

CHAPTER 4

Water resource management in Asia: Integration and interaction for a better future

Water is an essential resource for human beings to sustain life. It is also a critical resource to attain sustainable economic and social development. As population growth and economic expansion accelerated over the past few decades, water use expanded. As a result, the gap between water availability and water demand has increased, bringing about a serious water crisis in many regions of the world. The water crisis included widespread water scarcity, water quality deterioration, and the destruction of natural aquatic ecosystems. It is projected that about 3.5 billion people, approximately 6.5 times as many people as in the year 2000, will populate water-stressed countries by 2025 (Cosgrove et al., 2000). Water resources in Asia have already been threatened, both in terms of quantity and quality, and they cast a shadow on sustainable development in the region.

The fundamental objective of water management is to supply water where and when it is needed. However, past water management often emphasised “how to increase the water supply to meet the increasing demand” and paid little consideration to water resource conservation. Water management governance has often been fragmented, and coordination among water-related agencies has been weak. The centralised decision-making system has often been criticised because it could not reflect the local needs and conditions regarding water. It is often pointed out that weakness of such a centralised yet fragmented water management system is one of the root causes of the current water crisis. In view of this, a consensus has emerged at the international level. A fundamental paradigm shift is urged for countries towards the sustainable management of water resources. The proposed paradigm is often characterised by the following: cross-sectoral integration, decentralisation, and demand-driven. Since the late 1990s, water has attracted a lot of international attention as one of the priority issues to promote sustainable development.

Asia has the largest population in the world and as such it has faced most of the problems mentioned above in a more serious manner. To counter this situation, substantial efforts have been made in various parts of Asia to address the problems and there have been some positive achievements. This chapter examines the positive developments made in the region for better water resources management, with particular focus on participation and interaction of the various stakeholders in water management. Stakeholder participation is not a panacea for sound water management, but it certainly is one of the most essential approaches as it addresses the need for a more decentralised and demand-driven water management.

Water-related issues are broad, but there are two conspicuous issues that have commanded significant international attention. They are the supply of safe drinking water and the promotion of integrated water resources management. As a matter of fact, both were included as “international goals” in the UN Millennium Declaration and the Johannesburg Plan of Implementation. This chapter focusses mainly on these two issues.

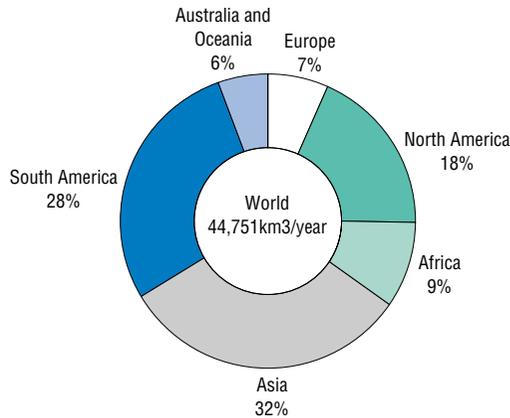
The state of water resources in Asia

Water resources in Asia

The absolute volume of water resources in Asia is 13,500 km³ per year or 32 per cent of world’s freshwater resources which is larger than any other continent of the world (Fig. 4-1). However, the region is the

home to approximately 60 per cent of the world’s population, but water availability per capita is only about 4,000m³/year, the smallest in the world and less than half of the world average (Shiklomanov, 2000). The population in the region is predicted to increase to 4.8 billion by 2030 (UN, 2004), therefore the situation is likely to deteriorate in the future unless appropriate action is taken.

Fig. 4-1: Regional distribution of water resources



Source: Igor A. Shiklomanov, Summary of the Monograph “World Water Resources at the Beginning of the 21st Century” (<http://webworld.unesco.org/water/ihp/db/shiklomanov/summary/html/summary.html#Renewable%20water%20resources>)

It should be noted that there is substantial variance in the availability of water resources in the region (Fig. 4-2 and 4-3). In general, Southeast Asian countries have higher water availability than other sub-regions, and South Asian countries have the least water resources. The absolute volume of water resources in China is large (Fig. 4-2). However, on a per capita basis, it is only 2,000m³/year which is close to the figure generally accepted as the water shortage level (1,700m³/year). South Asian countries accommodate large populations, but the water resources available are limited. Naturally water shortage in these countries is very serious.

Fig. 4-2: Renewable water resources by country

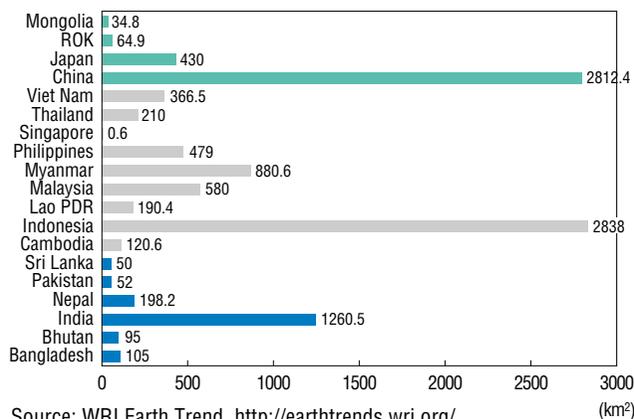
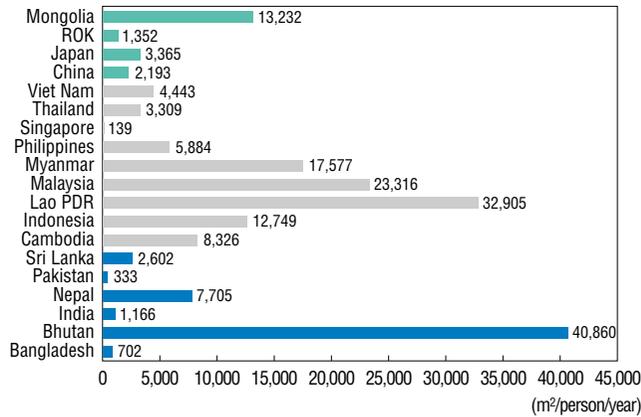


Fig. 4-3: Water availability per capita by country



Source: WRI Earth Trend. <http://earthtrends.wri.org/>

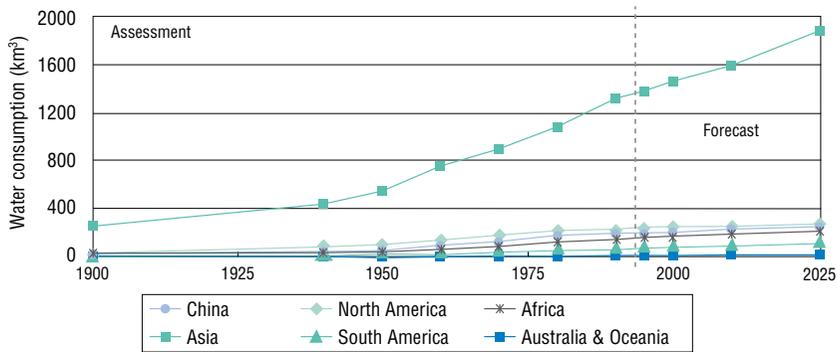
Also noteworthy is the seasonal variations of water availability. For example, Tianjin in China receives approximately 65 per cent of its annual rainfall (about 550mm/year) from June to August (Xu et al., 2004). In the dry season, even countries with relatively abundant rainfall face water shortages, which often cause conflicts among water users. On the other hand, in the rainy season, people often suffer from flooding. Especially in areas under the influence of monsoons, people suffer both from water shortage and floods.

