

CURRENT MANAGEMENT OF WATER RESOURCES IN INDONESIA

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ABSTRACT: This paper introduced policy, operational, and institutional aspects of water resources management has been done in Indonesia. Problem of water resources sector and need for sector reform in Indonesia, and principles of water resources sector reform and its objective, and national water resources policies are presented. The paper concludes with an outlook on the water resources management program has been formulated and the current status of its implementation.

1. INTRODUCTION.

Indonesia is composed of 13,667 large and small islands. The west region of Indonesia comprises the islands of Sumatera, Java, Kalimantan, Sulawesi and Bali. The East region includes the islands of Maluku, the Lesser Sunda Islands (Lombok, Sumba, Sumbawa, Flores, Timor, Solor, Alor, etc) and the Province of West Papua. This country is subject to tropical climate, which is marked by two seasons, the wet season from October to March and the dry season from April to September. This seasonal rainfall pattern is most pronounced in the west region from Sumatera to Bali. The east region except Papua has a rainy season, which is normally shorter than that of the west region. Between 53% and 86 % of the mean annual rainfall occurs in the October to March rainy season period.

Indonesia also has a large and growing population, and at the present time the population is over 200 million people. Over the past 30 years, massive investment has been made in irrigated agriculture to move the country from the position of being the largest rice-importer in the world, to food self-sufficient status. However, as the population has grown and as the economy has diversified and industrialized further, greater stresses on Indonesia's land and water resources have been realized. In Java, water balance studies for 2010 indicate shortfalls of water may increase to 38% of firm water resources. In Java and Sumatera, urban and industrial development encroaches on agricultural lands and result in conversion to other uses. The combined effect of deforestation, and population growth threaten water quality for existing development, and water availability for future development. At the latest decades, the condition of food self-sufficient status has become worse. That worse condition has not just caused by global climate changes but also suffering a lack of capability to manage water, and lack of sustainable financing management and of course deforestation on the upper watershed.

The increasing in non-agriculture demand, the competition for water uses will increase conflicts between the different types of users, increase water quality problem during low flow. In order to support future development in water resources and to promote long-term water resources conservation and preservation, it is necessary to adjust water resources policies and programs to improve management of water resources for sustainable development. This paper presented for introducing how the government of Indonesia have been adjusted the water resources sector policies, strategies and programs for future water resources development and management to look at all possible ways of achieving an optimal balance, managing both the supply side and demand side of the equation, and of course for sustainable uses of water.

2. PROBLEMS OF WATER SECTOR AND NEED FOR SECTOR REFORM IN INDONESIA.

2.1. Water Resources Management Problems.

The rapid demand of water in Indonesia has highlighted several institutional deficiencies in water resources management (WRM); such as:

- Indonesia has general water allocation priorities: domestic use, agriculture, industry and electric power generation, sport and recreational, environmental, etc. But these general priorities neither clarify the allocations amongst specific users, nor do they set priorities under long term and emergency shortages.
- Service on safe drinking of water is available to only part of the population. Though goals for expanding the service exist, funding constraints prevent these goals being met. The quality of raw water supplies from particular rivers is deteriorating due urban and industrial waste being discharged into waterways. Remedial programs are slow in execution and adequate measures to promote effective waste management, such as pollution charge or enforcement of standards, are not in place.
- Financial responsibilities are integral to a country's institutions. But for what aspects of resource development and management should society pay? To what extend should activities be subsidized? If the beneficiaries should pay, what facilities and responsibilities should government relinquish to them?

Indonesia's water resources sector faces increasingly complex long-term investment challenges and management problems, such as: legal structures, regulations, policies and institutions. The problems arise from the adverse impacts of population growth, urbanization and industrialization. It is therefore, essential that the government changes their sector policies, use more effective institutional frameworks, and improve planning and management systems as well as increased beneficiary participation to adjust to current and future challenges.

Mitigating the sector's problems requires improved institutional arrangements in terms of legal and regulatory frameworks, coordinated water resources policy formulation, better management procedures and controls, better budgeting systems, and mechanisms for stakeholder consultation and representation in policy formulation and decision-making.

