Center for River Basin Organizations and Management (CRBOM)

Experiences of Jasa Tirta I Public Corporation in Indonesia as a Corporate Type of River Basin Organization (RBO)


Workshop on Choosing Apropriate Type of River Basin Organization (RBO)

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JASA TIRTA I PUBLIC CORPORATION

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I. Introduction

This handout is prepared for the Center for River Basin Organization and Management (CRBOM) International Workshop, to address briefly on the Indonesian experience in water resources management by a corporate type of river basin organization (RBO), namely, Jasa Tirta I Public Corporation. This RBO operates in the Brantas and Bengawan Solo River Basins in Indonesia, as of end of 2013, and has been entitled to manage water resources in three other river basins under the Presidential Decree No 2 of 2014. This paper will underline how integrated water resources management was planned and executed in the context of the basin, by various means, stage-wisely development, and comprising institutional developments as well. Integrated water resources management means sharring water for multipurpose use, in an efficient and effective manner.

1.1 Integrated Water Resources Management

At its simplest, integrated water resources management (IWRM) is a logical and appealing concept. Its basis is that the many different uses of water resources are interdependent. That is evident to us all. High irrigation demands and polluted drainage flows from agriculture mean less freshwater for drinking or industrial use; contaminated municipal and industrial wastewater pollutes rivers and threatens ecosystems; if water has to be left in a river to protect fisheries and ecosystems, less can be diverted to grow crops. There are plenty more examples of the basic theme that unregulated use of scarce water resources are wasteful and inherently unsustainable.

Integrated (management) means that all the different uses of water resources are considered together. Water allocations and management decisions consider the effects of each use on the others. They are able to take account of overall social and economic goals, including the achievement of sustainable development. This also means ensuring coherent policy making related to all sectors. As we shall see, the basic IWRM concept has been extended to incorporate participatory decision-making. Different user groups (farmers, industries, hydropower, communities, and environmentalists) can influence strategies for water resource development and management. That brings additional benefits, as informed users apply local self-regulation in relation to issues such as water conservation and catchment protection far more effectively than central regulation and surveillance can achieve.

Management is used in its broadest sense. It emphasizes that we must not only focus on development of water resources but that we must consciously manage water development in a way that ensures long term sustainable use for future generations.

Integrated Water Resources Management is thus defined by the Global Water Partnership (GWP) as a process that promotes the coordinated development and the management of

water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.

IWRM is therefore a systematic process for the sustainable development, allocation and monitoring of water resource use in the context of social, economic and environmental objectives. It contrasts with the sectoral approach that applies in many countries. When responsibility for drinking water rests with one agency, for irrigation water with another and for the environment with yet another, lack of cross-sectoral linkages leads to uncoordinated water resource development and management, resulting in conflict, waste and unsustainable systems.

Box 1 Water Crisis - Facts

- Only 0.4% of total of global water in the world is available for humans.
- Today more than 2 billion people are affected by water shortages in over 40 countries.
- There are 263 river basins are shared by two or more nations.
- About 2 million tons per day of human waste are deposited in watercourses.
- Half the population of the developing world is exposed to polluted sources of water that increase disease incidence.
- Approximately 90% of natural disasters in the 1990s were water related.
- The increase in numbers of people from 6 billion to 9 billion will be the main driver of water resources management for the next 50 years.
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1.2 Why Do We Need Integrated Water Resources Management?

Water is vital for human survival, health and dignity and a fundamental resource for human development. The world's freshwater resources are under increasing pressure yet many still lack access to adequate water supply for basic needs. Growth in population, increased economic activity and improved standards of living lead to increased competition for, and conflicts over, the limited freshwater resource.

Here are a few reasons why many people argue that the world faces an impending water crisis:

- Water resources are increasingly under pressure from population growth, economic activity and intensifying competition for the water among users;
- Water withdrawals have increased more than twice as fast as population growth and currently one third of the world's population live in countries that experience medium to high water stress;
- Pollution is further enhancing water scarcity by reducing water usability downstream;
- Shortcomings in the management of water, a focus on developing new sources rather than managing existing ones better and top-down sector approaches to water management result in uncoordinated development and management of the resource.

- More and more development means greater impacts on the environment.
- Current concerns about climate variability and climate change demand improved management of water resources to cope with more intense floods and droughts.