Growing demands and increasing of social and environmental pressure

Water demand has increased in Asia with population growth and economic expansion. Securing water for agriculture, the biggest water-use sector, has been a challenge for many countries of the region, especially because increasing the volume of water has been simultaneously necessary for industries and households. The issue is also closely related to food security in the region. There has been some progress in the reduction of agricultural water usage because of more water-efficient irrigation technologies such as drip irrigation (Cosgrove et al., 2000), and traditional practices such as “subak” in Bali - a collaborative and participatory local water allocation system of irrigation. Rice paddy fields not only provide food, but play an important role in flood control and groundwater recharge. In the Asian context this fact deserves full recognition.

Water withdrawal for industry and households is projected to increase in most countries. In China, industrial water use accounted for 10 per cent of the total water usage in 1980. It rapidly increased to 25 per cent by 2000. In Malaysia, it expanded from 10 per cent in 1990 to 21 per cent in 2000 (FAO AQUASTAT). Industrial water withdrawal in Asia is projected to increase to 9.5 per cent of the total by 2025, from 6.9 per cent in 1995. During the same period, domestic water withdrawal is expected to increase from 9.9 per cent to 15.2 per cent (Shiklomanov, 2000). The rate and absolute volume of increase in water consumption in Asia has been and continues to exceed substantially other regions in the world (Fig. 4-4). It is projected that 2.4 billion people in the region will suffer from water stress in 2025, almost double the 1995 figure (Cosgrove et al., 2000).

Fig. 4-4: Increase of water consumption by region



Source: Igor A. Shiklomanov, Summary of the Monograph
 "World Water Resources at the Beginning of the 21st Century"
 (http://webworld.unesco.org/water/ihp/db/shiklomanov/summary/html/figure_8.html)

As demand for water further increases, conflict over limited water resources among different water users is likely to exacerbate. Conflict between up-stream users/countries and down-stream users/countries could be more frequently observed in the region. Asia has as many as 53 international rivers. As urbanisation proceeds, water use in cities will increase, which is likely to intensify competition over water resources between urban and non-urban areas.

Over-exploitation and the inappropriate development of water resources could result in significant environmental degradation. For example, over-intake of water and the construction of dams could significantly affect river ecosystems. Overexploitation of groundwater could cause a lowering of the water table that often results in land subsidence. Land subsidence is essentially irreversible and could increase the likelihood of flooding during high tides and vulnerability to natural disasters, such as a tsunami.

Degradation of water resources

Deterioration of water quality is recognised as one of the most serious environmental problems throughout the region. Biological oxygen demand (BOD) in Asian rivers is now 1.4 times higher than the world average. Also, the amount of suspended solids in rivers is four times higher than the world average (UNEP, 1999). Asian rivers also contain three times as much bacteria from human waste as the world average and more than 10 times the safety level suggested by the OECD guidelines (UNEP, 1999). Deterioration of water quality causes water-borne or "dirty-water" diseases such as hepatitis A and E, typhoid, cholera and diarrheal disease. It should be noted that globally an estimated 4 billion cases of diarrheal disease occur each year, causing 3 to 4 million deaths, mostly among children (www.infoforhealth.org). Water pollution has often seriously damaged local fisheries. Heavy metals and toxic chemicals contained in effluent from industry and agriculture have serious health impacts. It is reported that Asia's surface water contains 20 times more lead than the average of OECD countries (ADB, 1997). Arsenic pollution in groundwater has been a serious threat to the people of Bangladesh and some adjacent parts of India. Agricultural use of fertilisers and pesticides are causing growing concerns in China and countries of the South and Southeast Asian sub-regions.

Such degradation of water resources negatively impacts both human health and natural ecosystems. The economic loss caused by water pollution in the Yellow River is estimated at over US\$500 million per year (Changming Liu et al., 2002). It is important to recognise that water pollution reduces the volume of water

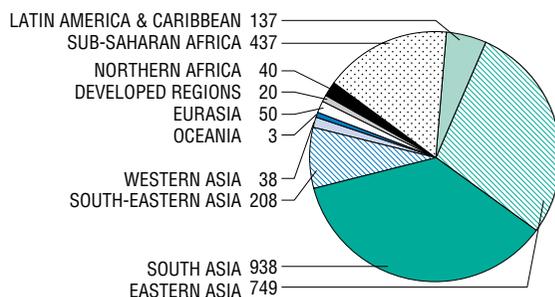
resources available, since polluted water cannot be used for productive purposes.

Safe drinking water and adequate sanitation - meeting international goals

Access to safe drinking water and adequate sanitation have been among the priority global concerns for decades. The Millennium Development Declaration and the Johannesburg Plan of Implementation (JPOI) in 2002 included quantitative targets regarding water supply and sanitation, i.e., to halve the proportion of the population that do not have access to a safe water supply and adequate sanitation by 2015. How to achieve these two targets remains a daunting challenge. The rate of access to the water supply has increased in the region over the last two decades, but still two-thirds of the 1.1 million people without access to safe water live in Asia (WHO and UNICEF, 2004). Those without access to safe water in China alone is equal to those with access to safe water in all African countries combined (WHO and UNICEF, 2004). Obtaining water for the household is often the job of women and children. The amount of labour spent by women drawing water for household use is estimated at about 150 million work days per year in India, the equivalent to a national loss of income of about US\$208 million (UN-Water, 2004).

The absolute number of people receiving adequate sanitation has increased between 1990 and 2002 in the region, with a 13 per cent increase in Southeast Asia, 17 per cent in South Asia and 21 per cent in East Asia (WHO and UNICEF, 2004). However, many people in these sub-regions still do not have access to adequate sanitation systems. For example, one third of the population in South Asia live without adequate sanitation (WHO and UNICEF, 2004). As shown in Fig. 4-5, more than 60 per cent of the world's population without improved sanitation live in Asia. The rural and poor populations have even less access to a safe water supply and sanitation systems. This has serious health implications.

Fig. 4-5: Population without improved sanitation by region in 2002 (in millions)



Source: WHO and UNICEF. Meeting the MDG drinking-water and sanitation target: A mid-term assessment of progress
http://www.who.int/water_sanitation_health/monitoring/jmp2004/en/ (15 November 2004)

International water dialogues and their implications to Asia

Development of international water dialogues

Policy dialogue at the international level has influenced significantly national and local policies, as far as water issues are concerned. In fact, international political pledges have been a driving force to mobilise political, financial and human resources at the national and local levels. International and regional organisations have served as catalysts to mobilise financial support and other assistance for developing countries. For example, the Mar del Plata Action Plan in 1979 requested that countries develop national plans regarding water supply and sanitation at the community level. Subsequently, the United Nations initiated its International Drinking Water Supply and Sanitation Decade in the 1980s. With the support of relevant international organisations, the decade stimulated development of water-related infrastructure. Asia achieved a significant increase in water supply infrastructure during that decade.

Fig. 4-6 indicates the change in the international agenda regarding water. With time, issues have become more diversified. The International Conference on Water and Environment in Dublin in 1992, set the recent trend on water resources management. At the Dublin Conference, the economic value of water resources was highlighted and water pricing issues received attention. Environmental services provided by water resources became an important point for discussion. The Dublin Conference identified “integrated water resource management (IWRM)” as the most important concept for sound water management.