2.2. Sustainable Irrigation.

Sustaining irrigated food production requires an effective irrigation operation and maintenance (O&M) program. Despite the preservation of O&M funding levels at about US\$ 70 - 80 million equivalent per year since 1987, efficient and sustainable irrigation O&M is not being achieved by the provincial governments responsible for implementation. Funds are used primarily for staff support and administrative activities. The planned increase in regional fiscal and management autonomy raises further concerns. The current system of Irrigation Service Fees has failed because of lack of accountability without direct link between revenue and provision of O&M. A "deferred maintenance culture" together with periodic externally aided rehabilitation has resulted in a costly short-lived irrigation system. Also, the Government's strategy of expansion of irrigation and swamp reclamation need review, particularly with respect to the choice of the most cost-effective and environmentally sustainable interventions.

2.3. Water Pollution Control Deficiencies.

Industrial water pollution control has been addressed through programs like PROKASIH (Clean River Program). Some water pollution abatement is being achieved but national discharge standards for each economic sector require stronger enforcement. Municipal effluent disposal and treatment has received little attention and funding, because of difficulties related to financing, cost recovery and available know-how. A clear operational concept remains to be elaborated regarding the best institutional and organizational arrangements for municipal effluent regulation and, more importantly, for the financing and operation of any treatment works require ensuring wastewater discharge quality. Attention to also needs to be given to water conservation and water pollution caused by mining and non-point sources of pollution.

3. WATER RESOURCES SECTOR REFORM.

3.1. Guiding principles.

The guiding principles of the water resources sector reform in Indonesia are derived from the national reform principles of the People's Consultative Assembly (MPR) Decrees. Basic Law No.11 of 1974 on Water Resources and relevant regulations deriving there from will be amended. The reform will re-align the role of government as follows:

- (a) The central government will be limited to an enabling and regulatory role while promoting public-private partnerships at the regional and local level, and transferring resources to provincial and district governments;
- (b) Sectoral mandates and implementation authority will be developed to provincial, district and local government;
- (c) Provincial governments will reorganized to serve the district and village levels and limit its role to extra-jurisdictional functions and issues such as management of river basin covering several districts and/or provinces.
- (d) Institutions which facilitate public consultation and stakeholder participation will be created;
- (e) System of participatory for irrigation management will be established which would include transfer of responsibility for irrigation management to water user groups.

3.2. Reform objectives.

Specific sector reform objectives are:

- a) To improve the National institutional framework for WRM
- b) To improve the organizational and financial framework for river basin management;
- c) To improve regional water quality management regulatory institutions and implementation;
- d) To improve irrigation management policy, institutions and regulations.

The reforms will be implemented by amendment of appropriate the existing legal and administrative instruments. New government regulations and provincial regulations were being introduced in areas where no regulation exists. Presidential and ministerial decrees will be issued, guidelines and procedures for subsequent enactment by provincial and district governments to ensure implementation of reform program.

3.3. National Water Resources Policy (NWRP).

A number of regional, national and international seminars were held during 1991-1993 period to discuss of WRM policies reform and its strategies. Some of important seminars held were:

- Integrated Development and Management of Water Resources for Sustainable Use in Indonesia, International Seminar, Government of Indonesia, Cisarua, West Java, 29 October – 1 November 1992.
- Basin Water Resources Management National Symposium, Directorate General of Water Resources Development (DGWRD), Ministry of Public Works, Cirebon, West Java, 19-20 July 1993.

The WRM policy reform follows the broader Indonesian policy framework as stated by the National Parliament, which stressed that development of regions is essential for overall national development for increasing stability, equality and growth along with prosperity of the people. The WRM policy reform is directed to shift from current narrow sectoral policies to a more holistic and integrated approach in which both structural and non-structural measures are used for effective and efficient WRM.

