the selection of cash crops with higher returns and less water demand than rice. Thirdly, it means considering all alternative uses of water, including those outside the agriculture sector, and allocating water preferentially to those that yield a higher economic value (baht m^{-3}). This chapter reviews whether, in the Thai case, these three objectives are sound and whether they can be achieved through economic tools, such as water pricing[5] or water markets. It is necessary to distinguish here between small- and medium/large-scale irrigation projects. The former are often epitomized by the traditional *muang fay* (river diversion) systems of northern Thailand, while the latter are best represented by the Chao Phraya delta. Unless otherwise mentioned, what follows refers to medium/large-scale projects, which make up two-thirds of the country's irrigated area. The discussion also centres on the dry season, when water scarcity is an issue, rather than on the rainy season.

Water Pricing and Water Savings

The Director General of the Royal Irrigation Department (RID) was recently seen on a Thai national TV channel explaining, somewhat contritely, that water efficiency was very low in Thailand (around 30%) and that this had to be remedied in the face of the water shortage experienced by the country. This short sequence epitomizes better than anything else the extent to which such a statement has become conventional wisdom. A thorough probe into the literature, however, provides little evidence that such a value and the general validity of the statement are established.[6] Rather, it suggests that such a view is derived from general analyses, such as those of the Thailand Development Research Institute (TDRI, 1990) or Postel (1992a) (which may have a positive role in raising the general awareness of the problems lying ahead but may be totally misleading when applied to a particular case), and is further disseminated by repetition.

International agencies (and sometimes, in their footsteps, local officials) commonly report that Thai farmers are 'guzzling' water or are showing 'water greed' (*The Nation*, n.d.), furthering the general idea that efficiency in large state-run irrigated schemes is often as low as 30% and sticking to this overall vision without questioning it any further. Yet research conducted in recent years has shown that water basins tend to 'close' when demand builds up and that little water is eventually 'lost' out of the system. There has been widespread recognition that focusing on relatively low irrigation efficiency at the on-farm or secondary levels could be totally misleading (Keller *et al.*, 1996; Molden and Sakthivadivel, 1999; Perry, 1999; Seckler *et al.*, 2002, Chapter 3, this volume). When analysed at the macro-level and the basin level, many systems – river deltas accounting for the most significant of them – are eventually found to operate with extremely high overall efficiency. Thus the scale of analysis of water-use efficiency is crucial.

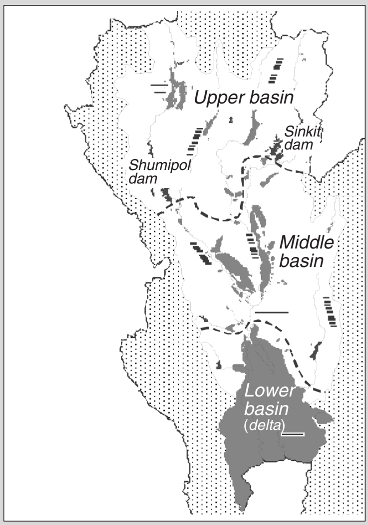
[5] Therefore, the chapter does not address the relevance of pricing for cost recovery or other purposes not directly related to crop or economic productivity.

[6] The values encountered in reports and theses are by no means straightforward. They mix values at the plot or scheme level and never consider the macro-level of the basin. Most of the drainage of small run-of-river or pumping schemes usually returns to the river. Regarding large-scale schemes, recent reports, such as JICA (1992), take 65% for the west bank (conservation area), while Binnie and Partners (1997) consider values of 45% (but give no clue as to why such values are adopted). In all instances, the focus is always on 'classical efficiency' and not on how it relates to the basin-level water flows and water balance.

