

## **FRESHWATER COUNTRY PROFILE**

### **INDONESIA**

#### **Decision-Making**

#### **Programmes and/or Projects**

- A. Integrated Water Resources Development and Management
- B. Water Resources Assessment
- C. Protection of Water Resources
- D. Drinking Water Supply and Sanitation
- E. Water and Sustainable Urban Development
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- G. Impacts of Climate Change on Water Resources

#### **Status**

#### **Capacity-Building, Education, Training and Awareness-Raising**

#### **Information**

#### **Research and Technologies**

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**Decision-Making:** The Ministry of Environment led series of consultancy meetings with major stakeholders, government agencies, private sectors, and civil society organizations during the process of Indonesia's Sustainable Development Summit held in January 2004. The initiative has become a strong base of formal commitment among sectors to implement sustainable development principles based on the agreed plan of actions. The President of Indonesia has endorsed the document as a formal agreement to support the implementation of the plan of actions ([www.melh.or.id](http://www.melh.or.id)). This event will be the base for the formation of Council for Sustainable Development in Indonesia. Points of agreements strongly indicate affirmation of most goals and targets of MDG and JPOI. In complying with the MDG goals, the National Development Planning Agency (Bappenas) is preparing country report for MDGs covering national targets and indicators to achieve within the framework of MDG. (Source: work in progress for Millennium development Goals, March 2004)

In 1999, with the enactment of the law on local governance, Law No.22/1999, the Government of Indonesia introduced a new policy to provide greater responsibility and role to the local governments to, among others, provide services which include provision of water supply and sanitation services for urban communities. This law and that of Law No.25/1999) including all their derivatives of government regulations and decrees, aim to recognize and commitment to the need of the local governments throughout the country to be more autonomous in developing the regions. The law on local governance stipulates that the role of the Central Government in provision of urban services shall therefore be limited to, among others, preparation of guidelines and manuals, as well as assisting the local governments in human resources development and management to enable them to undertake their current tasks.

The Indonesia Parliament has ratified the law on water resources management that aims to regulate access and control to clean water early in 2004. This new law would replace Law no. 11 Year 1974 which was enacted since 1974, Law no.11 year 1974. The later law aims to regulate the management of water resources, and the legal status between and or among individuals and institutions. The new law, under the umbrella of natural resources management law, was approved by the National Legislative in February, 2004. It is formulated to develop and implement comprehensive management principles as part of the reform in water resources policy. As a whole, the reform agenda is subdivided in to four groups, i.e., (i) policy and guidelines on water resources management at the national level, (ii) policy implementation with regard to institutional aspect on water resources management in the provincial and local governments as well as within the catchments areas, (iii) policy on management of water quality and prevention of water pollution, and (iv) policy on irrigation management.

*Environmental protection:* The Ministry for Environment has the role of coordinating all government's activities that have an impact on the environment. The Ministry for Environment has tried to compile and analyze regulations that explicitly or implicitly encouraged better environmental practices.

The Directorate General for Forest Protection and Nature Conservation (PHKA) under the Ministry of Forestry manages the conservation areas. Meanwhile, National Development Planning Agency (BAPPENAS) has the crucial role in coordination for cross-sectoral planning in attempt to ensure the integration of integrated water resource management and protection.

The National Development Planning Agency (BAPPENAS) completed the current Indonesia Biodiversity Strategy and Action Plan (IBSAP) in 2003 through a thorough participation process and consultation meetings with government, NGOs and private sectors at regional and national levels. These national guidelines for sustainable development and environmental protection were part of reform efforts to ensure public, multi-stakeholders consultation and collective actions.

The Government Regulation number 25/2000 on the regional autonomy stipulates that local government has the authority to conduct planning, implementation and monitoring, as well as evaluating all

governance and development aspects. The new policy of decentralization increases the responsibility of local governments in matters relating to regional environmental. Local governments have the authority to give permits for certain activities. This means that they have the responsibility of controlling the environmental impacts of those activities and to sanction any violators of environmental regulations. To practice this new responsibility, some local governments have enacted new regional regulations. Some of them have even prepared their own Local Agenda 21.

In attempt to address insufficient law enforcement and ensure proper “command and control” principles in implementing the regulations, the Government of Indonesia endorsed economic instruments as complementary tools. By providing incentives and disincentives in favor of the environment, it is hoped that consumption patterns will be shifted toward wiser utilization of environmental resources.

*Water resource management:* In ensuring the fulfillment of government’s commitment in implementing sustainable development, the State Ministry for Environment is the principal government body in charge in coordination with the Ministry of Forestry and the Ministry of Settlements and Regional Infrastructure. It also works with the Ministry of Agriculture that regulates water irrigation and pesticides residue in the water body.

A number of laws, regulations and policies concerning water pollution control and water resource management have been released. Their enforcement, however, remains challenging issues to be dealt with the Ramsar Convention on Wetlands. This convention came into force through the government regulation No. 27/1991 on Wetlands. Based on integrated approaches in watershed protection, a Ministerial Decree No. 20/2001 was on the rehabilitation of forest and land was issued by the Ministry of Forestry. This was followed by the recent release of government regulation No. 82/2001 on Water Quality Management and Water Pollution Control.

At the national level, several regulations have been issued to promote sustainable agriculture, such as the Pesticide and Seed Control (under Law no. 12/1992) and Pesticides Restrictions for Rice Crops (Presidential Instruction No. 3 of 1986). The regulations, however, need further enforcement measures.