Key principles of NWRP to implement specific objectives were setup in May 1999 as part of launching the Basin Water Resources Planning and Management Activity. The NWRP will cover water quantity and quality management for both surface and groundwater **in the context of river basin and aquifers, including upper watersheds, floodplains and estuarine areas**. The NWRP were include policy principles to guide legislative, institutional and regulatory interventions that:

- 1) Introduce a **water use rights framework** for surface and groundwater water allocation and utilization conducive to economic and social development, equity and environmental sustainability;
- 2) Improve **efficiency in the utilization of water**, particularly for irrigation;
- 3) Facilitate **conjunctive allocation and use of surface and groundwater** through a unified licensing mechanism;
- 4) Seek attainment of **regional surface and groundwater quality levels conducive to national socio-economic development and environmental sustainability**, and compatible with both Spatial Land-Use and Basin Development Plans;
- 5) Develop institutions for prioritized, **integrated spatial and river basin planning processes** based on participatory involvement of stakeholder representatives in publicly transparent water resources and irrigation decision-making activities;

- 6) Strengthen the **enabling mechanisms for community management and financing of irrigation networks, municipal water supply and sanitary wastewater disposal**;
- 7) **Establish a monitored planning, programming and budgeting system** for prioritized and sustainable water resources development investment and management under the new legal framework for regional autonomy and related national revenue sharing;
- 8) **Create a regional water resources regulatory and management structure** to support and implement integrated river basin management under the principle "One Basin, One Management" through Provincial Basin Management Units and, wherever feasible, corporative self-financing entities under Regional Government control;
- 9) Reinforce the **principle of beneficiary contribution** towards the government costs of public water supply and irrigation services, and the principle of "Polluter Pays" for the public costs of water pollution abatement applicable to all pollution sources including publicly owned entities and municipal authorities.
- 10) Improve the regulatory and **incentive framework for private sector participation and partnership** in water resources and water quality management, as well as irrigation management through investment, operating and maintenance concessions.
- 11) **Improve coordination** between forestry, agriculture, conservation and water resources sector public and private activities to promote environmentally sustainable watershed, floodplain and estuarine management; and
- 12) Establish specific **integrated policies for environmentally sustainable wetland conservation and swampland development**.

4. WRM REFORM PROGRAM AND STATUS OF ITS IMPLEMENTATION.

4.1. Improvement of the National Institutional framework for WRM.

A major Water Resources institutional review and reorganization process is underway to bring the benefits of development to the local regions based on concepts of decentralization and autonomy. Under this, the role of national level institutions will be to provide guidance, while the role of the Provincial level institution will be to provide supervision and limited management. Much of the operation and maintenance function and its management will be transferred to the District or local level institutions. In reorganizing the Provincial water resources institutions emphasis will be shifted from the current highly irrigation oriented role to that of integrated WRM oriented roles.

Based on the existing Laws, a number of legal measures are being for the creation of new institutions, organizational changes and implementation of specific WRM policies. Both the regulatory and management systems are being strengthened in areas such as irrigation, water quality, river management, dam safety, flood management, water supply, etc. The water resources policy reforms will be implemented by amendment of appropriate legal and administrative instruments such as Law No.11 of 1974 on Water Resources and its existing Government Regulations to: (i) conform with proposed regional administration and fiscal legislation, (ii) implement the proposed sector reforms, (iii) facilitate execution of NWRP Implementation Plan.

The President has submitted the draft of a new Law to National Council of Public Representative (DPR) on October 8, 2002. Many follow-up of legal instrument such as Regulation, and Guidance already prepared but cannot enacted before the issuance of new Law of Water Resources.

4.2. Water Resources Institution and stakeholder participation.

Integrated WRM implies a very strong degree of coordination between all the sectors involved in or dependent on the use of water. Establishment of a National Water Resources Sector Apex Body comprised of the various ministers responsible for water resources development and management. **The function** of the Apex Body were guide policy formulation, resource allocation, program implementation and regulatory control in general, and inter-sectoral coordination and issue resolution in particular. A permanent advisory group of stakeholders, NGOs and public representatives were formed to provide input to the Apex Body from time to time. A technical committee of Ministry and Agency, Directors General and an Executive Secretariat under the Ministry of Settlement and Regional Infrastructure will support the Apex Body.