II. Type of RBOs

2.1 General

In order to manage water in an integrated manner, it commonly agreed that a certain institutional body is required. This understanding may vary, later on, to various forms of institutions that were developed along the specific circumstances in basins and countries. However, it is agreed that integrated water resources management is conducted at the lowest appropriate level, that is, at a river basin scale. Therefore, the institutional body that undertakes integrated water resources management at that scale is commonly addressed as a river basin organization (RBO).

RBOs can exist as for example: councils, committees, commissions, agencies, authorities, and corporations.[1] A distinction can be made between three 'model types':

a. The council (or river basin committee, RBC) can assemble government and non-government representatives. It can have important responsibilities with little or no formal authority. It may have no staff; secretariat functions can be provided externally (for example by a public RBO). It typically provides guidance on for example water-sharing and water-related development.

b. The public RBO is a part of the executive branch of the state (with the status of a government body). It is often placed under a ministry, and is managed and staffed by government employees. It can be involved in regulation and enforcement and many other basin-level tasks.

c. The corporate RBO is owned by the state but operates as an independent legal entity. It can employ its own staff, can buy, own and sell property, and make many decisions on its own, within limits decided by the state and subject to supervision by the state. It can be involved in implementation, operation, maintenance, and many other basin-level tasks.

[1] As an example, the Philippines applies five types of RBOs: authority, commission, council, project management office, and inter-agency committee. Indonesia applies three types: central government RBO, provincial government RBO and corporate RBO.

Table 1– Model types of RBOs

	Council/RBC	Public RBO	Corporate RBO
Ownership	Autonomous	The state	The state
Governing board	None; or reporting to a ministry[2]	None; or typically having status of a ministerial department	Representatives of one or several ministries
Legal basis	Law and ministerial decree	Law and ministerial decree	Law and formal registration
Typical tasks	Guidance on watersharing and waterrelated development; and other tasks	Water allocation, planning, operation and maintenance, monitoring, regulation, enforcement; and other tasks	Planning, implementation, operation, maintenance, monitoring; and other tasks
Management	Council head (governmental or nongovernmental), Serving as a facilitator	Government-appointed head within the public administrative system	CEO-style director with high autonomy, responsible to the governing board
Staff	No staff; secretariat services provided by the government	Government employees, with salaries and career patterns based on seniority	Employed directly, performance-based salaries and career patterns
Operation	Consensus-oriented dialogue with water users and other stakeholders	Rule-based (for the sake of transparency, an important feature in public administration)	Responsive; related to demands and opportunities
Budget	Government budget	Government budget	Prepared autonomously, approved by the board
Financing	Government funding	Government funding	Direct revenue from operation (*water user fees*); government subsidies; performance contracts; but also may be loans; bonds; grants

Adapted from: Hidayat and Valiant (2011)

Some RBOs (particularly big ones) combine some of these characteristics, reflecting national law, traditions and preferences for public administration, as well as demands and opportunities in a particular river basin. Water councils/RBCs can receive secretariat services from a public agency, perhaps a public RBO or river basin office.

Different types of RBOs can operate side by side in the same basin, sharing various tasks between them. This is seen in Indonesia, for example in the Brantas and Bengawan Solo Basin in the Java Island, which is served by a water council, a public RBO and a corporate RBO (Jasa Tirta I Public Corporation).

[2] Thailand, the RBCs report to the National Water Resources Council (NWRC).

2.2 Financing

The public RBO is funded by the government in accordance with good national housekeeping. The corporate RBO is funded independently (but the government can contribute eventhough it is rare in terms of direct funding). Revenue streams can from case to case include taxes (including green taxes); fees (water, sewage disposal, electricity, various services and resource utilization); subsidies and cross-subsidies; and performance-based contracts with the government, linked to actual services.[3] The corporate RBO may share a part of its revenue with the state, for example if it manages a large hydropower potential. Apart from cash flows, the state can support the corporate RBO by loan guarantees (without affecting the public cash flow), however this degree of financial flexibility has not been exercized in the case of Indonesia.

2.3 Organizational Culture

There are important cultural differences between a public agency and a corporation. The differences can be briefly described as follows:

1. The ultimate (and highly important) purpose of the former is to serve the minister in fulfilling his or her responsibilities. This implies a top-down delegation of authority, responsibilities and tasks, and a high degree of predictability. The need of transparency indicates rule-based decisions.
2. The ultimate (and equally important) purpose of the corporation is to serve the customer (or beneficiary), which indicates a strong customer orientation.
3. The typical career in the government system is life-long, based on 'universal' (and hereby general) qualification criteria, developed during regular rotations between different postings, for example within a ministry. This is a good thing for the ministry (and for the national level of management), but can cause some disruptions at the basin level, for example if an entire generation of staff and/or key personels are shifted at the same time.
4. In comparison, the corporation can employ people for shorter periods than a lifetime, but it can also retain key staff if so desired; and it can maintain a dual-track career pattern for generalists (including managers) and specialists. Promotion, remuneration and other incentives can be based on performance, rather than seniority.