Fig. 4-6: Development of international dialogues in the water sector

1st Period: 1970-the early 1980s: Human health issues ignited international discussion of water

- The Mar del Plata Action Plan in 1979 calls countries to develop national plans and programmes regarding the provision of water supply and sanitation systems at the community level.
- United Nations International Drinking Water Supply and Sanitation Decade in the 1980s

2nd Period: 1980s-the early 1990s: Growing recognition of water as an element of sustainable development

- Negative social and economic impact of water issues became highlighted. Such negative impacts include water pollution, water disputes, destruction of natural ecosystems.
- Dublin Principles in 1992 that refer to the economic value of water, and the importance of “integrated water resource management.”
- Chapter 18 of Agenda 21 at UNCED in 1992 shows various agendas related to water.

3rd Period: 1992-2000 Water issues jumping to priority issues

- World Water Vision presented at the 2nd World Water Forum greatly promoted awareness of the critical conditions of water to international community.
- In the Millennium Development Goals, a goal for safe water supply was included (to halve the portion of the population without adequate water supply).
- Johannesburg Plan of Implementation in 2002 reaffirms the water supply goal of the Millennium Development Goals and also set a sanitation goal. It also requests countries to formulate integrated water resources management and water efficiency plan by 2005.
- The 3rd World Water Forum was held in Kyoto, Japan as the first major international conference on water in Asia.
- The UN Commission of Sustainable Development (CSD) reviews the progress of implementation on water and sanitation sectors during 2004-05 as biennial thematic review.

Non-governmental bodies as emerging players in the international dialogues on water

UN agencies, international financial institutions, and regional organisations provided the lead in international agenda setting regarding water, until the Dublin Conference. Since then, the international water agenda has been further developed by the two major international bodies, i.e., the World Water Council (WWC) and the Global Water Partnership (GWP) that were both established in 1996. While both have maintained close relationships with their main founders (the World Bank and UN agencies, as well as academia and other stakeholders related to water), they have also broadened their constituency by institutionalising a democratic decision-making structure.¹⁵ The WWC intends to be an “international non-profit umbrella organisation” that brings key stakeholders together. On the other hand, the GWP would like to act as a facilitator for implementation. Both the WWC and GWP enjoy a considerable membership worldwide, ranging from NGOs, public and private sectors, and international organisations.

In 1997, the WWC initiated World Water Forum (WWF), a triennial international conference on water. The WWF was designed to provide a platform for open discussions on water among various stakeholders, and to channel voices of stakeholders to high-level political processes. The World Water Vision developed in 2000 by the WWC became a driving force in making water one of the top priorities among the sustainable development agenda. The World Water Vision was a comprehensive assessment of world water situations, and approximately 15,000 persons, at local, national, and international levels, participated in the development process. The GWP formulated through a participatory process the “Framework of Action,” which included a summary of regional, national and local strategies, and recommendations for actions to deliver “tangible results.” Both the World Water Vision and the Framework of Action were presented at the 2nd World Water Forum (WWF2) in 2000. Involvement of various stakeholders in both processes helped raise public awareness of water issues, and laid a basis for future collaboration among different stakeholders. The 3rd World Water Forum (WWF3) and Ministerial Conference was held in Kyoto, Japan. It was the first major water conference held in Asia (Box 4-1).

Local actors have increasingly voiced their views in the international arena. Representatives of local NGOs and community groups expressed diverse views, taking local interests into account, which range from water supply issues to the conservation of the aquatic environment. Networks of NGOs have been established, which include the International River Network, Public Service International, and the Water and Gender Alliance. NGOs serve as watchdogs in the international scene and as providers of information for local people. They represent local communities, the poor and the marginalised in general. They were astute in pointing out the risks associated with the privatisation of water supply services.

In Asia, NGOs and their networks have been active in the promotion of local activities and convey the voices of local communities to regional and international policy forums. NGOs and their networks have been instrumental in bridging international funding institutions and local communities. For example, the Gender and Water Alliance (GWA) is working together with the ADB in promoting gender mainstreaming into ADB’s water sector programmes since 2003.

Box 4-1: Implications of the Third World Water Forum for Asia

The Third WWF (WWF3) held in Kyoto, Japan in 2003, was the first major international conference held in Asia exclusively devoted to water issues. Excluding those from Japan, as many as 1,647 people from Asia and the Pacific participated (Secretariat of the WWF3 and WWC, 2003). WWF3 was an opportunity to raise awareness of water issues, and to promote more public participation in local water initiatives. WWF3 was considered significant in that it successfully incorporated the “Asian” perspective more in international dialogues, and it further enhanced participation of stakeholders.

Before WWF3, there was criticism that WWF did not reflect “Asian perspectives.” Issues important to Asian monsoon areas and multiple functions of rice paddies had not been properly covered. For example, the Action Plan produced at the 1992 Dublin Conference recognised the importance of agricultural water from the food control viewpoint, but it also stated that water should be saved for other sectors. Participants from Asia insisted that rice paddy farming in Asia did not waste water although it used a lot. They argued that the multiple functions of rice paddy farming, such as flood control and groundwater recharge, should be fully recognised. To reflect this concern, the Ministerial Declaration of the WWF3 stated that “a diverse array of agricultural practices and agricultural economies have evolved in the world.” Flooding was a major concern to many Asian countries, and at WWF3, flooding issues were highlighted more than before.

Another criticism against the WWF was the participation of stakeholders. To counter this, WWF3 was made fully open to the public. The secretariat of WWF3 collected “water voices” from various stakeholders and accepted all the requests to organise various sessions. As a result, as many as 351 sessions were organised under 31 themes (Secretariat of WWF3 and WWC, 2003). The most controversial session on public-private partnership was co-organised by two opposing organisations that could not come to an agreement. Such openness of WWF3 was welcomed by NGOs, who were strongly opposed to private sector participation in water services. On the other hand, WWF3 was a disappointment to the private sector that had expected the WWF to promote private sector participation.

WWF3 provided an opportunity for Asia to promote people’s awareness of water and consolidate relevant activities in the region through a series of regional and sub-regional preparation meetings. Key participants in the preparation meetings gradually established networks and facilitated mutual understandings. Such development of regional networking could be a key factor in promoting further regional actions for water issues.

Interaction of international actors in water management in Asia

As Fig. 4-6 indicates, water issues have become more diversified with time. This, in turn, has increased stakeholders at all levels. Coordination among stakeholders and strategies to generate synergies has become essential.

In Asia, there are some joint programmes between the United Nations and regional financial institutions. “Water for Asian Cities” is one such example in which the ADB and the UN Habitat are involved. However, the dominant form of collaboration in Asia seems to be initiatives between international organisations and NGOs. For example, the ADB has developed many partnership projects with NGOs, including the GWP, the Water Gender Alliance, the Water and Sanitation Programme, and Network of Asian River Basin Organizations. The UNDP has promoted a programme called “CapNet,” capacity-building for countries in the region in which the GWP is involved. This trend may be a reflection of the fact that NGOs have closer contacts with local stakeholders and thus act as facilitators of more effective project implementation.

The partnership approach taken by the Global Water Partnership seems effective in promoting linkage between international initiatives and local/national actions. The GWP has lead discussions on “good water governance” and “practices of integrated water resource management.” It developed a database of good practices in integrated water resources management named “Tool Box.” The GWP also actively provides expertise to developing countries through its regional technical advisory committees (regional TAC). In Asia, there are three TACs, namely, South Asia TAC (SA-TAC), Southeast Asia TAC (SEA-TAC), and China TAC. TAC members are often close to those directly involved in national water policy planning in each country, and therefore their activities often have a direct impact on national policies. The sub-regional TACs played a prominent role in the formulation of regional and national water visions for the WWF2. Sub-regional TACs organised workshops and training to build capacity for each country. Sub-regional TACs also facilitate the translation of the international water agenda into action at the local level. For example, in China, a water partnership in Heibi Province was launched in 2003. In Southeast Asia, the partnership among water stakeholders catalysed by the TAC resulted in the establishment of the Association of Southeast Asian Nations (ASEAN) Working Group on Water Resources Management (AWGWRM), which was expected to be transformed into a sub-regional water partnership by 2004.

