Water Policy 13 (2011) 518–534

Implementing integrated river basin management in the Red River Basin, Vietnam: a solution looking for a problem?

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Abstract

Several water policy principles considered to be modern and internationally sanctioned have recently been adopted by Vietnam. This article focuses on the establishment of the Red River Basin Organization but expands its analysis to the wider transformations of the water sector that impinge on the formation and effectiveness of this organization. It shows that the promotion of integrated water resource management icons such as river basin organizations (RBOs) by donors has been quite disconnected from existing institutional frameworks. If policy reforms promoted by donors and development banks have triggered changes, these changes may have come not as a result of the reforms themselves but, rather, due to the institutional confusion they have created when confronted with the emergence of the Ministry of Natural Resources and Environment (MoNRE). For the MoNRE, the river basin scale became crucial for grounding its legitimacy and asserting its role among the established layers of the administration, while for the Ministry of Agriculture and Rural Development, RBOs became a focal point where power over financial resources and political power might potentially be relocated at its expense. Institutional change is shown to result from the interaction between endogenous processes and external pressures, in ways that are hard to predict.

Keywords: Environment; Red River; River basin organization; Vietnam; Water policy

1. Introduction

In the last decade, many Southeast Asian countries have remodeled part or all of their water policies. This is due to recurring crises (water shortages, flood damage, pollution, etc.) and also to global initiatives and networking that have given greater public salience to water issues, as well as the influence of development banks and cooperation agencies that have been pushing for reforms (Molle, 2005). In Asia, principles of Integrated Water Resources Management (IWRM) and river basin management (RBM) have been fostered by several organizations, among others, the Asian Development Bank (ADB), the

doi: 10.2166/wp.2011.012

World Bank, the Global Water Partnership (GWP), the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), and also by regional events (e.g., Southeast Asian water forums) and networks (e.g., the Network of Asian River Basin Organizations). The ADB, in particular, has been quite active in supporting policies and reforms that embody principles held as modern and internationally sanctioned. This includes the drafting of national policy and laws, the creation of 'apex bodies' (i.e., inter-ministerial councils, supported by permanent offices, that define overall guidelines and policies on water issues) (ADB, 2000; Arriëns, 2004; Birch, 2004), the establishment of River Basin Organizations (RBOs), the privatization of public companies, and increasing financial and other contributions from users (e.g., through water pricing and the formation of water user groups).

While these principles provide sound and useful guidelines for national water policies at a certain level of generalization, their confrontation with reality has frequently yielded disappointing results. Water reforms have been marred by physical, environmental and socio-political complexities that generally had not been anticipated (Sampath, 1992; Mollinga & Bolding, 2004); water pricing reforms have seldom, if ever, achieved the gains anticipated (Dinar & Saleth, 2005; Molle & Berkoff, 2007); IWRM has gained wide acceptance but has proved hard to put in operation (Biswas, 2004; Molle, 2008); the promotion of 'apex bodies' and RBOs in Asia has also yielded mixed results (Newborne, 2006). Many analysts have discussed and questioned the conditions and the possibility of the transfer of experience to the Mekong River Basin (see Pigram, 2001 and Malano *et al*. 1999 regarding the Australian experience), and the possibility of 'leapfrogging' from one particular situation to a model developed in another country (Shah *et al*., 2001).

Vietnam has recently adopted several of these policy recommendations. A Law on Water Resources (LWR), approved in 1998, was followed by the creation of an 'apex body' (the National Water Resources Committee (NWRC)) in 2000, and three RBOs in 2001, before the Ministry of Natural Resources and Environment (MoNRE) was set up in 2002. Although institutional changes are often incremental, these few years of experience in reforming the water sector offer an opportunity to examine the implementation of these new policy frameworks. This paper first provides some information about the water sector in Vietnam, then focuses on the establishment of the Red River Basin Organization (RRBO) and expands its analysis to the wider transformations of the water sector that impinge on the formation and effectiveness of this organization. A few reflections on the policy process are drawn from this analysis, albeit in a tentative form given the relatively limited period of time considered here. The analysis is drawn from field work carried out in early 2007 that included direct interviews with main players ranging from NGOs and donors to officials in ministries and provinces, as well as a comprehensive review of existing documents, and was updated by complementary surveys in 2008 and 2009.

2. Institutional change in the Vietnamese water sector

2.1. Brief retrospective

Institutional change cannot be understood without some historical perspective. Work on the drafting of the Law on Water Resources began after the policy changes (*Doi Moi*, or 'reform' in Vietnamese) of 1986, and the final version was approved by the National Assembly of Vietnam in April 1998 and enacted on 1 January 1999 (Malano *et al*., 1999). The principle of managing water resources by river basin is enshrined in the law, although not prominently. Article 64 enjoins the government to

make 'concrete provisions for the organization and activities of the agency managing the planning of the river basin'. State management functions are clearly assigned to the Ministry of Agriculture and Rural Development (MARD), other sectoral ministries, and People's Committees of the provinces.

In June 2000 the National Water Resources Council (NWRC) was established as an apex body that was meant to advise the government on strategies and policies regarding national water resources, major river basin plans and international water sources, and on the resolution of water-related conflicts between ministries, agencies, and provinces. It was to be chaired by the Vice Prime Minister, assisted by the Minister of MARD, and had 18 members belonging to the various ministries concerned. Its permanent office, the Office of National Water Resources Council (ONWRC), was established within MARD in June 2001. The initial impetus very much originated in the ADB's policy to promote apex bodies in the region and the final incorporation of the NWRC in the draft Law on Water Resources later gave way to debates in the Assembly.

One year later, River Basin Planning Management Boards (RBPMBs) were created in three major river basins, namely the Mekong (Cuu Long), Dong Nai and Red-Thai Binh, to manage, i.e., to coordinate, river basin planning management. The RBPMB were three-tiered RBOs with a governing board, a managing office or secretariat (placed under the Institute for Water Resources Planning (IWARP) at MARD for the Red-Thai Binh river basin), and stakeholders.

The creation of MoNRE in August 2002 was an important part of the reforms aimed at 'modernizing' the state by promoting the separation of regulation/management (handled by MoNRE) from operation or construction (handled by line agencies) (Hydrosult & Arcadis, 2005). This created a somewhat odd situation due to the fact that RBOs were, at the same time, being implemented under the purview of a sectoral ministry (MARD), with the support of donors who had launched the Second Red River Basin Sector Project (2RRBSP) approximately a year prior to the advent of MoNRE. MoNRE was established mainly to deal with the then pressing issues of integrating land administration and environmental management, especially pollution control, and its role in water management was initially not a major concern. On 11 November 2002, Government Decree No. 91 specified the functions, responsibility, authority and organizational structure of MoNRE as a 'government body to exercise the state function of management over the land, water resources, minerals, environment, meteorology, hydrogeography, measuring and mapping at a the national level' (GoV, 2002).