[3] Such as flood protection and morphological management of the river network (in Indonesia) and urban drainage (in Japan)

2.4 The performance of the RBO

The performance of an RBO is related to its mandate and requires a suitable harmony between mandate, authority and capacity. The particular benefits of the corporate RBO can be influenced by factors such as:

a. The time horizon for decisions, including political decisions and investment planning;

b. Performance orientation (and risk adverseness);

c. Incentives, motivation factors;

d. Attitude to innovation and to organizational adaptation;

e. Hierarchy (or power distance); allocation of (formal and informal) authority within the organization;

f. Dispute resolution capacity - internal and external;

g. Attitude to external knowledge-sharing and collaboration; and

h. Attitude to internal knowledge-sharing and collaboration.

Many of these factors will deviate between a public and a corporate RBO. In the Indonesia experience, with these different factors, the public-agency and corporate-type of RBO can assist each another whenever both of them are operating in the same basin.

III. Jasa Tirta I Public Corporation

3.1 Legal Basis of Establishment and Objectives

Jasa Tirta Public Corporation was established as a state-owned company with a specified concensus in rendering water services and performing O&M activities based on water service fee abstracted from the users. The corporation was established under the Government Regulation No. 5 of 1990.

To adapt further to the responsibilites and assignments, the regulating basis of Jasa Tirta I Public Corporation was twice ammended. Firstly, in 1999, by the Government Regulation No. 93 of 1999, in orderto strengthen the organization and permit its jurisdiction to extend to other basins; and recently by the Government Regulation No. 46 of 2010, to adapt to the Law No 7 of 2004 on Water Resources.

The objective and goal of Jasa Tirta I Public Corporation is take part and support the Government policy and program on economic sector and national development in general, and particularly on business of water resources and water resources management, as well as optimization of Jasa Tirta I Public Corporation resources to produce goods and services based on healthy corporation management principles.

3.2 Main Business Activities

In order to achieve the objective and goal, Jasa Tirta I Public Corporation conducts main business activities: (1) services to provide bulk water for drinking water, industry, agriculture, flushing, port, electric power generation and others; (2) provide water power to generate electricity for the State Electricity Company; (3) generate and distribute electric power and drinking water, perform consulting in water resources fields, heavy equipment rental and water quality laboratory services, and (4) develop other water-related services including piped domestic supply at specified scales.

Besides the above activities, Jasa Tirta I Public Corporation also conducts optimization of resources owned by the corporation for office estates, warehousing, tourism, hotel and resort, sport and recreation, hospital, telecommunication infrastructures, energy resources, consulting services, construction services, eco-business, training center, agriculture, leasing, and business of infrastructures owned and controlled by the corporation.

3.3 Tasks and Responsibilities

Jasa Tirta I Public Corporationin-charged in managing the water resources in 40 rivers (including the Brantas River) of the basin and to operate, maintaining, and managing the major infrastructure in these rivers. In 2000, the corporation was authorized to undertake water resources management activitieswithin 25 rivers of the Bengawan Solo River Basin (an inter-provincial river basin lying in Central Java and East Java Provinces). summarizes the rivers in the Brantas and Bengawan Solo Rivers Basin managed by the corporation.

Table 2 – Assigned rivers to the corporation within the Brantas and Bengawan Solo under the Government Regulation No 46 of 2010

Brantas River Basin (40 rivers)	Bengawan Solo River Basin (25 rivers)
Brantas, Amprong, Lesti, Metro, Lahor, Bambang, Lekso, Semut, Jari, Putih, Ewuh, Dawir, Parit Agung, Parit Raya, Ngrowo, Ngasinan, Tawing, Tugu, Bodeng, Song, Badak, Serinjing, Konto, Kedak, Widas, Kedungsoko, Ulo, Kuncir, Bening, Beng, Watudakon, Brangkal, Sadar, Kambing, Porong, Marmoyo, Surabaya, Kedurus, Wonokromo, Mas	Bengawan Solo, Tirtomoyo, Keduwang, Walikan, Dengkeng, Blora, Ceper, Ujung, Lohgede, Siwaluh, Grompol, Tempuran, Mungkung, Gambiran, Madiun, Ketegan, Cemer, Catur, Brangkal, Gandong, Kukur, Jungke, Ketongo, Trinil, Foodway Plangwot-Sedayulawas

Therefore, tasks and responsibilities of Jasa Tirta I Public Corporationare defined to: (1) rendering water services at the basin-scale, and (2) conductingcertain activitiesof water resources management at 40 assigned-rivers in the Brantas River Basin and 25 assigned rivers in the Bengawan Solo River Basin.