In the dry season, the Chao Phraya delta provides an illustrative example of such a closed system. Most of the return flow from fields is reused downstream and most of the drains have been gated to capture or retain superficial and subsuperficial flows in the dry season. Several tens of thousands of tube wells have been dug to tap shallow aquifers wherever suitable. Water releases at Bhumipol and Sirikit dams (see Box 17.1), as well as at the Chai Nat diversion dam, are nowadays better attuned to user requirements and this results in little waste. If we consider the efficiency of irrigation at the macro-level, we see that the only 'waste water' (i.e. not depleted for production purposes) is water that evaporates in waterways or fallow lands or that eventually flows out of the delta system into the sea in excess of what is needed to control pollution and intrusion of salinity in the mouth of the river (in the dry season). As this water is now extremely limited, it follows that very little water is lost.[7] The second component of water 'loss' is that of infiltration, either to shallow aquifers or to deep aquifers. In the first case, water is tapped again through shallow tube wells (forming secondary water sources) or soon flows to the drainage system, where it is reused. In the second case, the infiltrated water reaches deep aquifers, which are notoriously overexploited in the Bangkok area, resulting in land subsidence and horrendous costs in the upgrading of flood protection and in flood damages.[8] Therefore, we may state that infiltration losses in the delta are not sufficient to offset the depletion of the aquifers. The water balance in the basin (Molle *et al.*, 2001a) shows that in the dry season the overall efficiency of controlled[9] water use is around 88%.

Box 17.1. Water allocation in the Chao Phraya basin.

The Chao Phraya basin can be conveniently divided in three parts. The upper part (upstream of the two main storage dams: Bhumipol and Sirikit dams), the middle part (from the dams to Chai Nat) and the lower part, or the delta proper (see figure). The dams are operated by the Energy Generation Authority of Thailand (EGAT). In the dry season, according to the year, between 2 and 8 Bm^3 are released to be distributed by the RID among 25 subunits called 'Irrigation Projects'. Priority of water goes first to Bangkok, then to the control of saline intrusion, next to the supply of orchards and shrimp ponds and last to inland transportation and rice cultivation. The irrigation sector, despite receiving the largest share on average, has to cope with a high interannual fluctuation of the amount of water apportioned to it. Allocation is a top-down process, where the shares of the Projects are centrally defined. Water abstraction in the middle basin cannot be fully controlled by RID and has been increasing dramatically (to 35% of dams' releases). In the dry season, pumping from waterways is the most common way to access water.



[7] In past years, the Energy Generation Authority of Thailand (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 during the dry seasons of the last 10 years. Whether this should still be permitted by EGAT, even in the wet season, is discussed in Molle *et al.* (2001a). In all cases, such losses are controlled and deliberate and, therefore, cannot be considered as decreasing the efficiency.

[8] It is estimated that damages from the 1995 flood amounted to 50 billion baht (i.e. US$2 billion).

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

Even when we carefully examine plot irrigation, it is hard to find the criticized 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 (in this so-called flat conservation area, water is integrally and individually pumped from a dense network of waterways) and for approximately 60% of the farmers in the upper delta. It follows that, altogether, about 80% of farmers resort to pumping, the great majority using low-lift axial pumps powered by two-wheel tractors. 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 developed an impressive individual pumping capacity allowing them to tap whatever little flow might appear in the canal. Because of the costs incurred by these water-lifting operations, there is little likelihood that farmers may be squandering water.[10] This is consistent with recent estimates of water use in the delta, which show that scheme efficiency (evapotranspiration (ET)/net diverted water) is remarkably high (60%), with only 10,000 m^3 diverted ha^{-1} and per crop, including 15% of rainfall (Molle *et al.*, 2001a).