This was followed by the MoNRE Decision No. 600/2003 on the functions and responsibilities of its Department of Water Resources Management (DWRM) that readily put MoNRE on a collision course with MARD. The decision specified that the DWRM was an agency within MoNRE with the 'function to assist the Minister in *implementing state management of water resources* including rainwater, surface water, groundwater, and seawater in river basins, in land and sea territory of the Socialist Republic of Vietnam' (MoNRE, 2003; emphasis added). Amongst other things, the department was made responsible for developing 'legal documents, policies, strategies, long-term, 5-year, and annual plans, programs, and projects on water resources protection, exploitation, utilization and development'.

2.2. MARD versus MoNRE: Turf battle over roles

In July 2003, two months after Decision No. 600, Government Decree 86 on the 'functions, tasks, powers and organizational structure of the Ministry of Agriculture and Rural Development' confirmed MARD's duty with regard to '*state management functions* over agriculture, forestry, salt industry, *water resources* and rural development nationwide' (GoV, 2003; emphasis added). It should submit drafts of

laws, ordinances and other legal documents, and also strategies, master plans of development, long-term, 5-year term and annual plans, and key programs, projects on the domains being put under its management to the government and Prime Minister.

Perhaps, as a means of repositioning itself within this new administrative environment and bolstering its claim to a management role, the MARD Minister issued a Decision on 4 September 2003 that specified the functions and organization of the Department of Water Resources (DWR), in replacement of the existing Department of Water Resources and Hydraulic Works Management. In 2004, in response to donors, MARD also designed operational regulations for the RBOs that were placed under its purview (MARD, 2004) and established a General Office for River Basins Planning Management with a mandate to assist the Director of the DWR in collaborating with ministries, agencies and provincial people's committees (PPC) to implement the functions and responsibilities of the RBOs.

Since water management had to be carried out at the basin level and since the Law provided for it to host RBOs, MARD argued that all the state functions related to planning and construction in particular would be based on basin plans prepared by that Ministry. MoNRE, in turn, would be responsible for state water management at the national level, and not at the river basin level. It would not be directly involved in basin-wide development plans and construction, activities which traditionally drain the largest parts of the state budget. MoNRE's perception, on the other hand, was that 'the function of state management of water resources has been handed over from MARD to MoNRE' (Trang, 2005; Cong, 2007).

Other arguments in this turf battle referred to the respective weaknesses of the two ministries. MARD, on the one hand, was decried as being narrowly focused on irrigation and flood issues, heavily biased towards structural and engineering approaches (Nghia, 2004a), and its involvement in regulation issues would be contrary to the principle of separation of power between regulation and operation. MoNRE, on the other hand, was held as being technically weak (especially at the provincial level, with its incipient provincial Departments of Natural Resources and Environment (DoNRE)), without the competence needed to monitor and regulate water allocation, water quality (a role inherited from MARD, who never developed significant water quality control), or environmental changes altogether.

The turf battle between the two ministries continued with attempts to boost their respective positions through decrees and strategy documents (see Figure 1). In late 2004, the government requested MoNRE (in coordination with MARD) to prepare a government decree on RBM (CRDE & IESD, 2006) that would, in particular, modify Government Decree 86/2003 and 'remove the function of coordinating river basin management of MARD' (Hydrosult & Arcadis, 2005). MoNRE, in turn, requested and received support from ADB and the Danish International Development Agency (DANIDA) to draft the decree. In March 2005, the draft of the Decree on 'River Basin Management' challenged MARD's 'ownership' of management at the basin level (GoV, 2005). MoNRE was to lead the appraisal of 10-year river basin plans and the decree dramatically reshuffled responsibilities by introducing

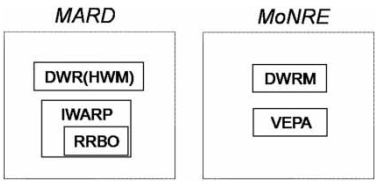

Fig. 1. Schematic summary of the main government organizations involved in IRBM for the Red River Basin.

advisory River Basin Councils, shifting decision-power to MoNRE, and limiting MARD to performing actions defined and monitored by MoNRE. In April 2006, MoNRE tried to strengthen its ownership of the policy process by publishing a 'National Water Resources Strategy towards the year 2020' (MoNRE, 2006) that called for a review and amendment of the Law on Water Resources.

MARD responded by its own 'Strategy for sustainable national water resources management and development' (MARD, 2006a). The focus was clearly on the conventional management of supply in order to respond to new and growing needs, including the requirements induced by cities, industries, tourism, aquaculture, salt production, and agricultural diversification, and the necessity to ensure environmental flows (or at least minimum flows to downstream areas). It claimed to differ from earlier planning studies that 'were mainly implemented to meet development requirements of the agricultural sector' (MARD, 2006a).

In the face of such recurring contradictions, standing Prime Minister Nguyen Sinh Hung convened a meeting on 5 March 2007 to hear the opinion of ministers from MARD and MoNRE. The Notice on the conclusion of that meeting (GoV, 2007) confirmed the intention of transferring basin planning to MoNRE and requested MoNRE to prepare a new draft decree on RBM together with modifications of decrees 91/2002 and 86/2003.

3. Integrated water resources management in the Red River Basin: Starting a process

3.1. The RRBO

The Red River is the second largest river in Vietnam. It is an international river that originates in China and traverses Vietnam before emptying into the East Sea. Administratively, the Red River Basin covers or overlaps 26 provinces and its population in 2002 was 28 million, including Hanoi, the capital city of Vietnam. It supports a large irrigated area (650,000 ha, mostly in the delta) and is subject to recurrent problems of flooding. Not surprisingly, the basin was given priority in the process of establishing RBOs in the country.

During the final phase of the passing of the Law on Water Resources, the ADB approached the Vietnamese Government and proposed a 3-year (1998–2000) Technical Assistance (TA) entitled the 'Red River Basin Water Resource Management Project' which would 'assist the government to establish a 'river basin commission' for the Red River Basin, to manage the planning of water resource management and facilitate improved stakeholder involvement and agency coordination in the process' (Wright, 1999). On 9 April 2001, the MARD created the Red-Thai Binh River Basin Planning Management Board (or, more simply, the RRBO as officially used by MARD), although the concept of 'river basin planning management' is not fully equivalent to river basin management. In the same year, another ADB TA was (partly) dedicated to building the capacity of the NWRC and the incipient RBOs through study tours, awareness raising workshops, assistance in drafting official documents, and by 'carrying out activities to expose key people to the meaning and benefits of IWRM' (ADB, 2001).

Although MARD had agreed to the establishment of the NWRC and the RBOs, which remained under its full control, its lack of interest was manifest. After a few initial meetings in 2000, the NWRC did not meet for nearly 2 years. The lack of funding, office facilities and operational guidelines for the RRBO were held as the main constraints to proper data management and communication, and to field investigations of the current status of the basin (Nghia, 2004b).

