



FROM VISION TO ACTION

A SYNTHESIS OF EXPERIENCES IN SOUTHEAST ASIA

Le Huu Ti

and

Thierry Facon

THE FAO-ESCAP PILOT PROJECT ON NATIONAL WATER VISIONS

Bangkok, October 2001

RAP/2001/06
ISBN: 974-88406-3-8

THE FAO-ESCAP PILOT PROJECT ON NATIONAL WATER VISIONS

FROM VISION TO ACTION

A SYNTHESIS OF EXPERIENCES IN SOUTHEAST ASIA

Le Huu Ti

Economic Affairs Officer
Water and Mineral Resources Section
Environment and Natural Resources Development Division
United Nations Economic and Social Commission for Asia and the Pacific

&

Thierry Facon

Water Management Officer
Regional Office for Asia and the Pacific
Food and Agriculture Organization of the United Nations

Bangkok, October 2001

**This report was prepared as the Final Project Report
for submission to the Environment and Natural Resources Development Division
of ESCAP and to the FAO Regional Office for Asia and the Pacific.**

**The views expressed herein are those of the authors and do not
necessarily reflect the views of the United Nations
or of the governments involved in the project.**

All rights reserved.

This publication may not be reproduced, in whole or in part, by any method or process, without written permission from the copyright holders. Applications for such permission with a statement of the purpose and extent of the reproduction desired should be addressed to the Head of the Environment and Natural Resources Development Division, ESCAP, UN Building, Rachadamnern Nok, Bangkok 10200, Thailand, and to the Head of the Water Resources Management Section, FAO RAP, Maliwan Mansion, Phra Athit Road, Bangkok 10200, Thailand.

© FAO/ESCAP 2001

CONTENTS

FROM VISION TO ACTION: A SYNTHESIS OF NATIONAL WATER VISIONS IN SOUTHEAST ASIA – Le Huu Ti & Thierry G Facon	1
MALAYSIA’S WATER VISION: THE WAY FORWARD – The Malaysian Water Partnership	25
THE PHILIPPINES: FORMULATION OF A NATIONAL WATER VISION – Hector Dayrit	43
THAILAND’S WATER VISION: A CASE STUDY – Sacha Sethaputra, Suwit Thanopanuwat, Ladawan Kumpa, Surapol Pattanee	71
VISION OF VIET NAM’S WATER, LIFE AND ENVIRONMENT IN THE 21ST CENTURY – To Trung Nghia	99

FROM VISION TO ACTION

A SYNTHESIS OF NATIONAL WATER VISIONS IN SOUTHEAST ASIA

Le Huu Ti
Economic Affairs Officer
Water and Mineral Resources Section
ESCAP

Thierry Facon
Water Management Officer
FAO Regional Office for Asia and the Pacific

I. INTRODUCTION

1. Background

The World Water Vision process, which was developed before the Second World Water Forum, held in the Netherlands in March 2000, has generated a great deal of enthusiasm towards better management of water resources in the region and elsewhere. In order to build on the momentum generated by this global initiative and turn it into a regional cooperation programme for a more effective contribution of the region to the World Water Vision efforts, a programme of cooperation between the Food and Agriculture Organization of the United Nations (FAO) and the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) was initiated in 1999 with a view to promote the development of national water visions. In the initial phase of the programme, ESCAP and FAO, in collaboration with other international organizations, were to jointly review important achievements in the methodology of developing water visions, and FAO would make financial resources available for four case studies to be carried out in as many countries of the region.

Current joint initiative versus the World Water Vision process: The development of a World Water Vision is perceived as a learning process. The joint initiative was therefore conceived as an anchoring component of the process in the region. It was expected that the joint project would contribute to laying down a cornerstone for the continuing national water vision building process and to establishing a firm foundation for a regional water vision development programme. In this connection, for each of the four countries selected, the case study carried out by a contracted national expert in cooperation with the respective supporting water resources institutions would include a review of past national efforts in the formulation of a national water vision and would lead to an updated version of national water visions including plans of priority action. The terms of reference prepared for the services of the national experts required in the initial phase of the project also aimed at building up a regional network of experts for long-term cooperation in water resources management.

2. Approaches already adopted for the vision process

The outcome of the many efforts made during the past two and a half years to define a world water vision is complex, as pointed out by the response from the Stockholm water symposium: *“There was a unanimous agreement that the Commission report needed to be focused on a few issues with recommendations for a strategy to solve them”* (Debbie Gray, IUCN-Canada, 28 Sep 1999). However, in terms of approach, there was a strong similarity in methodology, in other words a consensus on the overall planning process, which led to “Vision” and then to “Action”.

Apparently, it has been agreed all along that the development of a world water vision is a process, and that the formulation of a vision is as important as follow-up actions. The view of the Water Supply and Sanitation Collaborative Council as expressed in its Vision 21 showed the conceptual approach adopted so far: **Knowledge synthesis > vision > changes > goals > strategy > plans > action.**

Similarly, the group in charge of the preparation of “Vision on water for food and rural development” adopted a five-step process: **Vision > principles > driving forces > our choices > strategy for action.**

These conceptual approaches to vision building are fundamentally similar and were apparently accepted by most people taking part in the Stockholm water symposium, in particular the need for practicable strategies and realistic action plans.

3. Purpose of this paper

This paper is prepared at the end of the initial phase, which marks also the beginning of a stronger and closer regional cooperation process to synchronize regional efforts for better-integrated water resources management and for more-effective contributions to economic and social development in the region. In that regional context, the paper aims to describe the initial phase of the process, findings and recommendations deriving from these efforts, and possible strategies for concerted regional collaboration.

II. IMPLEMENTATION OF THE PILOT PROJECT

1. Implementation arrangements

a. Selection of countries for pilot case studies

In order to capitalize on the achievements of the Global Water Partnership for the World Water Vision process and taking into account the limited resources available within the pilot projects, it was decided to select the following countries as case studies for the pilot project: Malaysia, the Philippines, Thailand and Viet Nam. It should be pointed out that in the context of the formulation of a regional water vision for Southeast Asia, a number of studies were carried out in these four countries in 1999 and the early part of 2000. These studies included the formulation of a national water vision through the mapping of gaps and needs in integrated water resources management and the formulation of a framework for action in the water sector. The findings and experience derived

from these studies were used to develop an approach for the implementation of the pilot project as elaborated in Section II.2.

b. Implementation arrangements

As the pilot projects emphasized the process of turning national water visions into action, it was decided to select the implementation modalities that would ensure continuity of the efforts and sustainability of the momentum generated by the projects. Such modalities would need to build on the central role of the national agency responsible for the formulation of national water resources policies or plans in the selected country. In the implementation of the project, efforts were made to identify experts from the related national agencies as the project consultants. In the process, the project consultants received the help of other key government agencies as well as NGOs and the private sector in the respective countries, as listed below.

- **Malaysia:** Dr Salmah Zakaria, Director of the River Engineering Division of the Department of Irrigation and Drainage, Malaysia, and her colleagues, in cooperation with the Malaysian Water Partnership.
- **Philippines:** Mr Hector Dayrit, Executive Director, National Water Resources Board, in cooperation with the ITN Foundation and the SEATAC Secretariat of the Global Water Partnership.
- **Thailand:** Mr Surapol Pattanee, Director of the Policy and Planning Branch, Office of the National Water Resources Committee, in cooperation with a national team of experts from key agencies.
- **Viet Nam:** Dr To Trung Nghia, Director, Institute of Water Resources Planning, and his colleagues.

The project required substantive contributions from ESCAP and FAO, not only in coordinating contributions and reviewing the national studies, but also in preparing technical papers on international experiences and approaches adopted in the formulation of a national water vision for integrated management and for agriculture and rural development. This synthesis paper is also part of the substantive contribution made by the technical staff of ESCAP and FAO to the pilot projects with a view to prepare for follow-up action in the common regional endeavour.

2. Approach adopted in the pilot project

The vision exercise's ultimate purpose is to generate awareness throughout the world of the water crisis that we face and the possible solution for addressing it before it is too late. This will lead to the development of a new policy, a legislative and institutional framework operational at all levels, from the individual to the international, to manage the world's freshwater resources effectively, efficiently and equitably in the interests of humankind and Planet Earth. (A vision of water in the twenty-first century)

For the same purpose as the one mentioned above, it can be noted that strenuous national efforts towards sustainable management of water resources have continued over the past few decades, particularly since the adoption of the Mar del Plata Action Plan by the United Nations in 1977. The water vision process, however, introduced a new methodology aiming at developing a more strategic approach to the management of world water resources. Within this process and in line with the

purpose of the joint technical cooperation between FAO and ESCAP, national experts were recruited to be responsible for the case studies and to carry out the following tasks:

a. Preparation of country case studies

In order to facilitate comparison of efforts and compilation of experiences in the formulation of national water visions for action, general guidelines for the preparation of the country case studies were adopted, with the following components:

(1) Review the national experiences related to the formulation of a national water vision

The vision process must be viewed from the perspective of a pragmatic programme or framework of action to respond to the different development needs (short-term and thus urgent, as well as long-term needs) and to ensure the sustainable management of the water resources of a country. This section was therefore devoted to a discussion of the national processes and related experiences.

(2) Identify the key components of the process of formulation of a national water vision

The world water vision process showed that the formulation of a water vision would require consultations at different levels (first and second rounds) and different components (subsector visions, regional visions and thematic and regional vision syntheses). In such an integrated process, sectoral visions may be developed, such as for water supply and sanitation, food security, environment and ecosystems, and water in rivers. As the importance of the subsectors may be different from one country to another, the selection of components or subsectors was decided during the implementation of the projects. In order to ensure the active participation of all stakeholders, the relative importance of the components was conceived from the perspective of the stakeholders participating in each project.

(3) Review the framework for the development and management of a national water vision

In this component, implementation and management of a national water vision was to be examined not only in the context of the development of a **shared** vision, but also based on a pragmatic framework for integrated water resources management. The fact that water resources management is increasingly practiced worldwide at the river basin level to meet both socio-economic needs and the needs of nature was also taken into account. A comprehensive discussion would therefore include the relative importance of the framework of water resources management at river basin level in the context of the water vision formulation process.

b. Organization of national roundtable discussion of the case studies

After they were submitted to ESCAP as planned, the first draft reports on the case studies were reviewed by the ESCAP and FAO officials concerned, who forwarded their comments to the national experts involved. After revisions were made, a two-day roundtable of national experts was organized in each pilot country by the respective supporting national institutions and experts according to the following schedule:

- ***Viet Nam:*** 25-26 April 2000 in Hanoi – attended by 36 participants, i.e. 24 officials from the Ministry of Agriculture and Rural Development, 11 officials from other ministries and one NGO representative.
- ***Philippines:*** 3-4 May 2000 in Manila – attended by 74 senior officials from various water-related subsectors and institutions including water professionals and social scientists. The roundtable workshop was organized by the National Water Resources Board in cooperation with ESCAP, FAO, the SEATAC Secretariat on behalf of the Global Water Partnership, and the ITN Foundation.

- **Malaysia:** 23-24 May 2000 in Kuala Lumpur – attended by 21 participants including representatives of various agencies of not only the federal government but also selected state governments working on water resources projects, academics, NGO representatives and members of the private sector.
- **Thailand:** 19-20 June 2000 in Bangkok – attended by 37 participants from key water-related agencies, selected provincial officials, and representatives from NGOs and the private sector.

In all these roundtable workshops, FAO and ESCAP officers presented their findings on the world water vision process and took part in detailed discussions.

c. Preparation and submission of the final country reports

After the completion of the roundtable workshops, the case study reports were revised to incorporate the findings and recommendations of the roundtable discussions and were submitted for review and comments to the ESCAP and FAO officials concerned. The final reports are available upon request. In the subsequent chapters, the main findings and recommendations of these reports are summarized and examined in the context of a regional cooperation programme taking into account the latest developments. The relevant project reports are listed in the reference section of this synthesis.

III. IMPORTANT FINDINGS AND RECOMMENDATIONS

As this synthesis report is prepared to provide complementary aspects to the four country studies, it endeavours to present a comparative picture of the countries, important findings in the implementation of the initial phase, experiences derived from the national processes of formulation and implementation of national water visions, and various recommendations.

1. A comparative analysis of achievements in the selected countries before the studies

The four pilot countries covered in the initial phase of regional cooperation between ESCAP and FAO over the study of water resources management provide a good perspective on the socio-economic development of developing countries in the region as well as on water resources management. As can be seen from Table 1, these countries recorded relatively high economic growth rates over the past two decades (with GNP growth of between 3 and 8 percent per year) and experienced an important transformation in their economic structure, moving away from a mainly agriculture-based economy towards an increasingly industry-based (Malaysia and Thailand) or service-based (the Philippines) economy, with the exception of Viet Nam, which is still predominantly agricultural. As agriculture accounts for most of the use of water resources, the economic transformation provides an interesting perspective on the development of and achievements in water resources. This is true not only for the role of water resources management in economic transformation, but also for the implications of the recent financial crisis, which started in 1997. From Table 1, it can be seen that the financial crisis has increased the relative importance of the agricultural sector in the Philippines and in Viet Nam, and severely affected economic conditions in Thailand and Malaysia (with a reduction in GDP of 10.2 and 7.4 percent in 1998 respectively – World Bank, 2000).

In this context, the study of achievements in water resources management over the past decades in the four countries shed welcome light on the background of the processes leading to integrated water resources management and to the formulation of national water visions. In these national processes, the role of water resources development and management could be examined from the point of view of economic efficiency, as a stabilizing factor of socio-economic development in the countries concerned. The implementation of the projects also led to complex perceptions of economic efficiency in water usage, such as the adoption of the concept of “virtual water” in the formulation of water policies and strategies. With respect to the concept of a stabilizing factor, the use of water resources for agricultural development is now seen in the much wider and more sophisticated context of globalization and the market economy. During implementation, attempts were made by the respective agencies to identify measures and indicators in order to assess the economic efficiency of water usage and to provide management options that take into account the role of the market in enhancing the stability factor provided by the agricultural sector.

On the other hand, it should be noted that there are important differences in the legal and institutional frameworks for integrated water resources management among the countries. However, in all countries, efforts are being made to improve the frameworks as well as stakeholder participation.

Table 1. Key economic indicators of the pilot countries

	1979	1989 1998	1998	1999
Malaysia GNP (US\$ billion)	21.6	38.8	72.5	79
Agriculture (% of GNP)	24.4	18.1	13.3	10.7
Industry	39.1	39.8	43.6	46.0
Manufacturing	20.2	23.8	28.7	31.5
Services	36.5	42.1	43.2	43.4
Philippines GNP (US\$ billion)	27.4	42.6	65.5	76.6
Agriculture (% of GNP)	27.4	22.7	17.4	17.7
Industry	37.0	34.9	31.3	30.3
Manufacturing	25.1	24.9	21.8	21.5
Services	35.6	42.4	51.3	52.0
Thailand GNP (US\$ billion)	27.4	72.3	112.1	124.3
Agriculture (% of GNP)	24.0	15.1	13.4	11.6
Industry	30.3	36.3	37.4	41.7
Manufacturing	21.0	26.7	29.2	–
Services	45.7	48.7	49.2	46.7
Viet Nam GNP (US\$ billion)	–	6.3	25.9	27.4
Agriculture (% of GNP)	–	40.8	27.0	27.1
Industry	–	22.9	34.0	36.7
Manufacturing	–	19.1	–	18.7
Services	–	36.2	39.0	36.3

Source: World Bank Website, World Bank, 2000

2. Findings related to the formulation and implementation of national water visions

On the basis of the adopted approach for the implementation of the project mentioned in Section II.2, the formulation and implementation of a national water vision involve not only various aspects of the national water vision, but also the priority components (sectors or areas) of integrated water resources management of the countries.

a. National water vision statements

- **Malaysia** *In support of Vision 2020 (towards achieving developed-nation status), Malaysia will conserve and manage its water resources to ensure adequate and safe water for all, while taking care of preserving the environment.*
- **Philippines** *By the year 2025, water resources in the Philippines are used efficiently, allocated equitably and managed in a sustainable manner, with provision for water-related disasters.*
- **Thailand** *By the year 2025, Thailand will have sufficient water of good quality for all users through efficient management and an organizational and legal system that will ensure equitable and sustainable use of the water resources, with due consideration given to the quality of life and the participation of all stakeholders.*
- **Viet Nam** *The Vietnamese water vision is the integrated and sustainable use of water resources and the effective prevention and mitigation of harm caused by water for a better future on water and for a better life and environment.*

The national water visions thus defined were developed through a number of national workshops, starting from the assessment of the need to apply integrated water resources management (as initiated by the Global Water Partnership). The above statements were formulated in connection with the development of a framework for action on integrated water resources management. Although the frameworks for action developed in the pilot countries are more or less similar, details of the linkage between the national water visions and the respective frameworks for action differ, depending on the number of national consultations conducted before the implementation of the project. Further details can be found in the country study reports.

b. Implementation of the national water visions

From the results of the national consultations conducted in the project, it is important to note the recognition and appreciation of the need for consistent and fruitful implementation of the national water visions of the four pilot countries by all the key agencies involved. These key agencies also expressed their firm commitment to implementing the respective national water visions. All other concerned agencies also expressed their keen interest in being involved. The implementation of the national water visions was examined through the various stages of the strategic planning process during the national roundtable workshops. In such a process, analysis was made to take into account the need for a sustainable programme of action and in particular for the effective integration of these efforts and activities into the national development process. The planning analysis also included the implications of the participatory approach (**shared vision**), the need for brief institutional analyses

(**key agencies and their respective missions**), key approaches to planning and management (**integrated river-basin approach**) and good governance principles (**performance indicators and monitoring**). It should be pointed out that from the strategic planning analysis mentioned above, the opportunities identified by the participants in the various consultative workshops differed, depending on the actual conditions and stage of development of each country. Furthermore, since this was only the beginning of a regional process of consolidation in the development and implementation of national water visions, no attempt was made to have all perceptions come together under a single format.

For the smooth and consistent implementation of a national water vision, the leading agencies were identified as follows:

- **Malaysia:** The workshop identified the various steps and policies required, and the key agencies or organizations responsible for these policies. For the endorsement and acceptance of the national water vision by all stakeholders, it was suggested that the Economic Planning Unit (EPU) and the Malaysia Water Partnership (MWP) take the lead in cooperation with the related state agencies. The workshop recommended the establishment of appropriate mechanisms for coordination with and monitoring by the National Water Resources Council, the EPU/Implementation Coordination Unit, the state EPUs, the state Land Councils and the water regulators. The workshop also recommended that MWP take the lead in a common effort to sensitize NGOs and facilitate their involvement in the implementation of the framework for action, maintain and regularize consultations among the key partners of the national water vision, and in cooperation with the ministries of Education and Information, enhance public awareness of the vision. Finally, the workshop recommended that EPU invite MWP to join the technical working group preparing the Eighth Malaysian Plan (2001-2005) and the Third Outline Perspective Plan (2001-2010).
- **Philippines:** As the government coordinating and regulating agency for all water resources development activities in the country, the National Water Resources Board (NWRB) agreed to take the lead role in the implementation of the national water vision and the proposed framework for action, as recommended by the workshop. In addition, in view of the magnitude of work that has to be done to turn the vision into action, the workshop initiated the formation of a partnership, the Philippine Water 21 Partnership, as the first step to jumpstart the vision into action. During the workshop, most of the experts representing various agencies and organizations indicated their commitment and readiness to join the partnership. Also at the workshop, NWRB and the Philippine Center for Water and Sanitation: International Training Network (ITN) Foundation agreed to lead the partnership to implement the national water vision and prepare for the Third World Water Forum in 2003.
- **Thailand:** Major efforts have been made during the past two years to improve water resources management in Thailand, including the agriculture-restructuring programme. Included in the ongoing programme are various components aimed at strengthening the legal and institutional framework and management capacity of various agencies. At the centre of the efforts for capacity building is the Office of the National Water Resources Committee (ONWRC). At the national consultation workshop, all the participants recommended that ONWRC take the lead in the implementation of the national water vision and that necessary strengthening in the legal and institutional framework of ONWRC be made, as part of the implementation of the national water vision. In this context, the workshop recommended that ONWRC be responsible for the following key elements of the water-vision implementation process: (a)

working out a process leading to acceptance of the vision; (b) monitoring progress towards the vision, (c) coordinating the implementation of related action plans, (d) developing and applying performance indicators, and (e) reporting on progress and achievements.

- **Viet Nam:** The Law on Water Resources was approved by the National Congress in May 1998 and came into effect in January 1999. The Ministry of Agriculture and Rural Development is the leading body responsible for the implementation of the law. The national consultation workshop recognized the importance to integrate the implementation of a national water vision into the implementation of the Law on Water Resources, which is being carried out with vigour and enthusiasm by all the parties concerned. In the context of that law, the National Water Resources Council was established in June 2000. The council is expected to take a leading role in the implementation of the national water vision; in particular, it will “*advise the government on all key water resources management issues at the national level, including mobilization and participation of all communities and stakeholders, in order to successfully achieve the national water vision*”.

Besides the identification of the lead agency or agencies, the national workshops identified other key features and elements for the implementation of the vision in their respective countries. These can be summarized as follows:

- **Malaysia**

The following key objectives of the vision were identified:

Water for people: all have access to safe, adequate and affordable water supply, hygiene and sanitation.

Water for food and rural development: provision of sufficient water that will ensure national food security and promote rural development.

Water for economic development: provision of sufficient water to spur and sustain economic growth within the context of a knowledge-based economy and e-commerce.

Water for the environment: protection of the water environment to preserve water resources (both surface and groundwater) and natural flow regimes, biodiversity and the cultural heritage, and to mitigate water-related hazards.

A set of initiatives was deemed necessary to achieve the above key objectives of the vision: (a) managing water resources efficiently and effectively (addressing both quantitative and qualitative aspects); (b) moving towards integrated river basin management; (c) translating awareness to political will and capacity; and (d) moving towards adequate, safe and affordable water services that would benefit developed-nation status by 2020.

The way forward to realize the national water vision was identified as the establishment of associated programmes in the Eighth Malaysia Plan (2001-2005) and the Third Outline Perspective Plan (2001-2010), especially for the following areas: (i) adoption of the national water vision, (ii) formulation and adoption of a national water policy, (iii) establishment of river basin organizations, (iv) water pollution control and river rehabilitation, (v) groundwater exploration and management, (vi) water-demand management, and (vii) research and development. The national water vision will be adopted to ensure continuous supply of water in terms of quantity and quality to meet all needs, including the protection of the environment. This vision shall be one of the main agendas of the sustainable national development plan.

The strategy and plan of action to realize the vision are to be formulated, adopted and disseminated to all stakeholders, so that everybody is committed to conserving water resources and their ecosystems. Water is everybody's business. The seven strategic steps identified and recommended by the national consultation workshop for implementation are as follows:

- (1) Endorsement and acceptance of the national water vision by all stakeholders.
- (2) Establishment of river-basin organizations.
- (3) Establishment of a mechanism for coordination and monitoring.
- (4) Sensitizing and facilitating the involvement of NGOs in implementing the framework for action.
- (5) Enhancement of public awareness of the national water vision.
- (6) Establishment of a mechanism for participatory management of stakeholders in all subsectors.
- (7) Maintaining and regularizing dialogue among the key partners of the national water vision.

- **Philippines**

In order to achieve the national water vision, a framework of action would include the following:

- Managing water resources efficiently and effectively by (a) creating an environment for sector agencies enabling them to perform legislation, regulation, resource mobilization and investment generation, (b) eliminating or significantly reducing wastage (pricing, reduction of non-revenue water, education, research and development), and protecting aqueducts and supply lines;
- Expediting socially responsive private sector participation and enhancing public-private partnerships;
- Moving towards integrated river basin management by increasing the number of river basin authorities from 2 to 18 by the year 2025, and protecting water resources and integrated watershed management;
- Advocating political decisions and political support to implement the vision;
- Mobilizing and institutionalizing broad partnerships between government and non-government organizations, people's organizations, private sector and academic bodies, etc, to put the vision into action and monitor performance with a view to develop a strong gender-sensitive water culture at all levels;
- Moving towards adequate and affordable water, sanitation, sewerage services favouring the poor and marginalized sectors of society;
- Putting in place a monitoring and evaluation system with a view to improve performance and accountability; and
- Recognizing the overwhelming need to create a government authority responsible for policy formulation and law enforcement.

A four-year plan of action was drawn up to implement the national water vision. For a start, a press conference will be held by NWRB to drum up interest in the Philippine water vision, and the legislators behind the Clean Water Act will be invited to participate. Bills on water pending in Congress will be reviewed with a view to integrate them into a single bill. Simultaneous with the press conference, ground working with politicians and executives will

be undertaken. The Philippine Center for Water and Sanitation will spearhead the establishment of the Philippine Water 21 Partnership, which was formed among the workshop participants as a first step to jumpstart the vision into action. The partnership is one of the Philippine responses to the Second World Water Forum and it is expected to report to the Third World Water Forum to be held in Japan in 2003. The national framework for action agreed upon during the workshop will serve as the reference for the activities the partnership will want to undertake. The partnership is expected to promote the national framework for action by convincing others to accept it and come up with their own sets of activities in order to vitalize it. It is now up to the Water 21 Partnership to put direction and synergy into the different activities that have to be done so that the vision is realized by the year 2025.

- **Thailand**

Implementation should consist of five components, as listed below.

- *Acceptance of the vision*: the Office of the National Water Resources Committee (ONWRC) is responsible for obtaining cabinet or ministerial endorsement, campaigning through the proper mass media, organizing an NGO forum and incorporating the vision into the Ninth Five-year Plan.
- *Monitoring of progress towards the vision*: ONWRC will do the monitoring on behalf of NWRC, through the river basin committees and the concerned line agencies. In order to achieve this, capacity building for ONWRC and the river basin committees and an effective water law are required.
- *Implementation of the action plans*: ONWRC is to coach as much as possible the line agencies, river basin committees and private organizations through the various steps in the action plans.
- *Development and application of indicators for monitoring*: ONWRC is responsible for identifying suitable indicators and methods to measure the degree of fulfilment of the vision, and making sure that these indicators are used in the monitoring of the Ninth Plan and the action plans.
- *Reporting of monitoring results*: ONWRC is responsible for once a year reporting to the Cabinet, organizing a national assembly, and for publishing and disseminating the monitoring reports.

For the successful implementation of the national water vision, key elements of the national water resources policy were identified and subsequently reviewed and submitted to the government. The National Water Resources Committee approved the water resources policy in its 20 July 2000 meeting and the government approved the national water vision on 25 July 2000. The policy has the following components:

1. Accelerate the promulgation of the draft water act, which will be the framework for national water management, by reviewing the draft and implementing all steps necessary to make the act effective, including a review of existing laws and regulations.
2. Create water management organizations at both national and river basin levels with supportive laws. The national organization is responsible for formulating national policies and monitoring and coordinating activities to fulfil the set policies. The river basin organizations are responsible for preparing water management plans through a participatory approach.

3. Emphasize suitable and equitable water allocation for all sectors using water, and fulfil basic water requirements for agricultural and domestic uses. At the same time, define efficient and sustainable priorities in water usage for each river basin under clear water allocation criteria, incorporating beneficiaries' cost sharing based on ability to pay and level of services.
4. Formulate clear directions for raw water provision and development compatible with demand and with the potential of the river basins, and ensure suitable quality while conserving natural resources and maintaining the environment.
5. Provide and develop raw water sources for farmers extensively and equitably in response to water demand for sustainable agricultural and domestic uses, similar to the provision of other basic infrastructure services by the State.
6. Include water-related topics in the curriculum at all levels of formal education to create awareness of water value and understanding of the importance of efficient water usage and of the necessity to maintain natural and man-made water resources.
7. Provide sufficient and sustainable financial support for action programmes in line with the national policy, including water-related research, public relations, information collection and technology transfer to the public.
8. Promote and support participation, including clear identification of procedures, clear guidelines on the rights and responsibilities of the public and of non-government and government organizations in efficient water management. Water management includes water usage, water source conservation, and monitoring and preservation of water quality.
9. Accelerate preparation of plans for flood and drought protection, including warning, damage control and rehabilitation, efficiently and equitably with proper use of land and other natural resources.

- **Viet Nam**

The framework for action needed to achieve the national water vision was found to include the following elements:

1. Integrated water resources management to ensure provision of sufficient water for domestic, economic and social uses, a sustainable environment and flood control by (a) change in perception of water and water management, (b) improvement of strategy, policies and mechanisms for water management, (c) management of water demand and water usage, (d) equitable and reasonable allocation of water, and (d) research in water saving and water efficiency technology.
2. Adoption of a basin approach to integrated water resources management through (a) partnerships among stakeholders for integrated water resources management, (b) balance between water usage and ecosystem preservation through river basin planning, (c) application of decision support systems for integrated water resources management and (d) enhancement of international cooperation on shared water courses.
3. Enhancement of awareness and political will, institutional strengthening and capacity building for integrated water resources management through (a) renovation of investment policy and mechanisms in the development and management of water infrastructure, (b) separation of water governance and water services, (c) establishment of a water management system at central, basin and local levels, (d) establishment of a synchronized and comprehensive legal framework and (e) capacity building.

4. Achievement of effective water services by (a) institutional strengthening of water services in terms of accountability and self-sufficiency, (b) recognition of water as an economic commodity, (c) adoption of a strategy for water services development with the participation of several sectors and the community of water users and (d) construction, rehabilitation and efficient management of the water infrastructure.

The strategy to be adopted for the implementation of the national vision would require (i) to make all communities and stakeholders aware of the vision, (ii) to monitor and update its process of implementation, (iii) to establish all river basin organizations and implement water resources management at the basin level, (iv) to improve the legal and institutional framework, particularly for water resources management, and (v) to rehabilitate all the water sources for development.

c. Key components and other highlights of the national consultation process

Apart from focusing on the implementation of the national water visions as discussed above, most of the countries included other key components for national consultation, depending on the number of national experts participating in the national workshops. The list of these components is given below.

- **Malaysia:** (i) water supply and sanitation, (ii) water for food and rural development and (iii) rivers and the environment.
- **Philippines:** (i) water supply and sanitation, (ii) water for agriculture and aquaculture, (iii) river basin management and (iv) water quality, the environment, and water-related disaster reduction.
- **Thailand:** (i) water supply and sanitation, (ii) water for agriculture and rural development and (iii) river basin management with emphasis on the Chao Phraya River basin.
- **Viet Nam:** (i) water supply and sanitation, (ii) water for agriculture and rural development and (iii) river basin management with emphasis on the Red River basin.

It may be noted that the highest number of participants in a national workshop was in the Philippines, thanks to the co-sponsorship of the Philippine Center for Water and Sanitation: International Training Network Foundation and the Global Water Partnership–Southeast Asia Technical Advisory Committee. The most important findings and recommendations of the consultations on these components are given in the respective country reports; the key features and most interesting facts are presented here for reference.

- **Malaysia**

The key sectoral features of the national water vision in the case of Malaysia are as follows:

- **Policy and law:** The National Water Policy shall be formulated by the federal government and adopted by the state governments. The policy encompasses integrated management of land and water resources based on river basins, and the protection of watersheds and aquifers. The policy guides interstate water transfers, allocation of water to different users, dam monitoring and safety, and development activities in watersheds including the vicinity of dam reservoirs. Contemporary laws are enacted to facilitate the implementation of the National Water Policy and shall be adopted by the state governments.
- **River basin organizations:** State governments are recommended to set up water management institutions similar to the Selangor Water Management Authority (LUAS). This will contribute to the implementation of best practice in the management of water resources to ensure a sustained supply of good-quality water. Laws are enacted to support

these institutions. The human resources of the institutions comprise inter-discipline water professionals able to overcome present and future challenges in the national water sector.

- **Pollution:** Activities polluting water resources are monitored and corrected. Surveillance of watersheds is assisted by remote-sensing techniques to detect illegal activities and overcome water pollution problems. Polluted rivers are restored in stages with the participation of all stakeholders. Awareness enhancement programmes are extended to the riverine population and to the parties responsible for the polluting activities. The 'polluters pay' principle will be enforced. The programme of restoration of water resources will only be successful if it begins at source, that is, with the control of polluting sources.
- **Groundwater:** Groundwater exploration programmes will be carried out, especially in the main river basins, to identify potential aquifers; aquifer zones will be identified and protected to safeguard this important resource. Guidelines and appropriate laws will be formulated and enforced to control development with potential polluting activities.
- **Water demand management:** Water resources management will emphasize demand rather than supply management in order to reduce the exploitation of new water sources to meet increasing water demand. Water demand management encompasses the activities undertaken to increase the efficiency of water supply and water usage and the promotion of water recycling. Incentives will be given to industries that practice water reuse since they contribute directly to water demand management and the reduction of effluents. New housing, commercial and industrial estates shall be fitted with water-saving devices including rainwater harvesting devices and the implementation of the new drainage philosophy of zero peak flow contribution from developed areas.
- **Research and development:** R&D activities in the water sector are to be enhanced. A centre has been established to coordinate R&D activities, provide direction and allocations for research and act as the national database and reference centre. The centre is staffed with water professionals from different disciplines and incentives are provided to induce the best local and foreign water professionals to work there.

With respect to the Malaysian experience on integrated water resources management (IWRM), performance indicators for water sector policies are under development, especially on key issues such as efficiency (productivity of water) or food self-sufficiency (production versus food demand). Application of the IWRM concept to flood management in Malaysia also provides useful experience for the development of a national strategy on the matter. The Department of Irrigation and Drainage is developing a strategy for flood management to address flooding problems while promoting the economic value of healthy rivers. The strategy focuses on river channels, floodplains, and river basins and includes: (a) river management, (b) legislation and policy concern, (3) flood risk mapping, and flood warning and preparedness planning, (4) public participation, (5) developing options and alternatives, and (6) monitoring, evaluation and revision. In order to promote more rigorously the application of IWRM, partnership with the private sector and NGOs is underway and the Malaysian Water Partnership has been established for this purpose.