The consequence of all these elements is that few overall water savings can be expected from a hypothetical change in the behaviour of water users, because the efficiency in the Chao Phraya delta, and probably in other closed basins of Thailand, is already high. Molle *et al.* (2001a) have investigated the different paths that may lead to improved efficiency and equity (dam management, shifts in cropping calendars, etc.) but have shown that emphasis on irrigation-use efficiency would be misplaced. In addition, it is both self-evident and widely recognized that the individual volumetric pricing of water is not feasible in the context of small-scale rice farming in large gravity-irrigation schemes. Thus all incentives to save water embedded in volumetric pricing are lost when we are forced to shift to a water fee per unit of land or other proxy.[11]

This drastic constraint is generally dealt with by turning to the alternative of 'water wholesaling', in which water is attributed to groups of users ('water management blocks', for TDRI (2001)), for example, to those farmers who are served by the same lateral canal, on whom would fall the burden and the responsibility to allocate and manage water, solve conflicts and collect a water charge. This alternative also has the advantage of 'forcing' farmers to act collectively to achieve greater efficiency/equity within the command area of their canal and to constitute a form of bargaining power to discuss issues of water allocation with RID. In such a case, the incentive is passed on to the group, which is expected to derive its own internal arrangements aimed at saving water and hence reducing the water charge of the group as a whole and of each of its members in particular.

Such volumetric pricing could theoretically even elicit investment in water-saving technologies, if the investments compare favourably with the corresponding financial savings. The Iran case described by Perry (2001) suggests that technological change is too expensive for farmers, irrespective of the cost of water, and that the net value of water consumed (in \$ m^{-3}) is comparable to the costs of reducing consumption through improved technologies. In addition, such investments are to be made (collectively) by upstream farmers to the benefit of the downstream farmers, a scenario that is difficult to

[10] In some cases, the costs of pumping may even discourage farmers from growing a second or third crop. These costs, combined with poor levelling, also explain the low use of water in sugarcane cultivation.

[11] In addition, the introduction of such a fee per area is doomed to encounter severe difficulties in situations where access to water is highly heterogeneous. This is the case, for example, in the upper delta, where some farmers may access water throughout the year, while elsewhere others receive a very uncertain supply. In addition, this access can be partly provided by gravity and partly by pumping, and their respective shares can vary greatly from one year to the next. Therefore, quantifying the real benefit of irrigation water for hundreds of thousands of farmers, when this benefit is, spatially and temporally, highly heterogeneous, is deemed impractical.

envision without public intervention. In the Thai case, there is no available technology (hardware) that could bring about drastic water savings in rice cultivation, but such a mechanism might encourage technical innovation regarding water management at the plot level.[12]

This appealing solution of water wholesaling features nicely in paper proposals of consultants and academics, and is credited with some success in Mexico or Andhra Pradesh. However, it implies a series of prerequisites that are often not given due attention (Molle, 2001; Molle *et al.*, 2001a). A detailed review of these conditions is beyond the scope of this chapter but it can be mentioned that the main difficulties lie in the definition of a 'service' to which the fee would correspond. This includes the question of both allocation (the process to define each year how the fluctuating water stock in the dams is to be apportioned) and distribution (ensure the timing and the discharges of deliveries as agreed upon). The degree of technical and institutional control over the whole water basin is at present insufficient to ensure this. On the other hand, it is debatable whether there is enough social capital within a rather heterogeneous farming population to carry out all the tasks that the groups are expected to perform.

In sum, water pricing on an individual basis is possible only if based on the plot area and is, therefore, tantamount to an additional tax with, at best, no impact on water productivity.[13] The 'wholesaling' of water is an option that requires far-reaching improvements to be brought about at the technical and institutional levels prior to implementation. Even in such a case, there is no strong empirical evidence that the turnover of management to water-user groups has any significant impact on water productivity (Samad, 2001). In addition, a careful analysis of field water use, as well as water accounting for the basin, does not point to significant water losses (but some improvements in dam management and scheduling are nevertheless desirable and possible). This suggests that the heavy transaction costs incurred by the establishment of some form of water pricing would far outweigh the meagre potential gains in productivity.

