

Sustainable water resources management in Indonesia

A. Sandhyavitri, Indonesia and R. J Young, UK

The development of water resources management in Indonesia has been fragmented and largely ineffectual. A comprehensive strategic review is required to ensure sustainable urban water supply (UWS) within a structure of integrated water resources management (WRM) based on hydrologically defined administrative areas. Strategies applicable to national, regional and local levels are discussed. The strategies at the national level encompass: planning frameworks for WRM based on watersheds; strengthening of environmental regulatory systems and institutions; strengthening of co-ordination between departments responsible for all aspect of water; and the establishment of competent and robust institutions. At the local/regional level, the strategies emphasise the crucial steps for ensuring the implementation of sustainability of both WRM and UWS including identification of local and regional WRM problems; and establishment of institutions responsible for financing, operation and management of UWS systems. Consideration is also given to the potential for the phased introduction of private sector involvement in the financing, operation and management of UWS systems.

Introduction

The Republic of Indonesia's development policy has been based on the three fundamental principles ("Trilogi" Development Policy) encompassing "equity, growth and stability". These principles should be compatible with the following water resource management strategies:

- The proper utilisation of water according to sustainable principles;
- The identification of the river basin unit as a basis for the management of water resources;
- The inclusion of the private sector and community participation in the financing, operation and management and development of water resources;
- The maintenance of high levels of economic development within the country.

In practice the "Trilogi" Development Policy and WRM strategies have not been successfully applied to sustainable water resources management (SWRM) based on river basin unit. The major constraints on the implementation of these policies have been:

Geographical burdens - Indonesia is the world's largest archipelago with more than 17,000 islands, with five major islands, and 30 groups of smaller islands. The five main islands are Sumatra (473,606 km²), Java (132,107 km²), Kalimantan (539,460 km²), Sulawesi (189,216 km²) and Irian Jaya (421,981 km²). In 1997, the Republic of Indonesia consists of 27 provinces, 247 kabupaten (regencies), 57 kotamadya (urban municipalities).

Political, bureaucratic, financial, and technical con-

straints - These encompass poor water resources management, incoherent water policy and practices, insufficiently trained personnel, a lack of professional and technical staff, non-involvement of communities, lack of a coordinated land use policy and control and poor project finance. Urban water resources project have traditionally been financed from tax revenue and the Government borrowing, which has proved to be inadequate in the development of the water sector in Indonesia.

Sustainable water resources management (SWRM)

The effective implementation of SWRM policies and strategies in Indonesia will need to be based on river basin units. This will require a number of steps to be taken at the national, local/regional government levels, and will also need assistance from bilateral and multilateral agencies with experience in SWRM. This paper describes a suggested structure for SWRM involving the development of UWS and WRM at the national and local/regional government levels.

At the National Level

- (i) Integrated water resources management and water supply policy.
- (ii) Comprehensive planning frameworks for WRM based on watersheds.
- (iii) Strengthening environmental regulations and control. There is a need to establish stringent regulation and control for augmentation, allocation, distribution, and marketing of water, together with conservation within