Water services within at the basin scale are stipulated in Article 4 of the Government Regulation No 46 of 2010[4] whilst certain activities of water resources management within the assigned rivers in the basin is stipultated in Article 5 of the same regulation.[5]

Besides the tasks and responsibilities mentioned above, Jasa Tirta I Public Corporation also conducts public utilization of water resources to fulfill people needs for social services, welfare and safety of the public within the working area of the corporation. Those includes providing surface water supply to fulfill daily basic needs, providing irrigation water for public agriculture within the existing irrigation system, controlling flood hazards, conducting water resources conservation and performing the development of drinking water supply system (in Indonesian: *sistem penyediaan air minum* or abbreviated as SPAM).

The corporation is not responsible for irrigation system management but provides bulk water. In cases where water supply is made from the irrigation system for non-irrigation functions (water supply to industry), the corporation coordinates with the concerned irrigation agency. Thus, much of the management decisions are based on a consultative process through a proactive approach. The corporation is authorized to make most of the technical policy decisions and some policy decisions related to WRM, such as release of reservoir water for flushing, changes in water allocation during times of shortage, reservoir operation, awareness campaign etc.

Jasa Tirta I Public Corporation however has no policy power in areas of enforcement, basin planning, basin infrastructure development and investment for public services, off-stream water quality improvement, tariff fixing. In these areas where it is not permitted to make policy decisions, the corporation works through the administrative and consultative channel to influence decisions. As ariver basin organization, Jasa Tirta I

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4 The tasks and responsibilities are: (a) delivering services for water utilization by the users; (b) guarantee the water services for the users through the implementation of operation and maintenance works, including construction of water resources infrastructure which give direct benefits; and (c) provide technical consideration and advice to the government regulatory body in the basin, on water usage.

5 The tasks and responsibilities are to perform: (a) operation of water resources infrastructures which are already transferred to corporation; (b) perform preventive maintenance which consists of routine and periodic maintenance and minor repair of water resources infrastructures which are already transferred to the corporation; (c) perform preventive maintenance which consists of routine and periodic maintenance and minor repair of water resources which are already transferred to corporation; (d) assist the Government to protect and safe water resources and the infrastructures in order to maintain its preservation, based on the (financial) abilities of the corporation; (e) emergency maintenance of water resources and the infrastructures which are already transferred to corporation in consideration to the financial ability of the corporation; (f) assist the Government to perform water resources conservation and controlling of water resources destructive forces; (g) flushing for river maintenance; (h) monitoring and evaluation of water quantity and quality of water resources;(i) disseminate results of the monitoring and evaluation of water quantity and quality to users, community and other stakeholders; (j) in cooperation with the Government regulating body within the river basin: provide guidance and counseling to the community to improve their empowerment; (k) technical consideration and advice for the utilization of water resources.

Public Corporation has to be an accountable and effective organization in most aspects of the water resources management process, coordination, improving resource base, and working with other agencies and stakeholders by adopting a proactive management style and having a good working relationship with both formal and informal institutions.

Recently on January 22, 2014 the Presidential Decree No 2 of 2014 has stipulated three river basins in Indonesia to be the additional working area of Jasa Tirta I Public Corporation. The three river basins are: Jragung-Tuntang-Serang-Lusi-Juana (abbreviated as Jratunseluna), Serayu-Bogowonto and Toba-Asahan. Under the present situation, preparations are being made for expanding the corporation services to the three new basins, and hopefully will start to function as early as 2015.

3.4 Collaboration with Stakeholders

Water resources management covers across sector and across area of interest that require cohesiveness of action to maintain sustainability of function and benefit of water resources. As a platform for stakeholder liaison, cohesiveness of action and advisory mechanism for water-related basin-level development and management, it requires a coordination and consultative mechanism to integrate the interests of various sector, territory and stakeholders in water resources. According to the Water Resources Law No.7 of 2004, coordination of water resources management must be established at the national level (National Water Resources Council), at the provincial level (Water Resources Council or other name) and in basin level (Water Resources Management Coordination Team abbreviated WRMCT or in Indonesian: *Tim Koordinasi Pengelolaan Sumber daya Air* abbreviated as TKPSDA).