Another TA, the 2RRBSP, funded by the ADB and the Governments of the Netherlands and France, was signed in 2001 (but initiated in October 2003). Seven per cent of this US$156 million project was targeted for capacity building for the RRBO, public awareness, and a pilot water licensing and wastewater discharge permit system (in the Cau River). An initial orientation phase was to clarify the issues at stake and their perception by stakeholders in the basin's provinces (Shearwater, 2003). The Office of the RRBO organized 25 workshops involving key staff from water relevant sectors and decision-makers from the 26 provinces intersecting the Red River Basin. Irrigated agriculture, water supply and sanitation and pollution, and flood control/reforestation emerged as basin-wide priorities (Nghia, 2004a).

Phase I made it clear that the 25 provinces had few issues in common (aside from those already taken care of, such as flood or dam operation) and that IWRM should be implemented to tackle actual problems at a lower scale. The Cau and the Day River sub-basins (see Figure 2) emerged as strong candidates for pilot testing RBM. In October 2004, Phase II of the project started, with five different components addressing IWRM in the Cau River Sub-basin, strategic flood management in the Red River Delta, IWRM at sub-basin level in selected upland provinces, IWRM in the Day River Sub-basin (focused on water quality issues), and support to the Office of the RRBO (2RRBSP, 2006).

Meanwhile, the operation regulation of the first three RBOs (including the RRBO) was specified by a ministerial decision in April 2004 (MARD, 2004). The role of the RBOs is unambiguously to serve as technical coordinating and advisory bodies to MARD, 'assessing planning alternatives, basic investigation projects, inventory and assessment of water resources in the river basin; [and] submitting follow-up recommendations and proposals to MARD and authorized state agencies'. Other missions include data exchange and management, coordination with other ministries and agencies, capacity building, and awareness raising.

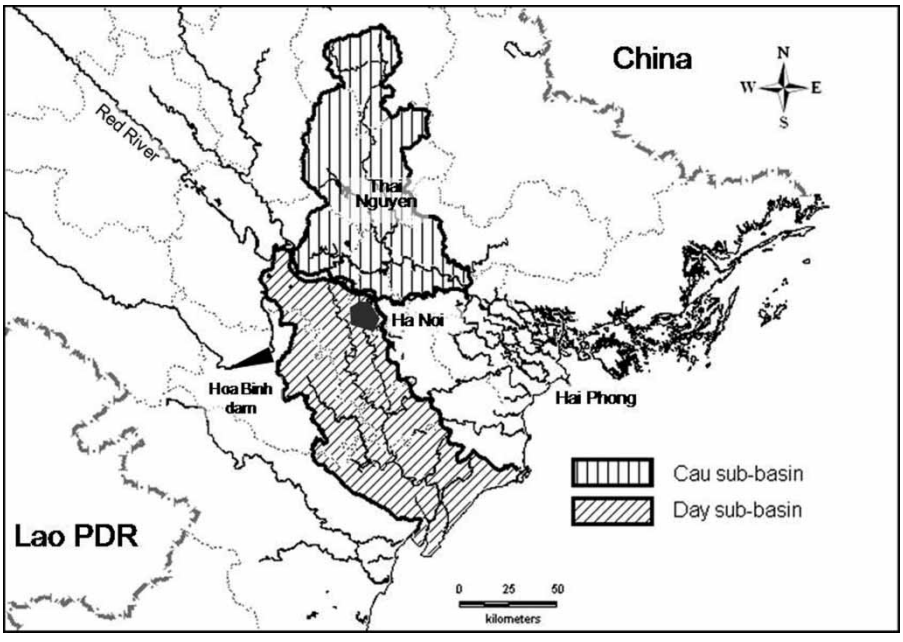

Fig. 2. Location of the Cau and Day river basins.

3.2. The Cau Sub-RBO

In May 2006, MARD established the Cau Sub-Basin Organization (CSBO) as an advisory body under direct control of the RRBO chaired by MARD. The CSBO was to be chaired permanently by the vice-chairmen of the Thai Nguyen Provincial People's Committee (PPC). The CSBO appeared to be a mere appendix of the RRBO, with the main task of advising the RRBO in water resource assessments, planning options, monitoring of implementation, and definition of priorities (MARD, 2006b).

As mentioned above, the Cau River Basin was selected in the screening phase because it presented a 'real IWRM challenge' (ADB, 2006). These challenges include water scarcity shared among the four lower provinces and conflicts in allocating the water of the Nui Coc Reservoir, which is used for: (a) irrigation; (b) supplying water to Thai Nguyen City; (c) diluting pollution in the Cau River; and (d) supporting recreational and tourist uses in the reservoir itself. The project, thus, included several components that looked at varied issues such as water balance, storage potential, irrigation performance in the Song Cau system, aquaculture potential and crop diversification.

However conventional they may appear, these issues proved to be more intractable than expected and studies were hindered by the lack of data on water flows and land use, and the limited time and means available to carry out extensive fieldwork. Pollution issues were also not fully captured because of patchy data and an inadequate regulation framework. The 'polluter pays' principle enshrined in the Law on Water Resources clearly appeared insufficient to solve the problems, not only because of confusion over standard definitions and monitoring but also due to inadequate enforcement capacity. Most polluting factories in the area are state enterprises, allegedly old and inefficient, which would be bankrupt overnight if they had to treat their effluents. This contributes to explaining why the effective definition and implementation of allocation rules, water quality monitoring, and improvement of irrigation management or reservoir operation were left to Phase III of the project, which started in early 2007.

The Cau River Basin does face problems of water allocation, pollution control and inter-provincial coordination. Whether these problems call for a Sub-RBO (S-RBO) with a permanent role or not is unclear. The fact that provinces have not been able to solve coordination problems in the past might indicate a need for some kind of intervention by the central government, at least to enable and assist in resolution mechanisms. But it is interesting to note that the six provincial people's committees had, earlier, taken the initiative to work on a collective arrangement, before MARD objected that only the Ministry had the right to create such an arrangement. This may partly explain the passivity of provinces that feel subjected to central power. The strong subordination of the CSBO to the central level of MARD, through the RRBO, and its domination by the Thai Nguyen Province, are likely to annihilate any sense of ownership by the provinces concerned.

3.3. The day sub-RBO

In 2003, following the example of the Cau River, the six chairs of the PPCs concerned with the Day River met in an attempt to solve water quality and environmental problems in the basin. The Day River branches off the Red River upstream of the capital, Hanoi, although this natural connection was later sealed, transforming the river into the receptacle of Hanoi's main drain, the Nhue River. Domestic and industrial pollution combines with agrochemicals and the Nhue and the Day rivers are, thus, the most polluted waterways in Northern Vietnam. One of the polders traversed by these rivers (the Bac Nam Ha polder) is also subject to water shortages during the winter–spring crop season.