- **Philippines**

The points which may be considered as highlights in the national consultation process include: a national water conference to focus on water supply and sanitation, recent developments in river basin organization reform, and partnership with NGOs.

(a) The 1999 National Water Conference

A national conference was held in March 1999 with the aim of creating a consensus and shared vision on water supply and sanitation for the 21st century. Heads of the different government agencies involved in water supply and sanitation as well as people from NGOs, private sector concerns, people's organizations, women's groups and others participated in the conference. The conference stressed the importance of creating a shared vision as foundation for strategy and action. It underscored the need to visualize the desired state of water supply and sanitation in the future and to steer the different stakeholders towards such a vision. It also emphasized the need for a participatory approach and had the following objectives: (a) elicit a shared vision; (b) identify changes necessary to attain it; and (c) map out steps to be taken within the next five years to effect the desired changes.

The key phrases or images that would describe the state of water supply, sewerage and sanitation by 2025 were as follows:

- *Water supply*: Sustainable, affordable, potable, safe and clean, accessible, sufficient, world class, conserved and protected watershed areas.
- *Sewerage*: Comprehensive sewerage system nationwide, state-of-the-art sewerage system, strict enforcement.
- *Sanitation*: Environmentally sustainable garbage disposal system nationwide and 100-percent compliance.

These key phrases were crafted into a vision statement for each of the nine groups, leading to the following integrated vision statement: "*A world-class, affordable and sustainable water supply, sanitation and sewerage system accessible to every Filipino.*" Entry points for change were also identified in the workshop to (1) narrow the gap between desired and actual output and (2) enhance the attainment of the group's vision statement. These entry points concerned policy issues, popular participation, creation of enabling mechanisms, and issues related to infrastructure and technology. Facilitating factors that would contribute strongly to the realization of the vision were also identified. Further details can be obtained from the Philippine country report.

(b) Recent developments in river basin organization reform

In years past, there were attempts at regional and basin planning for which corresponding institutions were created. In no time, however, these regional and basin agencies were dissolved and sectoral agencies were assigned to continue the programmes and projects within the purview of basin authorities. Currently, there are only two basin organizations, the Laguna Lake Development Authority and the Agno River Basin Development Commission. The latter was created only in 1997. According to a recent study, the government is again bent on pursuing the river basin management approach and would therefore need advice on approaches and capacity building to strengthen the existing river basin organizations. Recent developments on these two entities point out interesting features in national efforts to integrate the river basin management approach into the national development process, particularly into

its complex legal and institutional framework. As may be surmised from the features presented below, future achievements on this subject depend mainly on whether the government will decentralize authority or fully commit itself to river basin management for which strong leadership and community participation are required.

The Laguna Lake Development Authority

LLDA was created to promote the sustainable development and maintain the ecological integrity of the Laguna Lake basin, which is the largest inland body of water in the Philippines and second largest freshwater lake in Southeast Asia. The lake is used for fishery, navigation and transport, as a reservoir for floodwater and a waste sink, and for power generation and irrigation. By far the most important use of the potential of the lake is as a major source of fresh water for domestic and industrial purposes for Metro Manila and surrounding areas in years to come.

LLDA has regulatory powers such as exclusive authority to grant permits for the use of lake waters and clearance for all development activities within the region. Aware of the importance of the basin as a natural resource and of the rapid industrialization and urbanization around it, which put the natural environment under tremendous environmental stress, LLDA has:

1. formulated the Laguna de Bay Master Plan, which provides the vision for the development of the region and describes the strategy and programmes of action to realize that vision;
2. declared a multi-use policy; for the dominant use of the lake, this has meant a refocusing of priorities from the promotion of fisheries to environmental protection, watershed management and pollution control;
3. been implementing the Environment User Fee System, which is a market-based instrument designed to motivate industries to comply with all environmental standards by setting stiff disincentives for non-complying industries and attractive incentives for complying industries.
4. stepped up its efforts to stop the degradation of the 21 river systems which drain into the Laguna Lake. Using the basin or watershed approach to resource management, the revitalized river rehabilitation programme encourages multi-sectoral involvement in the effort to save the rivers and ultimately the lake from further environmental degradation.
5. commissioned various institutions to undertake important studies and projects in order to further upgrade its own capability to manage the lake and its watershed in a sustainable manner.

The Agno River Basin Development Commission

ARBDC is mandated to oversee and coordinate all development along the Agno River Basin and to ensure a holistic approach in water resources planning and management of the basin. Its core functions are to (1) develop a comprehensive master plan for the river basin; (2) coordinate the integration of the master plan and the local and regional plans and investment programmes; (3) cause the implementation of development programmes and projects with an overall impact upon the basin; (4) initiate, receive and recommend project proposals for the development of the basin; (5) formulate, review and propose improvements on existing policies governing that development; (6) commission, coordinate and monitor all planning studies and research and other development undertakings related to the basin; (7) coordinate soil erosion prevention, river siltation

mitigation, flood control and other projects among the concerned government agencies; and (8) establish a functional basin-wide information and database system including computer-generated planning tools such as GIS.

Unlike LLDA, which is an authority, ARBDC relies mainly on the commitment and participation of all related agencies. Under these circumstances, the current strong ARBDC leadership, headed by an undersecretary of the Presidential Office, has initiated a clear programme of strategic planning and management for the river basin. Important achievements of ARBDC include the establishment of a strategic plan and ongoing efforts to implement it.

(c) Partnership with NGOs

The national workshop recommended to mobilize and institutionalize broad partnerships between government and non-government organizations of all kinds to put vision to action and monitor performance in order to develop a strong, gender-sensitive water culture at all levels. The formation during the workshop of the Philippine Water 21 Partnership was conceived as the first step to jumpstart the vision into action. The partnership is expected to promote the national framework for action by generating ideas and convincing others to come up with their own sets of activities in order to flesh out the framework. In this spirit, NWRB and the Philippine Center for Water and Sanitation: International Training Network Foundation have taken up the challenge to lead the partnership. Since the workshop was held, NWRB has reportedly initiated various activities to further examine the sectoral action plans. These plans are deemed complicated because they involve specific targets and performance indicators, including milestones for monitoring the performance of the respective sectors in relation to targets. With a common level of understanding on where to go, NWRB expected to effectively play the leadership role, as recommended by the workshop, so that the national water vision for 2025 would be achieved with the support of government, NGOs, academia, the private sector, international partners and other bodies.

• **Thailand**

As mentioned above in the section related to national water policies in Thailand, the efforts going on in the field, including a programme to restructure agriculture, provide interesting features on integrated water resources management. Three important features are highlighted below: (a) a brief historical account of the development of river basin management in Thailand, (b) the important components of the ongoing water resources strengthening programme, and (c) the direction of water resources management in the Ninth Five-year National Economic and Social Development Plan.

(a) A brief historical account of the development of river basin management

In the Sixth National Plan (1987-1991), for the first time policy guidelines were adopted for all concerned agencies to prepare the water resources development plan at the basin level. In addition, other guidelines were issued to encourage the spread of small-scale water resources development to rural areas, to encourage people to organize, to plan for a greater role in management, to maintain water development projects, and to develop an information system among the relevant agencies. However, the water resources development guidelines were not implemented progressively as most agencies still used the project approach and there was little coordination among them.

Therefore, the Seventh National Plan (1992-1996) had strong development guidelines on basin-based water resources management for all the 25 river basins of Thailand. A total of Baht122 000 million (about US\$5 000 million) was invested in various projects on water resources developments over the five-year period of the plan. Nevertheless, by 1996 water resources management had not improved significantly. Water continued to be wasted by all economic sectors, especially agriculture, as water continued to be a free commodity for farmers and water used in manufacturing and services was charged at unreasonably low rates. Population growth not only led to higher demand for water but also to more intensive use of land leading to increasingly serious problems of watershed encroachment and water degradation, especially in and around Bangkok and a few provincial capitals.

If small-scale projects are initiated and prepared at the local level for approval at district and provincial levels, medium-sized and large-scale projects all follow the top-down approach. They originate at the central planning office and are based mainly on hydrological and technical considerations. Precious little information on the real needs of local users is gathered at the initiation and planning stages. Moreover, there is little coordination among the agencies involved, which sometimes results in cases of overlapping of project areas. As the involvement of the local population is limited, there is often misunderstanding between line agencies and local groups. All of this occurs because there is no comprehensive plan for the management of the nation's river basins.

In 1993, the first attempt was made to define a systematic water resources management plan, with guidelines for the study of the potential of the country's 25 river basins. The study, which was completed in 1994, covered data collection and preliminary analysis of potential water resources development in each river basin to meet water demand as projected for the period 1994 to 2006. In order to provide policymakers with a comprehensive river management strategy, the Chao Phraya river basin, which consists of eight sub-basins, was selected as a priority area: the basin spreads over some 30 percent of the total land area, is home to 27 million people and accounts for most of the country's agricultural production, industrialization and urbanization. The study on the Chao Phraya river basin resulted in six strategic guidelines, which are being followed as part of the eighth, current Five-year Plan:

- 1) *Institutional arrangement*: to establish a Chao Phraya River Basin Organization to manage all aspects of water usage using the principle of basin management through coordination of the activities of the government agencies active in the water sector.
- 2) *Supply management*: to develop the new surface resources, attend to catchment conservation and study and monitor groundwater.
- 3) *Demand management*: to emphasize the strengthening of the existing system of command and control, the application of a water charge and improvement of the information system in the short term and of water rights in the longer term.
- 4) *Water-quality management*: to integrate the management of water quality, introduce licensing of discharges and enforce water-quality standards.
- 5) *Flood management*: to establish within the Chao Phraya River Basin Organization a unit to provide a strategic flood action plan for the lower basin and strengthen the existing development planning control in the lower basin to prevent further encroachment into flood ways.

- 6) *Legal framework*: to support the implementation of the above strategies, such as the comprehensive new water law and the legislation for the introduction of discharge licenses.

(b) Important components of the ongoing water resources strengthening programme

Apart from the achievements in the development of a national water policy already mentioned, the ongoing water resources-strengthening programme is expected to achieve other important results through the implementation of the following components:

- A pilot project to organize river basin committees in the sub-basins of the Chao Phraya, which include the Upper Ping, Lower Ping and Pasak river basins.
- A study on the establishment of the Chao Phraya Basin Organization, to take into consideration the improvement of the water sector capacity.
- A study on the right-based allocation of water, to address some aspects of the concept of basin-based management, such as implementation policies and a pilot programme for this approach.
- River basin management: to formulate a river basin management system in three areas: the Ping River in the North, the Mun River in the Northeast and Klong Thatapao in the South, including a review of the available information and data for water resources management and watershed protection.
- The Thailand Integrated Water Resources Management System, which aims to promote research work and activities on water resources management.
- Modernization of the irrigation system, to study the conjunctive use of surface and groundwater, cost recovery in irrigation projects, and to promote people's participation in irrigation management, and the privatisation of irrigation.

It may be important to note the active collaboration of many agencies and international organizations, including ESCAP and FAO, in the implementation of the components funded by the Asian Development Bank.

(c) Direction of water resources management in the Ninth National Plan (2002-06)

It was pointed out during the implementation of projects on water resources management that the Ninth National Plan would focus mainly on (1) balanced development, (2) quality of development and (3) strengthening of the national development foundation. In this connection, incorporation of water resources policies in the Ninth National Plan would aim to achieve strategic results at the end of the plan on conservation and rehabilitation of water resources and the establishment of management plans for the sustainable use of water resources and optimum efficiency and effectiveness. This would involve (1) establishment of mechanisms for the effective management of water resources at national, basin and local levels, (2) completion of the management plan, which includes a crisis management plan, (3) definition of a social code and water laws for assessment and public participation, (4) institutional reforms and (5) capacity building.

In tandem with the strategic incorporation of water resources management issues in the Ninth National Plan, efforts are made to vigorously implement the programme on decentralization of water resources management as stipulated in the new Constitution. According to Senator Pramote Maiklad, former director of ONWRC and former director general of the Royal

Irrigation Department, the Constitution requires decentralization in three areas: (1) public participation in the development process, (2) decentralization of authority and (3) local participation in natural resource management.

- **Viet Nam**

The Law on Water Resources, enacted in May 1998, came into effect in January 1999, and current efforts to improve water resources management in the country are governed by the implementation of that law. This involves the promulgation of various decrees and the setting up of mechanisms for an integrated management of water resources. Important developments on the implementation of the law are listed below.

(a) Relevant features of the Law on Water Resources

The law, which deals with general rules on water resources management, stipulates the following principles: (1) water resources are publicly owned; (2) use, exploitation and protection of water resources is made according to plans to ensure their systematic management; (3) water resources must be used for several purposes; (4) the government guarantees the right of organizations and persons to use water; (5) organizations and persons using water are responsible for their investment; (6) international cooperation on rivers shared by many countries is in order and international laws must be adhered to; (7) management of water resources is the responsibility of the Ministry of Agriculture and Rural Development; (8) the National Water Resources Council is the government's think-tank on important decisions; and (9) river basin planning and management agencies are to be established under the overall supervision of the ministry.

(b) River basin organizations

As part of the implementation of the water resources law, strengthening of river basin management was in progress, including the establishment of river basins organizations. Included in this category of activities are (1) strengthening of the National Mekong Committee for better cooperation through the Mekong River Commission and (2) establishment of the Red River Basin Commission. The process to establish RRBC provided several interesting features, as summarized below:

- *RRBC vision*: “**Clean water, green land and prosperous people.**”
- *Key actors and agencies*: At present, the responsibility for management of the river basin water resources is fragmented among many agencies, provincial authorities and civic groups. RRBC is expected to lead and coordinate efforts to achieve its vision.
- *RRBC mission*: The national workshop identified the need to (i) consolidate all plans (sectoral and local) into an integrated basin plan for sustainable development, (ii) disseminate the plan and vision to all stakeholders and (iii) mobilize and encourage participation of all stakeholders in the implementation of the integrated plan and of the vision.
- *Priority actions*: (i) update, adjust and supplement all the plans into an integrated plan, (ii) establish a management body of the water resources of the basin with a suitable legal and institutional framework, (iii) disseminate the integrated plan, (iv) promote better control and mitigation of water-related disasters, particularly floods, (v) enhance the management role of government agencies for better interaction among sectors and with the people and (vi) enhance public awareness of the concept of “clean water and green land” and ensure people’s participation.

3. Findings from the project's implementation

Achievements in the implementation of the pilot project can be considered at two levels, national and regional.

a. National level

In all four selected countries, the government agencies invited to take part in the pilot project were recognized by all water-related bodies as key agencies in the formulation and implementation of a national water vision. In the Philippines the National Water Resources Board of the Philippines, and in Thailand the Office of the National Water Resources Committee, both project counterparts, were recognized and recommended to be the lead agencies for the implementation of those countries' national water visions. In Malaysia, the Malaysia Water Partnership, whose secretariat is provided by the Department of Irrigation and Drainage, was promoted to lead the partnership in the implementation of the national water vision. In Viet Nam, the project counterpart was the Water Resources Planning Institute, which provides the secretariat for the Red River Basin Commission.

It must be pointed out, however, that the success in the implementation of the pilot project was also due in large measure to the results of previous efforts made by the South-East Asia Technical Advisory Committee (SEATAC) of the Global Water Partnership (GWP) together with the institutional network established by SEATAC. It may be further noted that in the countries where GWP work was well developed, a good spectrum of stakeholders could be involved in the development and implementation of the national water visions, such as in Malaysia, the Philippines and Thailand. In Viet Nam, where large-scale GWP activities on water vision only began to take shape in March 2000, the national consultation workshop involved mostly government agencies reflecting mostly government policies or direction in water resources management. In the latest case, it appears advisable to hold further consultation workshops involving more NGOs and civic organizations in order to ensure the acceptance by all key stakeholders of the sense of ownership of the various components of the national water vision process.

b. Regional level

Through the partnership of FAO and ESCAP in the implementation of the pilot project, exchange of information on ongoing activities as well as existing networks was greatly enhanced. Among the key activities intensively discussed during the implementation of the project were the efforts of FAO in modernization of the irrigation sector and of ESCAP in promoting strategic planning and management in the water resources sector. Involvement of other regional organizations was also made as summarized below:

- SEATAC sponsored the participation of academics in the national workshop in the Philippines and invited ESCAP to its regional workshop on integrated water resources management as part of its efforts to prepare for the Third World Water Forum.
- The Asian Development Bank invited ESCAP and FAO to the various workshops organized in Bangkok within the framework of its project on capacity building in water resources management.
- Several other organizations, particularly the Asian Institute of Technology, had indicated their willingness to participate in the regional project. Due to resource limitations and time constraints, their participation could not be arranged.

Nevertheless, the above achievements in collaboration with SEATAC and ADB and the partnership of FAO and ESCAP provided not only important evidence of the benefits of cooperation, but also strategic elements in the development of a regional strategy and programmes for long-term collaboration.

IV. RECOMMENDATIONS FOR FURTHER REGIONAL COLLABORATION

1. Context for further regional collaboration

It may be noted from the regional survey carried out by ESCAP in 1998 on experiences and practices in the region on the integration of water resources management into national economic and social development that only four of the 19 countries that responded were aware of the development of a national vision for development planning. Although great efforts had been made by many international organizations, it was found from the pilot project that the formulation of a national water vision and action plan would require further efforts to ensure the applicability of the new planning methodology. Besides, after the Second World Water Forum in the Netherlands in March 2000, the enthusiasm and momentum generated by the World Water Vision process is expected to turn into an international driving force to prepare the Third World Water Forum, to be held in Japan in 2003. In this context, regional collaboration in water resources management starting with the FAO-ESCAP partnership could be translated into a regional programme of action for which the interested regional agencies would have sufficient time to mobilize resources to participate in its implementation.

2. A regional programme for collaboration

The following features of such a regional programme have been formulated by ESCAP for discussion and funding:

a. Programme title: Integrated regional perspective of water resources development and strategic action programme for regional collaboration in Asia and the Pacific.

b. Time frame: January 2001-December 2002

c. Immediate objectives

- To arrive at an integrated regional perspective of water resources development and management in Asia and the Pacific.
- To formulate a strategic action programme for collaboration to address priority needs in economic and social development in the region, particularly poverty alleviation, and to ensure sustainable management of water resources in the region.
- To provide consolidated contributions to the Third World Water Forum to be held in Japan in 2003 to promote sustainable use of the world's water resources.
- To assist developing countries in strengthening capability in management of the water resources sector, including enhancement of public awareness and participation in water resources management.

d. Problems addressed and needs identified

As recommended in the Ministerial Declaration at the Second World Water Forum, the Secretary General of the United Nations called on governments to make efforts to reach the various targets identified, particularly the reduction of the number of people who do not have access to safe water supply and sanitation. The forum also enjoined the UN system to re-assess periodically the state of freshwater resources and related ecosystems, to assist countries, where appropriate, to develop systems to measure progress towards the realization of targets and to report in the biennial World Water Development Report as part of the overall monitoring of Agenda 21. In this connection, the General Assembly at its Nineteenth Special Session in June 1997 called for a strategic approach for the implementation of all aspects of the sustainable use of fresh water for social and economic purposes. It is therefore necessary to develop and implement a collaborative regional strategic action programme on water resources development and management to support efforts of developing countries to address regional economic and social priorities, in particular poverty alleviation, food security and environmental protection.

e. Project implementation strategy

In order to achieve a good integrated perspective of water resources management in the region, it is necessary to involve not only the member countries, but also key United Nations agencies, NGOs and the private sector. This strategy is expected to build on the achievements of the pilot project initiated by ESCAP and FAO on the formulation of national water visions. These concerted efforts will be developed and coordinated through the adoption and development of an integrated conceptual approach by key partners and a detailed programme of implementation. With such a conceptual approach and detailed programme, the project will have sufficient flexibility in management while facilitating coordination of efforts. Furthermore, the project also aims to develop a common method of strategic planning and management among the sectors region-wide and promote cooperation among a selected group of water resources planners and experts in relevant fields to form the core of a regional network to carry on the process beyond the Third World Water Forum.

f. Output

- Reports on the status and achievements in the various aspects of water resources management for economic and social development in the region and identification of related priority needs in the region.
- Consolidated report on integrated regional perspective of water resources development and management.
- Strategic action programme for collaboration towards ensuring sustainable management of water resources in the region.
- Consolidated recommendation on the strategy and policies in water resources management for submission to the Third World Water Forum.
- A core group of officials trained in the latest methodologies and practices in water resources planning and management.

g. Target beneficiaries: Governments, training institutions, financing institutions and the private sector in developing countries and international agencies working in water resources. The project publications are expected to be of use to the ACC Subcommittee on Water Resources and CSD.

h. Activities

- Prepare an overall conceptual approach to the development and implementation of a collaborative strategic action programme for adoption and implementation;
- conduct studies for each study component, by reviewing past development and the latest achievements in the respective areas of water resources management in Asia and the Pacific, organizing regional workshops to establish priority areas for regional action, and monitoring the preparation of related reports for submission to the Third World Water Forum;
- conduct a regional survey of progress in the development of national water visions, make a regional assessment of achievements in integrated water resources management and organize sub-regional workshops to formulate sub-regional action programmes;
- consolidate overall achievements and the regional strategic action programme on integrated water resources management in the region; and
- publish the reports and disseminate the findings of the project.

i. Scope of the work

The programme will involve assessing the integrated programme as well as various key water resources sectors in the region, including the following: (1) water supply and sanitation; (2) state of rivers, aquatic environment and nature; (3) food security, agriculture and rural development; (4) water and urban development; (5) education, training and public awareness; (6) gender mainstream in water resources management; (7) groundwater management; (8) economic usage of water, including hydropower development; (9) waterborne transportation development; (10) international achievements in river basin management; and (11) legal and institutional framework for water resources management.

REFERENCES

1. **Dayrit, Hector.** *Case study on the formulation of a national water vision: the Philippines*, July 2000. National Water Resources Board, Manila
2. **Facon, Thierry.** *Overview of the water vision for food, agriculture and rural development: strategic choices for countries*, April 2000. Regional Office for Asia and the Pacific, FAO, Bangkok
3. **Le Huu Ti.** *A conceptual approach to the formulation of an action-oriented national water vision*, April 2000. Water and Mineral Resources Section, ESCAP, Bangkok
4. **Malaysia Water Partnership,** *Malaysia's national water vision to action: the way forward*, July 2000. Kuala Lumpur
5. **Office of the National Water Resources Committee.** *Thailand's water vision: a case study*, July 2000. Bangkok
6. **To Trung Nghia.** *Vision on Viet Nam's water, life and environment in the 21st century*, June 2000. Water Resources Planning Institute, Hanoi

MALAYSIA'S WATER VISION: THE WAY FORWARD



EXECUTIVE SUMMARY

In support of Vision 2020 (towards achieving developed nation status), Malaysia will conserve and manage its water resources to ensure adequate and safe water for all (including the environment). Such is the Malaysian vision for water in the 21st century.

The key objectives of the vision are as follows:

- *Water for people:* all have access to safe, adequate and affordable water supply, hygiene and sanitation.
- *Water for food and rural development:* provision of sufficient water that will ensure national food security and promote rural development.
- *Water for economic development:* provision of sufficient water to spur and sustain economic growth within the context of a knowledge-based economy and e-commerce.
- *Water for the environment:* protection of the water environment to preserve water resources (both surface water and groundwater) and natural flow regimes, bio-diversity and the cultural heritage, along with mitigation of water-related hazards.

The set of initiatives that need to take place in order to achieve the key objectives of the vision is evaluated based on the four challenges towards a better water future, which are (a) managing our water resources efficiently and effectively (addressing both quantity and quality aspects), (b) moving towards integrated river basin management, (c) translating awareness into political will and capacity and (d) moving towards adequate, safe and affordable water services, as will benefit developed-nation status by 2020.

The actions for a better water future are also determined based on milestones and targets and they have to do with (a) institutional and legal aspects, (b) participatory approach in the decision-making process, (c) development of innovative technologies, (d) efficient use of water resources, (e) extensive research and development, (f) shift from water-supply to water-demand management, (g) establishment of river basin organizations, (h) integrated water resources management, (i) promotion of water awareness and water education, (j) promotion of networking in the water sector, (k) good databases and dissemination, (l) resource assessment, monitoring and protection, (m) water ecosystems protection, (n) flood and drought contingency plans, (o) water-quality management, (p) frequent dialogues with the stakeholders, (q) a Water Sector Master Plan and (r) formation of a National Water Institute.

The way forward to realize the national water vision is to establish associated programmes in the Eighth Malaysian Plan (2001-2005) and the Third Outline Perspective Plan (2001-2010).

I. PREFACE

Malaysia is rich in water resources, whose development has been the basis for the socio-economic development of the country over the past decades. Lately, the water supply situation for the country has changed from one of relative abundance to one of scarcity. Population growth and urbanization, industrialization and the expansion of irrigated agriculture are imposing rapidly increasing demands and pressure on water resources, besides contributing to the rising water pollution. The way forward to a prosperous and sustainable future is to keep development to a level that is within the carrying capacity of the river basins while protecting and restoring the environment.

The objective of the water vision is to move from where we are today to where we need to be to meet future water needs and ensure sustainable use of water. This exercise involves a process of study, consultation and promotion which will develop knowledge at the national level, produce a consensus on a vision for water for the year 2025, raise awareness on water issues among the population and decision-makers and generate a framework for action. This framework will set the basis for the development of a detailed action plan to help move from the concept outlined in the vision to tangible results – making every drop count – which will make a real difference in people’s lives. It is a route map to take us from our present situation to the vision for 2025.

The Malaysian water visioning process is undertaken by both the Malaysian Water Partnership (MWP) and the Malaysian National Committee for Irrigation and Drainage (MANCID). MANCID has conducted sectoral consultations with respect to water for food and rural development at both national and regional levels. MWP is the national consultative body on the water sector and has conducted a series of five national consultations on the water sector with respect to the mapping of needs and the national water vision, global sectoral visions, the framework for action, gender and water, and the realization of the national water vision.

This paper was prepared as part of the latest consultations organized in the context of the regional FAO-ESCAP cooperation initiative to build on previous achievements of the national water visioning processes to identify priority activities for national action and further regional cooperation in the water resources sector. As a result, efforts are being made to incorporate the framework of action for the realization of the national water vision into the future national development plan and other related plans.

II. INTRODUCTION

Malaysia receives an average annual rainfall of 3 000 mm. Water resources development has been a catalyst for the socio-economic development of the country during the past decades. Dams and kilometres of pipelines and canals divert water from rivers to sustain domestic, industrial and agricultural needs. Lately, the water situation for the country has changed from one of relative abundance to one of scarcity. Population growth, urbanization, industrialization and the expansion of irrigated agriculture are imposing rapidly growing demands and pressures on the water resources, besides contributing to the rising water pollution. Water management is becoming increasingly comprehensive and complicated due to large concentrations of population, commercial activities and industries around the cities and towns, increasing water consumption, increasing water pollution,

increasing land use conflicts and climate changes. At the same time, any new development of water resources to meet the ever-increasing demand faces rigorous scrutiny from environmentalists and conservationists.

The way forward to a prosperous and sustainable future is by keeping development to a level that is within the carrying capacity of the river basins while protecting and restoring the environment. Integrated water resources management (IWRM) should be adopted in managing the water sector and the catchment. IWRM is an approach towards integrating and effectively coordinating policies, programmes and practices addressing water-related issues, which takes into consideration the various aspects of socio-economic development and the conservation of the environment.

This paper attempts to outline a desirable water scenario in the country for the year 2025 and provides a description of the national water sector which the Malaysians would like to have in 2025, including a strategy to achieve the vision. The introduction is followed by a description of the World Water Vision and national water vision processes and of the objectives of the vision and framework for action. Section II describes the management of water resources, with an overview of the water sector, a presentation of the main issues and challenges facing the Malaysian water sector, and a possible scenario for the future. Sections III and IV describe the national water vision and the national framework for action. The conclusion is given in Section V.

1. The world water vision process

The World Water Vision project was initiated by the World Water Council. WWC, which was established in 1996, is an international water policy think-tank co-sponsored by the Food and Agriculture Organization, the United Nations Environment Programme, the United Nations Development Programme, the United Nations Educational, Scientific and Cultural Organization, the World Health Organization, the World Meteorological Organization and the World Bank. WWC has undertaken to develop a long-term vision on water, life and the environment, known as World Water Vision, through the establishment of a World Commission on Water for the 21st Century on 11 August 1998. The commission is expected to prepare a long-term vision for addressing the issues of water in the next century, that is to say, to develop a widely shared vision on the actions required for tackling water issues globally, regionally and nationally.

The establishment of the commission was decided by WWC in response to the unanimous recommendations of the international community at the first World Water Forum held on 21-22 March 1997 in Marrakech, Morocco, and at the Water and Sustainable Development Conference, held in Paris on 19-21 March 1998.

The project to develop a world water vision is characterized by a participatory approach with extensive consultation and innovative futuristic thinking emphasizing communication with groups beyond the water sector. The vision is expected to be global, including both developed and developing regions, but with special attention given to the needs of developing countries and of the poor. The visioning process uses two types of consultation, i.e. sectoral and regional.

The sectoral consultations illustrate the notion that all water subsectors are necessary parts of an integrated water management approach. The sectoral vision demonstrates the perceived critical issues,

strategic directions and trends or discontinuities likely to affect a particular subsector over the next 25 years. Twelve subsectors are considered and the four main ones are water for people, water for food and rural development, water and nature, and water in rivers. The sectoral visions are arrived at through network consultations.

The appropriate scale for resolving water resource issues, though, is not necessarily global but regional or local. The central idea behind regional visions is that they encapsulate widely shared views on how water resources should be used, allocated or shared and managed in the region over the long term to meet the needs of the people while maintaining a sustainable balance between demand and supply. The regional consultations are conducted in close collaboration with the regional technical advisory committees of the Global Water Partnership and the International Hydrological Programme of UNESCO. There are 22 regional consultations and one of the regions is Southeast Asia.

Both the sectoral and regional visions will contribute to the overall World Water Vision. The World Water Vision prescribes the desired future and the actions needed for the sustainable use of water resources to become a reality. The results of the world water visioning process were presented and debated at the Second World Water Forum and Ministerial Conference that took place on 17-22 March 2000 in The Hague.

2. The national water vision process

The Malaysian water visioning process is undertaken by both the Malaysian Water Partnership (MWP) and the Malaysian National Committee for Irrigation and Drainage (MANCID). MANCID has conducted sectoral consultations with respect to water for food and rural development at both national (9 January 1999) and regional levels (17-19 May 1999). The latter was conducted in collaboration with the International Commission on Irrigation and Drainage for the East Asia region.

MWP is the national consultative body on the water sector. It was formed out of a recommendation made at the National Consultation on Integrated Water Resources Management, which was held in Kuala Lumpur on 29 November 1997; this meeting was assisted by GWP SEATAC. Five top issues in integrated water resources management were identified: (a) lack of a coherent national water policy; (b) need for concerted efforts in capacity building; (c) lack of a comprehensive database; (d) lack of coordination, and (e) lack of integrated planning and management. MWP is made up of nine core national agencies which are its executive members. The total institutional membership of MWP is 77, comprising government agencies, private-sector companies, water user groups, non-governmental organizations and research institutions. MWP has conducted a series of five national consultations on the water sector as follows:

- Water sector mapping and vision (28 June 1999) in collaboration with GWP SEATAC, which contributed to the identification of gaps, and to the need for strategic assistance, in integrated water resources management. This meeting also contributed to the preparation of the regional water vision (Southeast Asia).
- A national consultation (18 December 1999) to deliberate on the drafts of the four main sectoral visions, i.e. water for people, water for food and rural development, water and nature, and water in rivers; the comments from this consultation were forwarded to the respective organizations or authors for action.

- From vision to action (18 February 2000) to formulate a framework for action to realize the water vision. The representatives from the “water in rivers” and “gender and water” secretariats at the global level also addressed the meeting.
- Gender analysis in the water sector (21 February 2000) to address gender disparities in access to and control of water and the contribution of women in water resources management. The meeting was led by Ms Kusum Athukorala, the Gender Ambassador from the World Water Vision to South East Asia and South Asia.
- Towards realizing the national water vision (23-24 May 2000) in collaboration with ESCAP and FAO to reconfirm the national water vision and strategy, identify priority actions and recommend actions for regional cooperation.

3. Objectives of the vision and of the framework for action

The objective of the water vision is to move from where we are today to where we need to be to meet future water needs and ensure the sustainable use of water. This exercise involves a process of study, consultation and promotion, which will:

- develop knowledge on what is happening in the national water sector, and on trends and developments outside the water sector that may affect future water use; based on this knowledge, produce a consensus on a vision for water for the year 2025 to be shared by water sector specialists and decision-makers in the government, the private sector and civil society;
- raise awareness on water issues among the population and decision-makers in order to foster the political will and leadership necessary to achieve the vision; and
- use the knowledge and support generated to contribute to the framework for action.