The Indonesian Water Vision, declared in 2000, is “actualization of stable utilization in efficient, effective and sustainable manners for the prosperity of the whole people”. There are three major considerations to address in policy reform for water resources management: (i) the nature of water resources problems in Indonesia, i.e., threats on sustainability of water quality and water quantity, (ii) continuous need for achieving food security and sustainable irrigation, and (iii) overcoming institutional constraints. The government has launched on-going effort in addressing water resources’ problems and structural deficiencies through policy, legislative and institutional adjustments. These efforts are designed with integration of national efforts in ensuring food security, sustainable water and land use and an improved aquatic environment.

The specific objectives of the reform is (a) the establishment of a national intergovernmental water resources and irrigation management coordination framework; (ii) adopting and implementing of a binding national water policy to guide sectoral planning, programming, budgeting and real time management; (iii) the establishment of institutions and procedures for the involvement of stakeholders and water resources service beneficiaries in river basin management policy formation and decision making; (iv) improving national water resources management information and decision support data systems networks; (v) fostering integrated management and regulation of river basin water resources; (vi) establishing effective management organization in strategic river basins; (vii) introducing a water rights system for secure, equitable and efficient water allocation; (viii) establishing institutional frameworks for enforceable water pollution control; (ix) transparent empowerment of farmer irrigation organization with governance and financial powers to manage irrigation networks transferred to their control; (x) ensuring

fiscal sustainability and efficiency, as well as efficiency of operation and maintenance and rehabilitation of irrigation schemes; and reorganization of irrigation services administration. (Source: Water Resources Management, Country Report, 2003)

*Drinking Water Supply and Sanitation:* As part of the formulation of a new law on water resources, a government regulation on sanitation, with reference to wastewater development and solid waste management, has been drafted to ensure effective, efficient and accountable wastewater development as part of conservation efforts to protect water resources. Government's regulation for provision of drinking water is in ongoing legal development with the main aim to achieve a better and more efficient system with affordable tariff, and to create balance between the interests of consumers and providers.

Concerning drinking water quality, The Minister of Health has issued Ministerial Decree no 907/2003 regarding National Drinking Water Quality Standard. The decree regulates that provision of water supply should meet potable water quality. In accelerating access to safe drinking water, the government also committed to give wider opportunities for the role of cooperatives, community as well as private sector, in which the decision of community will be a priority.

### **Programmes and Projects:**

A. Integrated Water Resources Development and Management: The National Agenda 21 calls for the need to formulate and integrated water resource management, focusing on the provision of adequate and safe drinking water, enhancement of efficiency in water utilization and improvement in the quality of water resources. To date there is no integrated water resource management as yet, but some efforts have been conducted as a part of water resource conservation programme (see under programmes and projects). The floods in Jakarta in the beginning of 2002, for example, have shown how Environmental Impact Assessment (AMDAL) has not been carried out properly in the past. To improve this, major reforms in the decision-making sectors are needed.

Attempts to achieve better water resources management are concentrated on the provision of adequate and safe drinking water. Priority is also given to enhancing the efficiency of water use, improving the quality of water resources, balancing water resource availability and needs across regions, and developing an integrated water resource management (National Agenda 21).

Natural resources valuation is an attempt to include environmental aspects in policy making. The Ministry of Environment has completed the estimation of the Cisadane and Musi watershed areas in order to decide on the best way to manage those areas. The study was done in collaboration with the University of Padjadjaran and the University of Sriwijaya.

The Ministry of Marine and Fishery is focusing its activities on sea and coastal zone management in four main programmes: sustainable utilization; conservation; promotion of public participation; and spatial planning. In addition, the Directorate for Controlling Coastal and Marine Ecosystem Degradation under the Ministry of Environment has launched an Integrated Sustainable Coastal and Marine programme, such as Pantai lestari (Sustainable Coast, eco-port, eco-marine resort, coastal community development and environment with the objective of conserving the ecological functions of the coastal environment in support of sustainable development. The project is centered on four types of environment: tourist beaches, harbours, mangrove forests and coral reefs. Community-based coastal and marine resource management systems such as sasi in Maluku, sake-sake in North Sulawesi, and lebak-lebung in South Sumatra have been adequately accommodated by the government regulations on coastal and marine resource management. The government is currently formulating a bill on coastal zone management. The process of coastal zone management accommodates various public interests by developing public consultation forums at the national as well as local level.

For information on integrated pollution control through watershed management, see under C. Protection of Water Resources, Water Quality and Aquatic Ecosystems.

**B. Water Resources Assessment:** Inland waters in Indonesia covering areas of 534.000 km<sup>2</sup>, consists of 394.000 km<sup>2</sup> swampy areas, 119.500 km<sup>2</sup> catchment areas and flood plains, 16.000 km<sup>2</sup> man-made lakes and 5000 km<sup>2</sup> natural lakes.

There are 521 lakes, of which fourteen (14) of them have more than 100 m depth, eight (8) lakes with more than 200 m depth, and three (3) with more than 400m depth. The biggest lake are 1.130 km<sup>2</sup> wide with 590 m depth. Totally, these lakes contains 500 km<sup>3</sup> freshwater.