A corollary from this conclusion is that the refrain 'water is consistently undervalued, and as a result is chronically overused' (Postel, 1992a) may well have little validity in closed basins. In Thailand, many observers, such as Christensen and Boon-Long (1994), who believe that 'since water is not appropriately priced, it is used inefficiently, and consumers have no incentive to economize', have also considered this postulate as self-evident for irrigation.[14] Ironically, despite severely lacking consistency, it is presented as the main justification for water pricing and gains apparent consistency only under the effect of repetition.[15]

[12] Experiences from China and Madagascar suggest that yields can be maintained with innovative water-management techniques conducive to water savings. At the moment, there is no clear picture as to whether this is allowed by particular socio-economic and cultural factors or whether there is scope for the dissemination of these innovations. For the Madagascar case, see Moser and Barett (2001) for a pessimistic view on such a hope.

[13] It is often noted (Moore, 1989; Meinzen-Dick and Rosegrant, 1997) that the impact is more likely to be negative, as farmers paying for water feel that they have acquired a right to more 'comfort' in use and are less concerned with how much water they consume.

[14] This is an extrapolation of the experience with urban water, which differs markedly from irrigation.

[15] See the 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*, 2000a); 'Agricultural experts agree that water-pricing measures would help improve efficiency in water use among farmers' (*The Nation*, 1999); 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*, 2000b); the resident adviser 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); '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 percent' (TDRI, 1990), etc.

Water Productivity and Crop Choice

Conventional wisdom admittedly considers rice as a water-consuming crop.[16] The possibility of achieving water conservation by inducing a shift away from rice to field crops, such as mung bean, groundnut, maize, or chilli, which consume (ET) approximately 60% of the amount of water needed for rice, has long been underlined by policy makers and has formed the cornerstone of public projects aimed at fostering agricultural diversification (Siriluck and Kammeier, 2000). This was already a recommendation of the Food and Agriculture Organization (FAO) as early as the 1960s, as well as the alternative that 'received the most attention' from Small (1972) in his study of the delta. Australia and Japan were jointly engaged in agronomic tests in the late 1960s and 1970s in order to propose field crops for irrigated areas. 'In recent years, low export prices for rice, and the difficulties encountered by Thailand in maintaining her export markets have further intensified the interest in stimulating the production of upland crops', noted Small in 1972. Such a concern has been constantly expressed for at least four decades. Even nowadays, it is not rare to hear officials complaining off the record that 'farmers are stubborn', that 'they lack knowledge and only know how to grow rice', and that 'they oppose any change' described by outsiders as beneficial.

Planting crops with lower water requirements would, ideally, allow more farmers to benefit from a second crop in the dry season. If the economic benefit of such crops compares favourably with rice, then there is an overall gain in such a shift. This 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 has also been shown that people resented smaller, fixed taxes much more than larger ones indexed on real yields. It can be argued that yields in the irrigated areas discussed in this chapter are made stable by the use of irrigation. It must not be overlooked, however, that risk in production, in any case not negligible (diseases, grasshoppers, etc.), has been replaced by risk in marketing, further compounded by the higher requirements of cash input demanded by commercial crops. As a general rule, the potential return of capital investments is strongly correlated to the level of risk attached to the undertaking (Molle *et al.*, 2001b). This is clearly exemplified by Szuster *et al.* (2003) in their comparative study of rice and shrimp farming in the Chao Phraya delta. In other words, on average, cash crops may fetch higher prices but they are also subject to more uncertainty, either in terms of yields or of farm-gate prices. Thus, only those farmers with enough capital reserve to weather the losses experienced in some years can benefit from the overall mid-term higher returns; others go bankrupt and remain indebted. Shrimp farming, again, provides a good example of such a situation.

This situation differs significantly from that of Western agriculture, where bottom prices or 'intervention schemes' are generally established to compensate for economic losses when they occur (more on this later). In addition, Western farmers generally benefit from insurance (against exceptional yield losses), which comes with stronger cooperative and professional structures.