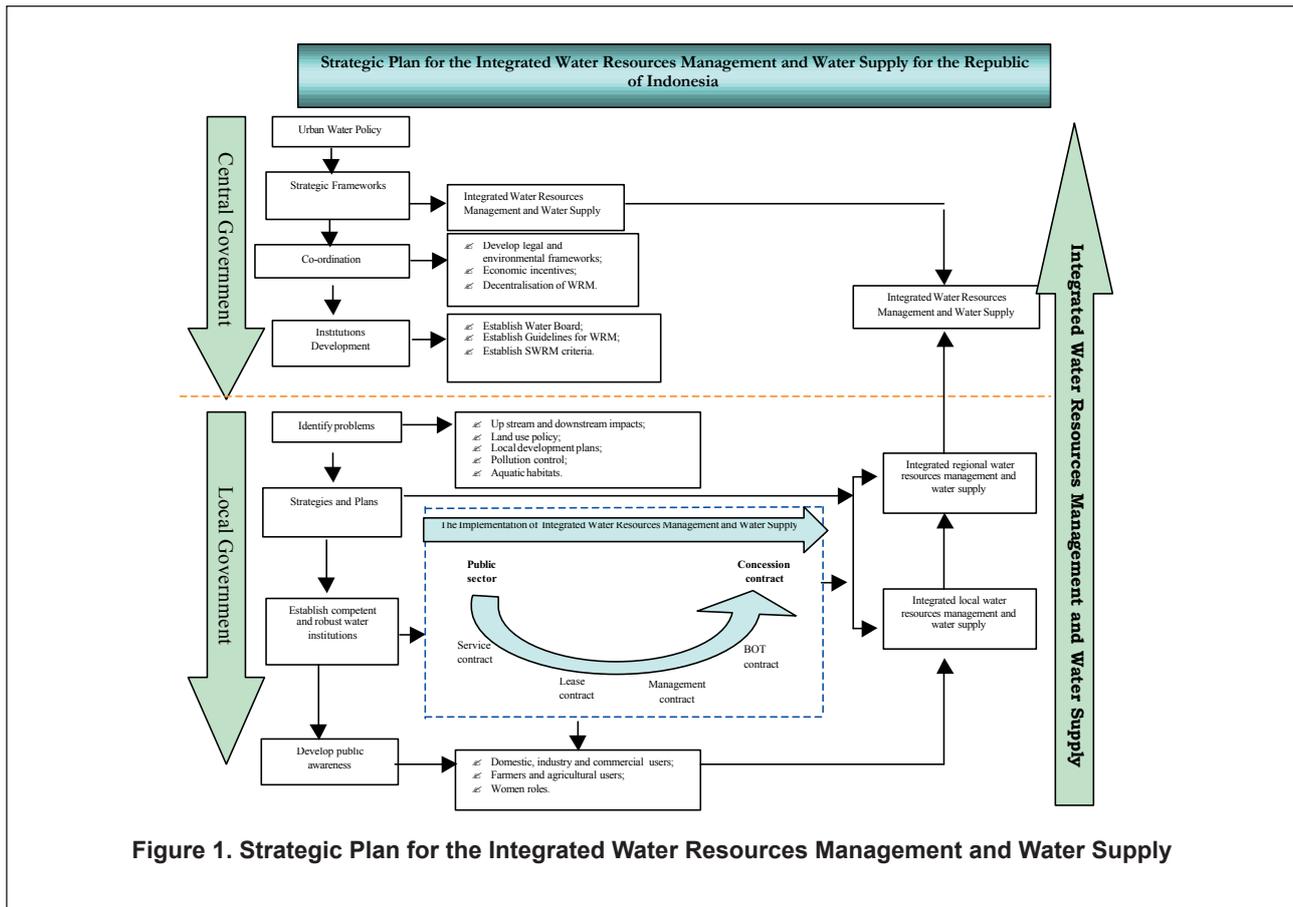


Figure 1. Strategic Plan for the Integrated Water Resources Management and Water Supply

catchments, protection of aquatic habitants and water quality using the following schemes:

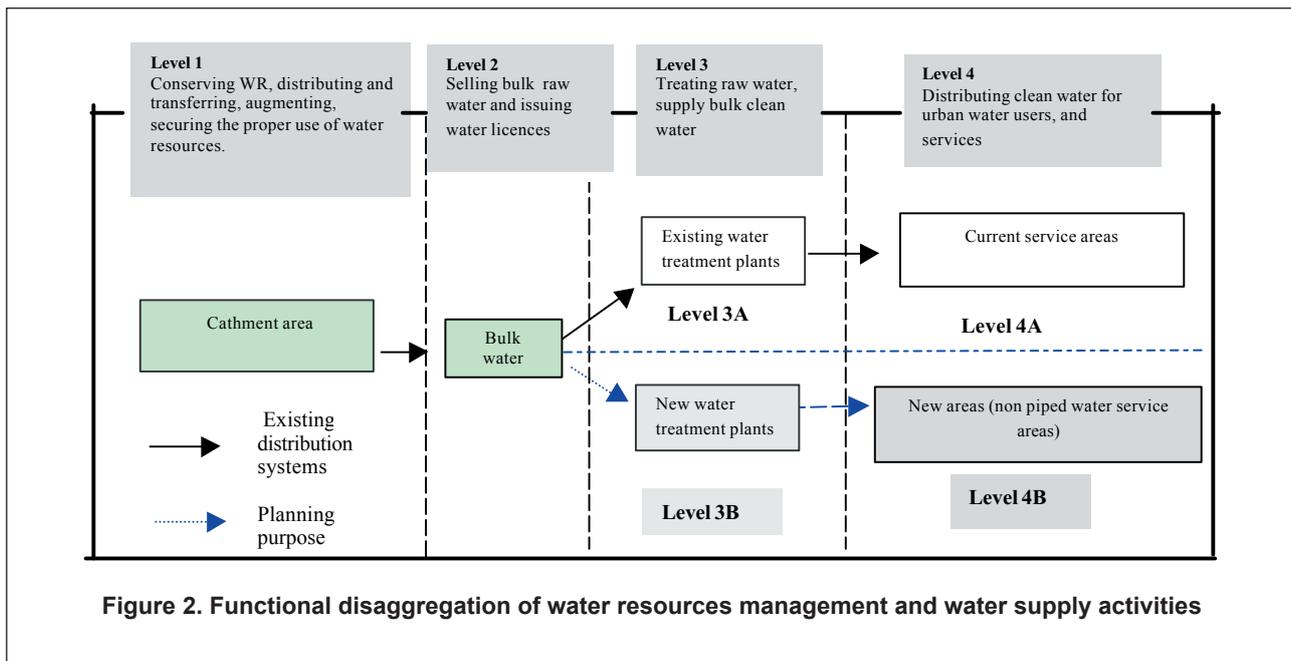
- **Economic incentive schemes encompassing:** environmental taxes, subsidies, grants, soft loans, deposit recycling schemes and progressive pricing for industrial sectors.
- **Legal and environmental frameworks** dealing with the control of adversarial impacts of the local and regional economic developments within the cathment areas. For example liability insurance, emission charges, user charges and tradable emission permits.
- (iv) **Strengthening coordination among departments responsible for water**, encompassing establishment of a formal water board/institution such as National Water Board and a Drinking Water Inspectorate at the national level. These institutions should have appropriate technical support, with the objectives of coordinating water policy, land use policy, and development activities, and the resources to take the necessary actions to monitor and control the implementation of these policies and plans. The National Water Board would have the “general supervisory duty” for controlling water quality, water resources and flood defences, fisheries, conservation, recreation and navigation, and also providing direction and training to local water institution. It would also be responsible for issuing the following guidelines:
 - **Guidelines for financing, operating and managing water**