The framework for action is designed to lay the basis for the development of detailed action plans to help move from the concepts outlined in the vision to tangible results – making every drop count – that will make a real difference in people’s lives. It is a route map to take us from our present situation to the vision for 2025. The framework will provide an analysis of the practical consequences of the strategic choices emerging from the vision and develop a clear picture of the range of actions and policies to use in the various water domains – water for the people, for food, for nature and so on. Second, it will translate these analyses into proposals for innovative policy measures, institutions, management instruments, investment priorities and implementation guidelines for integrated water resources at the various levels. These potential actions will be challenge-oriented, in that they will aim to overcome specific threats as well as foster positive developments and process-oriented mechanisms aimed at securing or facilitating the implementation of the strategy.

III. WATER RESOURCES MANAGEMENT

1. Water sector overview

Malaysia lies entirely in the equatorial zone. The climate is governed by the yearly alternation of the northeast and southwest monsoons. The northeast monsoon occurs from November till March, and the southwest monsoon between May and September. The northeast monsoon brings heavy rains and extensive flooding to the east coast of Peninsular Malaysia, while the west coast receives relatively little rain during the southwest monsoon owing to the sheltering effect of the mountains in Sumatra.

The maximum and minimum mean air temperatures are 33.4°C and 22.8°C respectively. The highest and lowest recorded annual rainfall are 5 130 mm (Sarawak, 1994) and 1 350 mm (Perlis, 1992) respectively. As for the number of rainfall days, the maximum recorded is 260 (Sarawak, 1995). The mean annual relative air humidity varies between 78 and 87 percent; this high humidity is due to the high temperature and high rate of evaporation. All parts of the country receive an average of 1 764 to 2 664 bright sunshine hours a year. These data are based on the last ten-year records (1989-1999).

The water resources in Malaysia are summarized in Table 1. Groundwater accounts for 90 percent of the freshwater resources. The renewable water resources are 630 billion m³ – the summation of surface runoff and groundwater recharge. This translates into an annual average water availability of about 28 400 m³ per capita. Based on this fact, Malaysia is a country with abundant water resources.

Table 1. Water resources in Malaysia

Annual rainfall	990 billion m ³ (Ref 1)
<i>Surface runoff</i>	<i>566 billion m³</i>
<i>Evapo-transpiration</i>	<i>360 billion m³</i>
<i>Groundwater recharge</i>	<i>64 billion m³</i>
Surface artificial storage (dams)	25 billion m ³ (Ref 2)
Groundwater storage (aquifers)	5 000 billion m ³ (Ref 3)

Streams and rivers with and without impounding reservoirs contribute 98 percent of total water used in Malaysia; the remainder is contributed by groundwater. River flow regimes are irregular and to secure safe yield from surface water sources, storage facilities were constructed. Currently, there are 47 single-purpose and 16 multipurpose dams (Table 2) with a total storage capacity of 25 billion m³. The main reason for the lack of groundwater use in the country is the easy availability of surface water resources; there are over 150 river systems in Malaysia (Ref 3).

Table 2. Dams in Malaysia

Single-purpose dams	
Water supply	34
Hydropower	7
Irrigation	3
Silt retention	3
Subtotal	47
Multipurpose dams	
Water supply + Irrigation	6
Water supply + Flood mitigation	5
Water supply + Irrigation + Flood mitigation	2
Hydropower + Flood mitigation	2
Hydropower + Water supply	1
Subtotal	16

Source: (Ref 2)

The water demand for 1980 and 1990 and the projected demand for 2000 are given in Table 3; the values within the brackets refer to the proportions of the total water use. Table 4 shows the national water supply production capacity and coverage and non-revenue water (NRW) for 1990 and the projected figures for 2000. Due to the rapid population increase and the rapid growth of industries, the annual water demand for the domestic and industrial sector has been expanding at the rate of about 12

percent. By 2020, the domestic and industrial sector is projected to be the main water user in the country.

Table 3. Water demand for 1980 and 1990 and projected demand in 2000

Water user	1980	1990	2000
Domestic and industry	1.3 billion m ³ (18 %)	2.6 billion m ³ (20 %)	4.8 billion m ³ (23 %)
Irrigation	7.4 billion m ³ (80 %)	9.0 billion m ³ (78 %)	10.4 billion m ³ (75 %)
Other	0.2 billion m ³ (2 %)	0.2 billion m ³ (2 %)	0.3 billion m ³ (2 %)

Source: (Ref 4)

Table 4. Water supply production capacity and coverage and non-revenue water for 1990, and projected figures for 2000

Item	1990	2000
Production capacity	6,103 mld (2.2 billion m ³)	11,800 mld (4.3 billion m ³)
National coverage (%)	80	95
Urban coverage (%)	96	99
Rural coverage (%)	67	83
Non-revenue water (%)	43	38

Source: (Ref 4)

Irrigation development primarily caters for the double cropping of paddy to meet the dual objective of increasing food production and raising farmers' income. There are 564 000 hectares of wet paddy land in Malaysia, 322 000 hectares of which are capable of double cropping through the provision of irrigation facilities. Irrigation efficiency is about 50 percent for the larger schemes, though some of the smaller schemes operate at an efficiency of perhaps less than 40 percent.

With respect to sanitation, in 1980 the government adopted the policy that all new housing developments of more than 30 units must have a complete sewerage infrastructure, including their own local sewage treatment plants. In 1994, the public sewerage services were privatized. Almost all of the urban population have access to sanitation facilities. About 79 percent of the urban population has access to the central sewerage system and 98 percent of the rural population is provided with pour-flush latrines (Ref 5).

Hydropower development was given emphasis through the four-fuel (oil, gas, coal, hydropower) energy strategy of the 1980s as it is a clean and renewable resource. Energy self-sufficiency is achieved by maximizing the development and use of indigenous energy resources. In 1998, the share of hydropower to total power generation was less than ten percent. The aggregate energy production of hydropower plants in operation and of prospective projects that have been identified or investigated is less than 30 percent of the technical potential. The gross hydropower potential of the country has been estimated at 29 000 MW, about 85 percent of which is in the states of Sabah and Sarawak.

Water quality has become an important concern as a direct consequence of accelerated economic development in the past two decades. Table 5 shows the water quality of the selected rivers for the period 1992-1998. In the case of groundwater quality, the preliminary findings of the monitoring programme, which began in 1996 in Peninsular Malaysia, did not show the presence of any significant

contaminant in the groundwater, except around solid waste dumping sites. A similar groundwater-monitoring programme is being implemented in Sabah and Sarawak.

Table 5. Quality of river water, 1992-1998

Category	1992		1993		1994		1995		1996		1997		1998	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Very polluted	7	8.1	11	9.5	14	12.1	14	12.2	13	11.2	25	21.4	16	13
Slightly polluted	55	63.2	73	62.9	64	55.2	53	46.1	61	52.6	68	58.1	71	59
Clean	25	28.7	32	27.6	38	32.7	48	41.7	42	36.2	24	20.5	33	28
Total	87	100	116	100	116	100	115	100	116	100	117	100	120	100

Source: (Ref 6)

2. Main issues and challenges facing the Malaysian water sector

The main issues and challenges facing the Malaysian water sector which affect the sustainability of development, allocation of water among users and the efforts of the people to achieve a better living are briefly discussed below.

a) Institutional and legal issues

There is no single agency in the country entrusted with the overall responsibility of holistic planning and management of water. Conflicts in water resources management such as allocation of water rights, flood management, pollution control, environmental protection, etc, are resolved through inter-agency coordination and consultation. However, at the federal level, a National Water Resources Council (NWRC) has been set up to pursue a more effective water management, including the implementation of interstate water transfers.

Malaysia suffers from a plethora of sector-based water laws, both at federal and state levels, and from the lack of a comprehensive water law. At present, water legislation is contained within the laws that are enforced by the various water-related government agencies, and many of these laws are outdated, redundant or ambiguous. This diversified water legislation focuses on limited aspects of water resources and water supply directly related to the responsibilities of the respective government agencies and thus difficult to enforce effectively.

b) Increased competition for water

The growth in population and GDP over the last three decades has resulted in heavy demand for water. The problem of population growth is particularly felt in the urban areas, due to rural-urban migration and growing urbanization. The exponential growth in urban population has stretched the government's ability to answer infrastructure and service needs and provide the environmental conditions required for better living. Often the supporting infrastructure for the collection, treatment and disposal of sewage and solid wastes is inadequate to cope with the amounts generated. This state of affairs raises problems of water and air pollution, public health and urban environmental degradation.

The increased demand for the limited and diminishing supply of clean water available has led to competition among the various water users, a competition the continued economic growth exacerbates increasingly. In addition, as the readily available portion of water resources has already been developed for use in practically all regions of major water demand, future water resources development will require the construction of more storage dams. These are not only costly to build: there's a high price to pay in environmental terms as well. Furthermore, the practicable limit of surface water resources development has been reached in some regions of high demand, and it has become necessary to consider inter-basin and interstate surface water transfer schemes.

c) Increased flooding problems

Ironically, at times of water shortages, parts of Malaysia face significant flood problems. Although floods are natural phenomena arising from excessive rainfall overwhelming existing waterways for a while, uncontrolled development activities in watershed areas and along river corridors can increase the severity of floods. The high rate of sedimentation in the rivers has adversely affected their drainage capacity, leading to more frequent floods in downstream areas and to more intense flooding. Incidences of flash floods in urban areas are on the rise due to the runoff characteristics of built-up areas.

The high rainfall during the monsoon results in large areas being subjected to flooding. It has been estimated that altogether about 29 000 km² or nine percent of the total land area of Malaysia are flood-prone, affecting some 12 percent of the population. The average annual flood damage was estimated at RM100 million in 1980, but this has increased due to urban expansion and the escalation of land and property prices.

Absolute control over floods is rarely feasible either physically or economically. However, flood mitigation measures are undertaken to reduce flood damage to a minimum, consistent with the cost involved. Besides the construction of dams and reservoirs and the improvement of river systems, measures to increase infiltration and to store the excess water in small ponds and retention basins are being promoted. The Department of Irrigation and Drainage produces a storm water management manual to address the incidence of flash floods in urban areas.

d) Environmental degradation

The development of public utilities such as water supply, sewerage, and urban drainage and flood mitigation programmes helps to promote economic growth and improve the quality of life. However, this economic development and the resulting rapid urbanization and industrialization have given rise to problems of increased water pollution.

The main sources of organic water pollution are domestic and industrial sewage, effluent from palm oil mills, rubber factories and animal husbandry. Mining operations, housing and road development, logging and clearing of forest are major causes of high concentration of suspended sediments in the rivers. In several urban and industrial areas, organic pollution of water has resulted in environmental problems and adversely affected aquatic life. In addition to organic wastes, rivers remain a convenient means of solid waste disposal. A major portion of household refuse which is not collected, burnt or buried finds its way into drains and rivers. In the Klang Valley, an estimated 80 tons of waste ends up

in the river system every day. River water quality and pollution control need to be addressed urgently since 98 percent of the total water used originates from rivers. Almost all of the investments in water-related infrastructure depend on reasonable river water quality.

e) Low efficiency of water use

Efficiency of water use in general is low. Irrigation efficiency is in the range of 40 to 50 percent, because almost all of the irrigation systems are open systems designed to take advantage of flooding. As irrigation water is charged on a per-area basis rather than on volume used and is relatively cheap, there is little incentive for farmers to use the water efficiently. There is also a high proportion of unaccounted-for water in urban water supply systems, as one quarter to one third of the domestic and industrial water is lost before it reaches the consumers. These losses are the result of leaks in the distribution systems and of illegal connections. As the physical limits of water supply are being reached, more emphasis is now placed on reducing the losses and thus increasing the net supply through improved efficiency in water use.

f) Increased expectations of the people

Since Independence, Malaysia has undergone rapid economic and social development and, together with better education, this has boosted people's expectations of better standards of living. Water shortages and flooding are no longer thought of as natural disasters to be endured and accepted. At the same time, environmental awareness in the country has grown, as reflected in the growing number of public complaints on environmental pollution. This reflects both the increase in the number of pollution sources due to the higher level of economic activities or the encroachment of new housing areas around existing factories or industries, and a greater awareness of the dangers of environmental pollution.

The increased expectations of the people will bring about heavier demands on the water resources, both for water supply and for pollution control. In the context of increased demand from population growth and industrialization competing for diminishing water availability, the need for optimum utilization of water takes on greater urgency, moving towards efficiency and effectiveness of use, as well as conservation and sustainability.

3. A possible water scenario (Ref 7)

A quarter century ago when the idea was mooted, Malaysia, which attained developed status in 2020, five years ahead of schedule, simultaneously realized and sustained the supporting vision "to ensure adequate and safe water for all". The country now prides itself on having a water sector that is managed efficiently and in an integrated manner. This became possible largely through smart partnership agreements entered, as early as the start of the new millennium, between the states and the federal government and facilitated by the National Water Resources Council. Water, apart from being regarded as an economic and social commodity, was recognized as an essential convenience calling for cooperation rather than conflict.

Efficiency of water use in all subsectors is high and comparable to the best in the world, facilitated by the adoption of appropriate technologies, management systems and practices developed through

continuing investments in R&D. Demand management is widely practiced and water is reused and recycled, wherever possible. These efforts have contributed to an overall reduction in per-capita water withdrawal and in the use of water resources in the country.

Uniform and innovative policies and legislation implemented in all states provided the enabling environment together with the legal and financial instruments to effectively deal with the rational development of the water sector for equitable allocation to all users, to answer domestic, industrial, agricultural, hydropower and ecosystem needs.

Strong institutions built around river basin entities manage both land and water matters in an integrated manner, supported by well thought out catchment and river basin management plans and using comprehensive databases and decision support systems models. Successful implementation of sound communication strategies and programmes has led to stakeholders and the community being involved in planning and management, especially at the local level.

These strategic actions and initiatives have made it possible for the people to enjoy uninterrupted, safe and quality water “on tap” and at affordable prices. Pricing policies have enabled cost recovery for investments and encouraged competitive water delivery services through greater private-sector participation.

The adoption of eco-friendly farming and industrial practices, provision of extensive sewerage services and waste management systems, and strict enforcement, have reduced significantly point and non-point pollution sources. These measures have contributed to a reversal of trends in the pollution of water sources. Most rivers now, including the Klang River, have been fully restored. Aquatic life has returned to once polluted rivers. Tourism and recreation flourish in the water environment.

In the agricultural sector, productivity expressed in crop yields per unit of water are comparable to the best in the world, the result of improved water management and farming systems adopting high-yielding crop varieties that have been tested bio-safe.

Water shortages are no longer an issue. Most flooding has been mitigated through both structural and non-structural means except in extreme monsoon flood events, for which early-warning systems and flood fighting and rescue measures are in place.

IV. THE NATIONAL WATER VISION

1. The national vision messages

Based on the visioning process conducted at the national consultation meeting held on 28 June 1999, the national water vision has been formulated as follows:

*In support of Vision 2020 (towards achieving developed-nation status),
Malaysia will conserve and manage its water resources to ensure adequate
and safe water for all (including the environment).*

The key objectives of the vision are as follows:

- *Water for people*: all have access to safe, adequate and affordable water supply, hygiene and sanitation.
- *Water for food and rural development*: provision of sufficient water that will ensure national food security and promote rural development.
- *Water for economic development*: provision of sufficient water to spur and sustain economic growth within the context of a knowledge-based economy and e-commerce.
- *Water for the environment*: protection of the water environment to preserve water resources (both surface and groundwater) and natural flow regimes, biodiversity and the cultural heritage, and mitigation of water-related hazards.

2. Driving forces in the water sector

As a result of the visioning exercise, a number of driving forces were identified which are expected to greatly affect the water sector scenario in the first quarter of the 21st century. These can be categorized under demographic, social, economic, environmental and technological, and governance headings.

The three **demographic** driving forces identified are: (a) continued population growth, (b) rapid urbanization and (c) migration patterns. These will have broad implications, including increased demand for municipal water, expansion of irrigated agriculture to produce more food, conversion of agricultural land for urban and industrial expansion, and pollution of water resources by urban, industrial and agricultural wastewater discharges.

Lifestyles and cultural preferences and prevalent poverty will continue to be an important **social** concern affecting the sector. Affluence increases water consumption, often to the point of overuse.

The driving forces in the **economic** setting are the adoption of market-based economic policies, the availability and condition of water, and industrialization. These will lead to further pressure on water resources due to increasing demand for industrial use and increasing water pollution due to industrial effluents.

In the **environmental** arena, the driving forces expected to affect the sector include: (a) overexploitation and/or pollution of surface and groundwater, (b) the decreasing integrity and health of aquatic ecosystems and (c) climatic changes. The most powerful trend, however, is the increasing public concern over environmental degradation; it will contribute an important and useful perspective to the process of decision-making in resource development and management.

The **technology** identified as having great potential impact on the water sector relates to efficient water use and distribution, to water pollution, and to the selection of drought-, pest- and salt-resistant crops that are expected to reduce water usage and, subsequently, enhance water availability. This will include water reuse and water-recycling technology and the use of renewable energies in the water sector.

The driving forces related to **governance** include institutional and legal reforms and stakeholder participation in the process of decision-making in water resources management. This will also include

the shift from water supply management to water demand management and the management of water resources within the carrying capacity of the river basins.

V. NATIONAL FRAMEWORK FOR ACTION

The set of initiatives that need to take place in order to achieve the key objectives of the vision is evaluated based on the four challenges towards a better water future. These challenges are:

- *Managing our water resources efficiently and effectively (addressing both quantity and quality aspects)* – Increasing water demand as a result of population growth and industrialization, further compounded by the degradation of land and water resources, point to the need to efficiently and effectively manage water resources.
- *Moving towards integrated river basin management* – The river basin is a geographical unit with a well-defined boundary that defines the totality of the hydrological process and transcends political and administrative limits. It is therefore the ideal management unit to address water problems.
- *Translating awareness into political will and capacity* – The non-existence of sector leadership and political will to implement much-needed reforms has resulted in a deterioration of water quality, a decrease in water availability and conflicts among users (irrigation, hydropower, industry and domestic users). There is therefore a need to instil awareness on the economic, social and environmental value of water among politicians, decision-makers and other stakeholders in the water sector.
- *Moving towards adequate, safe and affordable water services as will befit developed-nation status by 2020* – Inadequate infrastructure, lack of public awareness in water resources management, and inappropriate water policies have had a negative impact on the water sector. In general, existing water distribution systems for domestic use and irrigation are largely inefficient and fast deteriorating. There is a need for legislation and policies to encourage private-sector participation.

The challenges, strategic orientations and actions suggested are given in Table 6, overleaf.

The assumptions underlying the success of the actions are (i) the existence of strong political will, (ii) availability of financial and technical resources from government or development partners and private sector ventures, (iii) effective institutional set-up, (iv) effective enforcement, (v) sustained joint ventures through public-private partnership and (vi) networking at national, regional and global levels.

Table 6. Framework for action

Challenge	Action
<p>Managing our water resources efficiently and effectively (addressing both quantity and quality aspects)</p> <p>The strategy is to:</p> <ul style="list-style-type: none"> • Practice integrated water resources management • Balance withdrawal/use and conservation of water • Manage water resources effectively and efficiently • Protect and allocate water equitably 	<ul style="list-style-type: none"> • Formulate a national water policy and comprehensive water legislation and guidelines • Establish an efficient institutional framework, such as river basin authorities • Ensure stakeholder participation in the decision-making process • Achieve capacity building within water-related institutions and promote water awareness in all water-using sectors • Develop innovative technologies with respect to wise water use, water and wastewater treatment, water reuse and recycling and alternative water sources • Engage in extensive research and development in the water management sector • Institute efficient water demand and water supply management
<p>Moving towards integrated river basin management</p> <p>The strategy is to:</p> <ul style="list-style-type: none"> • Develop federal, state and cross-sectoral coordination mechanisms for river basin management • Develop mechanisms for effective stakeholder participation • Ensure equitable sharing of water resources in each river basin • Manage river basins through the ecosystem approach • Minimize water pollution, floods and drought 	<ul style="list-style-type: none"> • Enable the National Water Resources Council to oversee interstate cooperation on water resources development and river management, including the development of a national water policy • Establish a state-level cross-sectoral coordination institution • Organize regular state and national workshops involving all stakeholders • Develop pilot projects in selected river basins • Promote networking and better organization of stakeholders • Ensure easy access to information • Carry out assessment studies/protection for each river basin • Develop water use/allocation policies and master plans for each river basin • Introduce incentives/disincentives towards equitable water distribution • Assess the ecosystem status, services and sensitivity in each river basin • Designate ecosystems for protection and restoration • Establish monitoring and enforcement mechanisms • Develop a flood-control master plan and drought contingency plans, including land-use guidelines for each catchment • Develop water-quality management taking into consideration the carrying capacity of the rivers and sustainable development indicators • Map out all the river basins and develop river basin classification/carrying capacity schemes to guide future development/environment control activities • Tackle hill/slope development and associated erosion and sedimentation
<p>Translating awareness into political will and capacity</p> <p>The strategy is to:</p> <ul style="list-style-type: none"> • Promote political awareness of the water sector • Mobilize mass media/NGOs over water awareness • Develop multi-stakes discussion and dialogues on relevant solutions • Monitor the implementation of agreed solutions and amend the policies based on the feedback 	<ul style="list-style-type: none"> • Submit information/recommendations for the water sector to the highest authority • Provide the water sector with enough staff and adequate training • Ensure water sector networking (national, regional and international) • Strengthen water-related institutions • Build up the water sector database and make for easy dissemination • Encourage dialogue among stakeholders at different levels and locations and publish the outcome of the consultations • Have the sustainability of the water sector monitored by independent groups • Use the recommendations by monitoring bodies to amend strategies • Promote wise water use by all users • Introduce the ‘polluters pay’ principle • Set up an effective enforcement agency
<p>Moving towards adequate, safe and affordable water services befitting developed-nation status by 2020</p> <p>The strategy is to:</p> <ul style="list-style-type: none"> • Provide safe water to all • Adopt water-demand management • Improve wastewater management • Improve governance • Go for capacity building • Promote public-private partnership 	<ul style="list-style-type: none"> • Review and update standards regularly • Develop a master plan for supply management • Continuously improve water technology • Practice good governance • Introduce water-related curricula into the education system • Promote greater cooperation among all stakeholders • Introduce acceptable water-pricing mechanisms • Enhance opportunities for water training • Set up a national water institute to look into the best practices in the water sector • Enhance research on high-yield and drought-resistant crops • Institute efficient water supply systems

1. Implementation of the national water vision

The key policies and the players, milestones and financial resources needed in the implementation of the national water vision are given in Table 7.

Table 7. Implementation of the national water vision

Key policies	Players	Milestones	Financial resources
1. Endorsement and acceptance of the national water vision by all stakeholders	<ul style="list-style-type: none"> Economic Planning Unit (EPU) MWP Related state agencies 	2001	RM200 000
2. Establishment of river basin organizations	<ul style="list-style-type: none"> National Water Resources Council State Legislative Council (SLC) 	2010	RM2 000 000 per state
3. Establishment of a mechanism for coordination and monitoring	<ul style="list-style-type: none"> NWRC EPU/Implementation Coordination Unit State EPUs (SEPU) SLC Water regulators 	<ul style="list-style-type: none"> National water policy: 2001 Contemporary legislation: 2003-2005 Water resource allocation: 2003-2005 Water pricing policy: 2003 Institutional transformation and capacity building: 2005 Water standards (raw, treated and effluent): 2005 	
4. Sensitize, and facilitate the involvement of, NGOs in the implementation of the framework for action	<ul style="list-style-type: none"> MWP 	2005	RM250 000
5. Enhancement of public awareness of the national water vision	<ul style="list-style-type: none"> MWP Min. of Education Min. of Information 	2005	
6. Establishment of a mechanism for participatory management of stakeholders in all subsectors	<ul style="list-style-type: none"> Operating agencies 	2010	
7. Maintain and regularize dialogue among key partners of the national water vision	<ul style="list-style-type: none"> MWP 	Annually	RM80 000 for 2 workshops per year

NB: MWP: Malaysian Water Partnership

2. The Eighth Malaysian Plan (2001-2005) and the Third Outline Perspective Plan (2001-2010)

The Malaysian Water Partnership should be invited by the Economic Planning Unit to be a member of the technical working group preparing the Eighth Malaysian Plan (2001-2005) and the Third Outline

Perspective Plan (2001-2010). The immediate issues that need to be addressed in both plans are shown in Table 8.

Table 8. Water sector issues to be addressed in the Eighth Malaysian Plan (2001-2005) and the Third Outline Perspective Plan (2001-2010)

Issue	Remark and action
1. National water vision	The adoption of a national water vision to ensure continuous supply of water in terms of quantity and quality to meet all needs, including those of the environment. This vision shall be one of the main agenda in the sustainable national development plan. The strategy guidelines and plan of action to realize the vision are formulated, adopted and disseminated to all stakeholders, so that everybody is committed to conserve water resources and their ecosystems. Water is everybody's business.
2. Policy and law	The national water policy shall be formulated by the federal government and adopted by the state governments. The policy encompasses integrated management of land and water resources based on river basins, and the protection of watersheds and aquifers. The policy guides interstate water transfers, allocation of water to users, dam monitoring and safety, and development activities in watersheds, including the vicinity of dam reservoirs. Contemporary laws are enacted to facilitate the implementation of the national water policy and shall be adopted by the state governments.
3. River basin organizations	The state governments are recommended to set up water management institutions similar to the Selangor Water Management Authority (LUAS). This will contribute to the implementation of best practice in the management of water resources to ensure sustained supply of good-quality water. Laws are enacted to support these institutions. The human resources of the institutions comprise inter-discipline water professionals able to overcome present and future challenges in the national water sector.
4. Pollution	Activities which pollute water resources are monitored and corrected. The surveillance of watersheds is assisted by remote-sensing techniques to detect illegal activities and overcome water pollution problems. The polluted rivers are restored in stages, with the participation of all stakeholders. Awareness campaigns are made among the riverine population and the parties responsible for the water-polluting activities. The principle of 'polluters pay' will be enforced. The programme of restoration of water resources will only be successful if it begins at source, that is, with the control of polluting sources.
5. Groundwater	Groundwater exploration programmes are implemented, especially in the main river basins, to identify potential aquifers, and protection zones are provided to safeguard this important resource. Guidelines for the development of potential polluting activities and the appropriate laws will be formulated and enforced.
6. Water-demand management	Water-supply management shall be replaced by water-demand management in order to minimize the exploitation of new water sources to meet the increasing water demand. Water-demand management consists of all activities to increase efficiency in water supply and water usage and promote water recycling. Incentives will be given to industries that practice water reuse since they contribute directly to water-demand management and to the reduction of effluents. New housing, commercial and industrial estates shall be fitted with water-saving devices, including rainwater harvesting devices, and the new drainage concept of zero peak flow contribution from developed areas shall be implemented.
7. Research and development	R&D activities in the water sector are enhanced and the water sector becomes a major sector in the Intensified Research Priority Areas programme. A centre is established to coordinate R&D activities, provide direction for research, allocate funding and act as the National Database and Reference Centre. The centre is staffed with water professionals from different disciplines and incentives are provided to attract the best local and foreign water professionals.

VI. CONCLUSIONS

The effective implementation of integrated water resources management (IWRM) will contribute to the realization of the national water vision in 2025. Reform and initiatives are needed to provide an adequate and enabling environment for this purpose. They include:

- An IWRM awareness-raising campaign in political and technical circles and among the public to gain active support at all levels.
- Reform of the institutional framework for the integrated planning and regulation of water resources, the water rights system and environmental issues (through legislation).
- Strict implementation and enforcement of laws and policies and streamlining of the bureaucracy (through executive orders).
- Improvement of data and information, including a review and rehabilitation of the data collection network for surface water, groundwater and water quality.
- Enhanced transfer of knowledge and information based on global experiences and best practices on all aspects of IWRM – policy, law, management procedures, etc.
- Capacity building for both professionals and institutions.
- Research and development to develop and disseminate knowledge, methods and tools to facilitate comprehension of the complex water system, forecast its long-term dynamics and compare the impact of various policies and management approaches with the institutional framework.

Many different visions can be described. Without some positive vision, without some thought about what truly sustainable water use means, Malaysia risks continuing on a path that will take her further and further in the wrong direction. Whether we succeed in ensuring that the future we want is the future we get will depend almost entirely on whether large numbers of people, water experts, specialists in other fields, policymakers and stakeholders generally, are convinced it is the future we need. The way forward to realize the national water vision is to establish associated programmes in the Eighth Malaysian Plan and the Third Outline Perspective Plan. Water is everybody's business and we should endeavour to make every drop count.

REFERENCES

1. **Government of Malaysia/JICA**, 1982. *National Water Resources Study, Malaysia, Sectoral Report, Volume 18*
2. **Water Supply Branch, Public Works Department**, 1998. *Malaysia Water Industry Report 97/98*
3. **Keizrul Abdullah and Azuhan Mohamed**, 1998. *Water – A situation appraisal and possible actions at the community level*. Seminar on local communities and the environment II, Environmental Protection Society of Malaysia, Petaling Jaya, Malaysia
4. **Economic Planning Unit**, 1996. *Seventh Malaysian Plan 1996-2000*
5. **Sewerage Services Department**, 1998. *Sewerage Services Report 1994-1997*
6. **Department of Environment**, 1999. *Malaysia Environmental Quality Report 1998*
7. **Shahrizaila Abdullah**, 1999. *Towards a Malaysian and global vision for water, life and the environment*. Workshop on the sustainable management of water resources in Malaysia – a review of practical options, Shah Alam, Malaysia

THE PHILIPPINES: FORMULATION OF A NATIONAL WATER VISION

Hector Dayrit

Executive Director

The National Water Resources Board
of the Philippines, Manila

I. REVIEW OF THE NATIONAL EXPERIENCE IN THE FORMULATION OF A NATIONAL WATER VISION

1. Water resources planning and development

The main components of water resources management in the Philippines are vested in the mandates of the various government agencies that undertake most of the water resources programmes and projects in the country. There are more than thirty such agencies and offices, each dealing with a particular aspect of water resources development. Thus, there are separate agencies dealing mainly with each of the sectors of water supply, irrigation, hydropower, flood control, pollution, watershed management, etc. Each agency undertakes programmes and projects exclusively within its own field of responsibility. Project identification and planning are performed to meet the targets of the agency with little or no regard to the needs of others.

The sheer number of agencies involved brings about overlap of work and conflicts among agencies, which result in a fractional water management plan that does not adequately meet the requirements for sustainability. Little effort has been devoted to require each agency in the resource area to formulate its plans and make them consistent with the overall direction of the whole sector. As it is, it would seem that the various water agencies plan and perform their activities with little regard for the entire water resources management thrust.

Under this setting, the National Water Resources Board (NWRB) was created in 1974 as the authoritative national organization to coordinate and integrate all activities in water resources development and management. Its main objective is to achieve scientific and orderly development and management of all the water resources of the Philippines consistent with the principles of optimum usage, conservation and protection to meet present and future needs. The mantle of authority of NWRB is derived from Presidential Decree (PD) 424 (NWRC Charter), PD 1067 (Water Code of the Philippines) and PD 1206 (Water Utilities).

Fragmentation among water-related agencies is evident in three areas of concern: water supply and distribution, economic and resource regulation, and planning and policy formulation.

The following agencies are involved in water supply and distribution:

- the Metropolitan Waterworks and Sewerage Services (MWSS) and its two concessionaires (after it was privatized in 1997) for Metro Manila, servicing 62.68 percent of its total population;

- the Local Water Utilities Administration (LWUA) and its water district offices for other cities and municipalities, servicing 58 percent of the total urban population within its area of responsibility; and
- the departments of Interior and Local Government (DILG) and Public Works and Highway (DPWH) and local governments which manage community water systems (usually involving point sources and piped systems with communal faucets), servicing 86.85 percent of the country's rural population.

Besides, there are also private systems, mostly residential areas and industrial parks which have their own systems installed, and which effectively regulate themselves, since there are no existing laws or regulations that govern performance of public utilities, i.e. tariff, or service efficiency.

The following agencies have the same function as resource regulators:

- The Department of Environment and Natural Resources (DENR) formulates policies for the enforcement of environmental protection and pollution control regulations. It is primarily responsible for the preservation of watershed areas and ensures water quality with respect to rivers, streams and other sources of water.
- The Department of Health (DOH) is responsible for drinking water quality regulation and supervision of general sanitation activities.

The local government units (LGUs) are also resource regulators, as the Local Government Code of 1991 (Republic Act No. 7160) devolved to local governments the power to discharge functions and responsibilities of national agencies and offices such as the provision of basic services and facilities including water supply systems (Section 17). It also gave the local governments the right to an equitable share of the proceeds from the use and development of national wealth and resources (which can be interpreted as to include water resources) within their respective territorial jurisdictions (Section 18). Thus, conflicts with respect to the powers of the water agencies including NWRB vis-à-vis the local governments have arisen.

As for planning and policy formulation, numerous agencies are involved, including the National Economic Development Authority (NEDA), NWRB, LWUA and local government units. NEDA serves as the highest socio-economic planning and policymaking agency of government. It ensures that programmes of government agencies are consistent with the government programmes as laid out in the Medium-term Development Plan, the Long-term Development Plan (also known as Plan 21) and the Medium-term Public Investment Programme. Both planning documents incorporate water resources sector plans at the national and regional levels. There are also coordinating committees established to align development of water resources with the national strategies and fiscal direction of the government. The National Irrigation Administration (NIA), the National Power Corporation (NPC) and the Department of Energy are also involved in planning and water infrastructure development with respect to the requirements of their respective sectors.

For the past years, the national government has endeavoured to develop an efficient water resources management system. There have been several studies of paramount impact to the sector such as the NWRB Framework Plans and the Master Plan Study on Water Resources Management in the Philippines in 1998 as a bid to fully rationalize the sector and revitalize it in terms of the efficiency and sufficiency of its service and resources.