The Day Sub-Basin Organization (DSBO) was officially set up in December 2005. As with the CSBO, the chair is rotated (every 2 years) among the chairs/vice-chairs of the six PPCs concerned. Officers in the DSBO see the organization as carrying more weight when requesting interventions from the government and as allowing better coordination of actions and decisions. It gives opportunities for officers from each province to be aware of what the other provinces plan in terms of water management structures (e.g., gates or flood control structures) and, thus, to anticipate and flag possible impacts on their own province.

The DSBO also illustrates the limited power of provincial offices vis-à-vis the central ministries. Since the Bac Nam Ha polder overlaps with several provinces, the Bac Nam Ha Irrigation Company comes under the direct jurisdiction of MARD. Local provincial officers resent the lack of decision power that prevents them from defining their own priorities. The actions proposed by the DSBO for 2007 looked more like a wish list and still carry little weight.

The main problem for the river continues to be pollution caused mainly by Hanoi. Obviously, the improvement of water disposal and treatment in the capital depends on the establishment of regulations and their enforcement but, more crucially, on the financial resources that the state decides to devote to solving the problem (building treatment stations, upgrading obsolete industrial units, etc.). Although the DSBO may contribute to stressing the urgency of such actions, its clout is probably marginal at the moment. It is, thus, a legitimate question to ask whether water quality management demands an integrated inter-sectoral approach requiring the formation of a permanent S-RBO or if it is primarily a question of investment in treatment facilities around Hanoi (and the decision to mobilize huge public funds to tackle water pollution problems).

3.4. Who wants RBOs? Reformulating the project

With all these plans for phase III under discussion, the project suddenly took an abrupt change of direction. The ADB and the Embassy of the Netherlands cancelled two of the four components planned for part A of the project. The Cau component was cancelled because of MARD's delay in defining an operating budget and appointing staff for the CSBO, and because of a lack of a strong demand by the provinces, and lasting confusion as to whether responsibility for integrated RBM would eventually rest with MARD or MoNRE. The Day component was to be carried out by MoNRE, independently of the DSBO and chaired by MARD which, again, stands in total contradiction with the idea of IWRM, as expressed by the concept of an RBO.

On 24 May 2007, the official letter 2794/VPCP-TCCB issued by the Office of the Government informed that the issue of transferring responsibilities from MARD to MoNRE would only be resolved as part of a wider process of reducing the number of ministries and rationalizing their mandates/functions. At the same time, the Ministry of Finance recommended abolition of irrigation service fees, signaling that major policy shifts might be on the way. In December 2008, almost 4 years after MoNRE submitted its first draft decree, the Government issued Decree 120/2008 on river basin management (GoV, 2008c). According to this decree, eleven River Basin Commissions for major river basins would be established by the Prime Minister and chaired by a Vice-Minister of MoNRE to supervise and coordinate the operations of ministries and local-level agencies involved in the implementation of river basin planning, exploitation, use and development of water resources based on the suggestion of MoNRE. For smaller inter-provincial river basins, MoNRE will establish River Basin Commissions chaired by a Chairperson of a PPC in the basin with a 2-year term. In all cases, each River Basin

Commission will be supported by an Office of the River Basin Commission to be located in a MoNRE department. These principles, however, do not empower MoNRE as long as the Law on Water Resources is not revised. A revision is under way (Kellogg Brown & Root Pty Ltd, 2009) but it will take years to get a new law approved by the National Assembly and for associated bylaws to be revised accordingly.

4. Analysis and lessons learned

4.1. The RRBO: a blueprint or an endogenous solution?

The above chronology of reforms and ADB TAs showed that the relevance of RBOs in general, and of the RRBO in particular, was largely un-questioned and allegedly anchored in provisions of the Law on Water Resources. Beyond capacity building for the RRBO and public awareness and education programs for water resource management, the project's pilot water licensing and wastewater discharge permit systems would demonstrate the benefits of IWRM. Project consultants found themselves in a situation where the RRBO staff would have to be trained without the RRBO having first asserted its legitimacy with regard to the ministries concerned and to the provinces. Phase I of the project found that the Red River Basin was not short of water and 'demonstrated that basin-wide participation is both difficult and unnecessary as the 26 provinces and 25 million people do not share common IWRM challenges' (Shearwater, 2005). This realization helped put the project on a new track and the focus shifted from conventional basin master planning to 'doing a few important water management things well', and from the whole river basin to the sub-basin level; at this stage, the risk arose that IWRM might appear as a solution looking for a problem and ADB expressed its concern that the participants of the initial phase 'hadn't identified a 'real' IWRM issue' (Shearwater, 2005). The issue of allocation of water from the Nui Coc Reservoir was singled out as an 'IWRM challenge' that combined issues of water quality and allocation, and concerned two or three provinces. A Sub-RBO was later formed for the Cau but the project support was eventually discontinued in the face of political (and technical) difficulties.

This reformulation of the project raises some more general questions on the nature of the policy process. It suggests that the weight of external actors in this process, particularly development banks and bilateral cooperation agencies, is quite significant, prompting two different questions: (1) are the concepts put forward, proposed and sometimes imposed, relevant to the problems experienced in Vietnam? and (2) if these concepts are sound, is their introduction timely and consistent with the actual bureaucratic and political configuration in the country?

It is apparent that many of the driving concepts pushed forward heavily draw on 'best practices' promoted at the international level. RBM, for example, is introduced as 'an internationally accepted approach providing the required levels of stakeholder involvement in water resource management decisions, and coordination across the many government agencies with responsibilities and functions in the water sector in a large river basin' (Wright, 1999). Similarly, there is intense and repeated borrowing from overarching consensual concepts like sustainable development, IWRM, or participatory management but these tend to sound hollow when decontextualized. The Law on Water Resources, for example, was presented as providing 'a modern, dynamic, and realistic legal framework in accordance with current international principles', although it was soon to appear to be obsolete in the wake of the establishment of MoNRE (not envisioned in the law) and RBOs (MARD & DANIDA, 2000). This discourse percolated

into national policy documents[1] but often sounds more like a rhetorical concession rather than a reflection of a change in mind-sets. Although there are incentives for national decision-makers (as well as for international consultants[2]) to rely heavily on these general concepts, they run the risk of generating proposals that will later, if implemented, find themselves at odds with both socio-political and physical realities. The nature of short-term projects and TAs, with rigid (and frequently unrealistic) time frames and disbursement schedules, also contributes to creating such situations.

It may also be the case that concepts are applied or proposed in an untimely fashion. Management regimes require bureaucratic configurations, legal frameworks and governance patterns that are consistent with these regimes. Pushing for a particular regime when these conditions are not met may just be wishful thinking with little chance of success. The first Red River Basin Water Resource Management Project was planned to 'assist the government in establishing a 'river basin commission' for the Red River Basin to manage the planning of water resource management and facilitate improved stakeholder involvement and agency coordination in the process' (Wright, 1999). These intentions, with hindsight, conflicted with the fact that the RRBO was to be set up under the control of MARD and that basin planning, notably water infrastructure development, would remain MARD's prerogative. In that sense, the institutional setting was not suitable, and probably adverse to the implementation of IWRM principles in general, and to RBOs in particular. This contradiction, that was to be made explicit later by the creation of MoNRE and by its very claim to a division of roles and responsibilities, was also painfully clear to consultants of the Red River Basin Water Resource Management Project (see for example, Taylor & Wright, 2001). Yet, such evidence did not warrant an early revision of the project.