A major step in coordination of WRM activities has been taken by the setting up of the Provincial Water Resources Management Committees with representation from both water resources decision makers and water users. These committees will coordinate most WRM policies and strategies based on National and Provincial Laws and Regulation. To real-time water operations at the river basin level, Basin Water Resources Management Committees has been setup to coordinate water allocation and water quality management in water short or critical basins. To this effect, the government was amend decrees establishing Provincial and Basin Water Resources Committees (PTPA and PPTPA) or replaces them with appropriate legal instruments incorporated into a revised UU 11/74 on Water Resources, and Government Regulation PP 22/82 on Water Resources Management and any related Regulations and Ministerial Decrees. The modalities of stakeholder selection, representation and roles are still to be determined.

However, representatives of irrigation, industrial, and the other stakeholders will be included on the PTPA and PPTPAs. Accordingly, the existing Provincial Irrigation Committees will be merged with PTPAs while District Irrigation Committees will become sub-committees of the PPTPA. Whereas only a few PTPAs and PPTPAs are active today in the provinces on Java and in some outer island provinces, we will set up and activate PTPA in all provinces and ensure active PPTPA in all developed river basin in about twelve provinces.

4.3. Data Networks and Management Information System (MIS)

To meet the long-term goals of river basin planning and river basin management, the establishment of comprehensive, compatible and inter-communicative Database (national, provincial, and basin levels) with corresponding interactive Management Information System (MIS) is required. The data management system would have two components; (i) the Database and, (ii) the Water Resources MIS. Database management system would be established primary at three levels (River Basin, Provincial, and National level). The transfer of selected aggregate MIS data from basin level or local government agencies to the Regional and Central Government authorities will become essential for coordinated sector management. Databases and MIS continuously be improved, brought into a common decision support system, and linked through a dedicated data network.

To promote sustainability of hydrological operations and data needs, the government were issue appropriate administrative and budgeting arrangements to upgrade hydrology institutions and organizations, along with a personnel program. These reforms will then be supported an appropriate decree, and implementation plan for establishment and/or strengthening of adequately funded and staffed Provincial Hydrological Units in about eight provinces.

4.4. Integrated Management in Less-Developed Basins.

Indonesia has about 5590 main rivers. The geographical diversity could be apprehended from size of the river basin that are dominantly small, about 86.6% has an area less than 500 square km. Short and steep rivers in Indonesia, whereas 94.1% are less than 50 km long. Only 15 rivers are longer than 400 km. Water resources development and management in Indonesia has been divided into 90 river basin management units.

To strengthen water resources management in less-developed basins, the Provincial Government was setting up a permanent Basin Management Units (Balai PSDA) to implement water resources management concept with river basin approach. The Balai PSDA is set up under Provincial Public Water Resources Service to manage river basins lying across District. The roles, responsibilities, and functions of Balai PSDA are management of: water allocation for several users, rivers, reservoirs, lakes and ponds, flood control and drought handling, swamps, in stream pollution control, river mouth maintenance, and inter-district irrigation system.

At the present, there were 23 Balai PSDA in Java (five Provinces) already functions, and 19 new Balai PSDA in the other island (Sumatra, Sulawesi, and East Nusa Tenggara) has been establish. The necessary regulations are in place to support the functioning of these institutions while detailed administrative and technical guidelines to implement various aspects of management need to be strengthened.

During the Water Sector Adjustment Program (WATSAP) period, the role and responsibilities of Balai PSDA as an operator continuously strengthened through a program of Basin Water Resources Management (BWRM). These programs have been supported by some international donor agency (World Bank, The Netherlands Grant, and Grant Aid from European Union).