NWRB prepared regional as well as basin framework plans in the 1980s for the 12 water resources regions and 41 river basins. The plans are large-scale analyses of the available resources, of potential water demand and of possible alternative measures to meet this demand. They provide implementing agencies with an overview of the issues and problems outside their own area of responsibility, thereby affording opportunities for a joint undertaking of projects among line agencies. They also provide a basis for the review of the individual projects and programmes as prepared by the development agencies. On the other hand, the six-volume Master Plan Study on Water Resources Management in the Philippines spearheaded by NWRB was undertaken, thanks to a grant from the Japan International Cooperation Agency to the Philippine government, to formulate a master plan on water resources development and management in the 12 water resources regions of the Philippines.

The vision of the Philippine National Development Plan for the 21st century (Plan 21) is to create a modern and humane society, raise the quality of life of all Filipinos and bequeath an ecologically healthy homeland to future generations. For water resources, the vision is of sustainable water management to provide affordable water for adequate needs, including disposal.

Among the various challenges in Plan 21 that are related to the water resources sector are the need to develop and implement sustainable policies, programmes and projects and the need to provide a harmonious and coordinated approach to water resources development while creating an environment conducive to private- and public-sector participation so as to increase investment.

Plan 21 states that the long-term strategy in water resources planning for the different regions of the country is based on the following principles: (a) water is a limited resource that must be conserved and managed efficiently; and (b) water has an economic value in all its competing uses and shall be treated as a commodity with an economic value; thus capacity and willingness to pay must be taken into consideration when pricing water. The long-term strategy of the plan is as follows:

1. The main thrust is to create an independent authority with sufficient powers and resources to formulate national policies on water resources management, regulation (quantitative, economic and service-efficient), usage, planning and conservation. For this:
 - a) Pursue the sustainable development of water resources through appropriate policy and legal reforms, particularly in resource exploitation, allocation, prioritization and optimization.
 - b) Promote an integrated approach to link social and economic development with the protection of natural water sources and ecosystems; such an approach must be decentralized, participatory and community-based, or else conducted at the most appropriate level.
 - c) Implement policies through decentralized operations within a national framework cognizant of the policy of devolution and community-based approaches in water management. As such, it is necessary to address the need for capacity building and training at local level in development planning, operation and maintenance.
 - d) Support the creation of river basin authorities to practice integrated water resources management. Each basin authority shall develop a master plan for the area.
2. Encourage private sector participation in all aspects of water resources management, use and development.
 - a) Promote market-based incentives for water conservation.

- b) Create one-stop shopping for water resources development.
 - c) Provide incentive programmes for private sector investment in all water resources development initiatives.
3. Anchor irrigation development on food security through self-reliance and uplift the socio-economic conditions of farmers in support of the social reform agenda.
 4. Strengthen forest protection efforts, including reforestation activities, through community-based projects.
 5. Develop a pricing mechanism that takes into consideration full cost recovery and other externalities while balancing it with people's capacity and willingness to pay.
 6. Develop an extensive information and education campaign that will make the public realize that water is a limited resource, and that it is a commodity which comes at a price.
 7. Rationalize and institutionalize the data collection system for an efficient and effective flow of information.
 8. Pursue and strengthen the strict enforcement of environmental laws, rules and regulations and adopt stiff penalties for violators.
 9. Prioritize research on and development of applicable and appropriate technology for water conservation, sanitation and pollution control.
 10. Encourage rainwater harvesting and impounding and prioritize the development of surface water resources to relieve stress and pressure on groundwater.
 11. Integrate gender concerns in all water resources development and management policies and programmes.

2. Current efforts in the formulation of a national water vision

1. The National Water Conference (World Water Day 1999)

The observance of the World Day for Water every 22 March began when the General Assembly of the United Nations adopted a resolution whereby 22 March was declared World Day for Water, to be observed annually starting in 1993, in conformity with the recommendations of the UN Conference on Environment and Development held in Rio de Janeiro in 1992, to create awareness of the world's dwindling water sources and resources.

The Philippine government, through Administrative Order No. 258 signed by President Fidel V Ramos on 4 March 1996, officially adopted World Water Day for national observance from that year onward. The order also provided for the observance of the National Water Conservation Year, starting on World Water Day. Corollary to the government's effort of attaining sustainable development, all sectors must demonstrate solidarity with the international community in advocating water conservation and sustainable use.

A national conference aimed at creating a shared vision on water supply and sanitation for the 21st century highlighted the celebration of World Water Day in 1999. Heads of the different government agencies involved in water supply and sanitation as well as representatives of non-governmental organizations, private sector companies, people's organizations, women's groups and other bodies took part in the conference to come up with a water sector statement in accordance with the year's World Water Day theme of "Everybody Lives Downstream", with emphasis on water resources management at the river basin level and in accordance with Vision 21, a shared vision for water supply and sanitation development for the next century.

Vision 21 was conceived during the Global Forum on Water Supply and Sanitation of the Collaborative Council held in Manila in 1997 to improve universal access to water supply and sanitation facilities through shared efforts.

The conference stressed the importance of defining a shared vision leading to common strategic choices and actions. It underscored the need to visualize the desired state of water supply and sanitation in the future and steer the different stakeholders towards this vision. The series of workshops from the regional consultations leading to the national conference had emphasized the need for a participatory approach articulating the needs of the various stakeholders to draw up a list of the changes and actions needed to attain the vision. The conference capped the local consultations done in several grassroots communities.

The objectives of the workshop were to elicit a shared vision, identify changes necessary to attain the vision and map out the steps that should be taken within the next five years to effect the desired changes.

To arrive at a vision for water supply and sanitation, the workshop participants were divided into nine groups, each group including representatives of private, government and non-government organizations in order to stimulate exchanges of views. Facilitators were assigned to each group and discussions were triggered by guidance questions and ‘situationers’ proved helpful in integrating the various perspectives.

The key phrases or images solicited to describe the state of the water supply, sewerage and sanitation in 2025 are as follows:

Water supply	Sewerage	Sanitation
<ul style="list-style-type: none"> ● Sustainable ● Affordable ● Potable ● Safe and clean ● Accessible ● Sufficient ● World-class ● Conserved & protected watershed areas 	<ul style="list-style-type: none"> ● Comprehensive system countrywide ● State-of-the-art system ● Strict enforcement 	<ul style="list-style-type: none"> ● Environmentally sustainable garbage disposal system countrywide ● 100% compliance

These key phrases were crafted into a vision statement for each of the nine groups, leading to the formulation of an integrated vision statement, which reads: *“A world-class, affordable and sustainable water supply, sanitation and sewerage system accessible to every Filipino.”*

Entry points for change were also identified in the workshop to narrow the gap between desired and actual output and enhance the attainment of the groups’ vision statement. The points are as follows:

Policy: This refers to statements and pronouncements of support for an integrated policy framework for sustainable water resources development.

- Legislate an integrated policy framework for sustainable water resources development
- Adopt and institutionalize an integrated master plan for water supply, sanitation and sewerage

People: These are changes in the mindset and behaviour of the stakeholders, who can act as sponsors, agents and advocates of change in the water system.

- Change mindsets and attitudes through a comprehensive information and education campaign
- Strengthen and expand the stakeholder base by involving the NGOs in the management of water-related programmes and providing them with adequate technical, institutional and financial support
- Take mainstream gender-sensitive approaches in water supply, sanitation and sewerage programmes

Enabling mechanisms: These refer to changes in approach when accessing material and non-material resources for the implementation of the water system vision.

- Implement an integrated water supply system and sewerage-related programmes through build-operate-transfer schemes
- Encourage more active private sector participation for higher financial mobilization
- Develop a reliable database on water. Install the Geographic Information System

Infrastructure and technology: This pertains to innovative and promising practices in water supply, sanitation and sewerage.

- Tap additional sources of water
- Implement a water research and conservation programme
- Phase out the use of non-biodegradable packing materials

Facilitating factors that would contribute strongly to the realization of the vision are the following:

- **Political commitment and social support.** The desired changes entail an integrated approach that would be best achieved with the political will of the present and future crops of leaders and of the citizenry.
- **Long-term orientation.** Stakeholders with varied interests will stay committed if the strategic direction is explicitly shared.
- **Integrated water, health and environment policy tools.** The participants expressed the need to integrate into one framework the policy interventions and actions related to water, health and the environment.
- **Comprehensive economic, financial and technological strategic guidelines.** Participants expressed the need to treat water as both an economic and social resource. A variety of cost-effective technological strategies should be put in place to conserve this finite resource not only for present use but for future generations as well.
- **Local and international networking in strategy implementation.**

2. National consultation on water sector mapping and visioning

The National Consultation on Water Sector Mapping and Visioning held on 12 May 1999 at the ADB headquarters was the first activity undertaken in the Philippines towards the formulation of a national vision. Its conclusions were to contribute to a regional report on water sector mapping and vision for Southeast Asia, a major project of the Global Water Partnership (GWP) in collaboration with the World Water Council (WWC). Similar reports were under preparation for South Asia, China, Africa, South America and Eastern Europe to address the various issues on water resources management; in turn, they were to contribute to the global reports of GWP and WWC, which were to be presented to the Second World Water Forum in March 2000 in The Hague.

The GWP thrust is on integrated water resources management (IWRM), which aims to ensure the coordinated development and management of water, land and related resources by maximizing economic and social welfare without compromising the sustainability of vital environmental systems. Thus, the one-day national consultation meeting on IWRM for the Philippines was convened to arrive at a consensus on:

- the priority issues in IWRM in the country for which strategic assistance is required;
- the availability in the country of service providers or expertise to address the priority issues;
- the gaps in the expertise available in the country;
- the national vision for water, life and the environment in 2025; and
- a national framework for action to attain the vision.

The Philippine meeting was divided into two parts: mapping exercises and visioning exercises. In this project, mapping was defined as identifying the needs for strategic assistance in IWRM and assessing the availability of service providers or expertise to address those needs. Service providers could be university institutes, research and consultancy organizations, UN specialized agencies, external support agencies, government institutions, individuals or publications. Strategic assistance can be seen as assistance to the process of decision-making on the management of water resources, including setting the framework for these decisions. The mode of assistance may take the following forms:

- advice on approach
- policy dialogue and awareness
- synthesized knowledge and information
- research and development
- capacity building

Visioning, on the other hand, consists of consultations with the stakeholders in the Philippines on their vision of water, life and the environment in 2025 and the development of a framework for action to attain the vision. Among the issues addressed on visioning are:

- scenarios and key drivers presented by the vision team
- desirable short-, medium- and long-term outcome
- acceptable/effective/workable tools for action
- practical options available to address priority problems
- suggested policy tools to attain the desired outcome
- acceptable trade-offs

To obtain the views and ideas from as wide a selection of concerned stakeholders as possible from the many subsectors and institutions that employ not only water professionals but also social scientists involved in the water sector, questionnaires on mapping were sent out to some 300 potential participants several months before the meeting. Those who responded were taken as participants to the meeting. The questionnaire listed all the possible issues in IWRM as well as the cross-sectoral issues in the other water subsectors that are considered relevant to the Philippines. The questions were framed in such a manner as to determine, among other things, which of the 62 issues in IWRM:

- would need strategic assistance and in what form, with ranking in order of importance;
- may be addressed by available service providers or expertise in the country; and
- may be addressed by the associated programmes or service providers being developed by GWP.

The results of the completed questionnaires were analysed and the issues ranked according to their average score. The participants in the meeting were divided into four groups and were requested to validate the results of the initial survey to arrive at a consensus on the priority issues through a process of grouping and regrouping similar ideas. Thus, the factors needed to achieve the vision – the “driving forces” – were identified. They served as input in the development of a framework for action. Validation results show that the Philippine need for strategic assistance revolves around four issues: standards setting, regulation, data management, and allocation. In other words, there is a need for assistance in developing a strong institutional framework which will resolve conflicts arising from these issues, i.e. allocation and use, tariff, and quality, and promote policies for a more equitable and efficient use of water.

The vision statement for the water sector endorsed by the participants to the meeting reads: “*By the year 2025, water resources in the Philippines are to be used efficiently, allocated equitably and managed in a sustainable way.*” Participants identified six driving forces that are necessary to achieve such a vision. These are grouped under the following general factors:

- **Demographic:** population growth, urbanization, migration patterns
- **Social:** lifestyles, cultural preferences, poverty
- **Economic:** economic policies, water infrastructure, industrialization
- **Environmental:** overexploitation, pollution, climatic change
- **Technological:** water use efficiency, water pollution, drought-, pest- and salt-resistant crops
- **Governance:** institutional reform, stakeholders’ participation

The framework for action to achieve the national water sector vision in 2025 for the foregoing driving forces is as follows:

- **Demographic**
 - Maintaining sustainable population growth.
 - Establishing the population carrying capacity of the ecosystems and natural resources base.

- Stimulating development in the countryside to relieve migration to and infrastructure pressure in urban centres.
- **Social**
 - a. Promoting resource access and upholding property rights; ensuring gender equity in the access to resources; upholding indigenous rights; providing the marginalized population with access to affordable water through socialized pricing.
 - b. Integrating the social acceptability dimension into project feasibility studies; preserving and restoring cultures and traditions; promoting equitable gender involvement at all stages of project development.
- **Economic**
 - a. Adopting water-pricing policies that reflect the economic cost of using water resources and encourage full cost recovery for water services, including resources management to the extent possible.
 - b. Considering the ‘users pay’ principle and market-based instruments to enhance water usage efficiency and rationalize the allocation of water resources.
 - c. Adopting the ‘polluters pay’ principle to reduce water pollution.
 - d. Apply economic principles in project planning to focus development on projects which satisfy both social needs and efficiency criteria.
- **Environmental**
 - a. Adopting environmental management tools in policy and decision-making
 - Proper land-use planning and zoning.
 - Application of environmental risk assessment for critical industrial projects.
 - Full implementation of a system for monitoring environmental quality and natural resources usage.
 - b. Protecting the environment and conserving natural resources
 - Protecting and conserving bio-diversity.
 - Ensuring watershed protection and management.
 - Maintaining the productivity of agricultural, forest and aquatic resources.
 - Maintaining the assimilative capacity or quality of air, water and land resources.
 - Ensuring proper disposal of solid, toxic and hazardous wastes.
 - c. Assessing the country’s vulnerability and adaptation capability to climatic change
 - d. Promoting environmental awareness, including environmental ethics, and supporting environmental management actions
 - Effecting change in values and attitudes through environmental education.
 - Developing environmental manpower to support environmental management.
- **Technological**
 - a. Adopting environment-friendly technology
 - Minimizing generation of waste.
 - Recycling and reusing wastewater.
 - b. Promoting water demand management and water conservation
 - Increasing irrigation efficiency through the application of measures, i.e. proper crop selection and techniques such as sprinkler or drip irrigation, and other options.
 - Improving the design, construction, operation and maintenance of water supply facilities to improve efficiency and minimize water losses.
- **Governance**
 - a. Improving institutional capability in integrated water resources management
 - Strengthening the technical, managerial and financial capacity of water sector institutions.
 - Strengthening linkage and coordination among the agencies concerned.

- Improving the information and data system for planning and decision-making.
- Regular updating of the national water resources assessment and water resources master plan using the latest reliable data.
- b. Promoting broader stakeholder consultation and participation in water resources management
- c. Ensuring the strict enforcement of water-related laws, implementing rules and standards
- d. Intensifying public information and education campaigns on water demand management

The identified driving forces or trends that are expected to shape the water sector scenario in the first quarter of the 21st century can also be linked to the issues in IWRM, which essentially suggests that the effective implementation of IWRM will highly contribute to achieving the national water sector vision in 2025. However, while significant headway has been gained in IWRM during the last two decades, reform initiatives are still needed to provide an adequate environment for the effective and efficient implementation of IWRM. These include:

- a. An IWRM awareness raising campaign in political and technical circles and among the public to ensure active support at all levels.
- b. Reform of the institutional framework for the integrated planning and regulation of water resources, the water rights system, and environmental issues (through legislation).
- c. The strict implementation and enforcement of laws and policies and streamlining of the bureaucracy (through executive orders).
- d. Improvement of data and information, including a review and rehabilitation of the data collection network for surface water, groundwater and water quality.
- e. Enhanced transfer of knowledge and information based on global experiences and best practices on all aspects of IWRM – policy, law, management procedures, etc.
- f. Capacity building, not only for individuals but also for institutions.
- g. Research and development to increase and disseminate knowledge, methods and tools to facilitate the understanding of the complex water system, to forecast its long-term dynamics and to compare the impact of various policies and management approaches with the institutional framework.

II. KEY ELEMENTS IN THE FORMULATION OF A NATIONAL WATER VISION

1. The water supply and sanitation sector

The national vision for the water supply and sanitation sector was conceived in accordance with the long-term vision on water, life and the environment, or World Water Vision 2025 – also known as Vision 21. It invites all stakeholders to contribute to the development of a global vision with the Netherlands government as the main sponsor of this worldwide consultation. Vision 21 was conceived during the Global Forum on Water Supply and Sanitation held in Manila in 1997 to improve universal access to water supply and sanitation facilities through shared efforts.

To develop a vision for water supply and sanitation in the future, the broader political, economic and socio-cultural context in which the water supply and sanitation sector operates was taken into consideration. For one, at the current growth rate of about two percent

annually, the Philippine population of about 70 million is expected to number slightly more than 100 million by the year 2025. Current water supply coverage is only about 78 percent, and sanitation coverage roughly about 69 percent. Sewerage coverage is only seven percent. Some of the main sectoral concerns identified are as follows:

1. Non-systematic approach to water resources management

An integrated and holistic approach to water resources management is simply missing. The sheer number of agencies involved compounded with the ambiguous definition of their responsibilities result in overlapping work, lack of comprehensive data and a fractional water resources management plan that is grossly inadequate in satisfying the requirements for sustainability.

2. Very low priority given to sanitation and sewerage

There is a lack of public awareness of the importance of sanitation facilities in relation to public health and environmental well-being. Data is inadequate to determine the effectiveness of sanitation and sewerage programmes. The existing facilities are generally unsatisfactory and inadequate to protect public health. Mortality and morbidity rates from waterborne diseases are still high. Investment in sanitation and sewerage programmes is minimal, which contributes to their low level of affordability and makes people unwilling to pay for such services.

3. Inadequate financial support to water, sanitation and sewerage programmes

Major investments in water supply and sanitation programmes are not a priority of local government units. Capital financing for major sanitation and sewerage programmes remains a problem. High capital costs make the construction of conventional sewers in many urban areas unaffordable without subsidies.

4. Unreliable water supply databases

It is said that many areas have exceeded the sustainable level of water utilization and it is of concern that the true level of utilization is not known because the available data are fragmented, incomplete and contradictory. The competition for water resources is not well managed. In particular, in some regions and provinces, water resources availability is becoming critical and will require bold planning decisions at regional level and new ways of thinking about water.

5. Inadequate capacity building in the water supply sector, including operations and maintenance

Most foreign-assisted projects include institutional-strengthening and capacity-building components. Despite these efforts, many constructed water systems soon cease to function and many more are in need of rehabilitation and improvement. While community participation and management is universally recognized as a vital component of water supply and sanitation projects, this strategy has yet to be fully applied. The support system to address the technical, institutional and financial needs of community-based water supply and sanitation associations is not institutionalized. Private sector participation is being encouraged, yet there is no effective and credible regulatory environment for all aspects of the sector.

6. Poor community participation and management, especially among women in the water sanitation and sewerage sector

The failure of most water and sanitation projects has been attributed to the low quality of community participation and management, especially among women. The alarming number of non-functioning community-based water and sanitation associations can generally be attributed to the lack of sustaining activities after the turnover of the project

to the association. Gender-sensitive project implementation, though frequently mentioned in projects, is not yet institutionalized.

2. Food security

The integration of the concept of food security into the national vision for water has to come to terms with the fact that poverty leads to environmental destruction. The poor are often forced to exploit the environment because of their need for food and water. How can one talk about sustainable development to those who are hungry and forced to degrade natural resources to survive? It is therefore important to address the issue on food security in the development of a national vision for water.

In the Philippines, agriculture as a whole is the greatest consumer of water, accounting for about 80 percent of the total water demand and yet it has a lower priority than domestic usage in the competition for scarce water resources. Irrigation constitutes a large portion of total water consumption by agriculture; it is considered the biggest water user in the country, notwithstanding the fact that only 47 percent of the potentially irrigable area of 3.16 million hectares is irrigated. About 95 percent of the irrigated area is devoted to paddy and about 70 percent of paddy production comes from irrigated lands.

The demand for rice, the staple food in the Philippines, is projected to grow to about 16 million tons by the year 2025 or about 60 percent more than the present supply. The country will not be able to meet the rapidly increasing rice demand in the present irrigation conditions.

Efforts at increasing the total irrigated area to meet the increasing food demand are impeded by the shortage in water supply. The problem in the irrigation subsector is low water-use efficiency, due to technical and institutional deficiencies such as:

- a. insufficient water control structures to ensure equitable and timely water deliveries to all sections of the irrigation systems;
- b. irrigation systems were not designed to prevent flooding in the wet season;
- c. increased siltation of irrigation systems caused by watershed degradation and severe erosion during typhoons;
- d. irrigation facilities could not be properly maintained, which resulted in inefficient water usage;
- e. deficient water management due to institutional weaknesses.

3. Environment and ecosystems

The integration of the concepts of environment and ecosystem into the national vision for water must take into account the fact that an integrated approach to water resources development and management is needed with a multi-sectoral involvement, based on the principle of sustainability. Therefore, it must be everybody's concern, and the collective objective must be to make certain that an adequate supply of quality water is maintained for the entire population without harming the ecosystem. National development and productivity must be achieved and sustained through the development and management of environmentally sound water resources.

There are three main areas of concern:

a. Watershed degradation

The chronic shortage of water supply in and around Metro Manila in the past years has brought to the forefront recognition of the adverse effects of man's activities in the watersheds. Due to illegal logging, shifting cultivation, forest fires, natural calamities, conversion to agricultural land and allocation of land to human settlements due to population growth, the forests have been shrinking steadily. Rapid deforestation, coupled with inappropriate land use practices, has led to soil erosion, siltation and sedimentation problems in the country's rivers, lakes and reservoirs, resulting in more frequent and more severe flooding and a reduced water supply in the dry season. This state of affairs has also resulted in a decrease in the recharging ability of the aquifers.

The government has launched several programmes and projects for the rehabilitation of degraded watersheds and protection of those that are still in good condition. However, so far, these initiatives have been inadequate to address the alarming rate of watershed degradation, because of the lack of a clear strategy, limited financial resources, fragmented implementation responsibility, shortage of properly trained manpower and increasing socio-economic pressure resulting from the rapid increase of population in the forested uplands where the vital watersheds are located.

b. Groundwater depletion and saline intrusion

The uncontrolled withdrawal from groundwater aquifers in recent years has resulted in the continuous decline of groundwater levels and in saltwater intrusion in areas near the coast such as Metro Manila (WRR IV), Cavite (WRR IV), Iloilo (WRR VI) and Cebu (WRR VII). The indiscriminate use of groundwater wells for residential or industrial use was due to the failure of water utility providers to service these areas.

Aside from the excessive abstraction of groundwater, there is no national groundwater data network to speak of, in the sense that there are very few observation wells for time series data on piezometric levels and pumping rates from production wells. The groundwater data being collected by many agencies are spatial and static information on the wells drilled such as location, lithology, well casings and the results of pumping tests during the development of these wells.

c. Water quality

Water is becoming a critical resource in the Philippines. This is due to the increased pressure on freshwater resources by the rapid growth of population, improvement of living standards and increasing economic development. Although the country is endowed with abundant water resources, usable water is becoming limited due to contamination and pollution. Forty of the more than 400 main rivers in the country are reportedly polluted in varying degrees. All rivers in Metro Manila are considered biologically dead. Water pollution compounded by poor sanitation and hygiene practices has led to an upsurge of waterborne and water-related diseases. Pollution of water sources is due to uncontrolled industrial and agricultural development and to the rapid growth of the population without the development of waste disposal facilities. The runoff during floods flushes out contaminants and wastes such as industrial effluents, agricultural pesticides, traffic emissions, street refuse and uncollected garbage, which eventually find their ways into the rivers and the groundwater aquifers.

The government proposes the strict enforcement of ‘polluters pay’ and other environmental laws. This, however, is not enough to preserve the river environment, due to the following issues and problems:

- a. Absence of a national policy framework for the sustainable use of freshwater resources.
- b. Need to harmonize development activities in areas affecting freshwater ecosystems.
- c. Need to institutionalize an integrated approach to river basins.
- d. Need for an assessment of water resources.

4. Water in rivers

The concept of water in rivers was integrated into the national vision for water because when it comes to using fresh water, human beings, whether they live in a village or in a megalopolis, cannot isolate themselves from their neighbours. Rather, there are fundamental linkages and dependencies between water users and uses in a given drainage basin which affect everyone in the basin.

Given the growing human population, urbanization, industrialization and food production, the need to consider these linkages and interactions within the context of a comprehensive river basin or groundwater aquifer-scale integrated management programme is more critical than ever.

In previous years, there were attempts at regional and basin planning for which corresponding institutions were created. In no time these regional and basin agencies were dissolved and subsector agencies were assigned to continue the programmes and projects within the areas of the basin authorities. At present, there are only two basin organizations, the Laguna Lake Development Authority and the Agno River Basin Development Commission, the latter being relatively new, having been created only in 1997. The government is now again bent on pursuing the river basin management approach and would therefore need advice on approaches and capacity building to strengthen the existing river basin organizations.

1. The Laguna Lake Development Authority

LLDA was created to promote the sustainable development and maintain the ecological integrity of the Laguna Lake Basin, which is the largest inland body of water in the Philippines and the second-largest freshwater lake in Southeast Asia. The lake is used for fishery, navigation and transport, as a reservoir for floodwaters and a waste sink, and for power generation and irrigation. By far the most important use that the lake can potentially be put to in years to come is as a major source of fresh water for domestic and industrial use in large portions of Metro Manila and adjoining provinces.

LLDA has regulatory powers such as exclusive authority to grant permits for the use of lake waters and to grant clearance for all development activities within the region.

Because of the importance of the basin as a natural resource, and aware that the rapid industrialization and urbanization in the region has put the natural environment under tremendous stress, LLDA has taken the following measures:

1. Formulation of the Laguna de Bay master plan, which provides the vision for development of the region and presents policies as well as programmes and projects that are believed to realize the vision.

2. Declaration of a multi-use policy in so far as the dominant use of the lake is concerned. The shift in policy has had LLDA refocus its priorities from the promotion of fisheries to environmental protection, watershed management and pollution control.
3. Current implementation of the Environment User Fee System, which is a market-based instrument designed to motivate industries to comply with environmental standards through stiff disincentives for non-complying industries and incentives for complying industries.
4. Stepped-up efforts to stop the continuing degradation of the 21 river systems that drain into the Laguna Lake. Using the basin or watershed approach to resources management, the revitalized River Rehabilitation Programme encourages multi-sectoral involvement in the effort to save the rivers and ultimately the lake from further environmental degradation.
5. To further upgrade its capability to manage the lake and its watershed in a sustainable manner, LLDA has commissioned various institutions to undertake important studies and projects.

The basic issues and challenges facing LLDA are:

1. Scarcity of domestic water supply in Metro Manila and adjoining provinces, and high potential of the lake as a source of raw water;
2. Environmental pollution, optimizing the benefits derived from existing economy-based instruments for pollution control and abatement, and designing appropriate market-based instruments as well as environmental and natural resource accounting and pricing strategies;
3. Equity and access to use of and benefits from lake water and land (lakeshore) areas, including allocation of quasi-property rights thereof;
4. Conflicting policies, plans, programmes and projects of other government agencies and the private sector;
5. Setting the scenario for an effective organization and pro-active management operation; and
6. Sustaining corporate financial stability.

2. The Agno River Basin Development Commission

The Agno River Basin Development Commission is mandated to oversee and coordinate all development along the Agno River Basin and to ensure a holistic approach to water resources planning and management of the river basin. Its functions are to:

1. develop a comprehensive master Plan for the river basin;
2. coordinate the integration of the master plan into local and regional plans and investment programmes;
3. cause the implementation of development programmes and projects with overall impact on the basin;
4. initiate, receive and recommend project proposals for the development of the basin;
5. formulate, review and propose improvements on existing policies governing the development of the basin;
6. commission, coordinate, monitor all planning studies and research and other development undertakings on the basin;

7. coordinate soil erosion prevention, river siltation mitigation, flood control and other projects among the relevant government agencies; and
8. establish a functional basin-wide information and database system including computer-generated planning tools such as GIS.

The programmes, projects and activities of the commission are as follows:

1. Formulation of the Agno River Basin master plan.
2. Coordination for programme implementation and project development.
3. Project monitoring and evaluation.
4. Development studies for planning and decision-making.
5. Information and database management system for planning and policy decision-making.
6. Advocacy and social marketing.
7. Resource generation and investment programming and marketing.
8. Institutional and staff development.

5. Institutional aspects

The institutional aspects have to be taken into consideration in the formulation of a national water vision, in as much as it would seem that the main issues in the water resources sector are supply shortages, haphazard resource allocation among water users, inefficiency of usage, pollution, and degradation of the watersheds. But as easily discernible as the prima facie issues, at the very core of the problem is the lack of (or rather, the need for) an integrated, coherent and sustainable water resources management programme.

III. THE NATIONAL WATER VISION STATEMENT

Taking into consideration all the foregoing issues and concerns in the water resources sector as presented in the different water conferences and consultations as well as in the national water resources master plan, the national vision for water in the Philippines by the year 2025 could be stated as follows: *“Water in sufficient quantity and of acceptable quality is available to all stakeholders, with provision for water-related disasters, in order to meet present and future needs.”*

IV. THE NATIONAL FRAMEWORK FOR ACTION TOWARDS ACHIEVING THE VISION

The national water vision could be achieved using the framework for action for water resources management and development as follows:

1. Water quality management

- Providing adequate treatment and monitoring facilities
- Strictly penalizing illegal users of water
- Improving expertise, knowledge and technology
- Minimizing groundwater usage in salt-intruded areas
- Strictly enforcing forestry laws and land-use policies

2. Water resources development

1) Water supply, sewerage and sanitation

- Providing a favourable environment for local government units, with assistance from the Department of Interior and Local Government, and private sector participation in the provision of services for water supply, sanitation and sewerage.
- Pursuing private sector participation of water supply facilities in other urban areas whenever appropriate, with a shift of emphasis from buy-operate-transfer schemes to the privatization of existing assets through concessions and similar arrangements covering raw water supply, treatment and distribution.
- Enhancing information campaigns and training in proper waste disposal and ecological and environmental preservation, with emphasis on women's participation.
- Providing incentives for contiguous water districts to merge into single business entities thereby attaining economies of scale in project development, subject to the government policy on fiscal incentives.
- Harnessing the resources of the private sector in improving the water supply and providing sewerage facilities in Metro Manila and other highly urbanized areas, including the development of water treatment facilities of highly urbanized major growth areas.
- Adopting a holistic approach to water resources development to include supply, distribution, treatment and sanitation.
- Developing standards for the regulation of service efficiency.
- Pushing for the creation of an independent authority to streamline the financial and economic regulation of drinking water utilities, subject to the government scrap-and-build policy on the creation of agencies.
- Encouraging the reuse and recycling of water.
- Encouraging the development of sewerage and sanitation facilities.
- Encouraging water utilities to evolve or graduate into different institutional types, based on their level of viability.
- Safeguarding the quality of water at all times and intensifying water quality testing and control.
- Pursuing the preservation of the environment, particularly the maintenance of watersheds within the area of jurisdiction of the water districts.
- Continuing the improvement of financial and technical evaluation of water districts to address the sustainability of water supply.
- Strengthening wastewater disposal and treatment including waste water engineering covering both terrestrial and aquatic bodies.

2) Irrigation

Primarily, the thrust on the irrigation sector would be the rehabilitation of existing irrigation systems, promotion of the development of irrigation systems that are effective, affordable, appropriate and efficient, and prevention of the further destruction of watersheds. Thus, efforts would be aimed at:

- Pursuing the rehabilitation and improvement of national and communal irrigation systems, small water impounding and diversion dam projects, and other minor irrigation schemes, including canal lining and provision of silt excludes.
- Expanding research and development of cost-effective, appropriate and efficient irrigation and management technology in cooperation with other relevant research institutions in the country.

- Strengthening the participation of irrigators' associations in the planning, development, operation and maintenance of irrigation systems.
- Reviewing irrigation pricing policies, specifically the irrigation service fee, to recover the cost of operations, and considering the possibility of an expanded role for farmer beneficiaries in the management of national irrigation systems.
- Training, building up the capability and promoting the participation of local government units and of women in the planning and implementation of communal irrigation projects, small water-impounding and diversion dam projects, small farm reservoirs and other minor irrigation schemes.
- Promoting a private sector-led development of minor irrigation systems such as shallow tube wells, low-lift pumps, small reservoir irrigation projects, small water-impounding projects, diversion dams and other inundation systems.
- Encouraging the construction of irrigation facilities through other variable schemes such as build-operate-transfer, build-transfer and other mechanisms that will fast track the development of irrigation systems.
- Coordinating with the Department of Environment and Natural Resources concerning the preservation and rehabilitation of watersheds to support the irrigation systems.
- Enhancing women's representation and participation in local development councils and providing adequate skills, training and support to improve their capability for more meaningful participation in the activities of the sector.