It could be argued, however, that the price of rice is also highly uncertain and that rice production suffers from uncertainty as much as other crops. If the price of rice does fluctuate, its crucial importance for the rural economy brings it under more scrutiny. Despite recurring complaints, echoed in newspapers, that rice farmers lose money when producing rice, the political impact of possible low prices, in reality, largely shields them from dropping

[16] This is derived from the vision of the large amount of water that must be diverted, in particular to meet land-preparation requirements and seepage/infiltration losses, but much less so on a purely agronomic basis (water depleted by ET).

under the reproduction threshold. Ad hoc public interventions are always implemented when such a risk arises (even though their impact generally falls short of expectations and benefits tend to be captured by millers and other actors in the rice industry). This does not hold, however, for secondary or marginal crops (which invariably include the desirable 'cash crops'), and complaints of scattered producers have little chance of being heard in the case of depressed prices. A typical example of such a cash crop is chilli, a rather capital- and labour-intensive crop, which can fetch 25 baht kg^{-1} in one year (providing a high return) and 2–3 baht kg^{-1} in the following year (with a net loss for farmers).

Theoretically, a shift to non-rice crops could be elicited by differential taxes for crop type or water use (when individual or group volumetric pricing is possible). However, such a measure will only be significant if the tax differential 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.[17] Raising (fixed) taxation to such levels would only increase the risk attached to non-rice crops, thus producing an effect opposite to that desired.

Evidence of the dynamics of diversification in the delta (Kasetsart University and IRD, 1996) points to the fact that farmers display great responsiveness to market changes and opportunities (a point definitely confirmed by the recent spectacular development of inland shrimp farming (Szuster and Flaherty, 2000)). Good transportation and communication networks allow marketing channels to perform rather efficiently. The main weak point remains the risk attached to the frequent fluctuation of the prices of field crops, which discourages farmers from shifting significantly to non-rice crops. As long as the economic environment of field-crop production remains unattractive and uncertain, there is little incentive for farmers to adopt such crops and a limited basis to sustain criticism of their growing rice, as many have incurred losses by growing field crops (either of their own accord or at the suggestion of extension services).

In addition, there are several other constraints (agroecology – heavy soil with little drainage, not favourable to growing field crops, labour[18] and capital requirements, skill learning, development of proper marketing channels, etc.) that have an impact on the process of diversification and it is doubtful whether 'pushing' for it would be eventually beneficial. Siriluck and Kammeier's (2000) study of a large-scale public programme aimed at encouraging crop diversification shows that such interventions meet with mixed success and are not flexible enough to adapt to different physical and socio-economic environments. Contrary to common rhetoric, farmers do not need to have their water priced to shift to other productions. They will increasingly do so if the uncertainty about water and commodity prices is reduced. They have time and again shown dramatic responsiveness to constraints on other production factors, such as land and labour (Molle and Srijantr, 1999), and have already sufficiently experienced the scarcity of water to adapt their cropping patterns, should conditions be favourable.

Water Productivity and Sectorial Allocations

The last form of achieving economic gains in productivity is to reallocate water used in agriculture to other sectors, which invariably display a higher return per m^3 used. There is a conspicuous and widespread argument that (public) centralized water allocation in Thailand has reached its limits and that water rights and water markets would provide a flexible mechanism to allow the reallocation of scarce resources towards the most economically profitable uses. This is strongly reminis-

[17] The price required to induce a 15% fall in demand for water would have reduced farm incomes by 25%.
[18] For example, the harvest of mung bean, a typical supplementary crop with no additional water requirements, is often a problem because of labour shortage.

cent of the deadlock experienced in the western USA, where water rights[19] are locked in uses of low productivity and where market mechanisms constitute one of the ways out of the stalemate (see Huffaker *et al.*, 2000). 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 to incorporate this concern into their rationale, asserting that the state has proved inefficient in allocating water to the most beneficial uses.[20] It is intriguing to see the ubiquity of this argument, even outside its 'original' context, and how it 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 (as in most countries) has been driven by a clear priority in use, which mirrors the economic return of all activities. Cases of non-agricultural activities, in particular industrial ones, that would have been constrained or impeded by the lack of water are unheard of and it is hard to see how criticism of central allocation can fly in the face of such evidence. The deadlock experienced in the western USA 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 USA, the rural sector be reluctant to relinquish its established rights.