All legal, administrative, personnel management, and budgeting arrangements will be put in place for effective functioning of the Balai PSDA as a river basin management unit. The activities started in these Balai included: institutional development, providing basic facilities of office and equipment, setting up of geographical information system (GIS) and database primarily for hydrology, and training. Several guidance and operation manuals for effective functioning of the Balai PSDA has been provided, some of these are: Training Need for Balai Staff, Database Management, Hydrological Data Management, River Infrastructure Management, Water Resources Manajement Model, Preparing Annual Work Program, Water Quality Monitoring, etc.

The Basin Water Resources Management Plan (BWRMP) is to be prepared by core multi-disciplinary staff in Central Planning of the Directorate General of Water Resources (DGWR). The intent is to develop and strengthen the Provincial Planning Unit to prepare in-house such plans and to enhance the ability of both Central and Provincial Planning Unit to prepare management plan and to monitor such plans. A great number of existing DGWR and Provincial staff have been trained in the areas of expertise required for planning and should be located. An approach of the planning has been adopted through establishing of a twinning team. The twinning team consists of some government staff and some expert both of foreign and local consultant. Since the establishment of Planning Unit in 1997, there were produced management plan in the five river basin and some of them have been enacted by related Governor as a frameworks of the WRM in such basins.

4.5. Management in Strategic River Basins

In developed and strategic basins of national importance, the GOI will strengthen water basin resources management by establishing self-financing, autonomous river basin management corporations. Two river basin authorities have been created, based on existing legislation; The Jasa Tirta Water Service Public Corporation in the Brantas River (Perum Jasa Tirta I) and the Citarum River (Perum Jasa Tirta II), both of which are centrally managed State-Owned Enterprises. Currently one other strategic river basin (Bengawan Solo) was established for incorporation as State-Owned Enterprises along the lines of PJT I. The other three river basin (Jeneberang, Jratunseluna, and Serayu-Bogowonto) are targeted for incorporation as State-Owned Enterprises or Provincial Government-Owned Corporations in line with the provisions of the pending regional autonomy legislation. Later these entities would become independent public corporations when the new organizations have adequate revenue and implementation capacity. However, the Government of Indonesia will re-evaluate the desirability of establishing three basin corporations as State-Owned Enterprises in consultation with the three Regional Governments concerned.

4.6. Secure, Equitable and Efficient Water Allocation

Two aspects that are important for WRM are (i) water use rights system based on licensing and, (ii) a water accounting system for water allocation. As demands increase and inter-sectoral competition increases for limited supplies, public regulation based on recognized water rights would be required to achieve societal goals.

The Government has been establishing draft of an enforceable formal national water and water rights framework as part of the NWRP. In particular, the problem of water rights for irrigation schemes will be explicitly addressed to include prevailing customary water rights concepts. Appropriate regulations and a uniform provincial framework of water licensing for abstraction and discharges that covers all user sectors will support the water rights system. The necessary policies, strategies, regulations, institutional approaches and administration will be detailed in a time bound plan. The basic legal and implementation instruments of the water rights system will be issued as part of the sector reform program.

Based on licensing and an annual allocation plan, a water accounting system for physical accounting of surface and groundwater allocated for various users in the basin would be necessary. Such system is important for recording longer term commitments for major water dependent investments and in stream objectives as well as for financial purposes such as setting up of water service fee, fixing of subsidies and cross subsidies and budgetary allocation. At the present time, appropriate basin water allocation models and GIS system to undertake the water allocation work has been setup in several basins by Balai PSDA.

4.7. Water Quality Management (WQM).

The involvement of institutions in water resources in WQM in Indonesia is currently at an infant stage. At this stage it is proposed that WQM be attempted in two complementary phases, (i) In-stream WQM and, (ii) Off-stream WQM.