3) Flood control and drainage

- Mitigating flooding to tolerable levels in Metro Manila and major river basins through the additional construction of flood control facilities such as dykes, river walls, levees, cut-off channels, diversion flood-ways and revetments, installation of pumping stations, dredging and related works.
- Providing adequate flood control and drainage facilities in all flood-prone areas outside of the main river basins that need protection as determined under the national land-use plan.
- Coordinating the development of flood control projects with the implementation of irrigation projects.
- Implementing water-impounding dams and drainage facilities not only to lessen flood damage but also to increase the production of rice and diversified crops through irrigation and as potential sources of water supply.
- Pursuing comprehensive planning of the main river basins and implementation of flood control structures.
- Pursuing the installation of flood forecasting and warning systems in all river basins.
- Pursuing much-needed reforestation and erosion control programmes for the watersheds.
- Relocating squatters living along the banks of rivers, esteros (estuaries) or creeks, in coordination with the other concerned government agencies.
- Pursuing maintenance of facilities against lahar (volcanic ash flow) and dredging or desilting activities to increase the flood conveyance capacity of river channels.
- Putting up and maintaining viable and effective garbage collection and disposal systems for areas near rivers, esteros and waterways used for drainage.
- Pursuing proper maintenance and upkeep of existing drainage systems through the concerted efforts of the national government and local government units.

- Organizing flood reaction teams and Bantay Estero/Ilog Brigades among local government units in coordination with the media.
- Putting up an effective flood monitoring system.
- Establishing a Flood Control and Sabo Centre to conduct applied research and development and human resources development.

4) Hydropower

- Expanding electrification to nonviable areas under the franchise area of electricity cooperatives by providing assistance including the application of the appropriate technology.
- Providing the energy requirements for rural development through more focused energy-electrification programmes and projects in the countryside.
- Accelerating the exploration and development of the country's indigenous sources of energy.
- Enhancing the development and use of new and renewable energy sources for power and electrification.
- Diversifying the sources and types of local and imported energy while ensuring balance between cost and security.
- Integrating sustainable development including environmental and socio-cultural concerns into the planning and implementation of energy programmes and projects.
- Increasing efficiency and reliability and reducing system losses in power generation, including distribution utilities and electricity cooperatives, by adopting appropriate standards and technology, and enhancing management reforms.
- Restructuring the power sector to improve efficiency and accountability by separating power generation activities from transmission, among others.
- Promoting energy conservation, energy-efficient technology and energy R&D.
- Providing new and renewable energy systems for off-grid areas especially for remote communities.
- Maximizing the use of clean, indigenous and renewable energy sources, and passing legislation to promote such development.
- Enhancing private sector investment and participation in all energy activities including increased involvement of *barangays* (communities) in minimizing system losses due to pilferage.
- Restructuring electricity tariffs to reflect the cost of efficient provision.
- Instituting safeguards against non-competitive practices, including cartelized pricing, in the energy sector.
- Minimizing government exposure to risks on build-operate-transfer types of power projects.

3. Mitigation of water-related hazards

- Formulating contingency plans for the management of the responses to natural disasters, prolonged droughts and other emergencies.
- Developing and maintaining databases for impact analysis of a particular disaster.
- Developing and improving assessment techniques and models.
- Conducting training, dialogue and consultation to improve knowledge, skills and attitudes in the planning, documentation and evaluation of a system.
- Developing or strengthening organization, linkages and networking.

V. THE NWRB-RECOMMENDED NATIONAL WATER VISION

The vision shared by the participants at the National Consultation on Water Sector Mapping and Visioning was expressed as follows: *“By the year 2025, water resources in the Philippines are used efficiently, allocated equitably and managed in a sustainable way.”*

The national water vision statement given earlier read as follows: *“Water in sufficient quantity and of acceptable quality is available to all stakeholders, with provision for water-related disasters, in order to meet present and future needs.”*

A comparison of the two visions shows that, except for the phrase “with provision for water-related disasters” in the second vision, the two use synonyms in the following phrases:

- ‘used efficiently’ = ‘in sufficient quantity and of acceptable quality’
- ‘allocated equitably’ = ‘available to all stakeholders’
- ‘managed in a sustainable way’ = ‘to meet present and future needs’.

This being so, the two visions could be integrated into one vision, to read as follows:

“By the year 2025, water resources in the Philippines are used efficiently, allocated equitably and managed in a sustainable way, with provision for water-related disasters.”

VI. REVIEW AND VALIDATION OF THE DRAFT NWRB NATIONAL WATER VISION AND FRAMEWORK FOR ACTION

The draft NWRB national vision and framework for action were reviewed and validated at a workshop held on 3-4 May 2000 which was convened by the National Water Resources Board and sponsored by ESCAP, FAO, the Philippine Center for Water and Sanitation: International Training Network (ITN) Foundation, and the Global Water Partnership – Southeast Asia Technical Advisory Committee (GWP-SEATAC).

The workshop was organized as part of the regional programme of cooperation between FAO and ESCAP to promote the development of national water visions. The joint initiative can be seen as an anchoring component in the definition of the World Water Vision.

The workshop was attended by 74 senior officials from stakeholders in various subsectors and institutions that included water professionals and social scientists involved in the water sector. FAO and ESCAP officers and experts also attended.

VII. FRAMEWORK FOR ACTION FOR THE VISION

The workshop adopted the NWRB integrated national water vision. As the coordinating and regulating government agency for all water development activities in the country, NWRB will take the lead in the implementation of the national water vision and the proposed framework for action to achieve sustainable water management practices and provide affordable water adequate for all needs, including disposal.

1. Implementation of the national water vision

1. Managing water resources efficiently and effectively.
 - Creating an enabling environment for sector agencies to perform legislation, regulation, resource mobilization and investment generation.

- Eliminate or significantly reduce wastage (pricing, reduction of non-revenue water, education, research and development).
 - Protection of aqueducts and supply lines.
2. Expediting socially responsive private sector participation and enhancing public-private partnerships.
 3. Moving towards integrated river basin management.
 - Increasing the number of river basin authorities from 2 to 18 by the year 2025.
 - Protecting water resources/watershed management.
 4. Advocating political decisions and political support to implement the vision.
 5. Mobilizing and institutionalizing broad partnerships between government and non-government organizations, people's organizations, women's groups, private sector and academic interests, etc, to turn the vision into action and monitor performance in order to develop a strong gender-sensitive water culture at all levels.
 6. Moving towards adequate and affordable water, sanitation and sewerage services favouring the poor and marginalized sectors of society.
 7. Putting in place a monitoring and evaluation system with a view to improve performance and accountability.
 8. Recognizing the overriding need to create a government authority to formulate policies and enforce laws.

2. Water supply and sanitation: issues, concerns and recommended actions

1. Non-systematic approach to water resources management

- Holistic approach to water resources development (including the tapping of groundwater and rainwater for water supply).
- Development of standards for the regulation of service efficiency.
- Designation of a lead agency for water supply, sanitation and sewerage.

2. Very low priority given to sanitation and sewerage

- Providing a favourable environment for the local government units and for private sector participation.
- Enhancing education and information campaigns on sanitation and sewerage.
- Providing incentives for contiguous water districts to amalgamate into single entities for economies of scale.
- Encouraging the development of sanitation and sewerage facilities, especially in coastal areas.
- Connection to sewerage facilities to be made compulsory.

3. Inadequate financial support for water, sanitation and sewerage programmes

- Harnessing the resources of the private sector and local government units out of their Internal Revenue Allocation development funds.
- Foreign funding.
- Pricing of sanitation and sewerage facilities.
- Creation of a funding window for community-managed water supply, sanitation and sewerage programmes.

4. Unreliable water supply and sanitation databases

- Continuing the improvement of financial and technical evaluation of water districts.
- Establishing databanks for water supply and sanitation at the regional and local-government-unit levels.

5. Inadequate capacity building

- Harnessing the resources of the private sector, including academia, NGOs, etc.
- Institutional strengthening.
- Developing and using suitable training IEC (information, education and communication) materials.
- Disseminating information on water-saving techniques (recycling programmes for water).

6. Poor community participation especially among women in the water supply and sanitation sector

- Incorporate gender-disaggregated databases on water supply, sanitation and sewerage (to have indicators for monitoring men's and women's participation).
- Involve women during all phases of project formulation and project implementation.
- Community organization and mobilization.

7. Depletion of groundwater supply

- Tap surface water and rainwater technology to enlarge the system.
- Monitor illegal deep-well usage.

3. Water for agriculture and aquaculture

Primarily, the thrust on the irrigation sector would be the rehabilitation of existing irrigation systems to improve their efficiency and service to farmers, promotion of the development of irrigation systems that are effective, affordable, appropriate and efficient, and prevention of the further destruction of watersheds. Thus, efforts should be aimed at:

1. Pursuing the rehabilitation and improvement of national and communal irrigation systems, small water-impounding and diversion dam projects, and other minor irrigation schemes, including canal lining and provision of silt excludes.
2. Expanding research and development of cost-effective, appropriate and efficient irrigation and water management technology in cooperation with other relevant government and private research institutions.
3. Strengthening the participation of irrigators' associations in the planning, development, operation and maintenance of irrigation systems.
4. Reviewing irrigation pricing policies, specifically the irrigation service fee, to recover the cost of operation, and considering the possibility of an expanded role for farmer beneficiaries in the management of national irrigation systems.
5. Training and building up the capability of local government units and promoting women's participation in the planning and implementation of communal irrigation projects, small water impounding and diversion dam projects, small farm reservoirs and other minor irrigation schemes.

6. Promoting the private sector-led development of minor irrigation systems such as shallow tube wells, low-lift pumps, small reservoir irrigation projects, small water-impounding projects, diversion dams and other inundation systems.
7. Encouraging the construction of irrigation facilities through other variable schemes such as build-operate-transfer, build-transfer and other mechanisms that will accelerate the development of irrigation systems.
8. Coordinating with the Department of the Environment and Natural Resources for the preservation and rehabilitation of watersheds to support the irrigation systems.
9. Enhancing women's representation and participation in local development councils and providing them with adequate skills, training and support to make them better able to participate fully in the activities of the sector.
10. Promoting efficient farm water usage, re-use and the adoption of technology for water conservation and modern irrigation.
11. Implementing strictly the provisions of the Water Code of the Philippines.
12. Solving conflicts in water usage and providing appropriate compensation packages in times of crisis.

4. River basin management

1. Establish river basin organizations that are fully representative of all stakeholders

- Legal and institutional framework or setting (legislation of an authority that would assist in the development of river basin management organization, an apex body of a sort which would help build and develop capacities in the local river basin organization).

2. Establish a strategic plan

- Environmentally sustainable, socially equitable, economically efficient allocation of water resources among stakeholders.
- Alternatives to alleviate conflicts, maximize productivity and mitigate the impact on the environment.

3. Establish an operational plan

- Develop and implement public awareness and consultation campaigns.
- Formulate and update a comprehensive master plan for river basins.
- Establish information and database management systems.
- Cause the implementation of development projects and programmes with an overall impact upon the basin.
- Formulate, review and propose improvements on existing policies governing basin development.
- Mitigate water-related hazards and maintain ecological balance.
- Sustain financial stability.
- Coordinate with other agencies, NGOs and other concerned parties regarding the implementation of projects, plans, programmes and policies.
- Adopt multi-use policies for the water resources.
- Uphold the 'polluters pay' principle.
- Rehabilitate and protect rivers.
- Map out the interests of the stakeholders. Note conflicting and coinciding interests.

- Prioritize interests.
- Standardize the organization that should manage the river basin.

5. Water quality, environment and water-related disasters

1. Water quality

1. Providing adequate treatment and monitoring facilities.
2. Strictly penalizing illegal users of water.
3. Improving expertise, knowledge and technology.
4. Minimizing groundwater usage in salt-intruded areas.
5. Strictly enforcing forestry laws and land usage policies.
6. Strictly enforcing environmental laws to ensure water quality.

2. Environment

1. *On land use*

- Proper land usage planning and zoning.
- Full implementation of land usage laws and of an integrated system for monitoring environmental quality and natural resource usage.

2. *On environmental degradation*

- Protecting, conserving and promoting biodiversity.
- Ensuring watershed protection, conservation, development, rehabilitation and management.
- Promoting and maintaining the productivity of agricultural, forest and aquatic resources.
- Enhancing and maintaining the assimilative capacity or quality of air, water and land resources.
- Managing properly domestic, industrial and commercial waste, including toxic and hazardous wastes.

3. *Assessment of the country's vulnerability and adaptation capability to climatic change*

4. *Promoting environmental awareness, including environmental ethics, and supporting environmental management actions*

- Effecting change in values and attitudes through environmental education in school and through the media.
- Developing environmental manpower to support environmental management.

5. *Development and maintenance of an adequate environmental database*

6. *Promoting and adopting environment-friendly technology*

- Waste minimization and cleaner production.
- Recycling and reuse of wastewater in all sectors.

7. *Promoting water demand management and conservation*

- Increasing water usage efficiency through application of measures, i.e. proper crop selection and techniques such as sprinkler or drip irrigation, and other options.
- Improving the design, construction, operation and maintenance of water supply facilities to improve efficiency and minimize water losses.

3. Water-related disasters

1. Formulating contingency plans for the management of responses to natural disasters, extreme climatic events and other emergencies
2. Developing and maintaining databases for impact analysis of a particular disasters
3. Developing and improving assessment techniques and models
4. Conducting training, dialogue and consultation to improve knowledge, skills and attitudes in planning, documentation and evaluation of the system
5. Developing and strengthening organization, linkages and networking

VIII. STRATEGIC ACTION PLAN FOR THE VISION

1. Implementation of the national water vision

An initial, four-year plan of action is proposed. It should start with a press conference to drum up interest in the Philippine water vision. As the arbiter for all water resources development in the Philippines, NWRB will conduct the press conference. The legislators behind the Clean Water Act will be invited to attend. Bills on water now pending in Congress will be reviewed to see if they can be merged into a single bill. Ground working with politicians and executives will begin as soon as the press conference is held. The Philippine Center for Water and Sanitation will spearhead the establishment of the Philippine Water 21 Partnership, a partnership formed among the participants in the workshop towards the attainment of the national water vision.

2. Water supply and sanitation

The priority programme in this sector is the creation in the first three years of the 25-year span of an authority to oversee water supply and sanitation and involve all stakeholders in the various activities required for the achievement of all objectives.

There is a definite need for an agency responsible for sewerage. As far as water supply is concerned, there are already many government agencies involved, whose functions are defined by NEDA. In the case of sewerage, however, at present only the Metropolitan Waterworks and Sewerage System (MWSS) actually operates the sewerage system. MWSS cannot be designated for sewerage since it operates only in the metropolis, whose concerns may not be those of other urban areas. While a Central Planning Office for Sewerage has been created in LWUA by virtue of a NEDA board resolution, it has not been operational as an agency due to budgetary constraints. So, a definite vacuum needs to be filled.

3. Water for agriculture and aquaculture

The priority actions for this sector are geared towards pursuing the rehabilitation of existing irrigation systems, reviewing the irrigation pricing policies and intensifying the collection of irrigation service fees as well as promoting modern water conservation technology.

A source of funding for these programmes could be government subsidies, though whether they would really help the irrigation sector is in doubt. The fact is, irrigation is essential to food security and food security will be paramount in coming decades because the exportable surplus of rice is declining worldwide. Besides, the irrigation sector in its current form cannot sustain itself financially because a) irrigation fees at present preclude self-financing irrigation systems and b) the irrigation fee collection efficiency – of 30 percent in Central Luzon and 90 percent in Mindanao – cannot sustain even National Irrigation Administration operations.

With this scenario, there have to be programmes to ultimately turn over the system to farmer organizations, so that later on NIA is not saddled with the provision of excessive subsidies to farmers. The following are alternatives for sustaining irrigation in the country:

1. Subsidy

- a) Subsidize NIA.
- b) Find funds for irrigation from other sources (local government units).

2. No subsidy

- a) Divest irrigation systems to water users' associations.

3. Gradual phasing from 1 to 2

- a) Decreasing subsidy.
- b) Subsidy shall include periodic rehabilitation works, depending on the viability of water users' associations.

4. Other measures

- a) Rollback irrigation support funds to 'pre-Estrada' levels.
- b) Promote decentralized small-scale irrigation techniques that would also use resources.
- c) Reduce graft and corruption, which account for 20 to 70 percent of government infrastructure costs.

4. River basin management

The priority programme is the establishment of 16 river basin organizations within the next five years. The operational plan includes the development of public awareness and consultation campaigns, establishment of a database and form-monitoring system and the formulation of a comprehensive or indicative master plan.

5. Water quality, environment and water-related disasters

The thrust of the strategic action plan in this sector is directed towards the following:

1. Water quality

- a) Providing adequate treatment and monitoring facilities.
- b) Strictly penalizing illegal users.

- c) Improving expertise, knowledge and technology.
- d) Minimizing groundwater usage in salt-intruded areas.
- e) Strictly enforcing forestry laws and land usage policies.
- f) Strictly enforcing environmental laws to ensure water quality.
- g) Monitoring waste discharges from commercial and industrial facilities and agricultural and urban runoffs.

2. Environment

- a) Proper land planning and zoning.
- b) Full implementation of land-use laws and of an integrated system for monitoring environmental quality and natural resources usage.
- c) Protecting, conserving and promoting biodiversity.
- d) Watershed protection, conservation, development, rehabilitation and management.
- e) Promotion and maintenance of the productivity of agricultural, forest and aquatic resources.
- f) Enhancement and maintenance of the quality of air, water and land resources.
- g) Proper management of domestic, industrial and commercial waste, including toxic and hazardous wastes.
- h) Assessment of the country's vulnerability and adaptation capability to climatic change.
- i) Change in values and attitudes through environmental education in school and through the media.
- j) Development and maintenance of an adequate environmental database.
- k) Waste minimization and cleaner production.
- l) Increasing water usage efficiency through application of measures, i.e. proper crop selection and techniques such as sprinkler or drip irrigation and other options.
- m) Improving the design, construction, operation and maintenance of water supply facilities to increase efficiency and minimize water losses.

3. Mitigation of water-related disasters

- a) Mitigating flooding to tolerable levels in Metro Manila and other major cities.
- b) Providing adequate flood control and drainage facilities in all flood-prone areas that need protection as determined under the national land-usage plan.
- c) Coordinating the development of flood control projects with the implementation of irrigation projects.
- d) Implementing water-impounding dams and drainage facilities not only to lessen flood damage but also to increase the production of rice and diversified crops through irrigation, and as potential sources of water supply.
- e) Pursuing comprehensive planning of the main river basins and construction of flood control structures.
- f) Setting up much-needed reforestation and erosion control programmes.
- g) Relocating and preventing squatters living along the banks of rivers, esteros and creeks, in coordination with the other concerned government agencies.
- h) Pursuing the maintenance of facilities against lahar and dredging or desilting activities to increase the flood conveyance capacity of river channels.
- i) Putting up and maintaining viable and effective garbage collection and disposal systems for areas near rivers, esteros and waterways used for drainage.

- j) Organizing flood reaction teams and Bantay Estero/Ilog Brigades among local government units, in coordination with the media.
- k) Organizing an IEC campaign on disaster preparation.

IX. CONSOLIDATED PRIORITY ACTIONS

The battle cry in water resources management in the Philippines is water security for the 21st century. The workshop has shown the magnitude of work that has to be done to put the vision into action. To catalyse the process, there have to be as many partners as can be gathered.

The formation in the workshop of a partnership called the Philippine Water 21 Partnership is just the first step to jumpstart the vision into action. This partnership is one of the Philippine responses to the Second World Water Forum and the new grouping is expected to report to the Third World Water Forum to be held in Japan in 2003. The national framework for action agreed upon during the workshop would serve as reference for the activities the partnership would want to undertake. The partnership is expected to promote the national framework for action by generating ideas and convincing others to come up with their own sets of activities to vitalize the framework. The scheduled press conference is intended for this purpose. It is now up to the Philippine Water 21 Partnership to put direction and synergy into the different activities that have to be done so that the vision becomes a reality by the year 2025.

The sectoral action plans are more complicated than putting a national framework into action, because they involve specific targets and performance indicators to establish milestones for monitoring the performance of the various sectors against such targets. The workshop recognized the need to conduct another round of sectoral consultations to further detail the plans it has formulated. Apart from the sectoral groups of the workshop, other sectors would have to be involved to put the plans into motion. Thus, the major activity that the sectoral groups recommended is another roundtable discussion, especially for the water supply and sanitation sector, since there is plenty of data and materials and NEDA has recently completed a study on the subject. This would be an important starting point for the sectoral groups to coordinate activities focused on the national water vision and enforce the framework for action that has been adopted. In this connection, there is also a call for NWRB to organize another workshop to which more sectors would be invited so that more people may accept to join the Philippine Water 21 Partnership. Participants in the workshop are expected to be the ambassadors of the partnership, to create awareness of the vision and to generate support for the framework for action at the individual and collective levels.

NWRB has taken up the challenge. With the support of all interested parties, it is hoped that NWRB will be able to fulfil its mandate to the fullest as the arbiter of all water resources development, despite its lack of teeth and resources. There is no other way but to work together. The Philippine Water 21 Partnership symbolizes this commitment. With a common level of understanding on where to go, this national vision for 2025 will be achieved with the support of government, NGOs, academia, the private sector, international partners and other organizations, and with NWRB as the lead agency.

THAILAND'S WATER VISION: A CASE STUDY

Sacha Sethaputra

Khon Kaen University, Khon Kaen, Thailand

Suwit Thanopanuwat

Royal Irrigation Department, Bangkok

Ladawan Kumpa

National Economic and Social Development Board, Bangkok

Surapol Pattanee

Office of the National Water Resources Committee, Bangkok

I. INTRODUCTION AND BACKGROUND INFORMATION

1. Background

The World Water Vision process has generated a great deal of enthusiasm towards better management of water resources in the region and elsewhere. In order to build on this global initiative, a programme of cooperation between ESCAP and FAO was recently launched to promote the development of national water visions. In the initial phase of the programme, an overall review of important achievements on the methodology of developing water visions was to be made jointly by ESCAP and FAO in collaboration with the Asian Institute of Technology and other international organizations. In addition, four case studies were to be undertaken in selected pilot countries in the region thanks to financial support from FAO.

As a follow up to the above initiatives, Dr Le Huu Ti of ESCAP and Mr Thierry Facon of FAO contacted the Office of the National Water Resources Committee to prepare a case study for Thailand. ONWRC responded by setting up a working group. This report forms a part of the working group's effort.

2. Objectives

In relation to the formulation of a national water vision, this report aims to:

1. review the national experience (Section II),
2. identify the key components (Section III),
3. review the development process (Section IV) and
4. provide materials for the forthcoming roundtable of national experts (Section V).

3. Approach and report organization

The approach adopted in this study was to build on previous achievements in the formulation of a Thai water vision, a process which was completed in July 1999. The working group responsible for this study has capitalized on the existing national water vision and extended it to cover the strategic

action plan required by the terms of reference and to be used by ONWRC as a road map towards achieving the vision statement.

In order to give readers a complete view of how the vision and the strategic action plan were formulated, this report covers the history of Thai water management in Section II. In addition, the section surveys the different water situations as dictated by geography (i.e. river basins) and by the five-year national plans. Section II thus presents the lessons learned from the past and the constraints and opportunities of the current situation. Using these as input, Section III explains why a unified national water vision is needed. The section identifies the strengths and weaknesses of the existing institutional system of water management in Thailand as key components of, or driving forces behind, the formulation of the national water vision. Section IV describes the national water vision statement and associated strategies and how they were evolved. From the contents of the four first sections, guidelines and actions are presented in Section V.

For readers unfamiliar with Thailand, Section I provides background information on the country's current water situation. The information in this section is used in the other sections as well.

4. Background information on Thailand

4.1 General information

Thailand, a tropical land which is part of the Indochina peninsula, is bordered in the north by the Lao People's Democratic Republic (Lao PDR), in the east by Lao PDR and Cambodia, in the south by the Gulf of Thailand and Malaysia, and in the west by the Andaman Sea and the Union of Myanmar. The total land area is about 512 000 km². As of 1997, the estimated population was about 60 million, with a growth rate of 1.0 percent per year. The urban population was estimated at about 11 million, with high concentration in the capital and the regional centres.

The country is still agriculture-based, with a total agricultural area of about 265 200 km². More than 60 percent of the population engage in agriculture, yet agricultural production accounts for only about 12 percent of GDP.

Due to rapid economic development in the past decade, water demand continues to grow and two of the four regions, namely the Northeast and the Central Plain, experience frequent droughts, and flooding also occurs more frequently due to deforestation. The water resources development budget has been increasing and represents a large portion of the national budget for development. However, current environment constraints may slow down large water resources development projects in the future.

The agricultural sector remains the main user of available water and accounts for 71 percent of total water demand; the industrial sector accounts for two percent, the domestic sector for five percent and the remaining 22 percent are for ecological balance. The trend, however, is for a reduction in the share of agriculture with a corresponding increase in both industrial and domestic water usage.

Currently about 80 percent of the urban population have access to treated pipe drinking water and this is planned to increase to 91 percent by the year 2017. As for the rural population, about 70 percent are

served with piped water systems, rainwater jars and tube wells for drinking water, but household consumption still has to rely on other water sources.

4.2 Water resources information

(a) Surface water resources

For hydrological purposes, Thailand has been divided into 25 river basins. The average annual rainfall countrywide is of about 1700 mm. The total volume of water from rainfall in all the river basins in Thailand is estimated at 800 000 million m³, 75 percent of which or about 600 000 million m³ is lost through evaporation, evapotranspiration and infiltration; the remaining 25 percent or 200 000 million m³ constitutes the runoff that flows in rivers and streams. With a population of about 60 million, the availability of water resources is 3 300 m³ per person per year, which is considered highly adequate in statistical terms. The data on surface water resources in Thailand are shown in Table 1.

Table 1. Thailand's surface water resources

Region	Catchment area (km²)	Average annual rainfall (mm/year)	Amount of rainfall (million m³)	Amount of runoff (million m³)
Northern	169 640	1 280	217 140	65 140
Central	30 130	1 270	38 270	7 650
North-eastern	168 840	1 460	246 500	36 680
Eastern	34 280	2 140	73 360	22 000
Western	39 840	1 520	60 560	18 170
Southern	70 140	2 340	164 130	49 240
Total	512 870	–	799 960	198 880

(b) Groundwater resources

Groundwater is an important source of water in Thailand. Public water supply for one fifth of the nation's 220 towns and cities and for half of the 700 sanitary districts is derived from groundwater. It is estimated that 75 percent of domestic water is obtained from groundwater sources. The groundwater system in Thailand is mainly recharged by rainfall of about 40 000 million m³ and by seepage from the rivers. Hydrological balance studies estimate that about 12.5 to 18 percent of the rainfall would infiltrate the soil and about 9 percent reach the aquifer. However, this is valid only for basins under favourable geologic conditions, such as those in the Northern Highlands, the upper Central Plain and along the Gulf Coastal Plain. For the other basins, such as those in the lower Central Plain including Bangkok and on the Khorat Plateau, it is estimated that only 5-6 percent of the rainfall reaches the aquifer.

The more than 200 000 groundwater well projects carried out by both the government and the private sector have a total capacity of about 7.55 million m³ per day (2 700 million m³ per year). It is estimated that 75 percent of domestic water is obtained from groundwater sources and that they service some 35 million people in villages and in urban areas.

(c) Water provision and water demand

The average annual rainfall countrywide is about 1 700 mm, ranging from 1 200 mm in the North and in the central plain to 2 000-2 700 mm in the western part of the South and the eastern part of

the country. About 29 percent of the surface runoff, i.e. approximately 70 770 million m³ annually, is kept in some 650 large-scale or medium-sized and 60 000 small-scale water resources development projects all over the kingdom with a total irrigable area of about 31 million *rai* or 4.96 million ha.

Although the water resources development programme has been implemented for more than eighty years, rapid rural development, industrialization, tourism development and income growth have raised water demand for domestic usage, agriculture and other purposes drastically. Inefficient use of water by various sectors and deteriorating water quality due to excessive use of fertilizer and pesticides and to urban sewage and industrial wastes also create increasingly serious problems in the availability and adequacy of water resources. Present water demand for irrigable areas and other uses countrywide is estimated to be 68 000 million m³ per year and is expected to reach 86 000 million m³ per year by 2006. Hence, the nation is facing serious supply constraints to further growth due to various impact problems in water resources development schemes. Water provision and water demand in each river basin are as shown in Table 2, overleaf.

(d) Water resources management in Thailand

Thailand's past three decades of sustained and rapid economic development have stimulated a quantum expansion in the demand for water services for power, irrigation and domestic and industrial usage. The government has devoted significant resources to meet this demand, and an approach towards water resources management has emerged, with emphasis on the expansion of access to services – electricity, irrigation and water supply for domestic purposes.

This approach has been successful in giving millions of Thai people access to potable drinking water, water to produce cheap and abundant food, and to generate hydroelectricity. However, as water has become increasingly scarce, this approach is no longer appropriate. The government now faces a different and more complex set of challenges, comprising both supply- and demand-side questions:

- Is the resource base, including water and watersheds, being managed in a sustainable manner?
- Are there opportunities for more effective management of existing sources of supply?
- Who will the water be allocated to and how will it be allocated?
- Who will provide and deliver services and who will pay for them?

Table 2. Description of water provision and water demand in the 25 river basins of Thailand

Basin No.	Name of river basin	Catchment area	Average runoff (10 ⁶ m ³)	Storage capacity (10 ⁶ m ³)	Irrigation area (rai)	Water requirement (10 ⁶ m ³ /year)				
						Domestic consumption	Tourism industry	Ecological balance	Irrigation / Agriculture	Hydropower
1	Salawin	17 920	8 571	24.00	188 948.00	11.96	4.46	1 027.8	616.93	–
2	Mekong	57 422	19 362	1 551.00	1 692 333.00	132.57	1.98	1 145.0	4 323.3	–
3	Kok	7 895	5 279	30.00	520 767.00	14.90	0.43	680.00	401.39	–
4	Shi	49 477	8 752	4 246.00	1 863 173.00	195.17	49.62	573.33	3 052.8	2 156.0
5	Mun	69 700	26 655	4 255.00	1 819 785.00	337.88	94.30	956.63	2 628.8	591.30
6	Ping	33 898	7 965	14 107.00	1 942 927.00	75.26	1.00	457.27	2 428.2	3 623.0
7	Wang	10 791	1 104	197.00	472 350.00	20.21	1.00	48.00	487.42	45.00
8	Yom	23 616	3 117	98.00	994 205.00	53.87	0.08	315.36	859.13	–
9	Nan	34 330	9 158	9 619.00	1 780 637.00	66.29	0.32	315.36	2 870.8	2 583.0
10	Chao Phraya	20 125	22 015	33.00	5 731 375.00	1 594.40	646.05	1 250.0	8 768.5	–
11	Sakaekrang	5 191	1 297	162.00	436 410.00	8.62	–	3.35	878.75	–
12	Pasak	16 292	2 820	124.00	661 120.00	72.32	23.28	158.00	927.38	–
13	Tha Chin	13 682	22 300	416.00	2 385 259.00	94.94	310.25	1 000.0	4 292.1	–
14	Mae Klong	30 837	7 973	26 690.00	3 400 000.00	20.34	–	1 577.0	4 323.3	4 670.0
15	Prachinburi	10 481	5 192	57.00	733 862.00	8.08	2.78	377.00	838.32	–
16	Bang Pakong	7 978	3 713	74.00	1 353 263.00	14.18	9.05	946.00	2 243.6	1.94
17	Tonle Sap	4 150	6 266	96.00	123 720.00	12.60	–	9.80	197.00	–
18	Pen. East Coast	13 830	11 115	565.00	427 000.00	129.10	83.50	74.70	578.46	79.00
19	Phetchaburi	5 603	1 400	750.00	562 688.00	14.30	2.90	67.00	1 110.0	693.00
20	Pen. West Coast	6 745	1 420	537.00	327 015.00	18.00	2.97	39.10	1 383.0	–
21	Southeast Coast	26 353	23 270	5.00	1 780 481.00	56.40	8.70	161.70	1 129.1	2 577.0
22	Tapi	12 225	12 513	5 865.00	245 970.00	25.90	10.00	3 085.2	144.60	2 596.0
23	Songkhla Lake	8 495	4 896	28.00	905 550.00	56.45	37.50	312.00	2 994.7	–
24	Pattani	3 858	2 738	1 420.00	337 878.00	31.20	2.44	670.80	441.11	1 152.0
25	Southwest Coast	21 172	25 540	20.00	339 273.00	53.20	18.90	74.80	253.00	–
	TOTAL	512 066	244 431	70 769.00	31 025 989.00	3 118.14	1 311.5	15 325.9	48 171.9	20 767.2

NB: 6.25 rai = 1 ha

II. THE NATIONAL EXPERIENCE

This section describes three aspects of the national experience on water management. First, the historical perspective is given in Subsection 1. Second, the various hydrological river basins are presented in Subsection 2. As water management plays an increasingly critical role in the country's development, it is logical to include the perspective of the various national development plans. This is done in Subsection 3.

1. Evolution of water management

Water management in Thailand has evolved with time. Three periods can be distinguished, each with its own focus (TDRI 1990), as follows:

1283 to 1857 – *Managing people to suit water conditions:* Water management was accomplished by moving people closer to or away from water sources as necessary. People were moved to areas with enough water for rice production and away from flood-prone areas. This could be done easily because there was plenty of land and seasonal relocation was compatible with military activity and wars.