4.2. Vertical and sectoral integration

Core aspects of IWRM include integration of water management, the coordination of actions, but also the adequate distribution of decision-making power, across hydrologic, administrative and political levels (see Figure 3). Executive power is exercised by the central government and three nested parallel levels of People's Committees at province (or city), district and commune levels, while central ministries and line agencies have representative departments at the province and district, or sometimes, commune levels, that are administratively under the PPCs.

The S-RBOs were established under the umbrella of the Red River parent organization, since these new organizations would not have the technical capacity to address inter-provincial issues. Under present arrangements, the S-RBO is subject to several lines of control and accountability, as sketched out in Figure 3. The S-RBO is first strongly under the control of MARD, because it is an appendix of the RRBO, and also because of the central contribution of this ministry to its staff. But it is also partly controlled by PPCs, first, because they chair it, and, secondly, because the heads of the provincial departments that staff it are reputed to be more accountable to their provincial leaders than to their ministries.

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[1] For example, the National Water Resources Council website states that 'The Law on Water Resources has reflected almost worldwide concepts and principles on integrated water resources management' (NWRC, 2007).

[2] National decision-makers understand that a degree of acceptance of these concepts is the oil that lubricates relationships with donors and the international level; experts and consultants, who often have very little time to do project feasibility studies, also ground a part of their legitimacy in the manipulation of these concepts whose hegemonic nature provides a degree of protection against criticism.

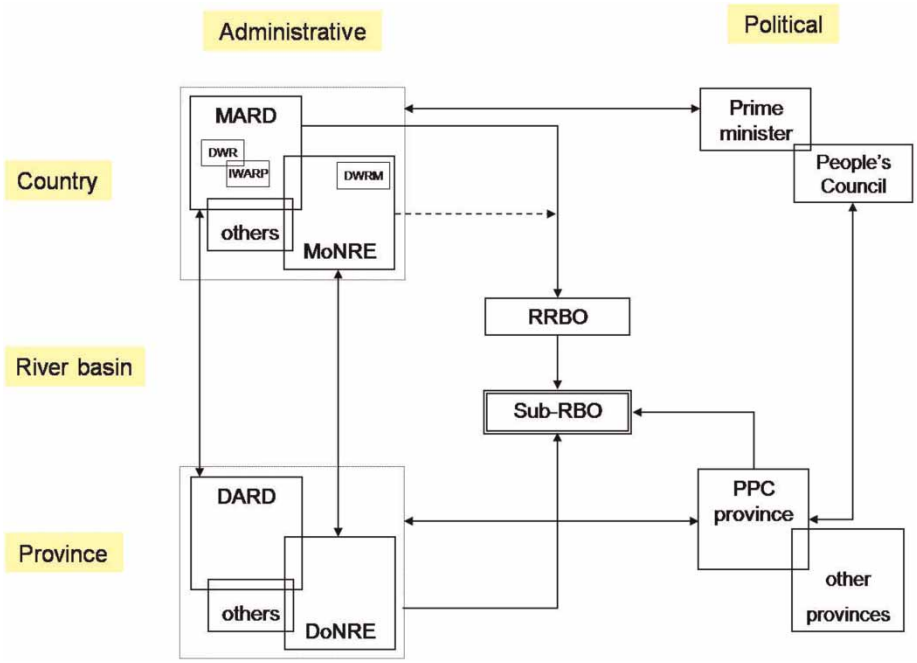

Fig. 3. Articulation of governance levels in the Red River Basin (2007).

The role of the S-RBO remains advisory but it clearly created a space in the governance structure which could offer opportunities for shifts in the distribution of power. At the moment, both the MARD and the provinces are somehow worried about the possible emergence of an intermediate level of decision-making; MARD is concerned by a dilution of its power to plan infrastructural development, while the provinces are concerned by the transfer of powers from them to an inter-provincial body with discretionary and overriding power (CRDE & IESD, 2006).

Although provinces have state management functions within their boundaries, it is clear that such a definition is unsatisfactory because many interventions in the water cycle have effects that travel across provinces and are supposed to be handled by MARD or by other relevant ministries. It is not clear whether this way of internalizing externalities, by going one level up to the ministry, should be replaced by resorting to an S-RBO at an intermediate level. If so, the responsibilities of the S-RBO have to be defined and there is potential, at that level, for replicating the infighting that is currently occurring at the ministerial level. The benefits of such a move are also not very clear for the provinces themselves. First, they are aware of their limited technical capacity but they may also be concerned with the access to central government subsidies since, at present, most inter-provincial issues are generally not only taken care of but also funded at the national level.

4.3. Regulation and the separation of powers

It has become a standard policy recommendation of 'modern water management arrangements' to separate the roles of water resources manager and operators as much as possible, so that powerful line agencies in charge of hydropower or irrigation, to name the most obvious, do not pursue sectoral

(over)development with little consideration for economic soundness or social/environmental impacts (Wright, 1999; Arriëns, 2004). While the manager ensures *regulation* of the water sector (by setting standards, allocating and monitoring water use, establishing environmental protection rules, coordinating planning, etc.), the operator takes care of structures or reservoirs according to the rules set. The *regulation* functions are best decentralized to the river basin level and encapsulated in an RBO. Above these two levels, apex bodies, in the form of inter-ministerial councils that meet two or three times a year, are also expected to give overall policy guidance and review legislation.

Where the regulation and operating roles are held by the same ministry (MARD), separating these roles means that substantial decision-making power will have to be shifted from that ministry to the (new) regulating body (MoNRE, in the present case). Therefore, such a shift requires the new distribution of roles and duties to be reflected in new legislation (at a formal level) but also that there be a regulator endowed with sufficient human power and technical expertise (at a practical level). Designing new formal rules without simultaneously reshaping the distribution of power that underlies prior institutional arrangements is unlikely to be effective (Evans, 2004).

At the time the profile of the RRBO was being outlined, it was clear, in particular, that the RRBO would be a coordinating agency 'which could not adopt any *state management* power or function' (Taylor & Wright, 2001). It is safe to assume that MARD accepted the idea of setting RBOs under its planning institute (IWARP) after making sure that it would not threaten its established role and that it would be confined to a coordinating role. The challenge only emerged with the setting up of MoNRE, which claimed the river basin level as the scale where it should exercise its state management function.