As a whole, freshwater is abundant in Indonesia reaching an average annual quantity of 15,500m<sup>3</sup> per capita; the availability of freshwater is quite huge, about 25 times when compared to that of the world which is only about 600 m<sup>3</sup> per capita annually. Nonetheless, such abundance of freshwater is not evenly distributed within the country and furthermore, the availability also depends on the seasons. This condition is likely to be attributed to degradation of the environmental condition and, consequently, changes in hydrological cycle, as indicated by:

1. Degradation of carrying capacity of the upstream areas of the water catchments as a result of uncontrolled clearing of forests; this situation has resulted in expansion of critical lands from 13.1million Ha to 18 million Ha, and critical catchment areas from 22 in 1984 to 39 in 1992 and still increased to 62 catchment areas in 1998.
2. Uncontrolled land clearing within the flooding areas, water catchment areas, and riverbanks that has resulted in reduced infiltration capacity, changes in river morphology, reduced carrying capacity of the streams thus expanding the risk and increasing the frequency of flooding.
3. Uncontrolled abstraction of water that also causes increased saltwater intrusion and land subsidence.
4. Degradation of riverbeds in Java, Bali and West Nusa Tenggara due to exploitation of sand that causes infrastructure and structural damage along the rivers.
5. Increased sedimentation of the riverbeds resulting from haphazard household solid waste disposal and tailings from mining activities.

The problems raised from increasing freshwater supply appeared particularly on the islands of Java, Bali, Nusa Tenggara Timur where the demand for water is higher than available water supply. Issues associated with this problems are population growth, industrialization, urbanization, groundwater overuse and inadequate supply in some regions.

**C. Protection of Water Resources, Water Quality and Aquatic Ecosystems:** Among the major programme of water resource management are the Clean River Programmes (PROKASIH) launched in 1989 and the Programme for Pollution Control, Evaluation and Rating of PROKASIH (PROPER-PROKASIH) in 1995. For instance, in order to protect water sources from pollution the MoE launched the Clean River Programme (PROKASIH) which by 1999 involved 37 watershed areas in 17 provinces. The project encourages water pollution reduction from industries, voluntarily (MoE, 2000). However, the success of this programme is debatable, since law enforcement is weak. It is hoped that Government Regulation No. 82/2001 on Water Quality Management and Water Pollution Control might serve as another policy tool to manage and prevent further water pollution.

PROKASIH aims to improve water quality by seeking pollution reduction from industries. This has been carried out in 37 watersheds in 17 provinces in 1999, up from originally 15 watersheds in 8 provinces (MoE, 2000) and has involved in 1275 plants (World Bank). In the next phase of PROKASIH 2005, the programme will use a more integrated approach encompassing all regions of watersheds from upstream to downstream. It will not only try to control pollution but also increase the measures to conserve water resources and rehabilitate the physical conditions of rivers. The implementation of the programme will give more authority to local government where the watershed is located. PROPER PROKASIH is aimed at promoting the industry's compliance to existing regulation and rewarding those whose performance exceeds regulatory standards through classification into five color schemes. By July 1997, of 270 participants, 55.2% were fallen into middle categories (blue and green) but none had reached the top category (gold) ([www.menlh.go.id](http://www.menlh.go.id)).

A variety of measures are proposed to protect water resources from agricultural activities, including strict monitoring and control of pesticide use, legal restrictions on land conversion and agricultural extension programmes focused on issues such as soil fertility and uses of crop wastes. One of the most successful programmes to promote sustainable agriculture is the Integrated Pest Management (IPM) programme. IPM was pioneered in Indonesia following the 1986 Presidential Instruction banning the use of 57 pesticides on rice and cutting off pesticide subsidies. Nearly 1 million farmers have been trained in IPM in Indonesia so far, and nearly every village in the major rice-growing areas has had at least one Farmers' Field School (FFS). Some 2700 full-time government IPM trainers operate in the country, along with over 12000 part-time farmer trainers. In the FFS programme, each farmer is given 40 to 60 hours of training.

**D. Drinking Water Supply and Sanitation:** The provision of safe drinking water and effective sanitation is an important priority of the Government of Indonesia. Beside the lack of investment in the sector over the past decade, access to clean water remains limited and the public services are often unreliable and inadequate. As part of a strategy to improve the level and quality of services and expand access to water supply and sanitation throughout the country, the Government of Indonesia is developing a comprehensive framework to regulate the provision of water services and to create enabling conditions for both private and community participation to manage and finance water and sanitation services.

The national program for drinking water and sanitation is in line with the UN Millennium Development Goals (MDG) to halve the proportion of people without access to safe drinking water by 2015. It also addresses the plan of implementation of the World Summit on Sustainable Development to halve the proportion of people without access to basic sanitation by 2015. The objective of the water supply and sanitation program is to improve the quality of life of the community. It is expected that through the improvement of the services of water supply and sanitation infrastructures, the community can improve health conditions, and subsequently increase productivity and the quality of life.

The future challenge is to meet the future projected water demand up to the year 2015. It is noted that there is a need for sustainable financing scheme to meet increasing urban water supply coverage. The central government funding and international aid have been used heavily to support this sector. Within its sectoral reform, it is expected that the existing water enterprises will expand significantly to meet demands for clean water. The demands will continue to increase in parallel with population increase. Special attention should be focused on provision of access to water for the poor. System expansions and improvements are urgently required, especially as a result of the last 5 years of limited sector investment. (Source: Water Resources Management, Country Report, 2003)

To date, poor performance of the regional water supply enterprises persisted as a result of debt problems, limited investment and management inefficiency. Many of the Regional Water Supply Enterprises are not well managed as a result of limited human resources. Idle capacity is also a problem which reaches 15% of the installed capacity. Untraced used of water in average is high reaching 40% of total water usage.