The in-stream work will comprise of maintaining water quality in rivers, reservoirs and other bodies through planning, monitoring of ambient water quality, licensing of discharges into the rivers and water bodies, increasing base flows, aeration, flushing, prevention of solid waste from entering the rivers and water bodies, shifting intakes where necessary, improving sediment trap efficiencies, selective dredging of river reaches and in extra cases supporting development of cluster treatment plants. Under BWRM program some of Balai PSDA have been done a limit activity to in-stream WQM to meet water quality standards in allocating water as judged appropriate. This had primary involve monitoring at key locations the stream water quality and with local institutions in basin and other water quality program such as the "Clean River Program"

4.8. River Infrastructure Management (RIM).

Management of the river system to ensure their functioning both during low and flood flows is important for efficient operation of the irrigation infrastructure and protection of the service area. The RIM component would comprise of activities related to the river morphology, river bed and river bank stability, river corridor management, sand mining, river system dredging, river mouth stability, estuary maintenance and, maintenance of all infrastructure in the rivers such as weirs, barrages, dikes, revetments, bank protection etc. This management will include both structural and non-structural aspects as it relates to river system maintenance. Both aerial photos and river surveys would be included to develop proper maps. The river survey would be carried out at specific interval to undertake river morphology studies and river improvement. The several Balai PSDA has implemented RIM.

4.9. Flood Management

Historically the former Ministry of public works has planned, designed and constructed number of flood control projects for both rural and urban areas. In most cases it operates and maintains the flood control schemes in coordination with provincial and local authorities. These structural measures in most cases have not been supplemented with non-structural measure such as flood forecasting and warning system, flood plain management, flood disaster emergency plans, flood fighting, flood operation and updating flood hydrology to determine current levels of flood protection.

At the present time, some of Balai PSDA is trying to lay emphasis on the non-structural measures of flood management in the selected river basins. The element of work involves updating of flood hydrology as necessary, to carry out flood routing to establish weak links in the system, identify and establish an appropriate Flood Warning System (FWS) or upgrade existing FWS as necessary for real time flood operation, prepare flood disaster management plans, monitor flood, prepare flood damage surveys and assessment.

4.10. Farmer Irrigation Organization Empowerment.

To improve public irrigation network sustainability, the government has been established an institutional and fiscal framework to enable effective and sustainable O&M of public irrigation network through revision of the 1987 Irrigation O&M Policy and Irrigation Service Fee (ISF) regulations. To this end, the President of Indonesia has issued a public Declaration of Irrigation Management Policy Reform (DIMR) on April 13, 1999 signaling the government intention to implement an effective policy of participatory irrigation management. The new irrigation policy will focus on incentives and arrangements for participation and empowerment at all levels of irrigation management which:

- 1) Establish autonomous, self-reliant and self-governing water user associations (WUA) with management jurisdiction over part or all of irrigation network based primarily on canal network boundaries and related operation considerations;
- 2) Allows transfer of irrigation management to WUA or WUA Federation above the level of tertiary canals;
- 3) Vests WUA with authority to discharge their responsibilities including developing and enforcing their own rules, levying fees, operating bank account and undertaking financial obligations.

- 4) Facilitates public-private partnership and administrative transparency through joint management of large irrigation schemes by providing WUA or WUAF representatives with a scheme-level forum for access to information as well as a right to “voice” and “choice” about government provision of budgets and irrigation services for their irrigation network.

5. CONCLUSION.

- 1) Water is essential to life, and adequate supply of safe drinking water is a basic human need, the provision of which is a key policy imperative. However, concern about water must extend far beyond concerns for survival and health and productive of life.
- 2) Water is essential to the eco-systems of the natural environment, on which all social and economic activity depends. In order to allocate water effectively between social, economic and environmental uses, the chain of water management from source to consumer must be regarded holistically including its natural state, abstraction, allocation and quality.
- 3) Balancing these demands is a complex and sensitive process, and compromises inevitably have to be made. These compromises are bound to meet with resistance from champions of different demands as against another. These conflicting demands needs to effectively mediated.
- 4) Integrated WRM is not product, but a process to which promotes the co-ordinate development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in equitable manner without compromising the sustainability of vital ecosystems.
- 5) To achieve integrated WRM, there is a need for coherent national policies to overcome fragmentation, and transparent and accountable institution at all levels.
- 6) Reforming in WRM policies and strategies is an important way in achieving for sustainable development of water resources in Indonesia. Sustainable development of water resources in Indonesia can only be fully realized with a WRM new policy, strategies and systematic programs.

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