The GWP itself is an international non-governmental organisation, but it has set up regional and national GWPs and TACs. These regional, and national GWPs have provided services customised to national situations, which have made the GWP an influential body in policy-making and implementation in developing countries in Asia. Currently, the GWP, in partnership with the ADB and ESCAP, plays a key role to support preparation of integrated water resource management strategies for countries in the region.

To transfer current water management to effective and efficient ones, some countries in Asia have been promoting sector-wide water reform,¹⁶ and we can see some promising developments in the following sections. The World Bank and the ADB have been major contributors to the success of the development of water sector reform in several Asian countries. For example, water sector reform in Indonesia, including the institutionalisation of river basin organisations, was originally based on the World Bank’s Water Resources Sector Adjustment Loan (WATSLA) (Ministry of Settlements and Regional Infrastructure of Indonesia, 2003). Bangladesh’s Ministry of Water Resources was established and the Water Resources Law was formulated under the support of the World Bank and the ADB. Besides Bangladesh, the ADB financially and technically assisted water sector reform in Cambodia, China, Lao PDR, Sri Lanka, and Viet Nam by conducting comprehensive studies of strategic options available for the water sector. One conclusion of the study in Sri Lanka, for example, recommended the establishment of the National Water Resource Authority (NWRA) which plays a central role in policy formulation for water management in the country.

The modalities of the assistance provided by international financial institutions are now a major driving force to promote water sector reform in the region, but they often result in conflict with local communities. An example of such conflict was brought about by the ADB’s Agriculture Sector Programme (ASP) in Thailand that aimed at achieving sustainable growth of the agriculture sector through agricultural sector reform. The ASP required an increase in productivity, enhancement of production of commodity crops, reduction of subsidies and the introduction of a cost-recovery system. In the Water Act drafted under the ASP, water charges to all water users, including farmers, were introduced as a measure to promote efficient water use as well as to recover the cost of water supply services. The draft act was strongly opposed by farmers on the grounds that it would have negative impacts on small farmers who could not afford to pay for sufficient water for their production. A major controversy over the water-use charges erupted across the country with outcries from farmers, NGOs, and academia. The ADB gave up on the cost-recovery scheme contained in the ASP. A draft of the country’s water act dropped the section on charging farmers for water use. One of the other contentious issues in the draft legislation was the definition of owner-

ship of water. The draft act stated that water belonged to the government. There was no clear definition of ownership of water in any form and local people have often followed local rules of ownership, and there was anxiety that such a definition of ownership of water could deprive existing water use rights to small farmers and poor communities. Similar requirements to introduce water charge systems and ownership of water had been included for other countries in the region as a condition of financial support by international financial institutions. Such countries included Sri Lanka and Indonesia, and popular protests took place in these countries as well.

Many countries in the region depend on international financial institutions for funds for development and confront a difficult and dynamic tension in trying to reconcile local and national political realities with the requirements stipulated by institutions such as the World Bank or the Asia Development Bank. Such financial resources come with conditions that influence the water sector reform of recipient countries and may bring social conflicts as described above. However, water sector reform is originally an attempt to change existing piecemeal or ad hoc management, and also to introduce demand control by introducing an appropriate legal framework and economic instruments (e.g., charge for water use) for more rational water use. Such a reform often brings conflict with the existing rules and vested interests in specific water beneficiaries. The current controversy over water sector reform issues is not always based on rational discussions. Current efforts to involve stakeholders in water policy-making will help, however, to promote mutual understandings over water management and to promote water sector reform in the long run.

Development in integrated water resource management in Asia

Integrated Water Resources Management (IWRM) aims to take into account the multiple nature of water resources and is an important concept of water management. According to the baseline document of IWRM prepared for WWF4, integration should be realised in ways such as between groundwater and surface water; land and water; the river basin and its adjacent coastal and marine environment; upstream and downstream interests. The concept was based on the reflection of the failure of sectoral management of water resources. The Johannesburg Plan of Implementation in 2002 included an international target that countries should prepare an IWRM plan by 2005. In recognition of the importance of the integrated approach for water management, many countries in the region have embraced the concept.

Institutional arrangement for integration

It is common in Asia to have a number of ministries responsible for various aspects of water resource management, including water supply, sanitation, irrigation, industry, and the environment. First attempts to implement IWRM have often been manifested by the integration of such fragmented and sectoral institutions.

In countries such as China, India, Thailand, and Viet Nam, some of the water-related ministries/agencies were restructured and integrated into new ministries to improve the effectiveness and efficiency of water resource management. In general, there are two types of integration. The first type is the creation of a “ministry of water resources” after the integration of water-related departments/sections in different ministries. India, Bangladesh, and China have made this type of integration. The integrated water resource ministry is responsible for activities such as formulating water resources development policies, managing allocation and conducting scientific research. Usually water quality and environmental conservation issues remain the domains of the Environmental Ministry. With coordination by the Water Resource Development Ministry and the Environmental Ministry, sustainable water management both in quality and quantity is pursued.

The second type of integration is the creation of a ministry that is responsible for water resource development with the exception of those responsible for irrigation and environmental conservation. This type is relatively new and based on the concept of natural resource conservation. Thailand and Viet Nam took this path in 2002. Both countries restructured their ministries of Science, Technology, and Environment, and created a ministry of natural resources and environment. This type of integration holds great potential for realising the comprehensive management of water resources in both quantity and quality. However, the responsibility for water management of the agricultural sector, which consumes the most water among other sectors, is still with the ministry of agriculture. How to facilitate effective coordination between the ministry of natural resource management and the agricultural ministry remains an unmet challenge (Box 4-3).

It will take time to see the positive effects of the creation of a new ministry for more coordinated policy-making and implementation in the water sector. However, such institutional reform, in both types of integration, can help facilitate information flows among water-related departments. Institutional arrangements in support of this will require further and more concerted attention if successful outcomes are to be realised.

Box 4-2: Examples of institutional attempts at improved integration

In Asia, many countries have established a national coordination body for that purpose, which in many cases is chaired by the head of state, with ministers of the water-related ministries serving as its members. A water-related ministry (department) that has taken the lead role in water resource development, such as the ministry of water resources, often implements the decisions of these bodies.

For example, Thailand's National Water Resource Committee (NWRC), established in 1989, is independent from water-related ministries. The NWRC is chaired by the Deputy Prime Minister and consists of representative of water-related agencies. Its Office of National Water Resource Committee (ONWRC) is an independent secretariat under the Prime Minister's Office. Such an independent secretariat could contribute to the strengthening of the coordination capacity of the apex body, although it was pointed out that the ONWRC is less effective than expected because it could not work well with an insufficient budget and a limited staff (Pattanee et al., 2003). Currently, the Department of Water Resources, created as the result of institutional reform in the water sector, plays the secretariat role for effective coordination.