Debts that need to be repaid from water sector accounted total cumulative about IDR 4,032 billion or equivalent to about \$ 820,000. In this respect, Indonesia's Water Enterprise Association (PERPAMSI), in collaboration with national and international institutions, has undertaken programs to increase its efficiency through privatization and rescue programme, including: (i) redefining the institutional arrangement in charge of water supply, (ii) implementing principles of entrepreneurship and professionalism in the management of the enterprises, (iii) introducing full cost recovery to water service without compromising the need to serve the low-income communities, (iv) accelerating debt restructuring, (v) systematic improvement and expansion of service coverage, and (vi) increasing the government's support on managerial, technical, and financial aspects as well as on managing the availability of raw water.

Programs and projects in water supply and sanitation (WSS) are divided into two categories: urban and rural. In urban sector, WSS projects are focusing on improving the capacity of local water enterprises to provide sustainable water services for targeted water users. In the rural areas, WSS projects emphasize on encouraging communities to plan, execute, operate, maintain and extend their own water services. Both projects adopt demand-responsive-approach. (BAPPENAS)

WASPOLA (Water Supply and Sanitation Policy and Action Planning Project) that focuses on formulating water supply and sanitation policy for urban and rural areas, WSSLIC (Water Supply and Sanitation for Low Income Communities), CWSH (Community Water Service and Health) and "ProAir" (Rural Water Supply and Sanitation) Projects that focus on improving water and sanitation services in rural areas, SANIMAS (Sanitation for Community) that focuses on improving sanitation status in urban areas, and LGWS (Local Government Water Services) that focused on improving urban water services. The water supply and sanitation for low income communities is designed to provide integrated water supply and sanitation infrastructure for deprived households; the project is undertaken by the communities themselves.

The Government of Indonesia, initiated by the National Development Planning Agency (BAPPENAS), Ministry of Finance (MoF), Ministry of Settlements and Regional Infrastructure (MSRI), Ministry of Home Affairs (MoHA) and Ministry of Health (MoH), is formulating a national policy on water supply and sanitation formulation and action planning as a means to provide guidelines to the local governments on community based water supply and sanitation development and management. In addition to Waspola, a national policy regarding institutionally-managed water supply and sanitation development is being prepared in 2004.

Through WASPOLA Project (Water Supply and Sanitation Policy and Action Planning Project), in 1999, a working group of water and sanitation which consists of representatives from related agencies was established. This working group has constantly expanded their membership to include representatives Ministry of Environment and water resource management sector. Through a series of trainings and workshops, this group intensively discusses and interacts with other agencies and institutions, such as the water user groups at the village levels, local governments, local water and sanitation authorities, non government organizations, and universities. This has facilitated the need for a multi-stakeholders decision making process and a well coordinated execution of the water and sanitation provisions for rural areas throughout Indonesia. (BAPPENAS)

The government also launched programmes to fulfill basic infrastructure such as the Kampung Improvement Programme (KIP) in the cities and Integrated Village Environment and Housing Development, both aimed at low-income families. Between 1994 and 1998, the KIP has provided services to 3.8 million urban people in 81 cities covering an area of 24,336 ha. In 1998, 19.38% had tap water supply and 54.35% had their own toilet. In 2000 the increase in household with tap water supply (19.08%) and their own toilet (55.43%) was not significant.

E. Water and Sustainable Urban Development: Integrated Urban Infrastructure Development Program/IUIDP during 1980 – 2000 provided great opportunities to increase public investments in providing sustainable urban water supply services. The main problems in urban water supply can be explained technically and managerially. One of the crucial issues relates to the dependency of local water enterprise on local government as the company owner. It often retarded the water enterprise to operate efficiently. One of the efforts to solve this problem is Local Government Water Services (LGWS) Project. This project focuses on capacity building and improving the management of local water enterprises. (BAPPENAS)

Other programs undertaken to improve sustainable urban water services include financial capacity improvements of the enterprises through debt restructuring and promoting public-private partnerships. (BAPPENAS)

F. Water for Sustainable Food Production and Rural Development: To encourage farmers to expand their agricultural activities in arid areas, the government provides credit for agriculture and conservation in water catchments area (KUK-DAS). It is a form on incentives for farmers to integrate soil and water conservation techniques in their agricultural activities.

G. Impacts of Climate Change on Water Resources: Indonesia is among the countries that will significantly affected from accelerated global climatic change. Water resource will be the most vulnerable to climate change. Food security, public health problems, sea level rise and othe impact will bring similarly devastating effects to Indonesia.

Droughts and floods that will accompany climate change will bring devastating effects impacts on agriculture sector, with food production being the most susceptible one. According to study by the , the Ministry of Environment the gradual climatic change will affect the agriculture yields by up to 1 percent.

*Climate variability:* Indonesia situated between the Asian continent to the north and the Australian continent to the south and between the Pacific Ocean on the east and the Indian ocean on the west. They are thus strongly influenced by the displacement and intensity of the Inter Tropical Convergence Zone (ITCZ), the Asian and Australian landmasses, and the Indian and Pacific Ocean air masses. There are two seasons, wet and dry, which are separated by transitions period. Rainfall tends to be frequent and intense, but not of long duration. The amount varies greatly with location and altitude. The monthly mean temperature is almost constant throughout the year.

Monsoons vary in strength from year to year,, sometimes dramatically. The variability of Monsoons means that some rainy seasons may be more extended and some dry seasons may be prolonged with no water. Indonesia play a major role in triggering El-Nino Southern Oscillation (ENSO) events that can cause disruption of weather pattern on a global scale.