1857 to the present – *Supply-side management:* The country was relatively free from war and the stable production of rice for consumption and export was feasible. Early in this period, water was viewed as belonging to the king, who distributed it on an as-needed basis through a government agency – hence the name Royal Irrigation Department. Most of the early water management effort was canal digging (for example, the Rangsit canal network) and water regulation for agriculture and transportation. As the population increased, the later efforts concentrated on building reservoirs and expanding irrigation areas. During this period, water was still so plentiful that wastewater was sufficiently diluted and hence was not perceived as an issue. During this period, irrigation and drainage were the main components of management.

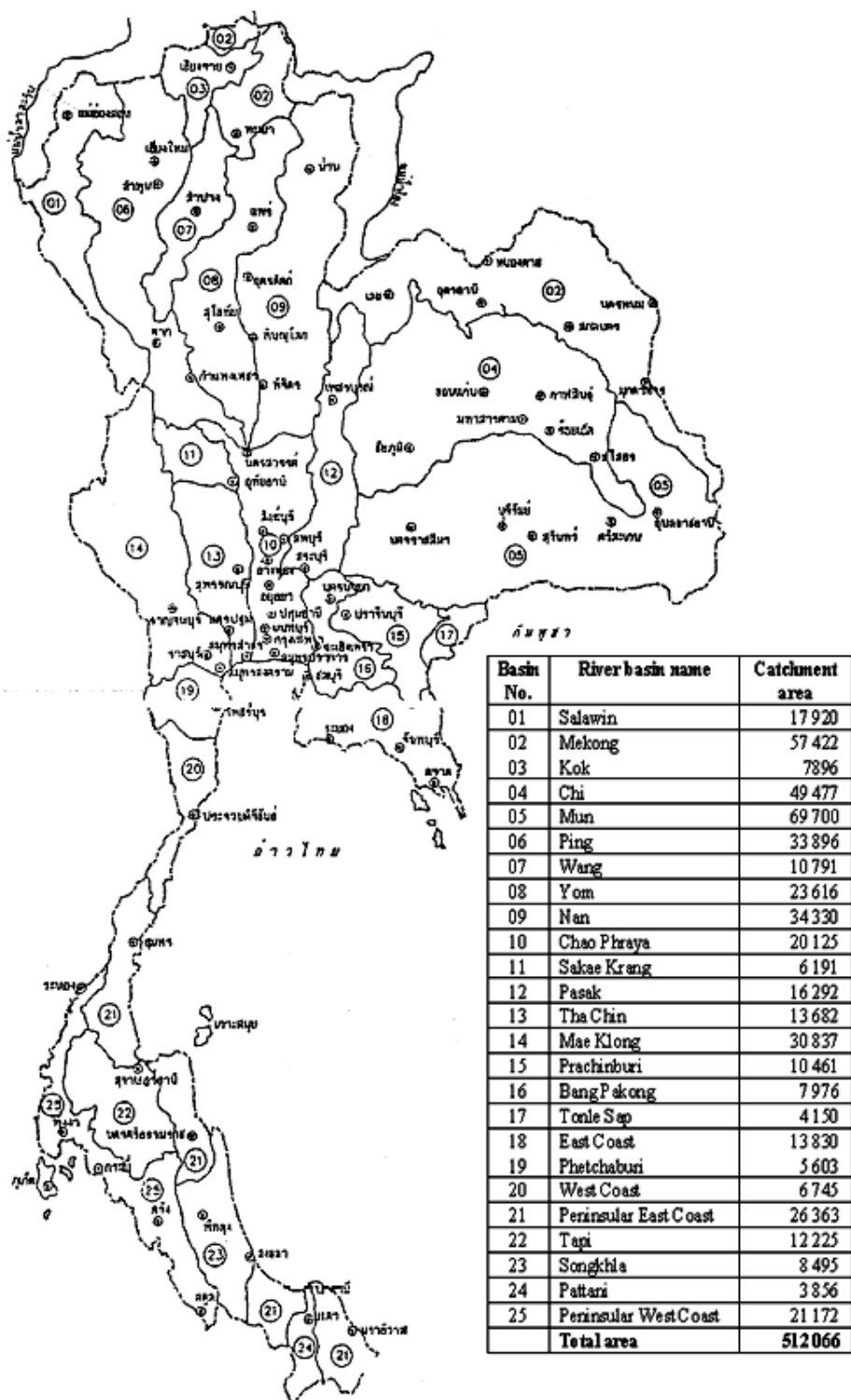
From now to 2025 – *Demand-side management:* At present Thailand is entering a third period, in which population and economic development pressures will dictate the nature of water management. In contrast to the first and second periods, water management will be characterized by transport of water from distant sources to where the people and activities are, by control and regulation of wastewater, and by efforts to conserve water.

In some respects, sophistication in water management will probably reach the current level of control of the mining industry. Mining concessions (for water) must clarify the rights and liabilities of users and are submitted to a sophisticated tax system. As more activities compete for the relatively constant amount of water, water gradually becomes like precious ore; users will have to pay for it as well as for wastewater discharge. Water rights and allocation plans will have to be set up to minimize and mediate conflicts.

2. River basins

The National Committee on Hydrology separates Thailand into 25 distinct hydrological units or river basins, as shown on the facing page. These 25 basins are regrouped into five areas, each with specific characteristics:

Figure 1. The twenty-five river basins of Thailand



1. Central area

This is the most important area for Thailand's economy. It is also the most agriculturally productive area without its own large water sources. Demand for water in this area far exceeds locally available supply. The area therefore depends heavily on water from river basins upstream.

2. Northern area

This area in the past was used as a source of raw water for the central area. However, the recent development of the area has increased local water consumption, thus reducing the contribution to the central area. Conflict is looming between this area and its downstream neighbour, the central area.

3. North-eastern area

This is part of the Mekong river basin's catchment area. The area is geographically unsuitable for large-scale water storage, hence cannot respond adequately to local demand. It has to rely on medium-sized and small-scale water storage and on inter-basin transfer.

4. Eastern area

The area is characterized by many short rivers, which are suitable only for medium-sized water storage projects. Due to other favourable conditions, the area is designated in the national development plan as a major industrial zone (the Eastern Seaboard) for the country. Accordingly, water shortage in the area is imminent.

5. Southern area

Many short rivers and high annual rainfall characterize this area. There are a number of large water reservoirs. Water shortage is confined to a few places and is less severe than elsewhere.

3. The national development plans

Thailand is an agriculture-based country and water resources were the main factor supporting the rapid expansion of agricultural activities and increase in productivity in the past. However, rapid population increase and accelerated economic growth, due to a boom in manufacturing and services, have caused a steep increase in water demand. Moreover, in recent years, Thailand has faced serious water problems such as pollution, shortages, droughts and floods. Therefore, water resources development and management has become an increasingly important issue and the emphasis can no longer be put on water management for agriculture alone.

3.1 Past national plans: the supply-side management water strategy

In the past, Thailand's water resources development policy aimed to respond to the demand for water in agricultural and other economic activities by emphasizing supply-side management. During the early stage of development, under the *First National Economic and Social Development Plan* (1962-1966), building up infrastructure was viewed as a prerequisite to developing the economy and in particular agriculture and manufacturing. Therefore, about Baht2 000 million of the government budget and another Baht1 000 million in foreign loans went into irrigation construction projects, the most outstanding of which were the Mae Klong and Chao Phraya dam projects. At the same time, the

Bhumibol dam was targeted for completion during the First National Plan in order to generate hydropower. At the end of the period, the irrigated area had expanded to about 12 million *rai* or 20 percent of total arable land at the time. The main area targeted for irrigation development was the central region, while in the North, the Northeast and the South a few irrigation projects were begun: the Lum Pao and Lum Phraploeng projects in the Northeast the Sao Tong project in Nakhon Si Thammarat province and the Mae Tang project in Chiang Mai.

In the ***Second National Plan*** (1967-1971), the water resources management strategy was continued to facilitate the rapid increase in water demand in agricultural and industrial production, hydropower and consumption, etc. As the arable area expanded rapidly to fulfil domestic and foreign demand for agricultural produce, investment in irrigation projects grew and some projects were started to expand the irrigated area, such as the Nan, Nam Un, upper Chi and upper Mun projects. The overall target was to expand the irrigated area to 15 million *rai* by the year 1971. The investment budget for irrigation during the second National Plan was of about Baht7 300 million, Baht5 400 million of which came from the national budget, Baht1 950 million from an external loan and about Baht550 million from foreign grants. At the same time, there was an investment of about Baht1 000 million for multipurpose projects such as the Mekong development project and the Sirikit dam project, which were both for electricity generation and irrigation.

Under the ***Third National Plan*** (1972-76), irrigation was further expanded to facilitate the development of agriculture. Water resources were developed through a project approach, with the emphasis on bringing ongoing projects to completion and fully utilizing the existing irrigation system, although new projects had to be considered to answer greatly increased demand in the future. In the irrigation sector, the Upper Chao Phraya project, for instance, was prepared for optimal use of the irrigated area. Budgetary allocations to irrigation development amounted to about Baht8 000 million, about Baht6 500 million of which came from government coffers, Baht800 million from external loans and Baht600 million from foreign grants.

During the ***Fourth National Plan*** (1977-1981), as water resources deterioration had become a pressing consideration, the water resources policy put the emphasis not only on supply management (with a Baht20 000 million budget) but also on rehabilitation. In addition, the necessity for a master plan for water resources development was realized during that period.

The ***Fifth National Plan*** (1982-1986) took into account the problem of water shortage and need for water allocation management and for a more efficient use of water resources. Besides large-scale and medium-sized irrigation projects, small-scale projects were undertaken to supply water for domestic consumption, especially in villages, in order to raise the standard of living of poor rural people. During that period, water resources development was implemented by many agencies – not just the Royal Irrigation Department (RID) and the Electricity Generating Authority of Thailand (EGAT), but also the ministries of the Interior, of Science, of Public Health and others. But there were still no master plan for water resources development.

In the ***Sixth National Plan*** (1987-1991), for the first time, there were policy guidelines for all concerned agencies to prepare a water resources development plan at the basin level. The other guidelines were to spread small-scale water resources development throughout the rural areas, encourage the creation of people's organization, plan a greater role for management, maintain existing

water development projects and develop the information system among the relevant agencies. However, the guidelines were not implemented thoroughly, as most agencies still used the project approach and had no coordination system among them.

Therefore, in the *Seventh National Plan* (1992-1996), there were strong development guidelines for water resources management in all 25 basins of Thailand. The guidelines for agriculture sought improvement in the efficiency and use of existing irrigation and in agricultural productivity. Farmers' participation was sought, and charging water fees was envisaged. The production of agricultural commodities (e.g. rice and cassava) that did not provide adequate or assured long-term income was not a priority of the plan. However, opportunities were foreseen for the development of high value-added crops: restructuring was proposed to match local market demand and to focus on diversified farming, with an increasing role for livestock, fishery and economic forestry. Specific support was offered to help services promote production and develop marketing systems (e.g. contract farming and farmers' groups) and agro-processing to improve market access and farm-gate prices. Farmers were to be encouraged to increase off-farm income, adapt themselves to changing commodity market conditions and the possibilities of employment in non-agricultural sectors.

During the 1992-1996 period of the plan, there were many investment projects for water resources development, with total investment of Baht122 000 million. The state contribution increased from Baht22 471 million in 1992 to Baht37 996 million in 1995, to which must be added foreign loans of more than US\$474 million. The main governmental agencies involved in water resources development were (and still are) RID and EGAT. By 1994, both agencies had implemented 8 005 projects (650 of them large-scale and middle-sized and 7 346 small-scale) with a total water capacity of 48 845 million m³. In addition, they operated 1 136 water-pumping projects. By 1995, the total irrigated area was of about 28.4 million *rai*, or 21 percent of total arable land.

However, by the end of the seventh plan, water resources management had not changed significantly. In Thailand, water supply and distribution is operated by the public sector as an open-access system whereby water can be consumed free of charge by all economic sectors, especially agriculture. Farmers use as much water as they like: the idea of cost recovery on irrigation investments has yet to gain currency. Water used in manufacturing and services is charged at unreasonably low rates. If some economic instruments have been used to control water quality, such as the special charge for wastewater from manufacturing and services, they have yet to be applied to control water consumption.

3.2. Main features of the current, Eighth National Plan (1997-2001)

The larger the population, the higher the demand for water, but also the greater the pressure on land, so much so that watershed encroachment has become so prevalent it has led to severe water degradation. The rapid industrialization cum urbanization in and around Bangkok and some provincial towns has worsened the degradation to the point that water there has become a health hazard.

Besides the taxing problems of water quality and availability, management of water resources is hampered by the inefficient enforcement of public regulations, and the top-down, centralized approach results in poor performance. Except for the small-scale projects, which are planned from the local level upward, all medium-sized and large-scale projects are mooted by the central planning

authorities based on hydrological and technical information but precious little information on the social side: local needs are investigated only at the project initiation stage. Moreover, there is little coordination among related agencies, which in a few cases results in overlapping project areas. The involvement of the local population is very limited and often causes misunderstandings between line agencies and local groups. These phenomena occur because there is no comprehensive plan of water management of the national river basins.

The first attempt to determine systematically a water resources management plan and guidelines was the study of the potential development of water resources in the 25 river basins of Thailand. The study started in 1993 and was completed in 1994. It covered data collection and preliminary analysis of the potential of each river basin to meet the demand for water for the period 1994 to 2006. However, it concentrated on the potential development of each of the 25 river basins with very little linkage to adjacent upstream and downstream basins.

In order to provide policymakers with a comprehensive river management strategy, the Chao Phraya river basin, which comprises eight sub-basins, was selected as a test case. The entire Chao Phraya river basin is the focus of the country's growth since it covers about 30 percent of the total land area with 27 million people – half of the total population at the time – and accounts for most of the country's agricultural production, industrialization and urbanization.

The main objective of the study was to formulate a comprehensive water management strategy for river basins, by integrating the needs of long-term planning and the requirements of short-term real-time operations, basin development and environmental protection, water quality and quantity, and surface- and groundwater development. This meant integrating institutional, policy, legal and technical measures in order to provide a coherent framework of basin planning and management to guide the systematic development, management and protection of a basin's water resources to meet the demands of socio-economic and population growth in the basin.

The study resulted in a six-pronged strategy, namely:

- 1) Institutional management, which is the establishment of a Chao Phraya River Basin Organization (CPRBO) to manage all aspects of water usage, using the principle of basin management through the coordination of the activities of existing government agencies in the water sector.
- 2) Supply management, i.e. to develop new surface resources, attend to catchment conservation, and study and monitor groundwater.
- 3) Demand management, which puts the emphasis on strengthening the existing system of command and control, as well as applying water charges and improving the information system in the short term. In the longer term, water rights should be formally assigned.
- 4) Water quality management, by integrating management of water quality, introducing licensing of discharges and enforcing water quality standards.
- 5) Flood management, which means to establish within CPRBO a unit to provide a strategic flood action plan for the lower basin and strengthen existing development planning control in the lower basin to prevent further encroachment into flood ways.
- 6) Legal management, i.e. the requirement to support the implementation of the above strategic orientations through, notably, a comprehensive new water law and legislation for the introduction of discharge licenses.

Thus, in the Eighth National Plan, the main strategy was to establish the systematic management of water resources, especially at river basin level, including the provision of clean drinking water and the supervision of water quality, pollution control and drainage. This strategy includes the following guidelines:

1. Organizing supervisory and coordinating mechanisms for the development of water resources at both national and river basin levels in order to ensure consistency and continuity in the work of all related agencies.
2. With the participation of all parties concerned, setting up appropriate systems at various levels for the allocation of water resources between the various types of water consumer, based on the principles of necessity, priority and fairness.
3. Collecting fees for raw water from industrial and agricultural producers and from domestic consumers. The price structure for domestic consumption and industrial usage will be adjusted to properly reflect the real cost of procurement, production, distribution and wastewater treatment.
4. Improving the transmission and allocation systems for both irrigation and domestic usage in communities, in order to minimize wastage of clean water through leaks.
5. Conducting public information campaigns to promote thrifty and effective use of water, encourage the use of water-saving devices and the re-use of cooling water and treated wastewater in some industrial activities.

3.3. Priority policy issues in the Ninth National Plan (2002-2006)

Halfway through the implementation of the Eighth National Plan, the application of the basin approach to water resources management and the establishment of a river basin authority are in the early stage, while water resources management problems are worsening. Therefore, in the Ninth National Plan, priority will be given to the following issues:

1. Shifting from the supply-side approach to the demand-side strategy. In Thailand, the supply-side approach has dominated the development and management of water resources for more than three decades. With new water-related problems arising, serious consideration should be given to the demand-side approach. Instead of focusing on investment for additional water supplies, the demand management option will concentrate on the organizational and institutional aspects in order to reduce costs while promoting sustainability and environmental conservation.
2. A comprehensive overall basin water management strategy will be substituted to the project-by-project approach. This strategy will be formulated by integrating institutional, policy, legal and technical measures, and will seek to provide guidance for the systematic development, management and protection of a basin's water resources in order to meet the increasing demands of socio-economic and population growth in the basin area.
3. Water should be recognized as a tradable commodity, since it has an economic value in all its competing uses. Therefore, incentives, regulations, permit restrictions, and penalties that will help guide and convince the people to use water efficiently and equitably will be established. Meanwhile, innovations in water-saving technology will also be encouraged.
4. Economic instruments should be considered for the alleviation of protracted water crises. The regulations supporting these economic instruments should be clear and acceptable to all groups of water users. Effective and realistic cost-recovery mechanisms should be adopted

and implemented. This would require considerable public awareness and education. Whether full cost recovery or recovery of operational cost is pursued should depend on water usage and local conditions.

5. The government will try to set up the institutional framework of water administration with users' participation by transforming its strategy and operating style in order to give the opportunity to stakeholders, especially local people, to participate in water resources management, such as:
 - announcing to the public all the projects that affect people living in a given area and
 - allowing representatives from the operating area to participate in the decisions that affect them.
6. The private sector should be encouraged to play a more important role in water resources management, especially concerning wastewater in urban areas.

3.4. Establishment of a river basin authority for water management

Under the new Constitution, the right of citizens to information and participation in regional and local development programmes is stipulated. The mechanisms of popular participation in the management of water resources must be worked out. All stakeholders should participate in the development and management process. Equally important is their contribution to cost recovery. To ensure the use and conservation of water resources in an economical and environmentally sound manner, a river basin authority has been proven effective in a number of countries. Such an authority must have a clear mandate as to its role and responsibilities, together with administrative guidelines to operate effectively. The river basin and sub-basin authorities are well defined in the draft water law now awaiting approval. The role of these authorities is to participate in the identification of water-related problems in the basin and in the formulation of solutions as well as of projects or programmes for agencies and government to consider and act upon. The government and line agencies will address the issues and proposals of the river basin authority to implement projects and set development priorities. However, as the idea is new and has never been put into practice in the country, some policy changes and preparatory work need to be carried out before the establishment of such authorities.

- Commission a study to look into the institutional framework and administrative procedure, and define clearly the role and responsibilities of a river basin authority.
- Establish a pilot river basin authority to serve as a learning laboratory for gradual expansion to cover all 25 basins.
- Encourage the participation of local people through the introduction of a bottom-up process for medium-sized and large-scale projects.
- Transfer some activities to user groups, such as maintenance of the distribution system, water distribution scheduling and control, etc.

III. THE KEY COMPONENTS

This section explains why a single national water vision is needed for Thailand. Briefly, the vision is needed because of the diversity in demands for water, in responses to those demands and in the limitations and opportunities of the different areas of the country. This diversity is driving water management into many different (and sometime conflicting) directions, causing inefficient use of resources, hence compromising the nation's ability to compete.

1. Increasing demand

More water is demanded from all sectors. Since water is an important resource for many economic activities, many people are involved in water resources management. The demand for water is increasing due to various reasons such as population growth and expansion of industry and services. In recent years, many areas have faced water shortages in some economic activities, especially agriculture, and domestic consumption during the dry season. New water development projects now have to address environmental issues, and many are unable to do so, seemingly for failure of considering them at the planning stage.

The demand for water has increased rapidly in every economic sector, as each wants to achieve its development target. In the case of agriculture, which consumes about 80 percent of the water supply, the demand for irrigation, which was of 58 171 million m³ in 1993, is estimated to reach 61 746 million m³ by 2006, an increase of about 6 percent. During that period, the irrigated area will have increased by 45 percent, from 30.2 million *rai* to 43.9 million *rai*. The share of irrigation water in the total water supply will have declined from 74 percent in 1993 to 68 percent in 2006. This declining trend reflects the competition for water from other sectors and points to more serious water shortages in agriculture. The Lower Chao Phraya project is a good example of misjudgement of future development: it has resulted in water shortages preventing cultivation of the irrigated areas during the dry season.

Total demand for domestic water, which was of 3 118 million m³ in 1993, should increase to 6 593 million m³ by the year 2006 – a more than 100-percent increase, much greater than the growth of population over the same period. Per capita water demand, which was of 153 litres per day in 1993, is projected at 262 litres per day in 2006. Water consumption by industry and tourism is estimated to increase by 64 percent over the period. Electricity generation is expected to increase only slightly, as EGAT has stopped implementing new large hydropower development projects and only some mini hydropower projects are implemented by the Department of Energy Development and Promotion.

Rapid economic growth has led to conflicts between people in various sectors, especially during the dry season. At the same time, the adverse impact of large dam projects on the environment is widely acknowledged in the country these days, putting a damper on new, large water development projects. All the more reason, then, for people from all sectors coming together to draw the national water vision in order to avoid conflicts of water usage in the future.

2. Differences in area requirements

All river basins in Thailand are different in terms of potential, water supply limitations, and types of water demand. The 25 main river basins of the country have a total runoff of about 214 128 million m³. The national NESDB study of these river basins, carried out in the early 1990s, shows the difference in water supply and demand in each and points out that they all have water shortage problems during the dry season.

The Chao Phraya river basin, which is the largest and the most important basin of the country, has faced the most serious water shortage problem. The high density of population and intense economic activity in the basin result in high water demand. The 1996 NESDB study on a strategy for water resources management in the Chao Phraya river basin confirms the problem. The water shortage of the Lower Chao Phraya depends very much on the combined available water stored by the Bhumibol and Sirikit dams and on total rainfall in the Northern region. The shortage of water will worsen in future, since water demand continues to increase both upstream and downstream while the total water supply remains the same or even decreases due to deforestation. During the 1999 dry season, paddy plantation was reduced because of the water shortage. Moreover, the study points out that there is no more potential for large dam construction in the basin or in the adjacent Tha Chin river basin.

In the Northern region, all river basins suffer from water shortage, especially the Salawin basin and, to a minor extent, those of the Kok, Ping and Wang rivers. In the Northeast, the Mun river basin is the most seriously affected, followed by the Chi and Mekong river basins. The soil structure in the Northeast has low potential for water storage.

In the Eastern and the Southern areas, water shortage problems are less serious than in the other regions, with the exception of the Eastern coastal basins of the Tonle Sap and Tapi rivers.

The different state of water supply and demand and different potential from one basin to the next imply different objectives and targets in water resources management to fulfil people's needs. However, at present, there is no master plan for such management in any basin. Therefore, the preparation of the national water vision had to include and reflect people's needs in every water basin.

3. Institutions

There are two major obstacles to effective water management in Thailand: the lack of clear policies and the lack of coordination among organizations. Water resources are administered and managed by eight ministries with different priorities and programmes that sometimes overlap or are in conflict. The irrigation projects of all sizes that are handled by the Royal Irrigation Department sometimes lack proper management of water delivery and this makes a change of priority in irrigation development difficult. Most of the irrigation system is designed to serve the needs of rice farmers in the central region. Large-scale and medium-sized irrigation systems do not adequately meet the current requirements of competitive mixed farming and contract farming linked to agro-industries and to competitive global export markets in all regions. At the same time, the differences in soil and hydrology conditions in the various regions have resulted in inefficient water delivery for irrigation. The irrigated areas are not fully utilized, especially in the dry season. It is estimated that the cropping intensity of irrigation projects is 70 percent in the wet season and 30 percent in the dry season.

Besides the Royal Irrigation Department, there are many agencies implementing small-scale water development projects. The Department of Energy Development and Promotion manages the pumping schemes and the Department of Mineral Resources manages and controls the use of groundwater. Other agencies take part in small-scale project implementation; they usually have their own work plans and do not coordinate their activities with other concerned agencies.

Most irrigation projects are formulated mainly to solve specific problems, often with little regard for the concept of basin or sub-basin. At the same time, the problem of unrealistic water allocation exists, especially in the dry season when the water supply is limited. Besides, with the exception of small-scale projects in which local people are involved at the inception, the current process of water resources development through projects has proven unacceptable to local people and other stakeholders, as they need more information and more participation in decision-making. The implementing agencies need to be responsive, but they have to follow their own procedures, evolved to facilitate operations, as well as important regulations such as the Groundwater Act of 1977, the Dykes and Ditches Act of 1982, the State Irrigation Act of 1992 or the Private Irrigation Act of 1939. To improve efficiency and increase stakeholder participation in water resources development projects, these acts need to be amended. Moreover, the national water law, which will be the framework for overall water resources management, needs to be approved and promulgated.

Currently there is no long-term national water resources management plan, and no targets and objectives have been set for the various agencies to follow. Despite the vast authority given it under a Prime Minister's Office regulation of 1989, the National Water Resources Committee (NWRC) functions like an ad-hoc committee tackling immediate and short-term problems. Actually, NWRC lacks full authority and an operating mechanism to oversee the implementation of the resolutions adopted by the Cabinet. The Office of the NWRC (ONWRC), which was established in 1996 with 80 officials, still lacks the capacity to support NWRC effectively, because of limited budget and quality staff.

Although NWRC has come up with directives, measures and programmes for water resources development and management, they were not based on any coherent blueprint and hardly any targets for achievement were set. As for the various agencies, they usually carry their operations over from year to year with little or no change and their plans are subjected to intense political lobbying. The 25 basin preliminary plans have not been of much use and there has been no follow-up study to formulate a long-term plan and targets of development. It is also apparent that there is no coordination in carrying out studies or in preparing a master plan, as in the case of the World Bank-funded NESDB study of the Chao Phraya river basin and the Chao Phraya river basin management study of the Royal Irrigation Department, which had more or less the same objective. With better coordination, some budget could be saved.

However, NWRC with the support of ONWRC and NESDB has started to implement water resources management through the basin approach. The subcommittee for the establishment of a Chao Phraya river basin authority was set up in 1998. Since then, the pilot implementation of a sub-basin authority has started in three priority sub-basins of the Chao Phraya basin, namely the upper Ping, lower Ping and Pasak. The corresponding sub-basin committees were established by NWRC at the request of the Cabinet. Each committee consists of all involved parties, such as representatives of the local government, local community, local people's organizations, etc. Its duties are information collection, local project formulation and approval before submission to NWRC, and resolution of local conflicts about water issues.

However, some problems have been found from the start in water resources management at the river basin level. First is the issue of management mechanism at basin level. The unclear policy, legal and institutional framework governing basin areas makes it difficult to effectively implement basin

management. Inadequate and sometimes conflicting legislation is also a problem. There are numerous agencies involved in basin management, and none has clear responsibility for basin management and development. Second is the problem of participation of stakeholders. The current process of project identification and formulation of line agencies has proven unacceptable to the local population and other stakeholders, who demand more information from line agencies and greater participation in the decision-making process. Many large-scale projects do not go through this public process and cannot proceed. There are a few issues that line agencies need to consider to reshape their approach. Third is the issue of involvement of stakeholders in the development process. All public water projects are intended to serve and benefit the users, though they may have adverse effect on some other groups or resources. It is therefore important to seek the opinion of all concerned parties or stakeholders, to get them involved from the early stage of project formulation and to keep consulting them throughout the development process. This is certainly a big change for line agencies. On the other hand, the stakeholders have to adopt a more cooperative and objective stance and be keen to compromise, instead of letting outside influence overshadow their real interests, as has occasionally been the case. Fourth is the issue of conflict management. With the more democratic practice of public involvement in water resources development, many conflicts happen during public hearings or consultations. The conflicts centre on environmental issues, compensation for those affected by the projects and demands from interest groups. At present, there is a lack of mechanism for conflict management, in the form of either institution, legislation or procedure. As competition for water will no doubt increase in the near future, conflicts will multiply; thus, conflict management is a necessity. Finally is the issue of sense of ownership and sharing of responsibility. As long as water is freely accessible and the government provides all water resources projects free of charge, the users or beneficiaries do not appreciate the projects and have little sense of ownership. The general feeling is that if it's a government project, it belongs to the government, so let the government take care of it: people do not feel responsible for the upkeep of the project.

The above legal and institutional framework shows that water resources management concerns many parties and requires much legal adjustment. All conflicts and problems need to be solved as soon as possible to achieve better management and it is necessary that all parties join in the process of improvement, development and formulation of the national water vision to come up with a common objective.

IV. THE NATIONAL WATER VISION

This section states the national water vision and how it was formulated, why it is needed and what has been done to translate it into reality.

1. The vision statement

The vision statement for Thailand is shown below. Explanation for its derivation is in the next subsection.

“By the year 2025, Thailand will have sufficient water of good quality for all users through efficient management and an organizational and legal system that will ensure equitable and sustainable use of water resources, with due consideration for the quality of life and the participation of all stakeholders.”

2. Development of the vision statement

A series of brainstorming sessions were held to arrive at the vision statement. Table 3 summarizes these meetings.

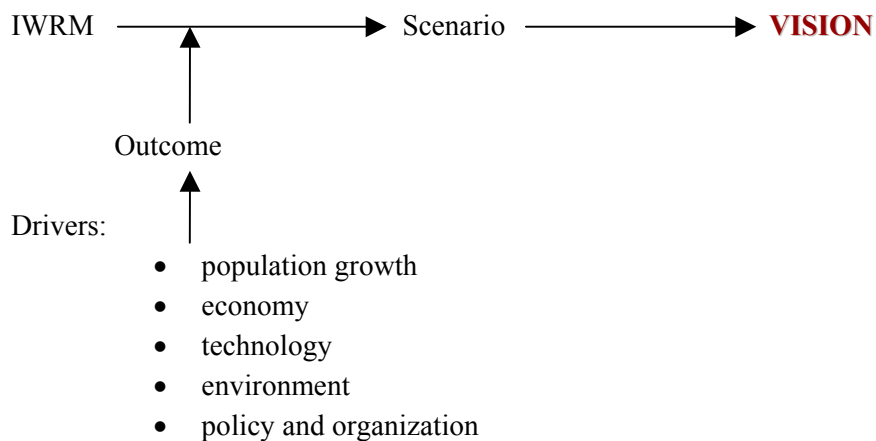
Table 3. Meetings leading to the formulation of the vision statement

Date /Venue	Title of the meeting
1) 5 September 1997/Public Relations Department's Meeting Hall, Bangkok	Directions for the management of water resources and preparation of the water resources management master plan for major river basins
2) 8-9 January 1998/Rama Garden Hotel, Bangkok	Policy and strategy for national water resources development beyond the year 2000
3) 21-22 July 1999/The Peninsula Hotel, Bangkok	National water vision

Formulation of the vision statement occurred in the last meeting of July 1999. How was the statement derived is explained below.

Conceptual framework

Conceptual framework used to guide the meeting is shown in the diagram below.



(IWRM = Integrated water resources management)

Methodology

Based on the above concept, participants were divided into four groups. Each group was assigned the following tasks: 1) select three targets it wishes to see reached in the next 25 years, 2) arrange the targets into several keywords and 3) form the group's vision from the keywords. The four visions were then discussed in a plenary session and arranged into a single statement for the National Vision on Water for Thailand.

V. POLICIES, STRATEGY AND ACTIONS

This section examines the steps taken to ensure that vision definition leads to action. A brainstorming workshop* entitled 'From vision to strategic plan and national policy' was organized on 3 March 2000. In this workshop, national policies, corresponding strategic guidelines and actions were formulated (Subsection 1). These and the national water vision as defined in Section IV were presented to the roundtable meeting held on 19-20 June 2000 (Subsection 2; the programme of the meeting is attached as Appendix 2). To legitimize and implement these policies, they were presented to NWRC, which adopted them with minor modifications in its 20 July 2000 meeting. Details of the endorsed policies are in Subsection 3.

1. Proposed policies

Results of the brainstorming workshop are summarized and presented in Appendix 1.

2. The roundtable meeting

Accepting the proposed vision, strategy, policies and actions, the roundtable meeting focused on what was required to start fulfilling the vision and on the details of some important water subsectors. The outcome of the meeting came under the five following headings:

1. Implementation of the national water vision
2. Water for the people: water supply, sanitation and health
3. Water vision for agriculture and rural development
4. Water management in the Chao Phraya river basin
5. Thrust of water management in the Ninth National Plan

The first four were formulated in corresponding working group discussions, the fifth during the final session of the meeting.

2.1 Implementation of the national water vision

Implementation was considered to consist of five components:

1. **Acceptance** of the vision: ONWRC is responsible for
 - a) Cabinet or ministerial endorsement and acceptance;
 - b) Campaign through the mass media;
 - c) Organization of an NGO forum; and
 - d) Incorporation of the vision into the Ninth National Plan.
2. **Monitoring** of the progress towards the vision: ONWRC is to do the monitoring on behalf of NWRC through the river basin committees and the concerned line agencies. To achieve this will require:
 - a) Capacity building for ONWRC and river basin committees.
 - b) An effective water law.

* Held at the Miracle Grand Convention Hotel, Bangkok. Organized by the Office of National Water Resources Committee. Sponsored by the Global Water Partnership, the Thailand Research Fund, and the Eastern Water Resources Development and Management Public Company Ltd.