resources based on local/regional conditions, highlighting the commercial aspects of the management of water resources (WR).

- **SWRM criteria** that may be used as the benchmarks of SWRM and SUWS in Indonesia, this would encompass: conservation of water resources and quality management; irrigation; swamp and coastal area management; river management and flood control; urban water resources management and human resources development.

At Local/Regional Government Levels

- Identification of all significant local and regional WRM issues such as: deterioration of water quantity and quality at source; upstream and downstream impacts from water pollution, groundwater depletion; integration of WRM strategy with land use policy; and the possibility to integrate WRM development plans with local and regional economic development plans.
- Establishment of competent and reliable local water institutions for controlling and managing water issues systematically. The establishment of institutions that are capable of financing, operating and managing water sector systems should include those in the various forms of public private partnership (PPP), private sector participation (PSP), or private community public sector participation (PCPP).
- Development of public awareness programmes concern-



ing the important of SWRM. The most common public supporters of SWRM have been farmers within water user associations concerning irrigation schemes. This public sector participation should be extended to the other water users such as urban water users encompassing domestic, industrial and commercial sectors.

At Implementation Stage

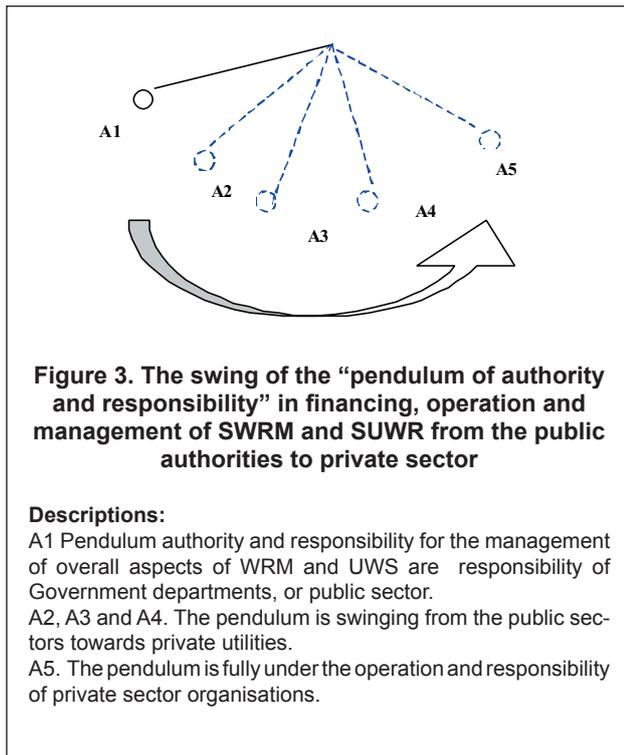
- There will be a need to relax PSP regulations in order to attract private sector involvement in the financing, managing and operating WRM and UWS schemes.
- Disaggregation of UWS business. Most segments of the UWS industry is either semi-monopolistic or fully monopolistic. Therefore, there is an opportunity to disaggregate the UWS system:
 - (i) Physical disaggregation. The disaggregation of water supply and water resources management based on physical geographical conditions could be implemented in 3 stages:
 - Stage I.** Disaggregation of local/regional watershed. This is proposed to prioritise the management of major rivers passing through urban areas within watersheds. For example, at least 270 rivers and 73 local authorities are located in the Sumatra Island alone (Data 1997). Initially, these 73 authorities should focus on the management of the major rivers in their WRM plans.
 - Stage II.** Disaggregation of local/regional watershed based on 90 main river or sub-river units (SWS) (Adapted from the Ministry of Public Work's regulation No. 39 year 1989). To combine and consolidate the major river basins based on local or regional watersheds.
 - Stage III.** This stage is to integrate (not disaggregate) catchment management plans. Catchment Management Plans (CMPs) should be integrated with the local economic devel-