**Status:** *Geographical aspects:* Indonesia is the world's largest archipelago, comprising more than 17,000 islands and 81,000 km of coastline. The sea area belonging to Indonesia is 3.1 million km<sup>2</sup> (compared to 1.9 million km<sup>2</sup> of land) with an Exclusive Economic Zone (ZEE) of 2.7 million km<sup>2</sup>. The country's coastal zone has numerous estuaries, mangroves, sea gass, coral reefs, and small island ecosystems. Marine tourism could also be developed around Indonesia's coastal area. By 2000, the Government of Indonesia had designated a total of 4,636,337.45 ha for marine conservation in the form of rate preserves (7 locations; 208,780.45 ha), wildlife preserves (3 locations; 65,220.00 ha), recreation parks (14 locations; 679,382.00 ha) and national parks (6 locations; 3,682,955.00 ha) (Ministry of Forestry website).

*Socio-economic aspects:* Indonesia's population was estimated at 210 million in 2000. In 1993, of the 185 million inhabitants, approximately 25.9 million were living in "poverty" as defined by international absolute standards. After the severe economic crisis, that number increased to 49.5 million in 1998 or 24.2% of the total population. Indonesia has succeeded in lowering its annual population growth rate from 2.34% during 1970 -1980, to 1.98% during 1980-1990, to approximately 1.66% during the 1990s ([www.bps.go.id](http://www.bps.go.id)). It is projected that the growth rate will decrease to 0.68% in the near future. In 1999, this number decreased to 37.5 million or 18.2% of the total population; 20.2 million of those poor lived in rural areas and 12.4 million in urban areas ([www.bps.go.id](http://www.bps.go.id)). However, an even population distribution has yet to be achieved. These are still enormous numbers and the fight against poverty must be conceptualized in an integrated fashion taking the following aspects into consideration: the impacts of the changing economy on the poor; the need to develop public infrastructure; and the impacts that such developments will have on the environment at local and regional level.

In certain areas, the carrying capacities of the environment have been surpassed, particularly in relation to agricultural productivity. To date, population distribution has been dealt with separately from environmental management. In the past, it was argued that family planning programmes were implemented with insufficient quality of care, especially for women. The programmes were conducted in a quantitative target-oriented way and did not respect women's right to choose. A new paradigm has thus emerged to improve the quality of service and pay more respect to women. In some areas, transmigration has lead to severe conflicts between the newcomers and the indigenous people.

Demographic changes will precipitate major changes in Indonesia. For example, an increase in both urbanization will increase Indonesia's urban population to 132.5 million (i.e. 50% of total population) by 2020 (National Agenda 21). While poverty and consumption have clear and tangible needs for management, to date the population dynamics of Indonesia have been less addressed. The increasing number of population is faced with an unequal regional development. According to the 2000 Population Census, Java, which makes up 7% of the country's land area, is inhabited by 60% of the population. On the other hand, Maluku and Papua which make up 25% of the area are only inhabited by 2% of the population (BPS, 2001a). Population affects human services and broader social and environmental factors in a variety of complex and recursive ways.

Health has been improving in Indonesia, as shown by a number of parameters. The infant mortality rate decreased from 145 per 1,000 live births in 1967 to 52 per 1,000 in 1995 and 44 per 1000 in 2000. The average life expectancy of men and women has increased significantly. It is estimated in 1980 was 52,41 year increased to 63,48 in 1995 (SUPAS 1995), and become 67,97 in 2000 (SP 2000). According to the Indonesian Demographic and Health Survey, in 1994, Maternal Mortality Rate (MMR) was still high, i.e. 390 per 100,000 live birth. Under-five mortality in Indonesia, however, has declined significantly from 111 per 1,000 live birth in 1986 to 59 per 1,000 in 1997 ([www.depkes.go.id](http://www.depkes.go.id)).

It is recommended that health services be based on local circumstances and aimed at self-sufficiency. Furthermore, health services should be enhanced especially regarding the part of the population most vulnerable to infectious diseases such as tuberculosis, cholera and malaria. These diseases must be eradicated, and urban health services must be developed in line with the dynamics of urban community. A long-term plan is to eliminate a variety of significant diseases (e.g. cholera, hepatitis B, rabies). Mass immunization and institutional development programmes will require an expenditure of approximately US \$ 52 million ([www.depkes.go.id](http://www.depkes.go.id)).

Human settlement issues are exacerbated by poverty, resource scarcity, pollution, and population density. There are qualitative and quantitative needs for more and better housing. Recent studies suggest that approximately 750,000 new housing units will be needed by 2020, and many of them will be required in densely populated urban centres. This will reflect not only population growth but also a demographic

change in housing from extended families to nuclear families. Provision of human settlement must also come with provision of facilities. It is estimated that in 2000, access to clean water, electricity, and sanitary facilities reached 75%, 86%, and 55% of the total population. As much as 22% of households are approximately 5 kilometres or more from public health centres and 67% of households are 5 kilometres or more from a fire hydrant (BPS, 2001a). There have been several failures in developing environmentally sustainable human settlements. The floods in Jakarta in the beginning of 2002, for example, showed that the Environmental Impact Assessment (AMDAL) has not been carried out properly in the past.