It seems that the argument is loosely based on the implicit (but fallacious) assumption that, if the agriculture sector uses a share of Thai (controlled) waters as high as 80% then it is likely to enjoy a sort of privilege, to the detriment of other activities. It is also often (rightly) stressed that saving 5% of water in agriculture would represent a huge amount for other activities, but not that the latter are not directly claiming it, as they are effectively served first. To present the agriculture sector as the spoilt, unrepentant and ungrateful child of the nation does little justice to the fact that farmers are, in fact, served with the (fluctuating) left-over water in the system. This share happens to be the largest one only because other uses have not yet developed to a wider magnitude (and also because the government (not the farmers) has invested in infrastructure allowing the use of this water for irrigation). The argument glosses over the facts that: (i) this share will decline in the future (as agriculture is usually deprived of its water when other sectors grow);[21] and (ii) the unwritten 'rights' of farmers being limited to the left-over water, the farm sector has to cope with a very fluctuating supply, which also generates severe

[19] There is some irony in the evidence that, if the Thai legal system had been based on prior appropriation rights, as in the western USA, the delta would have been granted senior rights on water since the 1960s 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 compensation!

[20] 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 [administration] 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 have been low due to the lack of effective water demand management that could prevent less productive water utilisation'. This suggests that irrigation and its assumed low return have deprived other potentially more productive uses, whereas irrigation is, in fact, allocated the leftovers in the system (after the prioritization of water to BMA and energy production). TDRI (2001) posits that 'the current command and control system are unable to meet structural and cyclical changes in the demand and supply of natural resources, including water', while Kraisoraphong (1995) states: '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'.

[21] Experiences from Israel, the USA, India or China indicate (Postel, 1992a) that, in all cases, the share of agriculture was decreased to the benefit of cities.

difficulties for management and for ensuring equity in allocation (see Molle, *et al.*, 2001a).

In addition, there are practical considerations that relegate water transactions to the category of fancy mind games. Reallocation of water is difficult to achieve because it requires not only an accurate definition of individual rights but also a very high degree of control of water and transportation facilities to transfer water from one user to the other. 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 allotted 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-course or factory in the suburbs of Bangkok?

Central allocation may appear as a problem to farmers, who are, effectively, gradually dispossessed of their unwritten 'rights' as other uses grow, but this is not a problem to other economic sectors, which are served at low or no cost[22] and on a priority basis. The definition of entitlements and their transfer within a 'bank' or a market mechanism would, indeed, have the positive consequence of providing a mechanism through which the ineluctable dispossession of farmers would be accompanied by financial compensation. In any case, we are very far from a situation in which individuals rights could be defined. The transfer of group-based entitlements would lead to extremely high transaction costs and to internal conflicts, so that such an option is both illusory and unattractive under present conditions.

Lastly, the very notion of economic productivity as a macro-level aggregate must also be scrutinized through the lens of its social and equity implications. 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, 1992b), this reallocation being either occasional or permanent. 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 underpinning and driving force of the proposed economic mechanisms. The small peasant, however, often distinguishes him/herself by a lack of choice or, rather, by an alternative which is, willingly or not, quitting the farm sector.[23] If farmers who are unduly exposed to the competition of sectors with a much higher profitability were eventually led to leave their lands fallow (or to sell them to big farmers), they could ultimately swell the ranks of the unemployed (and even the slum population in the capital if there is a strong push process at work). It is hard to see how the overall benefit of the society would be maximized by such a scenario, despite the fact that macro-indicators would (deceivingly) suggest an overall gain. The impact of the diversion of water out of agriculture is a complex issue (Rosegrant and Ringler, 1998), but in developing countries with large agriculture sectors and percentages of rural poor there is often little

[22] Non-agricultural users pay for (part of) the cost of production (abstraction, treatment, transfer) but not for water itself.