In the Philippines, there are two coordination bodies: the National Water Resource Board (NWRB), established under the Water Code in 1974, and the Presidential Taskforce on Water Resources Development and Management (PTFWRDM), established under Executive Order no. 374 in 1996. The NWRB is chaired by the secretary of the Department of Public Works and Highways. On the other hand, PTFWRDM's chairperson is the secretary of the Department of Environment and Natural Resources (DENR). The vice-chairperson is the chair of the NWRB. It appears that some functions are duplicated in the two bodies and need to be clarified. In Sri Lanka, the Water Secretariat was created to formulate water policy and coordinate water-related institutions. However, there is still fragmentation of water-related institutions and coordination among institutions is not enough. For example, there are two main institutions of water management, namely the Water Supply Board and the Water Resource Board, both of which were created by a decision of parliament. The former organisation is in charge of the water supply and promotes surface water use. The latter is in charge of water resource development and focusses mainly on groundwater resources. The difference of focus areas between the two organisations is not considered significant, and it seems to have formed a barrier to the sustainable use of available water resources in the country.

Box 4-3: Institutional reform in Thailand

In October 2002, Thailand experienced a major reform of the public sector. The establishment of the Ministry of Natural Resources and Environment (MONRE) was significant in terms of water management administration in the country. It was developed from the Ministry of Technology, Science, and Environment (MOSTE) and is composed of four clusters, namely, coordination, environment, natural resources, and inland water resources. The responsibility of managing inland water resources that once belonged to the Ministry of the Interior was reassigned to the new Department of Water Resources. The responsibility of groundwater management is now transferred to the Department of Groundwater Resources of MONRE from the Mining Department of the Ministry of Industry. By incorporating the inland and groundwater water clusters, MONRE is to play an important role in water management in the country, both in quantity and quality - ranging from water resource development, water resources rehabilitation and water crisis prevention to pollution control. Government policy on the management of natural resources, including water, is expected to be more effective and efficient under the new ministry. Before the restructuring, the budget of 6.65 billion baht was split up between seven departments in six ministries. Water resources management is now the responsibility of MONRE, which intends to furnish a comprehensive, cost-saving water resource control policy. As well, communication between the environment cluster and the inland water resources cluster under it is to be facilitated both formally and informally.

As the ministry that has the comprehensive responsibility for water resources, MONRE faces a lot of challenges. One of the most important is the coordination with the agricultural development sector under the responsibility of the Royal Irrigation Department (RID). The Bangkok Post reported that there were conflicts between RID and the Department of Water Resources of MONRE over small irrigation (“Ministries in battle over jurisdiction.” Bangkok Post, 2 February 2003). The DWR asserted that they had responsibility for small irrigation for more comprehensive river basin management. On the other hand, RID insisted that all responsibility of irrigation belonged to it. Such conflicts with the agricultural sector may happen in the implementation stage.

Integration of Stakeholders at a Basin Level

Many countries have been trying to incorporate the integrated approach in river basin management. This includes assigning high importance to involving local people directly in river basin management through the adoption of participatory approaches. In most cases, the national government takes the lead by setting up river basin organisations and provides them with support.

In Indonesia, river basin management is promoted by the Water Sector Adjustment Policy of the World Bank. In 1989 the national government of Indonesia identified 90 river basins, and then in 1990 specified authority for their management. The river basins were divided into three categories based on their administrative bodies. The majority of 73 river basins are under the responsibility of the provincial governments, 15 are under the national government, and two are under public corporations. More than 40 river basin water resource management organisations (RBOs) have already been set up. The RBOs rely on financing from the national and provincial budgets and several RBOs received loans from the World Bank. In practicing management at the basin level, many constraints have been identified, such as conflicts between national and local laws, overlapping authorities among the institutions concerned, shortage of human resources and their capacity, lack of hydrological data and monitoring activities, and insufficient participation of stakeholders (Helmi, 2003).

In Thailand, the national government divided up its 25 river basins. Under the National Water Policy, the RBOs or river basin commissions (RBCs) are to be organised for each river basin. According to the draft water act, which is being considered at the national assembly, each river basin commission is to have its own juridical mandates to set policies on the management of water resources and the planning, development and operation of water related facilities, to deal with water allocation, and to oversee all related activities in the river basin including conflict resolution between different users (Pattanee et al., 2003). The commission is to consist of qualified persons from the public and private sectors. Under the Chao Phraya Water Resources Management Strategy, the Chao Phraya Basin Organisation was established in 1997 with the financial support of the World Bank. The Office of National Water Resource Committee (ONWRC) was made responsible for the project. The ONWRC took the bottom-up approach and established RBCs in eight sub-basins. Major water-related agencies, water users, NGOs, farmers' cooperatives, academics, and local governments participated in the RBC activities. Besides the Chao Phraya basin, the ONWRC established three RBCs for the Upper and Lower Ping River and Pasak River basins in 1999 and has launched a number of pilot case studies. Through pilot studies in four RBCs, experiences and expertise will be accumulated and utilised for the establishment of RBCs in the rest of the basins (Pattanee and Aekaraj, 2003). Anukularmuphai concluded that the river basin approach was not successful in the initial stage because there are "no real drivers" to lead effective management due to diversity of members of various agencies and "little input" from local stakeholders (Anukularmuphai, 2004). He submitted that there is still "a long way to go with respect to perfection," but substantial progress was made in basin management from 1999 to the present in terms of stakeholder participation for improving basin management. Some reasons for the improvement include: a) the introduction of a simple and flexible coordination approach to motivate stakeholder participation; b) better institutional arrangements, i.e. the establishment of working groups with infrastructural working groups at sub-basin, district, sub-district and village levels; c) the development of ownership of stakeholders through a series of consultative and working group meetings; d) the emergence of leaders from stakeholders as drivers of discussion; e) the introduction of election or popular consent system to select representatives which contributed to maintain transparency and representation of local interests; f) the support of expertise from donor agencies (the World Bank and ADB) and consultants. It took some time to realise the effectiveness of RBCs. There were many difficulties to overcome in order to make RBCs effective: the fragmentation of governmental responsibility; the limitation of administrative boundaries; less motivation of the local stakeholders; and, tensions among different water beneficiaries. However, the involvement of local stakeholders as direct users of water has the potential of changing current water management by awareness and behavioral changes.

In addition to the establishment of RBCs, partnerships between NGOs and national and local governments in water environment conservation have become popular in Thailand. In the Tachin River basin in Thailand, local people are actively engaged in water conservation activities and the national government supports their activities by providing expertise (Simachaya, 2002). An agreement with local community leaders on the conservation of the Tachin River was concluded and has become the legal basis for local activities. In Kudnamsai, located in Kohn Kaen Province in northeast Thailand, a water-quality monitoring initiative was developed by the collaborative efforts of local academic groups, NGOs, and village leaders during 1999 to 2001. Under the initiative, the Local Environmental Information Centre (LEIC) was established, and community volunteers played a key role in monitoring activities and collection of monitoring data on the Pong River. A series of workshops were held to enhance knowledge and know-how on water-quality monitoring for local people. The monitoring data collected was made available to the public on a local web site. The local initiative promoted local awareness of water-quality issues and also developed the capacity of local people to monitor water quality and take action themselves. It is also notable that the initiative provided a good scientific basis for community leaders and government officials to resolve local water conflicts and realise pollution abatement (Inmuong et al., 2003). In Japan, collaboration between local governments and

citizens has emerged in a few river basins. In the Sagami River Basin, Agenda 21 was developed after long but constructive discussions among local governments, private sectors, NGOs and local community.