Agriculture is still by far the largest natural resource sector of the Indonesian economy and is also the livelihood of a majority of its people. Issues that relate to rural development and agriculture have special importance for broader attempts to implement sustainable development. In 2000, the agricultural sector (excluding forestry) contributed 15.75 % to the country's GDP. This excluded agriculture-based industry such as food manufacturing industry and the restaurant business. In the same year, the agricultural sector (including forestry) provided jobs for 45% of the population (BPS, 2001a). But the agriculture sector is transforming due to the increase in both technologies and international market pressures. It is expected to become more efficient, specialized and diversified and concurrently employ considerably fewer small farmers.

Still a major concern for land resource management is the conversion of agricultural to non-agricultural land. During 1980 to 1995, the urban area increased by an estimated 367,500 ha, an average of 25,100 ha per year. Almost 60% of that development occurred in Java (Damayanti, 2002). During 1981-2000, as much as 246,700 ha of wet rice land nationally was converted into other types of land-use ([www.deptan.go.id](http://www.deptan.go.id)). Households employed in the agricultural sector have the lowest income compared to other groups. Even agricultural households owning more than 1 ha of land make less money annually than non-agricultural lower-level urban households (BPS, 2001a). This explains the high level of urbanization and calls for more effective and serious efforts in rural development.

The government classified forests according to its function into three categories, namely protected forest, production forest and nature reserve. The total forest area, up until October 1999, was 120.3 million ha, consisting of 33.5 million ha of protected forest, 66.3 million ha production forest and 20.5 million ha nature reserves (BPS, 2000). The Ministry of Forest and Estate Crops has different data, however. According to TGHK (Forest Use Agreement), Indonesia's total forested area amounts to 143.3 million ha with a smaller area for protected and nature reserves and a much greater area for production forest compared to the BPS data (Ministry of Forest and Estate Crops, 1999). Deforestation rate is estimated at 1.6 million ha annually (Republik Indonesia, 2001).

According to the 2000 statistical data from the Directorate General of Land Rehabilitation and Social Forestry, the extent of critical land in Indonesia amounts to 8.1 million ha inside forest area and 15.1 million ha outside forest area (Ministry of Forestry website). BPS had some different data. According to it, the extent of critical area is 2.4 million ha of which 0.26 million ha cannot be rehabilitated (BPS, 1996). The main arid and semi-arid areas include East and West Nusa Tenggara and Central Sulawesi. Besides the natural factors like the dry climate and the soil's original characteristics, careless human activities have accelerated the rate of land degradation. Forest clearing is the major cause of erosion of the productive layer of soil. The extent of critical land expands 400,000 ha annually. From 1985 to 1987 the rate was even higher: 2.5 million ha (Kurnia, U. et al.).

The increased urban activities combined with population growth resulted in 100% expansion of urban areas between 1980 and 1995. Conversion of agricultural lands to other uses amounted to 106,424 ha in 1993-1995 with settlements representing more than half. The destroyed land totals 30 million ha with two thirds of which is in Java (National Agenda 21). Inefficient land resource use in urban areas is indicated by the existence of 1.2 million ha of idle land (Hamilton & Sumardjono, 1998).

Marine degradation has several causes, such as over-fishing, physical habitat degradation and spatial use conflict. The intensity of the development process and the over-exploitation of resources have caused pollution and environmental degradation in some regions, especially the northern coast of Java, the Straits of Maluku, South Sulawesi, and Bali. Nevertheless, there are many coastal and marine regions which have not suffered the same fate and where the environmental quality is still relatively good. These are the western coast of Sumatra, the southern coast of Java, the Indian Ocean, the Natuna Sea, the Sulawesi Sea up to Tomini Bay, the Banda Sea, and the Pacific Ocean.

*Water resources management.* In Indonesia, droughts and floods still occurs in many places. Indonesia is facing increasing freshwater supply problems, particularly on the islands of Java and Sumatera where the demand for freshwater is the highest. Issues associated with freshwater are population growth, industrialisation, urbanisation, overuse, and inadequate supply of fresh water in some regions. There is an increase of the demand for clean water by 9.6% per year during 1996-1999, yet only 40.6% of households in Indonesia have access to clean water in 2000 (BPS, 2000). The demand for water for domestic use only is projected to be about 81 billion m<sup>3</sup> in 2015. It is projected that by the year 2015 water use for irrigation, domestic need, and industry will grow with an annual increase of 6.7% between 2000 and 2015 by as much as 6.67%, 6.7% and 12.5% respectively (National Agenda 21).

Population growth, an increasing urban population, and an economic structure shifting from agriculture to industry, have all contributed to increase Indonesia's consumption patterns in clean water. Clean water consumption shows signs of steady increase with an annual growth of 9.6% during the period 1996-1999. Provision of clean water still needs to be enhanced to meet people's basic needs especially in rural areas. Freshwater consumption is dominated by the agricultural sector, which uses 98% of Indonesia's water resources (National Agenda 21). In contrast, the clean water supplied by the Regional Drinking Water Company (PDAM) provides water to merely 20% of 200 million Indonesians is mostly used by the domestic sector (90.2%) (July 8, 2000). This rapid growth of water consumption coupled with the decreasing quantity and quality of water resources has already created water scarcity problems.

On the other hand, only 39% of the Indonesian urban population and 8% rural population have access to clean water (Draft National Action Plan 2004). The Regional Water Utility Company (PDAM) can provide tap water to only 20% of the population, of which 90.2% is used by the domestic sector. The poor performance of PDAM is due to high level of debt and lack of investment as well as inefficient management (Tempo Interaktif, 2002). Limited supply has forced people to increasingly utilise ground water, leading to over-utilisation by households and industries, resulting in reduced ground water level. This problem is exacerbated by pollution both from industrial and domestic wastes, causing a decline in the annual per capita availability of water. Indeed, some cases of water use conflicts have been reported from some densely populated areas with intense development activities (MoE, 1997).