Establishment of coordination body of water resources management in regency are optional, depend on the local necessity of this coordination body.

Both for the Brantas and Bengawan Solo, WRMCT are established. Membership of the WRMCT consists of river basin organizations – both the corporate-type RBO (Jasa Tirta I Public Corporation) and the public type of RBO (in Indonesian: Balai Besar Wilayah Sungai), provincial and regency/municipal government agencies (related to regional planning, irrigation services, agriculture, environment, health, forestry, industry, energy and natural resources, in-land fisheries) and non-governmental organizations (water users, associations for irrigators, bulk-water user for domestic and industrial purposes, tourism, forestry pressure groups, etc).

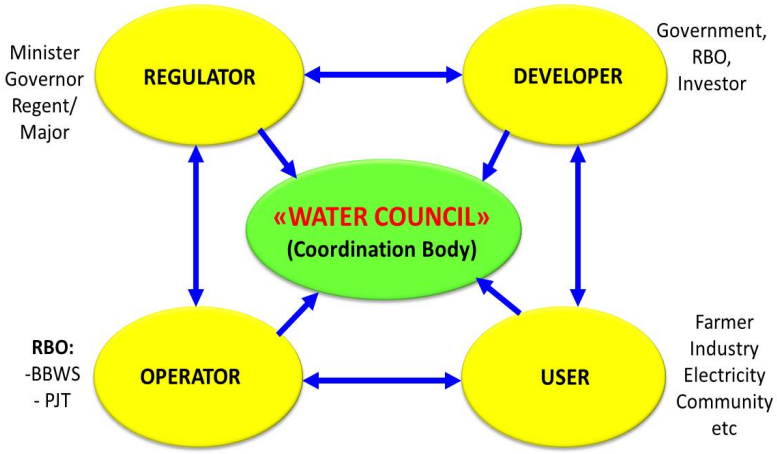

Figure 1 – Coordination scheme under the Water Resources Law No 7 of 2014

WRMCT is presided by a Chairman and supported by 4 (four) commissions, on water resources utilization, conservation, water-related hazards, and information system. WRMCT reports to the Ministry of Public Works and to the related governors that encompasses the basins.

Prior to the establishment of the Coordination Team, in order to avoid conflict among water users in the Brantas River basin, a Provincial Water Resources Management Committee (in Indonesian: Panitia Tata Pengaturan Air) that was established based on the East Java Governor's Decree No. 59 of 1994. The committee, responsible to the Governor, was supposed to be a coordination body where decision on all management aspects in water resources (planning, implementing, supervising, controlling and funding) in its respective area was made.

3.5 Organizational Setup

Jasa Tirta I Public Corporation is supervised by a supervisory board composed of central and provincial government representatives and is managed by a board of directors headed by a president director. Being a national corporation, the authority to oversee the management and functioning of PJT-I lies with the center through the MPW, with the Ministry of State-owned Corporation (MoSC) exercising a fiscal oversight role.

The Minister, who draws his powers from the water law, has supervisory control. The supervisory board has five members representing the MPW, MoSC, other Ministry concern (nowadays from the Ministry of Research and Technology) and provincial government (East Java and Central Java) who undertakes general supervision of the corporation's program, work plan, and budget. This is the only institutional setting in which the Provincial Government of East Java (for Brantas basin) and Central Java and East Java (for Bengawan Solo basin) can directly interact with the work of the corporation and influence the WRM in the basin, apart from the authority it exercises through other agencies in the basin. To a large extent the central ministries' (MPW and

MoSC) role overshadows the supervisory board's functions in the operation of the corporation.

The day-to-day management of the corporation is with an executive board director. Based on the recent Minister of SoC Decree (Nov. 2012), the board of director composed of a President Director, a Director for Technical Affairs, a Directors of Business Development, a Director of WR Management, and a Director of Financial and General Affairs. Three regional units (division) in the Brantas basin and two regional units in the Bengawan Solo, manage the field operations and maintenance of the water resources system.

3.6 Financing and Funding

In order to support the sustainability of Water Resources Management, a consistence and continuous funding support are required. The Water Resources Law No.7 of 2004has mandated that funding source for water resources management can be derived from: (i) government budget; (ii) private budget; and (iii) water service fee (WSF).