The river basin approach is fairly new to many countries in the region. It is a challenge as it proposes to change the river management from the current sectoral mode without the involvement of stakeholders to a more integrated and participatory one. The Network of Asian River Basin Organisations, a new initiative to exchange experiences in the region first proposed by the Japanese government at the WWF3, was launched in 2004 in collaboration with the ADB. The initiative is expected to provide expertise and support regional efforts.

Notwithstanding its relative newness, it is possible to extract from river basin management efforts to date some general lessons and guidelines that may be helpful for future efforts. These would include the following:

- In practicing river basin management, the national government should be responsible for developing local capacity, coordinating institutional arrangements suitable to local situations, and providing financial resources.
- Local governments should enhance their capacity to practice the river basin approach and should take over the coordinating role of the national government as much as possible, because they have direct connection to the local people and are in a better position to facilitate the local people's welfare.
- Involvement of local stakeholders enhances awareness and capacity. Nakagami pointed out that effective river basin management required equality among stakeholders and consensus-building and flexible policy-making mechanisms to meet the actual needs of stakeholders to the extent possible (Nakagami, 1991). He also pointed out that voluntary actions of the local people could be generated when their needs and values were appropriately incorporated into the river basin management plan.
- Transparency of policy-making and ownership by the local people are also important elements to encourage voluntary participation of local stakeholders.

Box 4-4: Implication of river basin management for international water courses

In Asia, many rivers are running through more than two countries, and conflicts over water in these international rivers, such as the Ganges-Brahmaputra-Meghana (shared by India, Bangladesh, Nepal) and the Indus (by India and Pakistan), were historically observed. Riparian countries tried to solve and prevent potential conflicts through bilateral/multilateral agreement over shared water resources. Asia can use the Mekong River Commission (MRC) as a good example of a mechanism that promotes the collaborative management of international water courses. Under the MRC, various activities took place including: the monitoring of water quality, the assessment of water resources, capacity-building and researcher exchanges. Similar collaborative mechanism could be replicated in other international river basins. Like river basin management at the national level, the local people's participation could facilitate more effective management and problem-solving in the international river basins. Partnership projects, such as participatory monitoring, could be a starting point of participation for local people.

Interaction of stakeholders in the enhancement of water supply and sanitation

Improved access to a safe water supply and appropriate sanitation has been an international political issue for more than three decades. In Asia, the development of water infrastructure, such as dams and sewage systems, has usually been emphasised but not always well-operated and maintained because of inappropri-

ate technical and economic capability of local entities. In recent years, construction of large dams and sewage systems has become recognised as not always being an appropriate solution because they frequently brought about negative impacts on the environment and local people. In particular, the poor often could not receive benefits from infrastructure development and continue to live in unsanitary conditions.

Achieving the goal of safe water and sanitation for all is a complex issue. To improve the current situation, it is necessary to introduce appropriate technologies that communities can afford and manage themselves. There is also a need to set up institutional and financial mechanisms to introduce and manage such technologies. National and local governments should be strengthened to take primary responsibility in implementing and maintaining water-related services.

In Asia, a safe water supply and adequate sanitation should be considered in two contexts: namely, rapid urbanisation, and, large populations in rural areas. In urban areas, large water infrastructure is considered efficient, because of the scale of the economy in providing water service to an increasing population. In this context, the generation of financial resources should be considered as a priority and the opportunity for private sector participation should be investigated but with the condition that consideration be given to the needs of the urban poor. Water pricing is a good policy option to rationalise water use, but it should be designed to take into account the affordability of the poor in particular. On the other hand, in rural areas small-scale water supply services or community-level water supply systems are considered suitable, utilising simple technologies.

Public-Private Partnership – Is it an option for the urban water supply?

At the WWF3, a report entitled “Financing Water for All” by the World Panel on Financing Water Infrastructure was presented. The report stated that current spending on new water infrastructure in developing and emerging countries is roughly US\$80 billion annually and that over the next 20 to 25 years this will have to be more than doubled to around US\$180 billion. One of the most challenging and controversial issues was how to finance this huge water infrastructure need. The private sector had a strong interest in the water business and contemplated the liberalisation of the water market, including the water supply and sanitation services. Private sector participation, it is often said, will realise effective and efficient water management. At the WWF2 in The Hague in 2000, “privatisation” and “full-cost pricing”¹⁷ were the keywords in the context of financing.

On the other hand, some NGOs expressed strong opposition to the involvement of the private sector because water was considered indispensable to human security, and the introduction of the market mechanism will interfere with people’s right to access water. To secure equal access to water for all, “public-private partnerships (PPPs)” is often the way forward rather than privatisation.¹⁸ There are some different modes of private sector involvement and they are selected based on local political, economic and social situations. PPPs themselves are an evolving concept, and the following experiences in Asian countries could give some improvements for future PPPs in the region.

Experience of private sector participation in metro Manila

In Manila in 1995, it was reported that the poor spent up to 20 per cent of their income on water from vendors who sold lower quality water at 7.4 times the basic rate charged by the government-owned waterworks company (ADB, 2004). Problems existed in the water supply systems, such as illegal connections and leakage from aging water mains. To improve the water services, the operation of the water supply network was replaced by two companies in 1997 with a 25-year concession. The Manila Water Company took over the east zone of Metro Manila, while the Maynilad Water Services administered the west zone.

The initial result was that water tariffs decreased and supply areas increased after the two companies took over the water services. More people could access piped water, and areas with a 24-hour supply were expanded. Manila’s experience was often cited as a successful case of private sector participation. Later, however, both companies raised the tariff gradually and the current rate now exceeds the original price charged by the state-owned company before privatisation. Although due perhaps, at least in part, to the unusual weather (El Niño) and the financial crisis brought on by the crash of the peso in 1997, the tariff increase became the target of harsh criticism by NGO and advocacy groups. This situation was further compounded in 2003 when the Maynilad Water Services announced that it would turn over its concession to the government-run Metropolitan Waterworks and Sewerage System (MWSS) because of heavy financial debt. This meant that not only the operation and management but also the debts incurred by the company would be returned to the state-owned agency. The net result is that the entire Manila privatisation of water is now widely cited as a typical failure of private sector participation with especially pernicious consequences for the socially-marginalised and the poor.

Table 4-1: Comparison of water tariffs (Philippine Peso)

	Manila water	Maynilad water
1997 (Pre-privatisation)	10.76	10.76
1997 (Post-privatisation)	4.02	7.22
1998	4.02	7.22
1999	4.26	8.23
2000	4.55	8.63
Jan-Oct 2001	5.1	9.17
Nov-Dec 2001	6.32	14.27
2002	9.38	19.92
2003	13.38	24.28

Community participation in public-private partnership – a more participatory option

The Manila experience has served to reinforce a negative viewpoint in some developing countries such as the Philippines and Indonesia with regard to wholesale privatisation of urban water supply. As a result, the new emphasis is on the concept of “partnerships” between the private and public sectors in which the public sector retains ultimate responsibility and provides a safety net for the water supply services. The problem is that, in many cases, national and local governments in developing countries do not have enough financial and institutional capability to provide the safety net. When promoting PPP, capacity-building of the public sector (government) to designing PPPs and adequate legal and institutional structure are clearly necessary.¹⁹ Encouragement of private small-scale water providers can be more facilitated. In Dhaka and Delhi, for example, they play an important role in supplying water for poor areas, although some of them are illegal (McIntosh, 2003). Such a mix of formal and informal mechanisms could enhance private sector participation in a more sustainable way.