opment plans, land-use policy, and project investment for river basin units. The local authorities and local water board authorities would coordinate all development of land-use and WRM projects in CMPs.

- (ii) Functional disaggregation. This would involve the separation of water company's functions into 4 activities, encompassing bulk water supply, water treatment plants, water distribution systems, and services.
 - Level 1: Responsible for managing WR and cathments based on SWS unit under single operator;
 - Level 2: Responsible for augmenting, supplying and transferring bulk water;
 - Level 3: Responsible for treating the water for domestic and urban water usage;
 - Level 4: Responsible for distribution water for domestic and urban water use, and providing services.
- (iii) Responsibility disaggregation. The responsibility for financing, operation and maintenance of UWS and WRM are shared between public and private sectors (Diagram 3) below. The pendulums represent the authority that is responsible for financing, operating and managing SWRM and SUWS.

Option A1: Levels 1 and 2 (see Diagram 2) are under the authority of Government institutions, and levels 4 and 5 (O&M of the facilities) under Local Public Enterprises (PDAMs). Private sector organisations only play a small role such as leakage detection, and repairs. Typically private sector involvement is in the form of a service contract.

Option A2: Levels 1 and 2 are under the authority of Government Departments. Levels 3A and 4A are operated by public water enterprises (PDAMs), and the private sector. Private sector companies serve a part of the city area or the new areas. Typical contracts that might be applied are management contracts, leasing, joint venture, Build Operation and



Transfer (BOT) contracts, and concession contracts.

Option A3: Levels 1 and 2 are under the authority of Government Departments. Private sector companies buy bulk water from the government, treat and distribute it to the city. The typical contracts that might be applied are Build Operation and Transfer (BOT) and concession contracts.

Option A4: Levels 1, 2, 3B, and 4B are under the control and operation of the private sector, and levels 3A and 4A are operated by public water enterprises (PDAMs). PDAMs serve the existing area within the city, and the remaining area of the city is served by private sector. The private sector also sells bulk water to PDAMs and industrial sectors. The typical contracts that might be applied are joint venture, BOT, and concession contracts.

Option A5: Levels 1, 2, 3, and 4 are fully operated by private utilities over a certain contract period (possibly 30 years). The typical contracts that might be applied are BOT, and concession contracts.

These 5 options for the development of integrated WRM and UWS in Indonesia are proposed to assist the local or provincial governments in making appropriate decisions for long-term and short-term local/ regional WRS development plans.

Conclusions

In order to sustain UWS, the strategic approach needs to be structured and integrated with that of WRM, based on hydrologically defined administrative areas. At the national level the Government should provide a supervisory and coordinating role. At the local/regional level a range of disaggregated options are described, which indicate the varying degrees to which private sector participation may be appropriate depending on specific conditions and localities.

References

- Directorate General of Water Resources Development, Ministry of Public Work, Jakarta, 1995 in Most, H. (1995). Implementation of Freshwater Objectives of Agenda 21 in Asian and Pacific Region. Water Resources Sciences No. 75. UN New York.
- Rees J. A., (1998). Regulation and Private Participation in the Water and Sanitation Sector. Global Water Partnership Advisory Committee (TAC), Global Water Partnership, Stockholm, Sweden.
- HMSO (1973). Report of Water Resources Board. Water Resources in England and Wales, Vol. 1, Publication No. 22. London.

Contact address

Ari Sandhyavitri
 The University of Riau (UNRI)
 PUSKOM-UNRI, Kampus Bina Widya,
 KM12,5 Sp. Panam,
 Pekanbaru, Riau, Indonesia
 email: ari@unri.ac.id

Robert J Young
 The University of Manchester Institute of Science and Technology (UNMIST), UK
 email: RJY@umist.co.uk