Based on the Government Regulation No 46 of 2010, Jasa Tirta I Public Corporation has been given the authority to collect, receive and use the revenue from WSF to finance water resources infrastructure operationa and management activities based on its tasks and responsibilities. The Ministry of Public Works (MPW) regulate and stipulate the WSF tariff.

3.7 Quality Assurance System

Managed by Jasa Tirta I Public Corporation I, the Brantas River Basin was the first river basin in Indonesia that applies the Quality Management System (based on the ISO 9001-2000 approach) for design, operation and maintenance of water resources and infrastructure; this quality system was implemented since 1997 under the motto Identity by Quality. This quality management system is then also certified for the Bengawan Solo River Basin since 2011.

Besides to anticipate stakeholders and beneficiaries request and to enhance stakeholders satisfaction by meeting their requirements, the reasons to adopt this Quality Management System is as an instrument improve the water resources management to more-over global standards; endorse efficiency, effective and consistent corporate action; improve employee's integrity; optimize time and resources usage.

Benefit of this quality assurance system:

- Operational aspect of the company is not affected by change of the employed workforce (better working methods);
- Improvement in the company's performance;
- Stakeholders' complaints are better handled and anticipated;

- Main tasks are undertaken more efficient and effectively;
- Better relationship between stakeholders and beneficiaries, and
- Easier to implement Good Corporate Governance (GCG) principles.
- Appreciation from external parties to the company's existence increases;
- Pilot concept for water resources management at the basin-wide perspective in Indonesia;

3.8 Corporation Achievement

After operating for several years, Jasa Tirta I Public Corporation has been able to pilot the developing management system and technology for advanced water resources management. The corporation has performed in either technical, financial, management aspect.

a. Technical Aspect

The following technical aspects were utilized:

- The fourth master plan of the Brantas River Basin, as inter-sectoral approach for water management and conservation in the basin since 1998 and the second master plan of the Bengawan Solo River Basin is implemented since 2000.
- Brantas and Bengawan Solo flood control plan has been established during preparation of the master plan and both are executed at an operational basis.
- Brantas river pollution control master planwas set up in 1998 for river pollution control and effluent regulations. The water quality shows improvement although the standard values have not been achieved.
- Water resources conservation is carried out in coordination and cooperation with related agencies in various departments, local governments and the population in general of the Brantas and Bengawan Solo River Basin.
- Water allocation is carried out through coordination with WRCMT as explained before. The operational patterns are prepared by Jasa Tirta I Public Corporation.
- Effluent discharge standard is currently stated in the East Java Governor Decree No. 136 of 1994 however it is being updated involving all agencies concerned under coordination of related agency at the provincial level.

b. Financial Aspect

Ever since its establishment, Jasa Tirta I Public Corporation has been carrying out the O&M of water resources infrastructures funded by the beneficiaries. Although it has not been fully funded by the water users, the step-wisely attempt to apply the principle of cost recovery in O&M activities is being applied basin-widely.

Tariff of the rendered water service fee is decided by the MoPW, based on the result of consultation to thecostumers done by Specific Team established by the MPW. The service is conducted also on a contract basis that provides security for both parties. In the future, it is expected that the Basin Water Resources Management Committee will act as consultation forum for having an agreement on this tariff.

Tariff of water service fee increased significantly in the last decade. Tariff applied in 2012 was Rp 149.37/kWh (for water power use for electricity generation), Rp 112/m^3 (for domestic water use) and Rp 221.07 /m^3 (for industrial water use, progressive approach), in other words,it has increases for 10.5 times, 3.2 times and 4.2 times respectivelycompared to the same tariffs of 2001.

Progressive block system tariff policy for industrial water users has shown a good example for promoting efficiency use of water. Many big industrial costumers (such as sugar cane factories) apply recycling technologies to reduce their water abstractions. Water service fee revenue has increased from Rp 29.1 billion in 2001 to Rp 298.3 billion in 2013 (audited). Budget allocation for operation and maintenance activities goes up from Rp 27.9 billion in 2001 to Rp 288.6 billion in 2013.

Other than the water service fee, Jasa Tirta I Public Corporation also raises fund from non-water services, such as consultancy, construction, equipment rental, land rental, tourism, and joint venture in resource utilization. Private sectors' desire to participate also in investment for water resources development such as hydropower project, drinking water supply, tourism etc. by establishing joint venture or joint operation.

c. Management Aspect

As a state-owned company, the corporate RBO in Indonesia is subject to various management audit and control. Management performance of the corporation is judged based on financial criteria's as well as good-corporate performance or best common practice in managing a company. This criterias are set forth by the MoSC and evaluated regularly on an annual basis like common corporations world-wide.