Following the failure of Maynilad, new arrangements with another company appears to be achieving positive social benefits. These arrangements may point to future directions in public-private partnerships. The first element is the provision of incentives to the employees. Area managers of the company have a responsibility for the day-to-day management of the water supply to the area assigned, and those who per-

form better will be financially rewarded (Llorito et al., 2003). This system created the right incentives to area managers and enhanced the efficiency and effectiveness of the services. The second element is the fact that almost the entire staff (95 per cent) of Manila Water transferred to the public-owned company, MWSS. With proper training and motivation, human resources with experience in local water services had been mobilised. The third element is the partnership with local communities. The company promoted new lines to poor communities to provide cheaper water for the poor and also promoted partnership projects with the local (Box 4-5). Flexible and participatory schemes, developed in partnership with local communities and rendered more suitable to local situations, could bring more water to poor end-users.

Box 4-5: Community participation in public-private partnership in Manila
– *Tubig para sa Barangay* –

Manila Water promoted “*Tubig para sa Barangay*,” a project that means “water for the community.” The project puts the responsibility of water management on a group of households or community group leaders, and promotes efficiency and effectiveness of the water supply by strengthening the sense of responsibility among group members. By the middle of 2002, 61,000 households had received new connections through the project. Basically, the company investigates the status of the target area, identifies community leaders and decides appropriate supply methods in communication with community members. There are three schemes available to local communities. In the first scheme, each household pays for an individual metered connection. In the second, 2-5 households share one metered-connection, for which payment is made as a group. One household acts as the leader and collects the payment from the rest of the group. The third option is the community-managed water connection, in which community leaders are responsible for meter reading, billing and collection of fees from all household members. The leaders can cut the connection if someone does not pay the fee. If a member does not pay the bill, other members of the group will suffer. Such group pressure encourages timely payment and also strengthens the sense of responsibility among community members for water supply services. Leakage and illegal connection are now reported to Manila Water by the community members. This has helped the company to reduce non-revenue water.

Source: ADB, Bringing Water to the Poor –Selected ADB Case Studies

Potential roles of communities and local NGOs - a case in Dhaka

The role of communities and NGOs in water services has been recently highlighted in terms of sustainability of the services. The Dhaka case (Box 4-6) shows that local NGOs can be facilitators between the poor and the public sector in water supply. As Dhaka’s case indicates, NGOs can often promote the access of local communities to water services better than public or private sectors. Better communication skills and a more flexible and transparent project management style could be the reasons for NGOs’ better performance.

The Dhaka case also suggests that it is important for those working for water services operated either by public or private sectors to keep all stakeholders informed about the choices in technology and financial and other significant matters. Important information should be shared among major stakeholders in a transparent and timely manner.

Box 4-6: Intermediate role of NGOs in the water supply to the poor in Dhaka

The Dushtha Shasthya Kendra (DSK), an NGO in Bangladesh, succeeded in increasing the access to the public water supply and sanitation systems for some squatter settlements in Dhaka by playing an intermediary role between the poor residents and the Dhaka Water Supply and Sewerage Authority (DWASA). Thirty-two water points and five latrines were installed in two years (1996-1998), and the success encouraged other NGOs to follow the DSK model.

Before the DSK introduced the public water supply, residents of the squatter areas, mostly women, had to obtain water from nearby factories, offices, and illegal water providers. Poor residents even took water from a waste-water pool at a chemical company. Safe water is necessary for these poor residents. To provide safe water for the poor, DSK tried to persuade DWASA to construct public water and sanitation utilities for those who did not have legal tenure. In principle, DWASA policy did not provide connections to households without legal tenure of their plot. However, it agreed to provide the water service for the poor areas on condition that DSK guaranteed security deposits and bill payments. DSK tried to enhance the capacity of the poor community to operate and maintain the new facility by themselves. A few water management committees were set up, which were responsible for the management of water points and the collection of fees. Committee members were selected among individuals of poor communities, or in some cases, all members of the community participated. Regular group meetings helped monitor the status of water services. In some cases, water management committees generated savings and promoted hygienic activities.

Source: Rokeya Ahmed. 2003. NGO Intermediation: A Model for Securing Access to Water for the Urban Poor.
http://www.wateraid.org.uk/in_depth/in_depth_publications/1503.asp (15 November 2004)

Water Harvesting – An option for more water

In the face of limited water resources availability, one of the ways to create “usable” water is by water reuse and recycling. In Singapore, highly treated waste-water of drinkable quality was introduced as “NEWater.” Because of technological advances that have reduced costs, seawater desalination has recently become an affordable option for some areas in the region, such as Singapore. Rainwater harvesting is another way to provide reasonably-priced water. Rainwater harvesting, which is the collection and storage of rainwater, can be practiced on rooftops, land surface or rock catchments. Water harvesting has a long history in Asia dating from ancient times, but in most areas it was abandoned as modernisation proceeded. However, as water shortage has become more serious, water harvesting has been gaining greater attention as a major source of drinking water, especially in rural areas. For example, in China, it is said that rainwater harvesting projects improved the domestic water supply for about 21 million people by the end of 1999. In the semi-arid areas such as Gansu, Shanxi, the artificially treated rainwater collection fields were built in an area of about 400 million square metres, to make rainwater collection more efficient (Qiang, 2004).

Water harvesting needs only simple technology and the initial and maintenance costs are not high. Therefore, local people can use and maintain water harvesting systems by themselves. Many success stories regarding water harvesting have been reported in many parts of Asia. One successful example is Thailand’s “National Jar Programme” which was launched in response to the United Nations Water Supply and Sanitation Decade (1981-1990) (UNEP, 2002). The programme promoted the use of jars for rainwater collection in rural households with the involvement of local people. In the initial stage, the Thai government provided financial support for the selection of suitable technology, training, and construction

materials to local people because they could not afford the initial and maintenance costs and did not have the technical capacity. All that could be provided was in-kind labour. Government interventions had been phased out over the course of the implementation period. Operation and maintenance costs, thereafter, had to be paid by the users themselves. However, many people gradually realised that water harvesting was quite beneficial to them. Demand for jars increased and a market for jar production was created. Eventually this rendered the government's subsidies unnecessary. A recent survey revealed that the rainwater harvesting reduced the costs that a typical household spends for clean drinking water to \$8.50/m³/year, which is more than 75 times cheaper than bottled water (UNEP, 2002).

Another success story took place in Gandhigram, India, where rainwater harvesting was introduced since 1995 (rainwaterharvesting.org). Necessary infrastructure such as a distribution system was constructed with support of the Shri Vivekanand Research and Training Institute, an NGO, government of India and private donors. Rainwater harvesting proved effective in providing water for the local people and also in increasing the recharging capacity of streams and groundwater. The distribution of harvested water was managed by a local body, and a water charge of Rs3 per month from each household was collected to cover the operation and maintenance costs. It was reported that villagers preferred paying the fee in return for a stable water supply rather than depending on the government's unreliable water supply. Harvested water is also used for irrigation. A village institution was established to monitor the water quantity harvested and to discuss irrigation plans with local farmers. Farmers pay Rs250 per ha for irrigation water and fees collected are used for the maintenance of the infrastructure. This community-based and participatory water management promoted the rational use of water and even increased the crop yield. The increase in yield, then, resulted in an opportunity to grow new crops, such as wheat and onions, which in turn created additional jobs for landless farmers (Centre for Science and Environment, 2004).