Analysis of various documents and interviews with officials suggest that the Gordian knot lies with planning, taken in the old sense of identifying structural interventions that will allow the increased use of water or a better protection from floods and droughts. In continuous planning, and in subsequent construction activities, lie both the professional gratification of planners and technicians, and the assurance of sustained budgets. Sustained budgets, especially in a context where both design and construction works are increasingly outsourced, open the way for people with decision-making power to benefit from investment flows. In 2006, the total budget of MARD was US$200 million of which US$126 million was allocated to investment for development.

Since RBOs are potentially endowed with the power to draw basin plans and, possibly, to screen these plans before final approval, it is not surprising to observe a dual strategy of: (a) maintaining RBOs as symbolic advisory bodies with reduced autonomous technical capacity; and (b) controlling RBOs in case their screening power is strengthened. Furthermore, since RBOs are largely promoted by foreign partners and are, thus, likely to be associated with the future delivery of loans and projects, they may also 'attract' more investments, which makes their control even more desirable. In other words, the legitimacy of RBOs as 'registration chambers' for projects – rubber-stamped with the seal of IWRM – can be attractive for the departments traditionally involved in structural interventions.

4.4. A narrow definition of participation

Emphasis on participation has become a major feature of development projects in general, and of the ADB's policy in particular (ADB, 2000; Molle, 2005). IWRM is expected to incorporate a healthy dose of participation from stakeholders and is based on 'an expectation that interested groups and organizations will coordinate and participate directly as far as possible' (Taylor & Wright, 2001). This view is rather optimistic and quite remote from reality.

The Law on Water Resources, however, is parsimonious with regard to participation (Molle, 2005). It contains 71 occurrences of 'State', 49 occurrences of 'Government', but none of 'participation' or 'participatory'. This can, perhaps, be attributed to the particular conception that people are effectively represented by local people's committees and other official organizations. Although it may appear as a way to sideline civil society, such a conception is also genuinely ingrained in local political discourse and culture; in that sense, participation strangely resonates with socialist ideology, and the notion of 'civil society' may seem redundant. It is abundantly clear from official documents that the statement, 'involvement of stakeholders is important for integrated water resources management' (Lai, 2002), refers to the involvement of all ministries and provinces concerned.

Regarding non-governmental organizations (NGOs), Taylor & Wright (2001) reckon that there are a few groups in Vietnam that could easily participate in a consultative role and, although NGOs do exist, they 'would not be considered eligible to take a formal role in an RBO'. Pushed by donors, MARD agreed to consider a proposal for NGO involvement but it seems that this did not arouse particular interest from the NGO Resource Center or from individual NGOs. Thus, whether out of lack of interest, preparedness or political space, NGOs are marginally represented, if at all, and participation – although ubiquitous at a rhetorical level – remains a concept that chiefly applies to the relative contributions and distribution of decision-making power between administrative levels.

5. Perspectives and conclusions

The establishment of the RRBO in 2001 owed a lot to development banks and cooperation agencies who promoted apex bodies, IWRM and RBOs. Due to the lack of other acceptable options but somewhat inconsistently and in contradiction with its expected role, the RRBO was set up under MARD, with a few members of staff and a small budget, and remained for 3 years without internal official regulation. The orientation phase of the 2RRBSP project identified priority issues and found basin-wide participation to be 'both difficult and unnecessary' (Shearwater, 2005), leaving the RRBO with little more than the role of overseeing its offspring to be set up at the sub-basin level. The inadequacy of a conventional RBO at the basin level that would coordinate provincial actions does not mean that there are no basin-wide issues. Flood management (with respect to dam operation, in particular) has been addressed at a central level since the 1960s at least; more recently, water levels in Hanoi reached their lowest level in 107 years of records, and the question of optimizing hydropower generation, navigation, and water releases at the basin level has come to the fore; yet these issues were technically addressed by MARD and Electricity of Vietnam (EVN) Group, with no contribution from the RRBO.

The emergence of the MoNRE in the institutional landscape created conditions for RBOs, once a concession to donors by MARD, to become an object of internal bureaucratic struggle and, as such, a valuable asset. For MoNRE, the river basin level was a new layer of administration it could legitimately claim that would allow the new ministry to assert its role and authority amid traditional administrative layers. RBOs opened a political space for a possible reorganization of responsibilities and reshuffling of power. Not surprisingly, this prompted MARD to do its utmost to keep control over RBOs resulting in a confrontation (through antagonistic decrees and strategies) between the two ministries.

The struggle to conserve both autonomy in planning and the current procedures of financial decision-making was found to be at the core of this inter-ministerial infighting. This is not an uncommon

situation, as also illustrated in the case of Thailand. Experience in other countries also shows that with the decline of irrigation and drainage works, and dam construction and the concomitant rise of environmental issues, investments in both studies and infrastructure tend to shift towards environmental studies and treatment stations, with a corresponding shift in money flows within the administration. This shift, from MARD to MoNRE, does not occur without friction and provides a good background to explain the present situation.

The confusion created begs for some clear-cut arbitration. Several options have been, and are being, discussed. The first option, probably favored by international partners, would be a clear revision or amendment of decrees 91/2002 and 86/2003, a transfer of the mandate for RBM and RBO from MARD to MoNRE, accompanied by adequate staffing and funding, and a revision of the Law on Water Resources to account for these changes (this revision is under way). A second option would be to ascribe overall management functions to the MARD which is the largest water 'user' (agriculture, forestry and fisheries), with little likelihood of moving away from past problems of poor management and over-exploitation, especially because other water users are not well represented in the existing RBOs (Cong, 2007). A third option would be MARD indirectly reasserting control through the reformation of a Ministry of Water Resources, in which MARD and MoNRE would be merged. Proponents of this option claim that integration should be done through a concentration of all water-related issues and powers under the same Ministry, allowing sectoral conflicts to be internalized. This logic is orthogonal to that of separating regulatory and operation functions (but, in November 2009, three General Departments for Forestry, Fisheries and Water Resources were established under MARD after internal reorganization). A fourth option, perhaps, would be to address the excess control of the center on basin issues by devolving more power to RBOs and promoting ownership of the provinces concerned. Yet the provinces still do not have the technical capacity to handle many technical issues and are financially dependent on the center for large-scale and inter-basin investments.

In 2008, the situation remained unclear. RBOs were not mentioned in either of the new decrees (GoV 2008a, 2008b) that specify the functions, responsibility, authority and organizational structure of MARD and MoNRE. However, by the end of 2008, a new decree on river basin management (GoV, 2008c) was issued, entrusting coordination of government actions at the river basin level to MoNRE.