[23] Similarly, it is often inferred from observations that some farmers, in particular contexts (such as Pakistan), are led to pay high amounts of money for secure water and that 'farmers are *willing* to pay' (Postel, 1992b; World Bank, 1993). A less optimistic reading 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 are higher than theoretically expected.

room to manoeuvre.[24] This concern is also echoed by the World Bank 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 a 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.

Advocates for 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 not always be realized and could conceal situations of 'no choice' or 'win–lose' situations with no alternative for one party in the transaction.[25] 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 characterized and what happens to those who cannot even formulate their demand because they cannot compete with bigger players.

Constraints and Opportunities for Water Reform

The meagre benefits that can be expected on the productivity side, in all senses of the term, do not imply that the status quo is the best option. Although this takes us beyond the limited scope of this chapter, a few comments are given here regarding the reform of the water sector.

Current disruptions in the Thai water systems relate to difficulties in both allocation and distribution (Molle *et al*., 2001a). In small basins of the north, water diversion needs sometimes exceed the available flow and there is a lack of technical and legal criteria to referee the disputes that arise. In the Chao Phraya basin, the supply to irrigated areas, notably the delta, is made chaotic because of the lack of control over users in the middle basin: over a span of 15 years, the percentage of dam releases diverted (often 'hijacked'!) by these users in the dry season moved up from 5% to 35%. Unscheduled planting of rice, often done by using residual surface water or groundwater, also contributes to creating local mismatches between effective supply and demand, triggering political interventions and raising the uncertainty in supply. Achieving equity in allocation is also made difficult by the fact that available water stocks (from storage dams) vary, for each dry season, between 2 and 8 Bm^3. As a result, it has proved unsustainable to stick to the rotational allocation policy established in the early 1980s, in which half of each project was to receive water in 1 out of 2 years, because this 'right' could not be ensured.

There is a wide (rhetorical) consensus that 'water rights' must be defined, that the administrative management of the water sector must be simplified and that a water law and basin organizations are needed. This fits a vague picture of modernization along the lines of what is presented as international 'best practices' or standards, and meets little opposition. Some wishful thinking helps one assume that such reforms will take place

[24] This is, in reality, 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'.

[25] Similarly 'users' is a neutral word that 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 by bureaucrats.'

by their own momentum, but there is limited debate on the substance of such reforms, and heavy doubt over whether provisions would be eventually enforced. Legal provisions are obviously useless without a basic capacity for law enforcement and penalties, an aspect in which Thailand admittedly has an unimpressive record (Christensen and Boon-Long, 1994; Wongbandit, 1995; Flaherty *et al.*, 1999). Countries like Sri Lanka and certain states of India have been debating water laws for 30 years without effectively enacting a law (Shah *et al.*, 2000) and, when they did, the most critical aspects either were removed from the final version or remained a dead letter (see also the example of Vietnam (Malano *et al.*, 2000)).

If such reforms are well intentioned and probably sound as a general guideline for long-term changes, it needs to be recognized that their implementation must be phased and conceived as a long-term process. For example, before considering establishing rights, participatory water-allocation processes at different relevant levels of the basin should be geared towards designing ways to define seasonal entitlements, which also implies regaining control over scheduling, over the expansion of irrigated areas and over unofficial water abstraction. This, in turn, has far-reaching administrative, technical and political implications, which are not subject to full control: in other words, reforms or laws are like water off a duck's back if they are not strongly backed by politicians and officials. What is known about the resilience of the Thai 'bureaucratic polity' (see, for example, Nelson, 1998; Arghiros, 1999) should preclude any optimism on the extent of the decentralization process,[26] as well as on the propensity of the administration to hand over its power swiftly and willingly. It is often implicitly assumed that the state bureaucracy is a neutral monolithic agency, sensitive to rational arguments about cost-effectiveness or public welfare. Pinstrup-Andersen (1993)[27] has shown that this was unrealistic and that the failure to incorporate knowledge of goals and behaviours of agencies and politicians was the most common feature of poor policies. A positive way of looking at the ongoing processes is to view these initiatives as part of a learning process. However, there is a risk that a partial failure would also make the participation of farmers increasingly difficult in the future.