As these examples indicate, water harvesting can increase water availability and enhance the community involvement in water management. In India's case, the village institution for irrigation water management plays a critical role in realising reasonable and equitable use through information-sharing and consensus-building. The participation of local people in the operation and maintenance of water harvesting systems can promote sustainability of the project, because local people clearly see the benefits of good management. It can be said that people increase their willingness to pay once they are convinced of the benefits from rainwater harvesting. Water harvesting is a promising option for water supply. It could also facilitate the participation of local people in water management and enhance the sustainability of the local water supply.

When water harvesting is promoted, health risks associated with harvested water need proper attention. Rainwater is originally pure and drinkable but it could be contaminated by pollutants in the air. In storage, it can easily become contaminated and a source of vector borne diseases. In the promotion of water harvesting, a system is necessary to minimise the health risks associated with harvested water. Technically, simple methods of water treatment should be introduced. These include boiling, slow sand filtration and solar disinfection.

For further promotion of rainwater harvesting, communities should be informed of up-date information on technologies available to maximise efficiency. To secure the water quality of harvested water is also important. In this regard, national or local governments could help the local communities by providing technical information and by facilitating a regular check on water quality. International actors could also act as an important facilitator of water harvesting as they may be able to provide technical and modest financial support. There is an initiative to set up an international water harvesting technology network. Such a network should be strengthened by regional and sub-regional networks.

Conclusion: Light at the end of Asia's tunnel

From the overview of water availability and the projected water demand curve of Asia, it is obvious that the region will face an increasingly serious water crisis in the near future and it is inevitably linked to development in the region. Indeed, without major new efforts, a catastrophic scenario of human misery, economic reversal and political unrest is likely. To avoid this it will not be enough to continue to seek technical solutions for short-term gains. Rather more attention should be accorded to demand control and to more integrated and strengthened water management systems.

As this chapter has shown, traditionally, regional water resources have been managed by the national government. However, government mismanagement, such as pro-development water policies and the neglect of local water needs have often caused conflicts with local people such as a large dam construction. The fragmented management approach has also contributed to mismanagement of water resources. These past failures highlight the importance of employing integrated and participatory approaches in water management.

To improve the current management of water, national governments in the region have tried to re-arrange water-related institutions which are often fragmented by sectors. National committees were established in many countries in the region for integrated water management. In today's global community, interaction between the international and national actors has been intensifying and national water policies have been developed under the interaction with international actors such as the GWP. Through financial assistance, international financial institutions have had a great impact on water policy-making. Sometimes such interventions by international actors have caused conflicts at the local level.

Local governments and other non-state actors are beginning to play a new role in water management, partly supported by decentralisation. NGOs and community groups have entered into the mainstream of water policy-making and implementation, in particular at the local level. Water is closely related to local social and economic conditions and there are many different interests over how water is utilised. To sustainably manage water resources, individual stakeholders at all levels should recognise their respective roles, and strengthen their capacity to meet their roles. Synergies among them should be enhanced through continuous discussion and collaboration for better management of water resources. Thailand's experience with river basin commissions showed that the involvement of stakeholders is not always accompanied with "efficiency" but the series of consultation and adequate arrangement of participation can promote awareness and enhance a sense of ownership by the local stakeholders and result in active participation in collaborative management at basin level. The Thai experience also shows the effectiveness of appropriate input by experts from international and local actors in supporting the promotion of basin management.

Private sector participation is an option to introduce an adequate water supply especially to urban areas, but Manila's experience suggests that this needs to be accompanied by partnership arrangements, including prudent public sector management. Manila's experiences showed the risks that can come with complete privatisation and also that it may be possible to minimise such risks by introducing an adequate legal and institutional framework through the appropriate regulatory body.

To further accelerate the positive changes over water management in the region, the following actions are recommended. Involvement and mobilisation of all stakeholders at various levels should be promoted, in principle. Such involvement sometimes will be time-consuming and may seem ineffective, but without the involvement of key stakeholders, implementation would face difficulties. Some examples in Asia in this chapter indicate that collaboration among different stakeholders and the development of trust and mutual understandings through successful experiences could bring more sustainable solutions.

(i) Provide adequate knowledge and information for decision-making

To facilitate sound discussion and decision-making on water management, adequate knowledge and information should be provided by both local and international experts.

At both national and local levels, access to information, including data on hydrology and water-quality, as well as the financial status of the water project in question, should be provided in a timely manner. Both international and national bodies should help improve access by employing adequate mechanisms of information dissemination. International and regional cooperation should play a role in providing consultation and facilitate the smooth flow of information.

It should be also noted that the Millennium Ecosystems Assessment, led by the World Resources Institute (WRI) and the United Nations University (UNU), has now been completed and presented cutting-edge scientific research output to policymakers. To maintain the momentum of this international effort a mechanism of scientific assessment should be internalised in the international community and a regional committee on scientific assessment should be established under such a mechanism.

(ii) Institutionalise local stakeholder participation in river basin management

At the river basin level, the participation of local actors is crucial. River basin organisations should ensure the participation of all relevant stakeholders. Through activities conducted by river basin organisations, local actors transform themselves from passive observers as watchdogs of national or local governments into active players in implementing actual projects. This bottom-up approach facilitates their sense of ownership and promotes voluntary actions.

Local actors, including local governments, NGOs, and local communities, need more strengthened capacity to cope with problems in their locality. Capacity-building is necessary and implemented in a way that suits the needs of local actors. Capacity-building for local governments should have a focus on general management, accounting and technical knowledge so that they can assume an effective role to promote integrated and participatory water management.

To ensure the process, the legal and institutional foundation should be strengthened. The same approach could be extended to international river basins.

(iii) Promote more private sector participation incorporating past lessons

To attain the targets of the MDGs, adequate funds should be raised and more substantial discussions should take place on how to finance water-related infrastructure. Dependence on international donors has limitations and some NGOs and communities are now presenting counter-arguments to the introduction of private sector participation. If there is no coordination on the issue, the discussion may follow parallel courses of action without reaching agreement. The existing experience of private sector participation in the region shows some alternative options such as community participation in public-private partnership. To meet the basic needs of those who do not have water services, intensive discussions to develop realistic solutions should be facilitated with the participation of all the stakeholders concerned.

In relation to private sector participation, water pricing issues should be studied further. It can be a good instrument to control water demand, but equity concerns should be properly addressed.

(iv) Apply simple and easy technologies that can enhance the participation of local people

Water harvesting is an example of simple and easy technologies that are effective and at the same time

enhance community participation in water management. Other technologies could include technologies for waste-water reuse and recycling, and water storage in wetlands. To maximise the use of water resources available, specific water quality guidelines for different uses, such as drinking, washing, producing products, and agricultural use, should be introduced to further promote simple technologies.

For the agricultural sector, drip irrigation, static irrigation and small scale irrigation promote water conservation. The application of such technologies should be promoted by international organisations and national/local governments to provide adequate information and initial financial support. Adequate legislative measures, for example, for the installation of roof top water harvesting equipment on new buildings, should be taken by national/local governments.

(v) Establish participatory assessment and monitoring systems

The current development of water sector needs to be assessed properly and then adjusted to reflect the actual situation in individual countries. An apex body, or an independent secretariat for water resources management, should take the initiative of conducting the assessment. The assessment should be a learning process and should be designed to contribute to the capacity development of government staff. Civil society's participation should be ensured in the assessment process. In assessing and monitoring an on-going project, the participatory approach should be taken wherever possible, because diversified views held by stakeholders involved will be useful in improving the project, particularly in terms of project sustainability and strengthened local support. It could greatly contribute to promoting the transparency of information.