What lessons can be drawn from the interactions between endogenous and exogenous factors in the institutional process observed? Despite the efforts deployed by several TAs, attempts at grafting attributes of 'modern' water policies in the Vietnamese bureaucratic configuration were not very successful at first. This was largely due to the lack of buy-in from Vietnamese officials and the bundling of various reforms with TAs. For example, NWRC's influence has been negligible and, after a few meetings, the Council discontinued its activities between 2001 and 2003; RBOs in the country were supported by foreign partners and largely ceased activities as soon as donor assistance ended; and the Law on Water Resources, once deemed a modern and solid basis for IWRM, was soon a candidate for revision. Some Vietnamese officials feel that TAs were prepared by international consultants without taking into account the complexity of Vietnamese institutional structures and its weak legislation, echoing Evans' (2004) critique of 'the presumption that the most advanced countries have already discovered the one best institutional blueprint for development and that its applicability transcends national cultures and circumstances.'

Critics point to a variant of top-down and untimely imposition of concepts and reforms by foreign experts and development banks (Bandaragoda, 2006) that generate the need for what these actors are precisely ready to offer, be it loans, technical assistance or projects, and emphasize

the gap between the formal mandate of newly established institutions and the way these operate in practice. There is indeed pervasive over-enthusiasm on the expected performance of these institutions, such is the case for apex bodies. New arenas for coordination do not necessarily lead to desirable outcomes: in Thailand, for example, the apex body was decried by some as a forum for ministries to engage in turf battles or horse-trading rather than for optimizing coordination (Newborne, 2006). Likewise, RBOs do not necessarily optimize decisions because outcomes eventually depend on the distribution of power (horizontally and vertically) rather than on the mere existence of an institution.

More positively, others consider this process as a variant of the muddling-through type of policy planning (Lindblom, 1970), where it is important to make small and incremental steps towards a general desirable blueprint whenever that is possible, hoping that contradictions will gradually solve themselves. MoNRE, or RBOs, for example, have been created in adverse environments but their principles may be activated by a few champions who, with time and the sustained influence of donors, work to achieve increased consistency. The Law on Water Resources may be rewritten to enshrine a new division of roles between MARD and MoNRE.

Of course, there is no assurance that this will happen. Policy reforms may abort, be discontinued, or simply be rejected (as has happened in many countries like Pakistan, Thailand or Sri Lanka, to take Asian examples; see Bandaragoda, 2006). Processes can revert themselves, especially when they have gone too far in too little time: MoNRE could be swallowed by MARD that would then reincarnate into an all-powerful water ministry (as floated in 2006; see Olszak, 2006). But the alternative is to dismiss possible external influence, give up action, and wait for things to sort themselves out, with equal uncertainty about whether something will happen at all.

With hindsight, it seems that the policy reforms on RBOs promoted by donors and development banks have triggered some changes. Surprisingly, these changes may have come as a result of the institutional confusion they have created when confronted with the emergence of the MoNRE, rather than being due to the reforms themselves. MoNRE was itself largely destined, at first, to help solve land and environmental issues rather than water issues, and owed little to external influence. The confluence of donor-driven projects establishing RBOs and the conflict between MARD and MoNRE that made the river basin scale a contested issue, helped strengthen changes in the direction of a better separation of duties and integrated planning. The river basin scale is crucial for defining legitimacy and roles but is also a level at which power over financial resources and political power could be defined. In a context where state enterprises are moved out of ministries and where most consultancy work is being outsourced, power will reside in planning and in the decision-making on what shall receive priority, where and when, and who shall do the job. It is too early to assess if, and how, MoNRE and RBOs will, eventually, substantially reshape the institutional landscape, but such evolutions can only be slow.

The question of what the best way forward is for external partners (somewhere between outright interventionism and a wait-and-see attitude) is likely to remain. In practice, institutional change is linked to political evolution, to the ever-changing power configuration of individuals and groups within the state and the administration who carry out varied projects, sometimes enlightened, sometimes not, and subject to an uncertain mix of endogenous and exogenous influences. It may be always possible, with hindsight, to opt for one or another path. Whether the rather indiscriminate grafting of the formal attributes of IWRM will bear fruit may eventually depend on internal processes whereby different individuals and groups will use the space created to push for their agendas.

References

Arriëns, W. T. (2004). *ADB's Water Policy and the Needs for National Water Sector Apex Bodies*. ADB, Manila, Philippines. Available at: www.adb.org/Water/NWSAB/2004/Arriens_Paper2.pdf. Accessed June 2010.

Asian Development Bank (ADB) (2000). *Water for all: The Water Policy of the Asian Development Bank*. ADB, Manila, Philippines.

Asian Development Bank (ADB) (2001). *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the Socialist Republic of Vietnam for the Second Red River Basin Sector Project*. RRP: VIE 30292. ADB, Manila, Philippines.

Asian Development Bank (ADB) (2006). *Technical Assistance to Vietnam for TA 3892. Second Red River Basin sector project. Phase 3 of Component 1. Capacity Building for the Cau River Sub-Basin Organization*. ADB, Manila, Philippines.

Bandaragoda, D. J. (2006). Limits to donor-driven water sector reforms: insight and evidence from Pakistan and Sri Lanka. *Water Policy*, *8*(1), 51–67.

Birch, A. (2004). Direction and experience in water sector apex body development. In *Paper Presented at the Regional Meeting of National Water Sector Apex Bodies, Hanoi*, May 18–21, 2004.

Biswas, A. K. (2004). Integrated water resources management: a reassessment. *Water International*, *29*(2), 248–256.

Cong, N. C. (2007). *River Basin Management: Who are Tesponsible?* Thesis prepared at training course on state management functions. National Academy of Public Administration (NAPA), Vietnam. Ministry of Home Affairs (in Vietnamese).

CRDE (Center for Resource Development and Environment) & IESD (Institute for Environment and Sustainable Development) (2006). *Integrated Management of River Basins in Vietnam for Sustainable Development*. Ministry of Plan and Investment, Vietnam Agenda 21.

Dinar, A. & Saleth, R. M. (2005). Issues in water pricing reforms: from getting correct prices to setting appropriate institutions. In *The International Yearbook of Environmental and Resource Economics 2005/2006*. Folmer, H. & Tietenberg, T. (eds.). Edward Elgar, Cheltenham, UK.

Evans, P. (2004). Development as institutional change: the pitfalls of monocropping and the potentials of deliberation. *Studies in Comparative International Development*, *38*(4), 30–52.

Government of Vietnam (GoV) (2002). *Government Decree No. 91/2002/ND-CP*. 11 November 2002. Specifying the functions, responsibility, authority and the organizational structure of the Ministry of Natural Resources and Environment. GoV.

Government of Vietnam (GoV) (2003). *Government Decree 86/2003/ND-CP*. 18/7/2003. Functions, tasks, powers and organizational structure of Ministry of Agriculture and Rural Development. GoV.

Government of Vietnam (GoV) (2005). *The government decree on integrated river basin management*. Draft. 29 March 2005. Prepared by MoNRE. GoV.

Government of Vietnam (GoV) (2007). *Notice No. 43/2007/TB-VPCP*. Conclusion of standing Prime Minister Nguyen Sinh Hung at the meeting on the assignment of functions and tasks between MoNRE and MARD on river basin management. Hanoi, 15 March 2007. GoV.