Conclusions

The justification for the current proposals for a reform of the Thai water sector rests heavily on assumptions of low irrigation efficiency and poor economic productivity, despite the wide irrelevance of these arguments in the Thai context. There is a risk that well-intentioned reforms will draw upon blueprints based more on some ideological drive[28] than on in-depth and site-specific analyses of the situation, and will end up being superimposed on the Thai context. The ubiquitous caveat found in many conclusions of papers dealing with the economics-based regulation of water use is found to be often widely disregarded in practice: it cautions against applying general principles without due consideration being given to the historical, geographical, cultural, socio-economic and political contexts. Policies that are believed to have proved successful are often replicated blindly and lead to resounding failure. This applies to various aspects of the water sector, including irrigation-system design, water institutions (Shah *et al.*, 2000; Molle, 2003b) or water legislation (e.g. the replica versions of the Chilean *Código de Aguas* (see Dourojeanni and Jouravlev, 1999)).

[26] However unsatisfying in the short term, the decentralization process is nevertheless a far-reaching political process that will in the long run bring more democratization. But this time frame, again, is in opposition to that of the proposed reforms.
[27] His focus was on food and nutrition policies but his conclusions can be applied to water policy as well.
[28] On how ideology shapes public interventions and policy in the Thai water sector, see Molle (2003b).

If most of the irrelevance of the arguments based on efficiency is linked to the closed nature of the Chao Phraya basin, then we must recognize the importance of devising reforms that distinguish between different types of basins, and even between different hydronomic zones (Molden *et al*., 2001). The Mae Klong basin, which also ends up in the Chao Phraya delta, presents a different picture. The average annual inflow into the main two upstream storage dams is approximately 30% above the average requirements in the basin. This means that the possible low efficiency of irrigation is hardly an issue. At the other end of the spectrum, water-short basins, such as the Chao Phraya basin, have gradually developed means of raising efficiency in use (gating of drains, conjunctive use of groundwater, pumping water from ponds and other low-lying areas, improving the management of dams, etc.) and may not lend themselves to significant improvements in that respect (Molle, 2003a). At present, only 12% of dam water is wasted by evaporation or going to the sea in the dry season (Molle *et al*., 2001a).

It has also been shown that the centralized water-allocation system has handled the issue of allocating water to activities with higher economic return relatively well, and that the alleged 'lion's share' of water for agriculture is actually the (fluctuating) left-over water in the system after allocation to higher-prioritized uses has been met. With reduced scope for achieving water savings or economic reallocation, the prospects for achieving significant gains in productivity are slim, and the concepts of a water charge or water markets lose most of their appeal. However, the 'virtuous' linkage existing between structural, managerial, institutional and financial approaches is also recognized (Small, 1996). The strongest argument about water pricing is the 'glue factor', where pricing is considered as a mere reinforcing factor of a contractual binding between the RID and groups of users. The 'wholesaling' of water to groups is an option that comes with several prerequisites, and emphasis is placed on the existing gap between these conditions and the current situation. However, if joint management and farmers' financial participation are desirable, there is still little empirical evidence of the impact of turnover on productivity (Samad, 2001); the gains are unlikely to be large, especially when no volumetric pricing is possible.

In contrast to the more appealing justifications based on the idea of 'saving water', which readily relates to the concrete experience of water shortage, it appears that the major changes to be brought about by reforms relate to water allocation within the agriculture sector (with full participation of users), to the control of new diversions, to equity and to the control of environmental impacts.

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