3. **Implementation** of the action plans: ONWRC is to coordinate as much as possible the activities of line agencies, river basin committees and private organizations according to the plan.
4. Development and application of **indicators** for monitoring: ONWRC is responsible for:
 - a) identifying suitable indicators and methodologies to measure the degree of fulfilment of the vision and
 - b) making sure that these indicators are used in the monitoring of the Ninth National Plan or the action plans.
5. **Reporting** of monitoring results: ONWRC is responsible for reporting once a year to:
 - a) the Cabinet,
 - b) a national assembly to be organized by ONWRC and
 - c) the public, through publication and dissemination.

2.2 Water for people: water supply, sanitation and health

As a continuation of the process of the national water vision, the inter-sectoral workshop entitled 'Water for life and health vision' was held in Bangkok on 15 March 2000. The participants adopted the following vision statement:

"By the year 2010, all Thais will have clean and adequate water supplies for good health, with the participation of all stakeholders in an efficient and sustainable manner."

Measurable goals were agreed as follows:

1. Clean and adequate domestic water consumption
 - Urban: 90 percent of households.
 - Rural: water supply systems in all target villages
2. Proper and efficient pollution control systems in all localities to prevent contamination of domestic water reservoirs.
3. Public awareness of domestic water consumption, effective usage, and pollution impact.
4. National leading agency for the management of water for life and health.
5. Participation of the local administration and all stakeholders in the effective management of water for life and health.
6. Water and water-related legislation to support water for life and health.
7. A modern and integrated information system for policy, planning and management decisions.
8. Promotion of research and development for a clean and adequate water supply to all.
9. Maintenance and promotion of local traditional wisdom in water for life and health management.

2.3 Water vision for agriculture and rural development

Agriculture is the most important sector in Thailand to support food security, create rural employment and stabilize the economy. Thai governments have emphasized agriculture and rural development continuously by launching a rural development programme followed by an agriculture-restructuring programme.

For more than fifty years, many irrigated agricultural development projects have been implemented in parallel with the development of irrigation. However, irrigation intensity is still low. Compared with the 132 million *rai* of total farmland, only 30 million *rai* are under irrigation. Historically, most of large-scale water resources development projects in the country were constructed from the 1950s to the 1970s and the areas served under the projects were only one fifth of the total cultivated area. A large number of farmers still do not enjoy the benefits of irrigation water.

The government therefore started a small-scale development programme in the 1980s with the aims of improving the living conditions of the people in poor rural areas and of reducing income disparity, and water resources development was part of the programme.

In conclusion, water resources development for agriculture and rural development should be considered of strategic importance, first for economic growth, by efficiently using the existing irrigated area and developing new areas wherever possible, and second for rural development in rain-fed agricultural areas, by promoting more small-scale projects and appropriate technology such as rainwater harvesting, including the royally initiated 'New Theory' projects.

2.4 Water management in the Chao Phraya river basin

In 1997, a Chao Phraya Basin Water Management Strategy was prepared with technical assistance from the World Bank. NESDB supervised the work in collaboration with major water agencies.

The recommendations of this strategy were as follows:

1. Establishing the Chao Phraya River Basin Organization
2. Water supply management
3. Demand management
4. Water quality management
5. Flood management
6. Improvement of the legal aspect

Follow-up projects are further developed in the Chao Phraya river basin:

- (a) A pilot project for trial of organizing river basin committees in the Chao Phraya sub-basins. There are three river basin committees, for the upper Ping, lower Ping and Pasak sub-basins.
- (b) A study on the establishment of the Chao Phraya Basin Organization, supported by AUSAID through the World Bank. The study takes into consideration comments from many workshops and from the people concerned. The suggestion for establishing such an organization comes with the recommendation to improve the capacity of the water sector.
- (c) A study on rights-based allocation of water, funded by the World Bank. The purpose of this project is to address some aspects of this approach, for instance, what kind of implementation would be required and what would a pilot programme for it be like.
- (d) A study of management in the Ping river basin, funded by ADB. The study tries to formulate a river basin management system in three areas, the Ping river basin in the North, the Mun river basin in the Northeast and Thatapao canal in the South. The activities include reviewing available information and data for water resources management and watershed protection.
- (e) The Thailand Integrated Water Resources Management System. The project will carry out research work in the Chao Phraya river basin.

- (f) Modernization of the irrigation system:
- Study on conjunctive use of surface and groundwater
 - Study on cost recovery in irrigation projects
 - Promoting people's irrigation management
 - Privatization of irrigation

2.5 Direction of water management in the Ninth National Plan

1. Preparation of the Ninth National Plan is based on the collection of opinions among the public. This is done in two steps:
 - Organizing meetings at sub-regional level for nine sub-regions.
 - Organizing meetings at the national level.
2. The steps in preparation of the plan are:
 - Drafting the vision and development framework to be proposed to the Cabinet
 - Drafting the Ninth National Plan to be proposed to the national conference and the consultative council
 - Proposing the draft plan to the Cabinet
 - Clarifying the plan's implementation
 - Announcing the start of the Ninth National Economic and Social Development Plan on 1 October 2001
3. Provision of raw water will be made with careful consideration of its impacts on the environment.
4. Support the establishment of river basin organizations, eventually to cover all 25 river basins, with the participation of all concerned parties.
5. Increase people's participation to water quality management, especially regarding wastewater.

2.6 Significant issues in water resources development

1. Accelerate water resources management in river basins, notably by improving rules and regulations and strengthening the concerned agencies.
2. Emphasize demand-side management
 - Encourage effective water usage and equitable water allocation
 - Adapt economic mechanisms, such as fees and licenses, for the promotion of effective water usage.

3. Endorsed policies

The policies mentioned in Subsection 1 were refined and endorsed by NWRC in its 20 July 2000 meeting. The endorsed policies are shown below.

1. Accelerate the promulgation of the draft water act to serve as framework for national water management by reviewing the draft, and implement all necessary steps to have the act effective, including reviewing existing laws and regulations.
2. Create water management organizations both at national and at river basin levels with supportive laws. The national organization is responsible for formulating national policies, monitoring and coordinating activities to carry out the set policies. The river basin organizations are responsible for preparing participatory water management plans.

3. Emphasize suitable and equitable water allocation for all water-using sectors to fulfil basic water requirements in agriculture and for domestic purposes. This is to be done by establishing efficient and sustainable water usage priorities for each river basin under clear water allocation criteria, incorporating beneficiaries' cost sharing based on ability to pay and level of services.
4. Identify clear directions for provision and development of raw water of suitable quality, compatible with the potential and demands of each river basin, while conserving the natural resources and maintaining the environment.
5. Provide and develop raw water sources for farmers extensively and equitably to respond to water demand in sustainable agriculture and for domestic consumption, similar to deliveries of other basic infrastructure services provided by the State.
6. Include in the curriculum at all levels of formal education water-related topics, to create awareness of the value of water and understanding of the importance of efficient water usage and of the need to maintain natural and man-made water sources.
7. Provide sufficient and sustainable financial support for water-related research, public relations, information collection and technology transfer to the public.
8. Promote and support the participation, with clear identification of its format, of non-government and government organizations in efficient water management. Water management includes water usage, water source conservation and monitoring of water quality.
9. Accelerate the preparation of plans for flood and drought protection, including damage control and rehabilitation efficiently and equitably with proper use of land and other natural resources.

4. Endorsement by the Cabinet

In its weekly meeting of 25 July 2000, the Cabinet endorsed the national water vision, its policies and related directives.

VI. CONCLUSIONS AND RECOMMENDATIONS

1. Conclusions

1. A well-planned process for the formulation of the national water vision and its downstream actions (strategic actions) has been in place since 1997. The process consists of a series of brainstorming meetings among more than a hundred national experts – government officials, NGO representatives, academics and consultants.
2. At the time of this report preparation, both NWRC and the Cabinet have endorsed the national water vision, along with its policies and blueprint for action.

2. Recommendations

It is fortunate that the formulation of the national water vision and actions leading to its realization are occurring at a time when the new (1997) Constitution is beginning to shape the country's future. The Constitution calls for public participation and partnership in all national development endeavours, including those of the water sector. In this spirit, the following recommendations are presented:

1. Demand attention from the political sector.

2. Clarify water rights and water allocation practices. Formulate a clear division of responsibilities between ONWRC (as the topmost national water management body) and local authorities (the river basin committees).
3. Promote and support the river basin committees to exercise local authority in river basin water management.
4. Lobby for inclusion of the output of the national water vision in the forthcoming Ninth National Plan.

REFERENCES

1. **TDRI.** 'Water shortages: managing demand to expand supply' in The 1990 TDRI Year-End Conference, *Industrialization in Thailand and its impact on the environment*, 8-9 December 1990, Bangkok
2. Office of the National Economic and Social Development Board (NESDB). *The First National Economic Development Plan (1961–1966)*
3. **Office of the NESDB.** *The Second National Economic Development Plan (1967–1971)*
4. **Office of the NESDB.** *The Third National Economic Development Plan (1972–1976)*
5. **Office of the NESDB.** *The Fourth National Economic Development Plan (1977–1981)*
6. **Office of the NESDB.** *The Fifth National Economic Development Plan (1982–1986)*
7. **Office of the NESDB.** *The Sixth National Economic Development Plan (1987–1991)*
8. **Office of the NESDB.** *The Seventh National Economic Development Plan (1992–1996)*
9. **Office of the NESDB.** *The Eighth National Economic Development Plan (1997–2001)*
10. **Office of the NESDB.** *Evaluation of the Second National Economic Development Plan (1967–1971)*
11. **Office of the NESDB.** *Evaluation of the Third National Economic Development Plan (1972–1976)*
12. **Office of the NESDB.** *Evaluation of the Fourth National Economic and Social Development Plan (1977–1981)*
13. **Office of the NESDB.** *Evaluation of the Fifth National Economic and Social Development Plan (1982–1986)*
14. **Office of the NESDB.** *Evaluation of the Sixth National Economic and Social Development Plan (1987–1991)*
15. **Office of the NESDB.** *Evaluation of the Seventh National Economic and Social Development plan (1992–1996)*
16. **Office of the NESDB.** *Evaluation of the Eighth National Economic Development plan (1997–2001)*
17. **Snoh Unakul.** *Monetary and Fiscal Policy and Economic Development Planning of Thailand.* 1971. Ramin Publisher
18. **Binnie & Partners (Overseas) Ltd.** October 1997. *Chao Phraya Basin Water Management Strategy, Final report.* Prepared for the Office of the NESDB, Bangkok

APPENDIX 1. PREPARATION OF A NATIONAL ACTION PLAN

Under each policy, objectives, strategic guidelines and action plans were set, the responsible agencies were identified and a timeframe specified for each action. The whole forms the national action plan.

POLICY: National water resources will be managed within a sound legal framework

Objective	Strategy	Action	Responsible agency	Time frame
To have a water law to serve as principal legislation for the efficient management of national water resources	Draft the water law and revise existing laws and regulations concerning water resources management	1. Set up a working group to revise the draft water law	ONWRC	Dec 2000
		2. Organize seminars and workshops to obtain feedback from all stakeholders	ONWRC	March 2001
		3. Submit the draft water law to the government for consideration	ONWRC	June 2001

POLICY: Water sector coordination will be ensured by a national body for policy formulation and regulation and by the river basin committees

Objective	Strategy	Action	Responsible agency	Time frame
1. To have legally established organizations manage water resources at both national and basin levels	Draft laws to establish a policy and a regulatory body for national water management, and to establish basin organizations with emphasis on public participation in basin water allocation and management	1. Study and design a suitable organization structure of the national and basin organizations for the drafting of supporting laws	ONWRC and concerned agencies	Dec 2000
		2. Establish basin organizations to prepare basin development plans	ONWRC	2001-2005
2. To expand drinking water supply service to cover all communities and villages in the country	Increase construction of drinking water supply projects for communities and villages	1. Short-term: Construct and provide water supply to cover 70% of communities and villages	TAO, DOH, PWA and private sector	2001-2003
		2. Long-term: Construct and provide drinking water supply to cover 95% of communities and villages	TAO, DOH, PWA and private sector	2004-2006
3. To have users share responsibility for services received	Use economic and financial measures for water allocation, fee collection, water market, compensation, and duty for wastewater treatment and other services through which the public participate in setting fees	1. Study and set appropriate pricing for various uses of water	ONWRC and concerned agencies	2002
		2. Study feasibility and set guidelines for the private sector to provide services	ONWRC and concerned agencies	2002
		3. Public awareness campaign for users to understand investment and other costs needed to be borne collectively	ONWRC and concerned agencies	Begin 2001
		4. Creation of a water fund for water management	ONWRC and concerned agencies	Begin 2001
4. To have appropriate water allocations for all users at both national and basin levels	1. Infrastructure rehabilitation 2. Management system improvement	1. Rehabilitation of water distribution and control structures to reduce losses 2. Modernize water delivery and control methods 3. Organize restructuring and human resources development in water management	Concerned agencies Concerned agencies Concerned agencies	Begin 2001 Begin 2001 Begin 2001
	3. Introduce reuse systems	1. Study and develop water reuse models 2. Provide incentives for water reuse	Concerned agencies	Begin 2001

POLICY: Water resources management will be carried out with clear guidelines and targets, supported by firm commitment, with due consideration given to the conservation of the environment

Objective	Strategy	Action	Responsible agency	Time frame
1. To have clear direction and firm commitment for water management	To make decision-makers aware of the importance of and associated problems in water management	1. Provide information and propose solution to decision-makers.	ONWRC	Begin 2001
		2. Adopt the IWRM approach for all concerned agencies to follow	ONWRC and concerned agencies	Begin 2001
2. To develop water resources in adequate quantity and of suitable quality for various uses with due consideration for environmental conservation	To prepare a master plan based on integrated basin water management and development	1. Prepare an integrated surface water and groundwater development, conservation and rehabilitation plan	ONWRC and concerned agencies	2001-2006
		2. Prepare a master plan for sanitary programmes and waste water treatment	OEPP, PCD, PWD, DOH and TAO	2004-2006
		3. Develop and establish a database on water, land, forestry and the environment	ONWRC and concerned agencies	2006

POLICY: Public awareness of water resources management will be increased by incorporating knowledge about water into the curriculum at all levels of formal education

Objective	Strategy	Action	Responsible agency	Time frame
To make all citizens aware of the importance of water and use water efficiently	Include curriculum on water at all levels of study	Prepare curriculum to cover water-related matters for all levels of study	ONWRC, MOE and MOUA	2003

POLICY: Sustainable water resources management requires investment in research, public relations and the collection and dissemination of information about water

Objective	Strategy	Action	Responsible agency	Time frame
1. PR programme to publicize government agencies' plans and projects among the public for understanding and support	To provide budget for public relations, create awareness and distribute information to agencies responsible for project implementation	1. Study and develop public relation models and media methods for concerned agencies to follow	ONWRC and concerned agencies	Begin 2001
		2. Training and recruitment of public relation personnel for the agencies	ONWRC and concerned agencies	Begin 2001
2. Development of qualified personnel in water management	To promote research and technology transfer for the personnel involved in water management	1. Prepare a master plan for research on water management	ONWRC and academic institutes	Begin 2002
		2. Conduct research, training and transfer of technology	ONWRC and academic institutes	Begin 2002

POLICY: Water resources planning, development, management and conservation require the participation of government agencies, private organizations and the public, based on procedures that clearly define the rights and responsibilities of stakeholders

Objective	Strategy	Action	Responsible agency	Time frame
To let the public/stakeholders participate in the planning, development and management of water, and to make them understand their rights and responsibilities in the use, preservation and conservation of water and the environment	1. To promote public participation in all steps of water management	Study and define procedures as well as the scope for public participation	ONWRC and concerned agencies	Begin 2001
	2. To launch a campaign to make the public aware of their right to water and of their responsibility to take care of, and conserve, water and the environment	Study and define the rights and responsibilities of stakeholders, and provide materials for public information	ONWRC and concerned agencies	Begin 2001

**APPENDIX 2. PROGRAMME OF THE ROUNDTABLE MEETING ON 'WATER RESOURCES
MANAGEMENT IN THAILAND: FROM VISION TO ACTION'
Bangkok, 19-20 June 2000**

19 June 2000 – DAY 1

8:00–8:45	REGISTRATION	
8:45–9:00	Opening session: Welcoming address	Director of ONWRC
9:00–10:00	Session 1 - From water vision to action: visioning process versus strategic planning - Overview of the water vision for food, agriculture and rural development: strategic choices for countries	Chaired by Dr Le Huu Ti, ESCAP
10:00–10:15	Open forum: discussion	Mr Thierry Facon, FAO
10:15–10:30	<i>Coffee break</i>	
10:30–11:15	Session 2 - Thailand's water vision – a case study - Experiences in strategic planning for water resources management	Chaired by Dr Apichart Anukularmphai Dr Sacha Sethaputra, ONWRC
11:15–11:30	Open forum: discussion	Dr Le Huu Ti, ESCAP
11:30–12:30	Session 3 - Water resources management for socio-economic development in the past and in the 9 th Five-year Plan - Water supply, sanitation and health - Water for food and rural development - Water resources management in the Chao Phraya river basin	Chaired by Dr Apichart Anukularmphai NESDB representative PWWA representative RID representative ONWRC representative
12:30–13:30	<i>Lunch</i>	
13:30–16:30	Session 4: Working groups - Implementation of the national water vision - Water for the people: water supply, sanitation and environment - Water for food and rural development - Water management in the Chao Phraya river basin	

20 June 2000 – DAY 2

9:00–10:30	Session 5 Findings and recommendations of the four groups	Moderator: Dr Sacha Sethaputra Respective chairpersons
10:30–11:00	<i>Coffee break</i> Preparation of a consolidated list of priority actions	Organizing Committee
11:00–12:00	Final session - Open forum on the recommended list of priority actions - Conclusions and closing remarks	Chaired by Mr Surapol Pattanee
12:00–13:30	<i>Lunch</i>	

Held at the Royal River Hotel, Bangkok-rat Room. Organized by the Office of the National Water Resources Committee in cooperation with ESCAP and FAO

VISION OF VIET NAM'S WATER, LIFE AND ENVIRONMENT IN THE 21ST CENTURY

To Trung Nghia

Director

Water Resources Planning Institute

Ministry of Agriculture and Rural Development

Hanoi

I. BRIEF HISTORY OF WATER RESOURCES EXPLOITATION AND USE IN VIET NAM

In the context of great changes and development in the world as a whole and in Viet Nam in particular, it is obvious that any socio-economic development is closely linked to the need for water. Rapid economic and demographic growth results in increased demand for water; improper use of water resources leads to water shortage and to pollution of the water environment. Viet Nam has had programmes and a short-, medium- and long-term strategy on water resources planning. The country is integrating into the world in linking the water issue to its development potential, putting it high on the overall agenda, together with social equality, sustainable development and protection of the environment.

In spite of confronting the myriad difficulties of a backward agricultural country suffering from continuous natural calamities and protracted wars throughout her history, Viet Nam has given top priority to irrigation and drainage, water resources exploitation and development. The following is an overview of her historical development.

1. Up to Independence in 1945

From time out of mind, the Vietnamese people have attached great importance to water. For plants, water was considered the key factor: “Water, manure, hard work and seedlings” is the age-old recipe. At the same time, they also realized the need to control water and water came first among the four calamities – “Water, fire, religion, invasion”.

In 1945, the Democratic Republic of Vietnam (as Viet Nam was spelt then) was born with a poor and backward economy. The country had only 13 water systems, many of which had yet to be harnessed. The Red River delta had an old and vulnerable flood-preventing soil dyke system. A typical case happened in 1945 when the Red River rose, its dyke broke and more than 260 000 ha of paddy fields were flooded. This calamity, coupled with the war, resulted in crop failures and the subsequent famine claimed more than 20 000 lives. Despite numerous difficulties and shortages, the government spent much of its capital and mobilized the people to overcome flood consequences, restore water structures and repair dyke breaks. The Mekong River delta had only a few channels to exchange goods and crop cultivation totally relied on rainwater. There was no water infrastructure. The Central, Midland and mountainous areas continuously suffered from droughts.

2. From 1946 to 1975

From the sorrowful 1945 lesson, the government advocated the protection and development of the country's water infrastructure and encouraged the people to build small water structures. Between

1946 and 1949, the water-structure-building movement by the people was extensively implemented in order to expand the available water infrastructure and increase irrigated areas. The government also pushed land reclamation and the building of flood-preventing dykes, particularly in the Red River delta.

The 1949-1954 period was the most difficult wartime. Nonetheless, the government paid special attention to water resources and issued Ordinance 68-SL on 18 June 1949 establishing inter-district and provincial hydro-agriculture councils, which were responsible for building, repairing and developing hydro-agricultural structures and dykes.

In the 1955-1957 period of economic restoration, the duties of the water resources industry were defined as follows: *“The macro hydro-agriculture duties are to restore all the water infrastructure system which was exploited before the Resistance and widen channels to increase irrigated areas, reform irrigation water management, and educate the people to save water so that little water is used but much land is irrigated. While the macro hydro-agriculture duties are implemented, it is necessary to develop micro hydro-agriculture countrywide”* (The 1955-1957 economic restoration plan).

In 1958, Vietnam shifted to a period of economic restoration and development. The targets of the water resources industry in the three-year plan were to overcome floods, widen irrigated areas, narrow cultivation areas reliant on rainwater, guarantee adequate water supply in the face of greater demand due to technological improvements and contribute to the cooperation movement in order to fulfil the three-year agriculture production duties and create a firm foothold for hydraulic modernization.

In 1960, Vietnam substantially developed water resources exploitation and control, taking the first steps in researching how to control and exploit the Red River. This was useful for the preparation of the first five-year plan. Vietnam started to build reservoirs and medium-sized hydroelectric plants. Several colleges and institutes were established for training and scientific research on water resources development.

The 1961-1965 period was considered as a great leap forward for the North’s water sector. Directing the guidelines for those five years, the Fifth Congress of the Communist Party’s Central Committee (the third legislature) issued a resolution in which the section on the water resources sector was defined as follows: *“Water service is the first measure to develop agricultural production. In the next five years, the water resources industry must take an active role in preventing droughts, narrowing flood areas, guaranteeing adequate water for paddy cultivation and for areas planted with vegetables and industrial crops that are only partially irrigated. To prevent floods, river and sea dykes must be strengthened and riverbeds scraped, guaranteeing protection from high river levels and strong winds. It is necessary to make plans for the Red River, build essential structures and start research on big rivers.”*

In order to fulfil the plan, the government started a new small water structure-building movement by the people over 1964 and 1965, which increased the number of reservoirs and irrigation and drainage structures. Research on how to control and exploit big rivers brought about the first tangible results. For the Red River system, terrace exploitation plans for the Lo and Da rivers were drawn and it was determined that the Hoa Binh hydroelectric plant should be the first water structure on the Da River. At the end of the 1961-1965 plan, there were 83 large-scale hydraulic structures and 2 830 medium-

sized structures which could irrigate 449 800 ha and drain 207 600 ha. The water resources industry of the period contributed to controlling nature, efficiently serving agriculture production and supplying safe water to large areas.

In the 1965-1975 period, the government advocated building large intensive-cropping zones which, properly irrigated and drained, could yield at least five tons of rice per hectare per year. Only selective building of large-scale and medium-sized water structures was done, because at the time the country was once again at war. The government issued the policy of developing water structures in mountainous areas. A series of medium-sized and small reservoirs were built, some of which had the capacity to hold millions to tens of millions of cubic metres of water.

3. From 1976 to 1995: reconstruction

In the 1976-1985 period, newly reunified Viet Nam started water resources protection, development and management countrywide. In the South, agriculture was still backward and totally reliant on nature. Droughts and floods occurred frequently. Millions of hectares of land were still in wild condition. The government advocated focusing all efforts on developing water resources services in the South to meet the urgent needs of each region to serve production, thus easing and improving people's lives. The water resources agencies quickly went about collecting all available documents, undertook supplementary analysis and primary research on regional plans, defined the structures to be built at once, and prevented actions that could run counter to the long-term strategy. In the North, hydro-agricultural completion was hastened in every locality. Water structures were improved in both capacity and operating speed. At the same time, key structures kept being built to meet every region's basic needs. The issue of drainage, which had been implemented at low level, was totally solved. In the Central area, the water resources services still had difficulties and only dealt with droughts.

The water resources services in the South set about convincing the people in the Mekong river delta to shift from backward cultivation methods to the new cultivation technology.

The 1985-1995 period was a time of renovation. The government advocated developing a diversified agriculture with food production as the key element to guarantee sustainable social development and a multi-faceted commodity economy with market mechanisms and government management. The new economic structure created the issue of diversely supplying water to people, animals and plants in plains, hills and mountainous areas. The supply of safe water, especially in mountainous areas, was taken up in the national plan. Water structures were radically and more efficiently exploited. However, in the process of exploitation and development there emerged problems on mobilizing socially useful labour, compensation, using land to build structures, environment protection, immigration, and investment capital management. Based on extensive and careful research, hydraulic regions were classified and investment projects designed in harmony with each region's natural conditions and development needs. Several large areas were successfully desalinated and turned over to cropping. From few structures formerly, by 1995 there were 75 large-scale hydro-agricultural systems, 750 big and medium-sized reservoirs, tens of thousands of channels and 7 000 km of river and sea dykes. There were also tens of thousands of small structures and pumping stations. 5 600 000 ha of paddy field and 560 000 ha of vegetable land were irrigated, 865 000 ha of land were drained, 16 000 ha of land were free of alum and 700 000 ha of coastal land were desalinated by building dykes and drainage channels, besides supplying water to tens of millions of urban and rural people and meeting water demand for domestic consumption and industrial production in mountainous areas.

In addition, Viet Nam attached importance to international cooperation and intensified cooperation on training cadres and on project research and investment, especially projects on rivers shared with neighbouring countries. In international cooperation, Viet Nam preserved the rules of national sovereignty and national interest, exploited and protected domestic water resources while seeking to harmonize relations among, and the national interests of, the countries along the banks of the Mekong River. Overall plans on water resources development in deltas were drawn, particularly for the Red River and the Mekong River deltas, creating the premise of an overall national plan. Plans were also drawn for key regions to serve investment projects on water resources and other industries in order to guarantee the balanced development of water resources among the regions. A draft law on water resources was prepared for submission to the government. The water resources agencies also drew plans for water resources development in the 1996-2000 period and development projections for 2010. The government had a programme to evaluate the country's water resources and water usage and issued a series of standards on quality of surface water, groundwater, wastewater, etc.

In spite of those achievements, there were still many problems, as listed below:

a. *The Red River delta*

Most dykes, built with earth, were usually eroded. Pumping stations had been in use for more than ten years, sometimes more than twenty, and electricity systems were backward. Annual maintenance and repair cost much money and effort, but the government budget was insufficient and irrigation and drainage fees were much lower than production costs; thus, the structures deteriorated. Meanwhile, water demand for production increased and there was a growing need for irrigation and drainage.

After the Hoa Binh hydroelectric plant came into operation, there occurred both positive and negative changes in the Red River delta and hydro-agricultural systems had to adjust to such changes.

Annual flooding was still a challenge to the sustainable and stable development of the delta, not only for agricultural production but also for the whole economy. Protecting dykes, consolidating the water infrastructure, preventing internal instability as well as overflows had to be done frequently with proper investment. In addition, it was vital for the sustainable development of the delta to combine the water resources plans for the Lo Gam and Da rivers with reforestation and forest protection.

b. *The Mekong River delta*

Due to ecological changes and upstream exploitation, the Mekong River's flow regime in the dry season and in the rainy season is very complicated. Saltwater was spreading and fresh water shrinking as the demand for water in the dry season increased. Therefore, the urgent task was to build saltwater-preventing structures, including surrounding dykes and drainage systems. Apart from agricultural development, industrialization in the Mekong River delta created a great demand for water.

The Mekong River's floods on the one hand made life difficult for the local people, particularly those in newly developed regions whose houses were not suited to flooding conditions; on the other hand, they provided alluvial deposits, increasing the fertility of the

soil, reducing the number of pests. So, it was necessary to work out different sustainable, adaptable strategies for different regions.

In some parts of the Tien and Hau rivers, erosion and landslides were a risk to people on the banks, but there were no ready solutions.

4. From 1995 to date

Since 1995, research on large hydroelectric plants has been completed. The Law on Water Resources has been passed. Based on the need to supply water, both in quantity and in quality, for urban, agricultural and industrial development, the water resources agencies have proposed the following development plan for the period leading to 2010:

a. Adequate supply

Water resources planning is the first step in agricultural production and a key element in sustainable industrial development. In coming years, apart from supplying water for paddy cultivation, water resources services must meet the further requirements of agriculture, industry, ordinary consumers, security and defence, and the ecosystem. Especially in agriculture, they must support industrial cropping, fruit tree growing, fishery, production for export and the development of midlands and mountainous areas.

b. Water usage coupled with water resources protection

Although Viet Nam has abundant water resources, most of them are generated in neighbouring countries and run the risks of running out and of being contaminated. Therefore, in order to use water resources in a sustainable manner, Viet Nam must act as follows:

- Water resources must be exploited systematically according to river basin and water structures, not according to administrative divisions.
- Water resources exploitation and use must be coupled with protection against scarcity and contamination.

c. Avert water-related dangers

If the advantages of water are to be exploited, water-related dangers must be averted, by combining national interests with those of the regions and localities and modern technology with popular traditions in accordance with the country's economic condition.

d. Intensify water resources management

The restoration of degraded water structures and the establishment of new structures of all sizes need to be properly balanced. Besides building water structures, water resources management needs to be intensified in order to make full use of investment capital and to achieve success.

e. Policy on community priority

Pay attention to water resources development in remote and mountainous areas, link water resources planning to social policies to supply adequate water to a growing number of people and make contributions to 'hunger eradication and poverty elimination' programmes and to settlement programmes.

f. Socialization of water resources services

Socialization of water resources services and management is implemented according to the motto: "Both the government and the people do." At the same time, the government advocates rallying all popular efforts and encouraging foreign and domestic investment in water resources exploitation and construction of water structures based on democratic participation and equal benefit. To that end, the government has intensified public education through the

mass media on the importance of water resources, by emphasizing that “water resources and water structures management is the people’s responsibility, obligation and right”.

g. Water financial policy

As water is of great value (water is considered as a commodity), it is necessary to make water financial policies to link water resources exploitation to the obligation of contributing capital. It is the way to afford the maintenance and improvement of water structures and protection against water-related dangers.

II. VIET NAM’S WATER RESOURCES: POTENTIAL, PRESENT SITUATION AND DEMAND

1. Surface water potential

Most of Viet Nam’s 332 000 km² land spread consists of hills and mountains, not very high but very dangerous due to steep slopes. They make for a very complex network of rivers and streams. Due to the humid tropical climate and plentiful rainfall, water flows are easily formed, but the uneven distribution of rainfall makes them uneven as well. In Midland and mountainous areas, there are places that are short of water all year round or in the dry season, yet are flooded in the rainy season. In the plains, where numerous rivers have plentiful water resources throughout the year, the problem is to drain water in the rainy season.

The surface water either generated in or flowing through Viet Nam’s territory comes from rainwater over an area of 1 167 000 km². The surface water potential is estimated at about 835 000 million m³ per year, though this number can fluctuate between 630 000-650 000 million m³ and 1 000 000 million m³. Water quality and quantity are affected by both natural and social factors. As 60 percent of Viet Nam’s surface water is generated outside the country, its potential is affected by the source countries’ socio-economic development.

With the present population, the water volume per capita is of about 4 000 m³ per year. According to the classification of the International Water Resources Association, a country with a water volume per capita of less than 4 000 m³ per year is considered a country of water shortage. Given population growth, Viet Nam is thus likely to experience a water crisis. All the more reason, then, to work out a national water vision which will include unified steps and a common strategy for the whole region and those countries in it sharing river basins. Water resources management under laws and stipulations is the key to proper usage and control.

2. Underground water potential

The estimate of the underground water potential, after many years of research, is still uncompleted. Hydrogeologists have given different estimates. However, the rough estimate is between 50 000 and 60 000 million m³, equal to 16-19 percent of the annual total runoff or of the total water volume of rivers in the dry season. Underground water is the supplementary source for rivers in the dry season. Yet, the exploitation of underground water in many regions reduces river water volume in the dry season.

3. Current situation of Viet Nam's water resources

a. Increasing shortage of water

Increasing population reduces the volume of water per capita. In 1945, it was of 14 520 m³: now it is of 4 840 m³. If Viet Nam's population were 150 million, the water volume per capita would be 2 420 m³ (as estimated from the internal runoff).

Due to climatic changes, the rainfall diminishes year after year. As the atmospheric temperature rises, so does evaporation. This leads to decreasing water resources and increasing water demand for irrigation. Therefore, the regions where the dry season lasts nine months and the annual rainfall is less than 1 500 mm can turn into deserts.

There is growing demand for water to increase the productivity of plants, to supply domestic needs, to develop industry, tourism, trade and services. Water overexploitation and overuse easily lead to serious contamination if proper measures are not taken.

b. Growing water perils

Severe storms occur more frequently. It is calculated that each decade has 1.6 times more storms than the previous one. Typhoons, causing the seawater level to rise by two metres, account for 11 percent of all storms. The sea level rises 0.2 cm annually. Coastal erosion and landslides become increasingly frequent and serious.

The highest amounts of rainfall per day can exceed 700 mm. In inland places such as Lai Chau or Kontum, daily rainfall of more than 300 mm has been recorded repeatedly. The shrinkage of source forests results in the probability of increasingly serious floods. Flash floods also occur more frequently in many places, particularly in small basins. The hydrogeology observation system is out of operation, however, so it is difficult to produce accurate figures.