Jasa Tirta I Public Corporation was established to solve managerial, personnel and financial problems that loom over the completed water resources infrastructure in the Brantas River Basin. This task was achieved, not in a perfect sense, but as a role model for other river basins in Indonesia. This corporate body is an example of what proper management can do to extend the development benefits to its beneficiaries.

Triple bottom line of key success areas is adopted by the management to realize the corporate vision 2025: «to beone of worldwide class basin water resources management agency» as described in the following figure.

Figure 2 – Three key success area in water resources institutional approach

After 20 years, the corporation has develop its management capacity, whereas some areas should be maintained continuously:

- Consolidated water resources management system supported by regional legislation for the operational basis of the management;
- Better river basin organization role in the integrated activity implementation related to water resources;
- Improved coordination, increase awareness and stakeholder's participation in decision making process based on agreed mechanism in BWRMC;
- International acknowledgment on quality management system of the Brantas water resources management presented by ISO-9001 Certificate from SGS International Certification Services in May 1997 (Certificate No. Q9755);
- Active participation in Network of Asian River Basin Organization (NARBO) since its establishment 2003;
- Satisfactorily score using the NARBO's RBO performance benchmarking, as result of peer reviewing by other RBOs in 2009.

On the financial and management aspect, the following achievements were obtained, based on the audited financial report of the corporation in accordance to the financial indicators given by the MoSC.

The benefits from water resources development and management in the Brantas River basin gives very significant supports to the economic development in the basin, in the region (East Java Province) and National which raise economic welfare of the area as measured in the gross domestic product (GDP).

Table 3 – Some comparasion to the Brantas River Basin performance in terms of water resources management

Benefit	Unit	Before 1990	1990-2000	2010-present
Flood control at the mainstream	Innundation	50.000 ha	5.000	< 5.000
Irrigation	Cropping intensity annually	1.8	2.2	2.2
Electricity	GW-hour	910	1.024	1.315
Domestic bulk-water supply	Million m^3			
Industrial bulk-water supply	Million m^3	125	204	315
Water quality	BOD-average/annual	12-16 mg/litre	3-14 mg/litre	3,2-7,5 mg/litre
Infrastructures	Overall condition	Less-maintenance	Maintained	Maintained

3.9 Brantas IWRM Spiral Model

Modern water resources development and management in certain river basin has a long history (almost 50 years since 1960's) abiding the colonial and post-colonial's efforts, and therefore having a wide spectrums of lesson learnt could be shared. It is a practical example of UNESCO (1992) basic concept as presented in **a spiral model of integrated water resources management**.

The spiral evolutionary model reflects progressivepositive changes in historical water resources development and managementand offers the following advantages: it allows IWRM actions to be started at anypoint of the evolutionary process; builds capacity over time; promotes cooperation and integration, as well as pursuit for better solutionsthat adapt to changing circumstances andvalues.

Box 2 – Nation-wide Jasa Tirta I Public Corporation

After a long period and wide-span of experiences in developing and managing water resources, the Government of Indonesia got the intention to scaling-up Jasa Tirta Public Corporation to be national wide water resources management body to manage national strategic river basins. The Presidential Decree No 2 of 2014 has stipulated three river basins as additional working area of the corporate-RBO. Thus, in total Jasa Tirta I Public Corporation manages 5 river basins.

The spiral of integrated water resources management illustrates the process as an incremental, step by-step process, and therefore provides apractical framework for looking ahead andplanning for successive turns of the spiral. The following figure illustrates the evolutionary step of water resources development and management in the Brantas River Basin since the modern WRDM has applied in the basin.

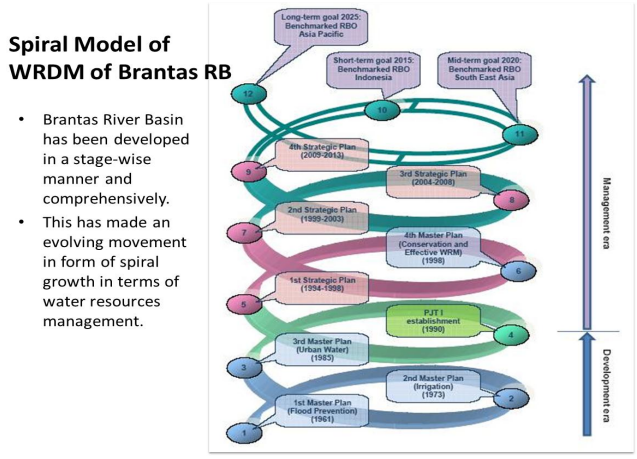

Figure 3 – Example of the spiral approach to integrated water resources management for the Brantas River Basin, Indonesia