Government of Vietnam (GoV) (2008a). *Government Decree No. 01/2008/ND-CP*. 3 January 2008. Specifying the functions, responsibility, authority and the organizational structure of the Ministry of Agriculture and Rural Development, Vietnam. GoV.

Government of Vietnam (GoV) (2008b). *Government Decree No. 25/2008/ND-CP*. 4 March 2008. Specifying the functions, responsibility, authority and the organizational structure of the Ministry of Natural Resources and Environment. GoV.

Government of Vietnam (GoV) (2008c). *Government Decree No. 120/2008/ND-CP*. 1 December 2008. Specifying functions, responsibility, authority and the organizational structure for River Basin Management. GoV.

Hydrosult & Arcadis (2005). *Working Paper on Water Related Legal and Institutional and Economic and Financial Arrangements. National Water Resources Strategy*. ADB TA 3528-vie, subproject 1, Hanoi.

Kellogg Brown & Root Pty Ltd (2009). *TA4903-VIE Water Sector Review Project*. Final report prepared for the ONWRC and ADB. Kellogg Brown & Root Pty Ltd, South Australia.

Lai, Nguyen Thai (2002). Notes for report on 'National Water Resources Council and River Basin Organizations, Lessons and Issues'. In *Meeting of ISG TAG2, 11 September 2002. Law on Water Resources (LWR) (1998). No. 08/1998/QH. Passed by the National Assembly on 20 May 1998 and effective from 1 January 1999*.

Lindblom, C. (1970). The science of 'muddling through'. *Public Administration Review*, *19*(2), 79–88.

Malano, H. M., Bryant, M. J. & Turral, H. N. (1999). Management of water resources: can Australian experiences be transferred to Vietnam? *Water International*, *24*(4), 307–315.

Ministry of Agriculture and Rural Development (MARD) (2004). *Operation Regulation of the River Basin Planning Management Board*. Enclosure to Decision 14/2004/QD-BNN-TCCB dated 8 April 2004 of the Minister of Agriculture and Rural Development. MARD.

Ministry of Agriculture and Rural Development (MARD) (2006a). *Water Resources Management and Development Strategy*. Main report. MARD, Hanoi, Vietnam.

Ministry of Agriculture and Rural Development (MARD) (2006b). *The Organization and Working Regulation for the Cau River Sub-Basin Organization (CSBO)*. MARD, Vietnam.

Ministry of Agriculture and Rural Development (MARD) & Danish International Development Agency (DANIDA) (2000). *Sector Programme Support Document*. Water sector, Vietnam (inception). MARD, Hanoi, Vietnam.

Ministry of Natural Resources and Environment (MoNRE) (2003). *Decision of Minister of Ministry of Natural Resources and Environment on Functions, Responsibilities, Power and Organization Structure of Water Resources Management Department*. *Decision No. 600/2003/QD-BTNMT*. 8 May 2003. MoNRE.

Ministry of Natural Resources and Environment (MoNRE) (2006). *National Water Resources Strategy Towards the year 2020*. Promulgated by *Decision 81/2006/QD-TTg* dated 14 April 2006. MoNRE, Culture-Information Publishing House, Hanoi.

Molle, F. (2005). *Irrigation and Water Policies in the Mekong Region: Current Discourses and Practices*. *IWMI Research Report 95*. International Water Management Institute, Colombo, Sri Lanka.

Molle, F. (2008). Nirvana concepts, narratives and policy models: Insights from the water sector. *Water Alternatives*, *1*(1), 131–156.

Molle, F. & Berkoff, J. (2007). Water pricing in irrigation: mapping the debate in the light of experience. In *Irrigation Water Pricing: The Gap Between Theory and Practice*. Molle, F. & Berkoff, J. (eds.). IWMI/CABI, UK, pp. 21–93.

Mollinga, P. P. & Bolding, A. (2004). Research for strategic action. In *The Politics of Irrigation Reform: Contested Policy Formulation and Implementation in Asia, Africa and Latin America*. Mollinga, P. P. & Bolding, A. (eds.). Ashgate, Aldershot, UK, pp. 291–318.

National Water Resources Council (NWRC) (2007). Available at: http://www.nwrc.org.vn/index.htm. Accessed June 2010.

Newborne, P. (2006). *Study of National Water Sector 'Apex Bodies' and Civil Society Involvement in Asia: Case studies of Thailand, Bangladesh and Sri Lanka*. WaterAid, London.

Nghia, T. T. (2004a). Report on the workshop results at 25 provinces in RRB. Priority issues in Red River water resource management. In *Meeting on Priority Integrated Water Resources Management Issues in Vietnamese River Basins*. Hanoi, 12 February 2004.

Nghia, T. T. (2004b). *Report on Red River Basin organization. Workshop on the Operation of the Offices of River Basin Organizations*, held on 3 March 2004 by the Department of Water Resources of MARD.

Olszak, C. (2006). Water allocation in an economy in transition institutional challenges and opportunities in Vietnam. In *Paper presented at the 11th IASCP Conference, Bali, Indonesia.* 19–23 June 2006.

Pigram, J. J. (2001). Opportunities and constraints in the transfer of water technology and experience between countries and regions. *International Journal of Water Resources Development*, *17*(4), 563–579.

Sampath, R. K. (1992). Issues in irrigation pricing in developing countries. *World Development*, *20*(7), 967–977.

Second Red River Basin Sector Project (2RRBSP) (2006). Available from: www.2rrbsp.org/ProjectInfo.html.

Shah, T., Makin, I. & Sakthivadivel, R. (2001). Limits to leapfrogging: issues in transposing successful river basin management institutions in the developing world. In *Intersectoral Management of River Basins*. Abernethy, C. (ed.). International Water Management Institute/Deutsche Stiftung für Internationale Entwicklung, Colombo, Sri Lanka, pp. 89–114.

Shearwater (2003). *Progress Report 2. Second Red River Basin Sector Project*. Part A: Water Resources Management. Project Management Support, ADB TA 3892-VIE. Hanoi.

Shearwater (2005). *Progress Report 6. Second Red River Basin Sector Project*. Part A: Water Resources Management. Project Management Support, ADB TA 3892-VIE. Hanoi.

Taylor, P. & Wright, G. (2001). Establishing river basin organisations in Vietnam: Red river, Dong Nai river and lower Mekong delta. *Water Science & Technology*, *43*(9), 273–281.

Trang, Truong Thi Quynh (2005). Water resources management in Vietnam. In *Workshop on the Water in Mainland Southeast Asia*, 30 November–2 December 2005, Siem Reap, Cambodia.

Wright, G. (1999). River basin management and irrigation in the Red river basin of Vietnam. In *Paper Presented to the Irrigators' Organisations Workshop, March 1999, Vientiane, Lao PDR*.

Received 27 January 2010; accepted in revised form 27 July 2010. Available online 23 April 2011