Basic facilities including water supply and septic tank are often inadequate in some housing development. Between 1994 and 1998, the the Kampung Improvement Programme (KIP) has provided services to 3.8 million urban people in 81 cities covering an area of 24,336 ha. In 1998, 19.38% had tap water supply and 54.35% had their own toilet. In 2000 the increase in household with tap water supply (19.08%) and their own toilet (55.43%) was not significant. There is a disparity between rural and urban areas. In 2000, in the cities 36.2% household had tap water supply compared to 6.9% in the villages, and 46.3% had toilet compared to 15.5% in the villages (BPS, 2001). However inadequate data and information makes it difficult to assess the real conditions of human settlements in Indonesia.

There are even cases of water use conflicts in some densely populated areas with intense development activities. Indeed there is a large disparity in the ratio of water needs to available water resources between

regions. The highest ratio is in Bali (805,63%) and the lowest one in West Papua with 0.08% (National Agenda 21).

Another important issue is the privatization of water supply through partnership between the regional water utility company (PDAM) with the private sector. This was attempted to improve the performance of PDAM. It has to be noted, however, that the cooperation between PDAM and the private sector created some problems related to public services. The profit orientation of the private sector often undermines the need to provide public services, particularly for the poor. There is a tendency that while services to the poor community will deteriorate, while on the other hand they have to pay higher prices for water.

The poor performance of The Regional Drinking Water Company (PDAM) with 40% coverage in urban areas and 92% of rural communities unserved is due to debt problems, lack of investment and management inefficiency (Tempo Interaktif). For information related to drinking water supply, see under D. Drinking Water Supply and Sanitation.

Recommendations in the management of water resources in Indonesia are as follows:

- The government needs to seriously undertake an integrated water management programme, taking into account improvement in accessibility to freshwater, water conservation and community participation.
- Water Utility companies, together with scientific community need to develop a freshwater data base and information system to support freshwater management, by making sure that the database is available to the public.
- Major groups need to promote local water management practices such as traditional water storage and management practices, rainwater harvesting and groundwater replenishment techniques.
- The private sector needs to promote efficient water use and water recycling for industries and to reduce water pollution gradually, with a view to finally conduct zero pollution practices in the future.

At present, the Government of Indonesia is initiating efforts to develop and implement comprehensive management principles as part of the reform in water resources policy. The policy reform includes legal instruments, guidelines, institutional development as well as human resources development. As a whole, the reform agenda is subdivided into four groups, i.e., (i) policy and guidelines on water resources management at the national level, (ii) policy implementation with regard to institutional aspect on water resources management in the provincial and local governments as well as within the catchment areas, (iii) policy on management of water quality and prevention of water pollution, and (iv) policy on irrigation management.

**Capacity-Building, Education, Training and Awareness-Raising:** Based on National Agenda 21, the government should develop policies and strategies to promote changing consumption patterns on the areas of Production and Consumption Patterns of Water Resources. The government has conducted campaigns in water conservation to increase public awareness as well as to encourage a reduction in water use.

The integrated pest management (IPM) programme in 2000, aims at hiring and placement of “community organisers” to respond to farmers’ concerns, and the elimination of many of the corrupt practices by local agricultural extension workers ([www.panna.org](http://www.panna.org)).

In 2000, BAPEDAL established an Education and Training Centre (PUSARPEDAL) to provide technical assistance and training in environmental management, including environmentally sound technologies ([www.menlh.go.id](http://www.menlh.go.id)).

The Ministry of Environment has prepared a handbook of environmental economics. The book will be used to introduce environmental economics at district and community levels. Seminars and training on environmental economics are often held for industrial, academic communities and even local government.

The government, initiated by the Ministry of Home Affairs and Ministry of Settlements and Regional Infrastructure, has undertaken and coordinated several capacity building efforts to improve the local governments' capacity to provide urban services, such as provision of water supply and sanitation services, and also to encourage and facilitate the participation of private and non-government institutions in the services (CBUIM-ADB, and see under Sanitation Profile). Similar efforts in water resources management have also been undertaken to strengthen and empower stakeholder participation, and to adopt a participatory ecosystem-based management approach to water resources management. While the Ministry of Health introduced Methodology for Participatory Assessment – for Public Hygiene and Sanitation (MPA – PHAST) to increase people awareness and to support project planning and sustainability.

Information: The State Ministry for Environment provided information on water resources through websites, seminars, workshops and media campaigns. It also published two editions of its Cleaner Production Newsletter.

In 2001, there was an Indowater Expo & Forum entitled “International Water, Wastewater and Recycling Industry Exhibition”. 150 establishments from 18 countries participated. Cleaner production technology and information could be dealt with in the Centre for Data and Information Service (PUSDATA) of the Ministry of Trade and Industry (MoIT).