The water flow in the dry season is diminishing due to decreasing rainfall and to two other factors: source forests no longer play their regulating role because of forest fires and deforestation, and water exploitation is implemented through a system of movable dams at river source. Therefore, in most places there are water shortages as early as February or March, one or two months earlier than used to be the case.

c. Worsening contamination of water

Water in lakes and rivers generally is good enough to meet people's requirements. But around industrial zones, rivers, lakes and the sea can be seriously polluted. Increasing urbanization and industrialization have resulted in rampant water contamination. In the dry season, there is not enough water in lakes and rivers to dissolve waste and the contamination becomes worse. The overuse of fertilizers and pesticides in agriculture contaminates both surface and underground water.

The modernization and industrialization of agricultural production has caused new kinds of pollution, as with coffee-processing plants whose processing of beans for export demands a great amount of fresh water, later released as wastewater.

4. The demand for water

a. For hydro-agriculture

Water resources planning was seen as the first requisite to develop agricultural production. So, on the seven million hectares of cultivated land, 75 hydro-agricultural systems were created, 3 million ha were irrigated, 1.3 million ha drained and 0.7 million ha desalinated. From 1944 to 1999, the population tripled but the food output grew six-fold – from 4.9 million tons in 1944 to 33.8 million tons in 1999 (68 percent of it on irrigated and drained land). In 1998, although serious droughts occurred, the food output was maintained thanks to the contribution of hydro-agriculture. So far, 30 hydro-agricultural projects have been proposed or are under operation. However, the efficiency of the projects is still low, below 50 percent.

b. In urban areas

There are 200 water stations, supplying three million cubic metres of water per day to more than half of the population, at the per capita level of 50-60 litres per day in general and of 80-100 litres per day to the 60-70 percent of the population living in large cities. However, water profligacy is still high. The demand for drinking water increases rapidly. Eighty percent of the urban population is to be supplied with 80-100 litres of water per person per day by 2005, and 120-150 litres in the case of the 90 percent of the people living in large cities.

c. In rural areas

Supplying drinking water to rural areas has been undertaken in the last five years, so that, at present, 30 percent of the rural population is supplied with drinking water. According to plans, by 2005 80 percent of the rural population will have access to safe water, 50 percent of rural households will have sanitary lavatories, and 30 percent of the animal sheds and 10 percent of the handicraft villages will have waste treatment systems.

d. For hydroelectric development

Hydroelectricity has been the driving force of the power industry. By 1998, six large-scale and medium-sized hydroelectric stations supplied 2 844 MW, equal to 50 percent of electricity demand countrywide. The 720 MW Yali station came into operation at the end of 1999 and two more stations are under construction. Sixty percent of the country is electrified, with a nearly one-hundred-percent coverage of plains. In coming years, hydroelectricity will continue to spearhead the power industry. Seven large-scale hydroelectric schemes with a total capacity of more than 5 000 MW will be introduced after the year 2000.

e. Total water demand

Viet Nam's population continues to grow rapidly. It is estimated to reach 93 million by 2010 and 126 million by 2040. Deforestation and water contamination have made the water volume per capita dwindle. Total water demand for agriculture, industry and domestic use, which was 65 000 million m³ in 1990, is estimated to be 72 000 million m³ in 2000 and 90 000 million m³ by 2010. These numbers still lag behind world figures.

Under the current water exploitation, which uses up two thirds of the inflow water and leaves the rest to preserve the ecosystem, it is impossible for Viet Nam to balance water demand and

supply. A national programme has recommended increasing useful water capacity to 70 000 million m³ between 2010 and 2020. Actually, such a recommendation is absurd, because for the past few decades, the useful water capacity from reservoirs has been of 18 000 million m³ only and only two percent of the average flow regimes have been exploited. Therefore building more water infrastructure is important, but the solution is to manage water usage. Given the danger of water withdrawal in coming times, it is essential to find more efficient approaches than traditional ones, which are inefficient.

III. ISSUES OF WATER RESOURCES PLANNING, POLICIES AND LAWS

1. Water resources planning and development

Water resources planning has been developed both in depth and in range. So far, planning in river basins and internal areas, though incomplete, has met real needs by:

- Governmentally managing water resources;
- Working out techno-economic solutions on hydraulic schemes;
- Making short- and medium-term hydraulic plans; and
- Working out an overall socio-economic development strategy.

The scheme to control and exploit the Red River is the most important among hydraulic schemes in the North. The Red River scheme includes:

- a flood prevention plan,
- an irrigation and drainage plan,
- a waterborne transportation plan,
- a hydroelectric plan and
- an overall terrace exploitation plan.

The water resources planning directions have proved logical. Constantly updated research has dealt with water demand by urban and rural inhabitants, for crop cultivation, animal husbandry and fishery. Yet the issue of water demand to sustain the ecosystem has not been addressed.

2. Water policies and strategy

Viet Nam has not issued any policies or strategy on water except several guidelines applied to water-related branch agencies at different levels. Those guidelines are extracted from specialized documents such as documents for long-term hydro-agricultural plans, irrigation and drainage fee, rural drinking water supply and hydroelectric development.

The Law on Water Resources deals with “the making of strategies, plans and policies on water resources protection, exploitation, use and development and their water-related consequences”. While the law had yet to come into effect, the Ministry of Agriculture and Rural Development and relevant authorities at the conference of foreign donors formulated a strategy on water resources development and management until 2010 as follows:

- To meet the increasing demand for water by building another ten multipurpose hydraulic structures and to contribute to sustained social and economic development by multiplying flood-prevention structures.
- To upgrade the available structures to fulfil the plan, gradually modernize and improve service to satisfy domestic consumption and production needs.
- To manage water resources, enhance regulations in accordance with the Law on Water Resources.

a. Water investment policy

In recent years, the government has funded many water resources development projects but these projects have not achieved consistent results. Every year water-related branch agencies submit their plans to the government, yet they do not consult with one another, especially about basin or inter-basin water balance. Therefore the Law on Water Resources should include articles on water protection, exploitation and use in harmony with river basin planning. As there is no national programme of water resources management, the investment in this field does not match the demand.

b. Capital return policy

All investment capital has been spent on building hydroelectric plants, as hydro-energy is considered a profitable commodity with quick returns. Lately, it has been suggested that hydro-energy can be replaced by thermoelectricity produced from incidental gas and cheap coal. Investment priorities should be defined in terms of national energy balance and useful exploitation of renewable and non-renewable natural resources.

Hydroelectricity can be profitable, so some say that beneficiaries should finance the construction of multipurpose reservoirs, which are essential to hydroelectric stations. Now, only the power agencies finance it. Therefore the government should require contributions from beneficiaries, get the people to know the cost of flood prevention and the risk of water shortage in river basins, so that beneficiaries and water users see the value of water and save water.

c. Capital mobilization policy

Since 1960, Viet Nam has issued the policy saying that both the government and the people jointly develop hydraulic structures. The 1999 report on hydro-agricultural fixed assets shows that government expenditure accounted for 83 percent and capital contributed by the people 17 percent. The policy of mobilizing capital from water users has been applied to rural drinking water development programmes. It is planned that by 2020 up to 100 percent of the capital in most areas, or up to 10 percent in poor regions, will be mobilized from water users. Therefore, to solve the issue of capital, it is essential to have proper policies in order to attract the participation of all economic sectors, i.e. the State, private companies and ordinary water users.

3. Legal documents on water

a. The Law on Water Resources

The Law on Water Resources began to be formulated in the late 1980s ahead of laws on other natural resources and it was submitted to the National Congress. As water has always been part of people's lives, it is very difficult to persuade them to abandon old ways of handling water in favour of managing water resources in a professional way.

The Law on Water Resources was approved by the National Congress in May 1998 and came into effect in January 1999, but implementation decrees have yet to be signed. The law provides general rules on water resources management, as follows:

- Water resources are publicly owned.
- Use, exploit and protect water resources under plans; guarantee water resources exploitation systematically.
- Water resources must be used for multiple benefits.
- The government guarantees the water usage rights of organizations and persons.
- Organizations and persons using water must contribute capital.
- Take part in international cooperation on rivers shared with other countries and abide by international laws.
- The Ministry of Agriculture and Rural Development (MARD) has the authority to manage water resources.
- The National Water Resources Council is the government's think-tank for important decisions on water resources.
- River basin planning and management agencies are to be established under the control of MARD.

However, the following issues should be clarified:

- Water resources management not only contributes to the sustainable development of the nation but also to the conservation of water resources.
- Government water resources management should be separate from government management of water usage.
- River basin management.
- Coordination among authorities, water-related branches, organizations and localities.
- Water is a special commodity; water businesses should promote water usage and management and be responsible to customers for quality of service.

b. Other laws relating to water

The other water-related laws are the Law on Forest Protection and Development (1991) and the Law on Environment Protection (1993). In the implementation of these laws, the Ministry of Science, Technology and the Environment (MOSTE) has issued rules and regulations on water usage, water quality and water contamination. The authority of the two ministries concerned with water management should be distinguished: MOSTE takes care of water quality in the environment as a whole while MARD manages water in terms of usage and volume.

4. Water resources management

a. Water resources management on a professional basis

Water resources management is a new development, thus it is essential to train a contingent of professionals skilled in its methods. Viet Nam's advantage is that the country took early action in sustainable water resources management and has received international support in this field.

b. The system of information management

At present, although there are documents relating to water resources management in the relevant branch agencies, these documents are not consistent. Therefore, a mechanism needs to be set up for branch agencies to exchange information. The Law on Water Resources has defined this duty.

c. The system of water research management

MOSTE manages scientific research at the national level; other ministries manage scientific research at the ministerial level. In terms of water-related technology, there have been considerable achievements in the construction of hydraulic structures and in water resources exploitation, but insufficient attention has been paid to water resources management, use and conservation.

5. Participation in planning and management

a. Joint participation approach

There has been some coordination among the relevant authorities, yet such coordination lacks efficiency. International experts highly regard 'joint participation' and embodied the concept in the second Dublin rule. The joint participation approach can be defined as follows:

- Coordination among the various relevant ministries and authorities;
- Coordination between water resources managers and users;
- Coordination between water resources policymakers and water users;
- Coordination among the State, water enterprises and localities;
- Coordination among professionals, managers, businessmen and the media; and
- Participation by women both as water users and as professionals.

This concept was refined in the third Dublin rule, but it is not popular in Viet Nam.

b. The role of the local community

Viet Nam has issued similar policies, inspired by the "of the people, by the people and for the people" slogan, and has legislated people rights and locality rights. The people have the right to participate in the national programmes on clean water and environmental hygiene by contributing ideas; the right to decide is left to the Communal People's Council and Committee. However, there are no similar regulations for hydro-agriculture. The water resources sector has set up pilot water cooperatives and associations, upholding the role of local water user communities. These organizations are considered as its agents.

IV. WATER RESOURCES DEVELOPMENT VIEWPOINTS

1. Aggregate water resources management

In conferences and forums on water resources, Viet Nam has expressed her determination to guarantee water and ecosystem sustainability and has supported the view on aggregate water resources management that making full use of water and other natural resources implies conserving the environment. In this context, the Global Water Partnership has made the following three points:

- The evaluation of water resources quality and quantity must be carried out based on soil examination.
- Water distribution includes distribution of fresh water and reused water.
- Strategy and mechanisms on water resources exploitation and control, in the context of limited water resources and capital, should deal with the improvement of the welfare system.

Globally, aggregate water resources management was agreed to unanimously in conferences on water resources and the environment held in Dublin (January 1992) and in Rio de Janeiro (June 1992) as follows:

- Fresh water is a limited and easily eroded natural resource but it is essential to living and to economic development.
- Water resources development and management must be carried out based on the joint participation of water users and policymakers at all levels.
- Women play the central role in water supply, management and conservation.
- Water has economic value and must be recognized as a commodity.

The Pacific-Asian consultative conference on water held by ADB in June 1996 issued seven strategic guidelines, as follows:

- Working out national policies and programmes on water.
- Investing in the management of a country's key river basins.
- Intensifying the sense of responsibility and self-support of water-supplying agencies.
- Introducing punishment and reward to improve people's knowledge of sustainable water usage.
- Managing the use of shared water resources and developing cooperation.
- Improving the exchange of information, consultation and cooperation on water.
- Increasing supervision, and exchanging experience.

2. Water vision for 2025

Viet Nam has set up a water vision subcommittee, which held a conference on the national water vision. The conference centred on:

- Obstacles on water resources development.
- Consultations on a strategy for water resources development.
- Classification of water demands: demands that can be satisfied locally; demands that need international support to be satisfied.
- Classification of groups: one group for organizations and individuals to support Viet Nam and one group of organizations and individuals to support other countries.
- Reports on the vision and the framework for action.

- Analysis of water visions.
- Analysis of frameworks for action on water resources.

The conference did contribute to building visions and frameworks of action on water resources in Southeast Asia and the world.

The water vision was formulated through exchanges on water resources development possibilities among water experts. The experts paid special attention to obstacles and incentives to developing a water vision, and to ways of attracting the participation of as many relevant professionals as possible.

The incentives include:

- Socio-economic growth
- Demographic pressure and life quality
- Technological progress and its potential
- Quality of the environment and of the ecosystem
- Development of society, of public knowledge and of democracy
- Country's regulating mechanisms
- The state of peace in the region and in the world

Experts analysing the World Water Vision came up with three scenarios: (1) evolutionary world and water, (2) water crisis and (3) sustainable world and water. These are useful references for the analysis of a Vietnamese water vision.

A national workshop entitled 'Water in the 21st century: vision and action' was held in Hanoi on 7-8 March 2000. It concluded that Viet Nam's water vision is the integrated and sustainable use of water resources and the effective prevention and mitigation of harm caused by water. This implies:

- Clean water for the people.
- Water for food safety and socio-economic development.
- Preservation of water ecosystems.
- Prevention and mitigation of harm caused by water.
- Reasonable pricing of water.
- Partnership aiming at efficient and effective integrated water resources management.
- International cooperation on shared watercourses for mutual benefit.

3. Framework for action

The framework for action aims at:

- encouraging participation by localities;
- formulating political guidelines on useful exploitation of resources;
- mobilizing supplementary investment capital;
- creating favourable conditions for water-related branch agencies to define their action plans; and
- defining realistic aims having immediate international support.

The framework for action on water does not provide detailed programmes or lists of development projects. Its aim is not only to call for government funds and international support but also to mobilize internal resources and participation by the state sector as well as the private sector.

The workshop also drew a list of actions for a better future for water, life and the environment, as follows:

- a) Integrated water resources management to provide sufficient water for domestic, economic and social uses, a sustainable environment, and flood control
- b) Changed views on water and water management
- c) Strategy, policies and reasonable mechanisms in water management
- d) Demand and water usage management
- e) Equitable and reasonable allocation of water
- f) Technological research in water saving and water efficiency
- g) Basin approach in integrated water resources management
- h) Partnership among stakeholders for integrated water resources management
- i) Balance between water usage and ecosystem preservation through river basin planning
- j) Decision-supporting systems for integrated water resources management
- k) International cooperation on shared watercourses
- l) Awareness and political will, institutional strengthening and capacity building for integrated water resources management
- m) Renovation of investment policies and mechanisms in the development and management of the water infrastructure
- n) Water governance to be separate from water services
- o) Establishment of a water management organizational system at central, basin and local levels
- p) Establishment of a synchronized and comprehensive legal framework
- q) Capacity building
- r) Effective water services
- s) Institutional strengthening of water services in view of accountability and self-sufficiency
- t) Water is recognized as a tradable commodity
- u) Strategy for the development of water services with the participation of multiple sectors and the water user community
- v) Construction, rehabilitation and efficient management of the water infrastructure

V. ROUNDTABLE WORKSHOP ON THE NATIONAL WATER VISION FOR ACTION

1. Workshop organization

On 25-26 April 2000, the Institute of Water Resources Planning (IWRP) of the Ministry of Agriculture and Rural Development, in cooperation with ESCAP and FAO, organized a roundtable workshop in Hanoi with 36 participants – 24 officials of the ministry, 11 officials from related ministries and one NGO representative. The list of participants and the programme of the workshop are attached as Appendix 1 and Appendix 2 respectively.

The workshop started with the presentation of three papers prepared by ESCAP, FAO and IWRP. After a brief exposition of strategic planning techniques, the workshop was divided into working

groups to identify priority actions to be carried out to realize the national water vision. The following conclusions and recommendations were the results of the workshop deliberations, mostly carried out by the working groups.

2. Conclusions

The participants reconfirmed the national water vision worked out in the national seminar on this subject in Hanoi a month earlier. The details of the national water vision adopted are attached as Appendix 3.

In order to implement the national water vision, the participants recognized the need to integrate it into the national socio-economic development process. For this purpose, the participants were convinced of the need to adopt a new methodology to planning and management and therefore agreed to adopt a “strategic planning and management” approach for the implementation of the national water vision. With such an approach, strategic plans can be established for all sectors or sub-regions or river basins of the country to facilitate coordination and monitoring of the implementation of the vision.

Due to time constraints, it was agreed to focus on four items: (a) overall implementation of the national water vision, (b) water for people: water supply and sanitation, (c) water for food and rural development, and (d) application of the national water vision to the Red River basin. These items were discussed within the following framework:

- What are the visions for the area?
- Who are the key actors and agencies?
- What are the mission statements?
- What are the main objectives?
- What are the approaches to the objectives?
- What are the performance indicators?
- Framework for action and resources.

3. Summary of priority actions

Group 1: overall implementation of the national water vision

- **Vision of the group:** All stakeholders accept the integrated use of water resources and management of water based on resources for economic and social development.
- **Key actors and agencies:** Many agencies and civic groups will have to be involved in the implementation of a national water vision, in particular MARD, the leading ministry responsible for the implementation of the Water Resources Law. In the context of the Water Resources Law, the government is expected to establish a national water resources council soon. Once the council is established, it may decide to take the lead in the implementation of the national water vision.
- **Mission statement:** The leading role in the implementation of the national water vision was defined as follows: “*Advise the government on all key water resources management issues at the national level, including the mobilization of all communities and stakeholders to participate in the process in order to achieve the national water vision.*”

- **Priority actions:** (i) disseminate the national water vision to all communities and stakeholders, (ii) monitor and update the process of implementation of the national water vision, (iii) establish all river basin organizations and implement water resources management at the basin level, (iv) improve the legal and institutional framework, particularly for water resources management, and (v) rehabilitate all water sources for development.

Group 2: water for people – water supply and sanitation

- **Vision of the group:** All people will be provided with safe and adequate water and sanitation and everyone will be aware of the importance of hygiene and environmental sanitation. (The group pointed out that at present 23.2 percent of the people are in urban and 76.8 percent in rural areas. Currently, 50-60 percent of urban areas are provided with piped water, 30 percent of rural areas with safe water. The national plan aims to reach 100 percent of urban areas and 80 percent of rural areas by 2010 and then 100 percent of all areas by 2025.)
- **Key actors and agencies:** At present, many agencies and civic groups are involved in water supply and sanitation. The key agencies include the Ministry of Construction (responsible for water supply of urban areas), the Ministry of Agriculture and Rural Development (for rural areas and the protection of water resources), several other ministries and civic groups (public education on hygiene and environmental sanitation). The group expected that a national body (such as a National Water Resources Council) could be established to provide overall guidance and monitor progress in the implementation of the vision.
- **Mission statement:** If such a national body were established, its mission statement would read as follows: “Provide water to all people in adequate quantity and at the quality level of the national standard for drinking water.”
- **Priority actions:** (i) enhance public awareness and participation, (ii) protect, rehabilitate, improve and assess all water sources for supply, (iii) improve the legal framework and policies on water supply on the basis of the value of the resources, (iv) reform the institutional framework, (v) improve financial resources and management for water supply and sanitation, (vi) train personnel and (vii) improve technology.

Group 3: water for food and rural development

- **Vision of the group:** Manage and protect the water resources in an integrated and effective manner to ensure food security, enhancement of living standards of people and sustainability of agricultural and rural development. In this connection, reach the watershed coverage of the 1950s to ensure the protection of biodiversity and forest resources.
- **Key actors and agencies:** the Ministry of Agriculture and Rural Development.
- **Mission statement:** (i) Guarantee water resources for socio-economic development as planned; (ii) guarantee irrigation water for sustainable development; (iii) provide adequate water to all sectors; (iv) prevent and mitigate water-related disasters; (v) improve living standards through the development of agriculture and rural areas and ensure food security; (vi) promote sustainable community development in rural areas; and (vii) strengthen the

capacity to protect biodiversity and manage the forest and watershed resources to contribute to socio-economic development.

- **Priority actions:** (i) enhance the participation of water users and their interaction with water suppliers, (ii) enhance interaction among sectors and between central and local agencies, (iii) modernize the water resources control system and apply the irrigation and drainage operation management concept and (iv) enhance public awareness and participation of communities in the management and integrated use of water resources.

Group 4: Implementation of the Red River basin vision

- **Vision of the group:** “Clean water, green land and prosperous people.”
- **Key actors and agencies:** At present, the responsibility for management of the river basin water resources is fragmented among many agencies, provincial authorities and civic groups. Efforts are being made to establish a Red River Basin Commission.
- **Mission statement:** (i) Consolidate all plans (sectoral and local) into an integrated basin plan for sustainable development, (ii) disseminate the plan and vision to all stakeholders, and (iii) mobilize and encourage participation of all stakeholders in the implementation of the integrated plan and of the vision.
- **Priority actions:** (i) update, adjust and supplement all the plans into an integrated plan, (ii) establish a management body of the basin’s water resources within a suitable legal and institutional framework, (iii) disseminate the integrated plan, (iv) promote better control and mitigation of water-related disasters, particularly floods, (v) enhance the management role of government agencies for better interaction among sectors and with people, and (vi) enhance public awareness of the concept of “clean water and green land” and ensure popular participation.

4. Recommendation

According to the plan for the implementation of the Water Resources Law, important developments are due to take place soon. Among these will be the establishment of the National Water Resources Council and of the Red River Basin Commission. These bodies are expected to play important roles in the adoption and implementation of the national water vision, including coordination among sectors and sub-regions. In order to prepare for the national process of implementation and in view of the keen interest of all participants in the strategic planning and management approach, it was recommended that assistance be provided to the respective national agencies to strengthen their capacity in strategic planning and management.

APPENDIX 1. ROUNDTABLE WORKSHOP ON 'VISION OF WATER, LIFE AND THE ENVIRONMENT IN THE 21ST CENTURY' – LIST OF PARTICIPANTS
Hanoi, 25-26 April 2000

No.	Participant	Institution
INSTITUTE OF WATER RESOURCES PLANNING		
1	Dr To Trung Nghia	Director
2	Dr Pham The Chien	Chief of Division
3	Mr Vu Hong Chau	Chief of Division
4	Mr Nguyen Thi Phuong Lam	Acting Chief of Division
5	Mr Tran Van Nau	Chief of Division
6	Mr Truong Trong Luat	Acting Chief of Division
7	Mr Dang Ngoc Vinh	Chief of Division
8	Mr Tran Dinh Thac	Chief of Division
9	Mr Nguyen Van Dam	Chief of Division
10	Mr La Song Toan	Chief of Division
11	Mr Le Phuong Van	Deputy Chief of Division
12	Mr Lam Hung Son	Deputy Chief of Division
13	Mrs Nguyen Le My	Accounting
14	Mr Thai Gia Khanh	Deputy Chief of Division
	Mr Le Tien Phong	Interpreter
OTHER INSTITUTIONS BELONGING TO THE MINISTRY OF AGRICULTURE AND RURAL DEVELOPMENT		
1	Mr Dao Trong Tu	International Cooperation Department
2	Dr Dang Dinh Phuc	Department of Water Resources Management
3	Mr Vu Tien Luc	Department of Water Resources Management
4	Dr Tran Dinh Hoi	Vietnam Institute for Water Resources Research
5	Mr Tran Si Trung	Vietnam Institute for Water Resources Research
6	Dr Prof Ngo Dinh Tuan	Hanoi Water Resources University
7	Dr Vu Cong Lan	National Institute for Agricultural Planning
8	Mr Hoang Si Dong	National Institute for Forestry Planning
9	Mr Le Van Can	National Programme for Rural Water Supply & Environment Sanitation
10	Mrs Nguyen Thi Minh Tam	Vietnam National Mekong Commission
OTHER INSTITUTIONS		
1	Mr Nguyen Tien Trong	Department of Planning & Investment
2	Mrs Do Hong Phan	Vietnam Union of Science & Technology Associations
3	Dr Dang Trong Khanh	Science, Technology & Environment Development & Strategy Institute
4	Mr Nguyen Van Trang	Power Investigation & Design Company No.1
5	Mr Pham Anh Tuan	Urban & Rural Planning Institute
6	Mr Truong Manh Tien	Department of Science, Technology & the Environment
7	Mr Nguyen Qui Hung	Transport, Development & Strategy Institute
8	Dr Tran Thanh Xuan	Institute of Meteorology & Hydrology

APPENDIX 2. PROGRAMME OF THE ROUNDTABLE WORKSHOP ON 'VISION OF WATER, LIFE AND THE ENVIRONMENT IN THE 21ST CENTURY'

Hanoi, 25-26 April 2000

25 April 2000: Day 1

8:00-8:30	Registration	
8:30-8:40	Welcoming address	Dr To Trung Nghia, IWRP Dr Le Huu Ti, ESCAP Mr Thierry Facon, FAO
8:40-9:40	Presentation and discussion 'A conceptual approach to the formulation of a national water vision for action'	Dr Le Huu Ti, ESCAP
9:40-10:40	Presentation & discussion 'Overview of the water vision for food, agriculture and rural development – strategic choices for countries'	Mr Thierry Facon, FAO
10:40-11:10	<i>Coffee break</i>	
11:10-12:00	Presentation & discussion 'Vision on water, life and the environment in the 21st century'	Dr To Trung Nghia, IWRP
12:00-13:30	<i>Lunch</i>	
13:30-15:00	Working group	Dr Le Huu Ti, ESCAP
15:00-15:20	Coffee break	
15:20-16:30	Group presentation	

26 April 2000: Day 2

8:00-9:30	Group discussion	
9:30-9:50	<i>Coffee break</i>	
9:50-11:00	Group discussion	
11:00-12:00	Group presentation	
12:00-12:30	Closing session	Dr Le Huu Ti, ESCAP Mr Thierry Facon, FAO Dr To Trung Nghia, IWRP

APPENDIX 3. NATIONAL WORKSHOP ON 'WATER IN THE 21ST CENTURY – VISION AND ACTION'^{*}

Hanoi, 7-8 March 2000

National vision and action for water in Viet Nam in the 21st century

The Vietnamese water vision is the integrated and sustainable use of water resources with effective prevention and mitigation of harm caused by water.

- Clean water for the people
- Water for food safety and socio-economic development
- Preservation of water ecosystems
- Prevention and mitigation of harm caused by water
- Reasonable pricing of water
- Partnership for efficient and effective integrated water resources management
- International cooperation on shared watercourses for mutual benefit

The Vietnamese action for a better future for water, life and the environment

1. Integrated water resources management to provide sufficient water for domestic, economic and social uses, a sustainable environment, and flood control

- Changed views on water and water management
- Strategy, policies and reasonable mechanisms in water management
- Demand and water usage management
- Equitable and reasonable allocation of water
- Technological research in water saving and water efficiency

2. Basin approach to integrated water resources management

- Partnership among stakeholders for integrated water resources management
- Balance between water usage and ecosystem preservation through river basin planning
- Decision-support systems for integrated water resources management
- International cooperation on shared watercourses

3. Awareness and political will, institutional strengthening and capacity building for integrated water resources management

- Renovation of investment policies and mechanisms in the development and management of the water infrastructure
- Water governance to be separated from water services
- Establishment of a water management organization system at central, basin and local levels
- Establishment of a synchronized and comprehensive legal framework
- Capacity building

4. Effective water services

^{*} Organized by the Ministry of Agriculture and Rural Development, the Vietnam Union of Science and Technology Associations and the Global Water Partnership South East Asian Technical Advisory Committee

- Institutional strengthening of water services for accountability and self-sufficiency
- Water to be recognized as a commodity
- Strategy for water services development with the participation of multiple sectors and the water user community
- Construction, rehabilitation and efficient management of the water infrastructure

Conclusions

1. Obstacles and challenges

- Water resources have increasingly deteriorated due to deforestation, environmental pollution and global climate changes. The exploitation of provincially and internationally shared water resources may be a challenge.
- Under the pressure of population and development, the biggest challenge is how to manage the use of water.
- Politically, although the government and relevant authorities are very concerned about water issues, they hesitate to reform management procedures.
- In the field of water resources management, for a long time too much attention has been paid to water resources exploitation but the management and protection that guarantee stable and sustainable development have been ignored. Water resources exploitation has been extravagant and management haphazard, overlapping and unsuccessful. The Law on Water Resources has not been fully implemented.
- In terms of water supply, the fact that water is an economic commodity has not been recognized. Although good results have been achieved in some localities, the water supply services, which are still subsidized by the government, have been inefficient overall.
- In terms of capital mobilization, even though the government attaches importance to water resources development, management has not been capitalized properly and there has been no overall strategy on water resources investment. Neither has the government issued policies to encourage economic sectors to invest in water resources.
- In terms of technology, considerable achievements have been made in building hydraulic structures. But not enough attention has been paid to water resources research and management, river basin exploitation, proper use of water and water conservation. Generally, water technology is still backward.
- Viet Nam has drawn lessons from the past. These lessons, once recognized and propagated, will promote the process towards sustainable water resources. Technology transfer and support from the international community will help modernize water resources management. The government and relevant authorities have realized the role of non-governmental organizations and professional associations and actively intensified the cooperation.

2. Solutions

In the context of increasing demand for water, decreasing water potential and worsening environment pollution, the following solutions are proposed:

- Formulating a framework of action on water resources development in the whole country and in each river basin. Thereby working out the strategy for water resources development towards 2025 and beyond as well as five-year action plans. Focusing on building reservoirs for the dry season.

- Designing legal documents on water resources exploitation and use, and on the prevention of and protection from water-related consequences.
- Systematically managing water resources exploitation and use, and the prevention of and protection from water-related consequences
- Making policies suitable to each period on water resources exploitation and use and the prevention of and protection from water-related consequences.

These solutions should be carried out simultaneously, with the participation of all water-related bodies: the State, investors and beneficiaries. It is essential to combine persuasion with administrative and economic measures to deal with issues. The formulation of national plans and strategies on water resources development should be carried out forthwith.

3. Potential for 2025

The government has defined targets for developing a stable and sustainable economy, society and environment. The water potential in the 21st century is as follows:

a. In the first decade

- Water resources development will evolve.
- Water resources exploitation will increase faster than in the past.
- Pilot programmes on sustainable water resources development and management will be carried out successfully in several places.

b. In following decades

- A series of policies will be issued, at once economically and socially more diverse and open and scientifically and technologically tighter, to meet the needs to save water, reduce paddy acreage and diversify crops. Education on water will be more widespread and better received.
- Water resources management will attract greater participation of domestic concerns and the international community. Professional and management skills will be further improved.
- Water contamination and conflicts on internationally shared rivers, though they will still occur, will be settled more logically. International cooperation in river management will be improved.
- Aggregate water resources management will be applied, contributing to the improvement of the people's standard of living.

Recommendations

According to the plan for the ongoing implementation of the water vision, IWRP has come up with strategic guidelines on water vision and action, as follows:

- 1. Properly use land resources in accordance with the sustainable development of water resources**
 - Protect the land environment.
 - Do research to further exploit usable land.
 - Make rational changes in the methods of using land.
 - Jointly manage the use of land and water.
 - Improve capacity in science and technology management, approach and application.

2. Use, manage and develop water resources in a proper, comprehensive and sustainable manner

- Give priority to the overall plan of water resources development in river valleys, especially for big rivers.
- Revalue water resources in terms of both quality and quantity.
- Calculate the need for water, the water balance of various uses, including water to maintain the ecological system; define households' need for water to plan provision of water in quality and quantity. For example, providing water to 70-80 percent of the people in rural areas with the capacity of 80 litres per capita per day by 2005 and 95 percent and 80-100 litres respectively by 2010.
- Build new water structures and upgrade old ones; attach importance to the management, operation and maintenance of water structures; complete canal systems and the systematic management of hydro-agricultural structures at various levels.
- Select and build reservoirs at river sources to prevent floods in the lowlands, to generate electricity and to meet other demands of aggregate usage.
- Preserve forests; develop source forests to improve their regulatory capability and to prevent flash floods; and reforest 40 percent of the country.
- Consolidate the dyke system; improve the capacity of drainage and of flood prevention.
- Strengthen the management of water resources and structures; complete the organization and management system from the central to the local level.
- Complete the establishment of legal documents to create favourable conditions for the management of water resources and structures.
- Enhance the training of human resources; push up scientific and technological research and development in the management of water resources and structures.
- Strengthen international cooperation.

3. Protect the environment

- Complete the policy on environment protection and issue guidelines on environment management and protection; strengthen governmental management of the environment at district and commune levels.
- Build quality supervising networks; further provide equipment for observation and equipment to treat environmental incidents; control environmental pollution.
- Invest in environment hygiene in rural areas.
- Issue compulsory and incentive policies to renew the technology and invest in waste treatment.
- Improve public awareness of the environment; educate communities and train executive managers.

4. Improve the methodology for water resources planning

- Train water resources planners in the methodology of strategic planning.
- Prepare new water resources planning standards based on the strategic planning methodology.
- Apply the methodology of strategic planning to the water resources sector.