Information on decision-making is available through the web sites of ministries and agencies, such as: the State Ministry of Environment ([www.menlh.go.id](http://www.menlh.go.id)); the National Development Planning Agency ([www.BAPPENAS.go.id](http://www.BAPPENAS.go.id)); the Central Bureau Statistics ([www.bps.go.id](http://www.bps.go.id)); the Ministry of Health ([www.depkes.go.id](http://www.depkes.go.id)); the Ministry of Transportation ([www.dephub.go.id](http://www.dephub.go.id)); the Ministry of Health ([www.depkes.go.id](http://www.depkes.go.id)); the Ministry of Settlements and Regional Infrastructure ([www.kimpraswil.go.id](http://www.kimpraswil.go.id)); the State Ministry of Women Empowerment ([www.menegpp.go.id](http://www.menegpp.go.id)); the National Coordinating Agency of Family Planning Programme ([www.bkkbn.or.id](http://www.bkkbn.or.id)); the Ministry of Forestry and Estate Crops (<http://mofrinet.cbn.net.id>); the Ministry of Research and Technology ([www.ristek.go.id](http://www.ristek.go.id)); etc.

Ministry of Settlement and Regional Infrastructures has established water resource data center unit to provide Information System for water resources at national level as well as to monitor and evaluate water resource development in Indonesia.

The Ministry of Environment has initiated Green GDP, a set of sustainable development indicators that took into account the assessment of environmental loss. This set of indicators is currently being developed to be implemented at the national level. All the studies on natural resource accounting (NRA) were already compiled. Learning from the best practices available, the MoE will develop guideline on the calculation of NRA.

The collaboration between the Ministry of Research and Technology, the State Ministry for Environment and NGOs has produced ERSI (Environmental Resource Sharing Information) with information on environmental science and technology, which has been disseminated through Warintek ([www.ristek.go.id](http://www.ristek.go.id)).

Research and Technologies: Research on water resources and drinking water have been conducted by research centres in universities, the Agency for Assessment and Application of Technology (BPPT), the Agency for Irrigation Research and Development, and the Ministry of Settlement and Regional

Infrastructures. The Institute for Land Research in Bogor started to research on water conservation technologies in the 1970s, when the Division of Soil and Water Conservation was established. Technologies on mapping, water resource management and post-disaster analysis are on the agenda of the government plan to allocate about \$ 600,000 to develop research and technologies in the area of human settlement for the budget year 2001/2002.

Current technologies of aerial photography, digital mapping, remote sensing, and satellite imaging such as SPOT and LandSat have been developed in a number of institutions and universities. Those technologies have been used to produce a Geographical Information System or a Land Information System. BPN uses satellite technology for remote sensing and Global Positioning System.

The Meteorology and Geophysics Agency provides information on weather and forecasts future prolonged drought in certain areas while the Ministry of Forestry and Crop Estates provides data on the extend of critical land.

The Institute for Land Research in Bogor started doing research on soil and water conservation technologies in the 1970s when the Division of Soil and Water Conservation was established. The Research Centre for Soil and Agroclimate also actively conducts research. Pilot projects exist in many provinces and many involve farmers.

Other natural resource valuation studies carried out by the Ministry of Environment are on coral reefs and mangroves. A monetary valuation of the karst ecosystem was also carried out with the support of CEPI (Canada).

Each governmental body mentioned above conducts research in environmentally sound technologies, and so does the Institute for Research and Development in the Industry of Leather, Plastic, Rubber and Plastic. The Ministry of Regional Settlement and Infrastructure is another body involved in the research.

On sustainable water management in Indonesia, it is worth noted that such management is facing challenges such as lack of data on hydrology, including freshwater sources, demand and supply in many regions.

Financing: There has been no aggregate data regarding budget allocation in water resource management. However, irrigation was allocated for 4.2% of the total national expenditure in the fiscal year 1999/2000 down from 6.7% in 1996/1997. The technical assistance for PDAM's rescue programme supported by the ASEM Trust Funds amounted to a total of US\$ 396,000, while the government expects to spend between \$20-50 million for the implementation programme (World Bank).

Tariff for water supply has been able to cover the operation and production costs. Within the framework of the Millennium Development Goals, since 2003, a National Action Plan for water supply is under preparation. Based on the Plan, approximately \$ 6.750 millions would be required to achieve the 2015 target for water supply. About \$ 3.750 million is estimated to cover urban areas water supply development and \$ 3 million for rural areas.

Lack of funding was identifies as major constraint. Soil and water conservation technologies needed are expensive and cannot be afforded by the government alone. The state budget and the reforestation fund (DR) were reported to allocate funds for land rehabilitation. The Government of Indonesia pleads to international communities to help with additional fund within the framework of CCD. To encourage farmers to expand their agricultural activities in arid areas, the government provides credit for agriculture and conservation in water catchment area (KUK-DAS). The credit scheme is intended to motivate farmers to integrate soil and water conservation techniques in their agricultural activities.

Cooperation: Indonesia intends to continue working with international development and financial organizations such as UNEP, UNFPA, FAO, World Bank, ADB and UNDP as well as other bilateral institutions (such as JICA and GTZ). There is an urgent need to assess how demography, environment, development and economic factors brought impacts in changing consumption and production patterns. Within the Indonesia-Australia Ministerial Forum (IMF), a Joint Working Group on Environment (JWGE) was established and chaired by officers from both countries' environment ministry. JWGE aims to promote cooperation on the environmental dimension of economics and trade.

The countries in Southeast Asia, who all have similar ecological characteristics, have agreed to overcome land degradation and its related poverty problems, they need help from the international community within the framework of the Convention to Combat Desertification (CDD).

Collaborations on water resources have been developed with other government institutions such as the Ministry of Energy and Mineral Resources, the Ministry of Foreign Affairs; public consultants; LP3ES; and international institutions like US-AEP, the World Bank, the Asian Development Bank, the Consultative Group on Indonesia, GTZ, OECF (Japan) and MD (Canada).

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