IV. Discussion of Benefits

4.1 General

The strengths of the corporate RBO are derived from its autonomy, which can vary from case to case, depending on the adequacy of its financing and on the actual involvement of the state in its day-to-day operation. To the extent that it is in a position to implement its own plans and development initiatives (within its mandate and financial capacity), it can respond faster to needs and opportunities. Also, it can provide a relative strengthening of the basin-level perspective as compared with the public RBO (where funds are allocated in the broader, national perspective).

There are three particular strengths of the corporate RBO:

1. **Good performance:** The public corporation can perfom well in terms of for example formal status; governance; human resources, technological development; organizational adaptation; cost recovery; and financial efficiency. This was demonstrated in Indonesia, where the two corporate type RBOs were top-rated in a recent national RBO performance benchmarking. Among the reasons is a better ability to adapt to new needs and new knowledge. It is easier for a corporation to re-define responsibilities, hire new staff, or create a new department, if the need arises.

2. **A much shorter way from decision to implementation:** Once an investment (or other development) need has been identified as useful, it can be promoted by in-house capacity, rather than by some line agency (or agencies) that can be external to the RBO that has raised the need. Subject to satisfactory financial feasibility and acceptable impacts, the investment can be financed in different ways, including loans - separate from a lengthy public investment planning procedure.

3. **A better basis for IWRM-based, multi-sector, basin-level development:** Development initiatives can be promoted as entities, rather than being split into different sector components as a practical precondition for promotion by line agencies during their (sector-based) investment planning. This reduces the need of an inter-agency synchronization of priorities, and allows for investment priorities being made in an integrated perspective rather than as a combination of segregated sector priorities. Also, the corporate RBO can focus more clearly on its river basin, where the public RBO, as a part of the government system, must apply the national perspective to some extent.

4.2 Relations between the government and the corporate RBO

The benefits of the corporate RBO are related to its partial independence from the government system. Still, any RBO, irrespective of its status, is in need of political support.

The balance between government control and independence is important. The government provides legitimacy and over-all directions, but can leave the operation to the corporation. A comprehensive day-to-day involvement would blur the distinction between the public and the corporate RBO, and would reduce the intended particular benefits of the latter – including the benefit of independent, external performance supervision by the state.

The statutes of the corporate RBO are issued by the government. They will define its mandate (often including a geographic delineation), the related authority, relations with various government bodies, and the flow of revenue. The RBOs investment planning, covering major financial obligations, would need endorsement from the state, as it is the case for private corporations that require endorsement from its owners.

The involvement by the state in the operation of the corporate RBO can take place via a governing board with representatives from the government. This can support a clear delineation of tasks and responsibilities.

4.3 Relations with the private sector

The private sector can contribute significantly at the basin level, both within planning, financing, implementation and operation.

The private sector offers a perspective that in some ways is complementary to the perspective of the public sector, in terms of scoping, time horizon, and financing. The private sector can contribute to water supplies, sanitation and waste disposal. In basin-level development planning, the private sector can contribute qualified opinions and guidance about for example water allocation, efficiency improvements, infrastructural development needs, and livelihood generation.

The corporate RBO can liaise with the private sector, from case to case in terms of knowledge-sharing, dialogue during planning and decision-making, financing or cofinancing of development initiatives, and general business relations. A good informal authority is helpful in this connection.

4.4 Ability to adapt

The corporate RBO is in a particular position to adjust and develop its operation in response to new demands and better knowledge. Experience from PJT1 shows that adjustments and adaptation options can include:

a. Strategic planning in support of present or desired future core competencies;
b. Stakeholder feedback for guidance of governance and institutional development;
c. Knowledge base development, including (but not limited to) data collection, data management and information systems, and related dissemination;
d. Streamlined collaboration with government agencies NGOs and communities;
e. Public relations and awareness-building;
f. Human resources management;
g. Responsiveness in service delivery;
h. Rechnological adaptation and innovation;
i. Various kinds of performance monitoring;
j. Management of occupational health and safety;
k. Full or partial cost recovery;
l. Implementation of various enforcement measures; and
m. General quality management with audits.

V. Addresing Future Challenges

Some issues are identified as the most likely to have significant impacts on future water management in the Brantas Basin. The issues and challenges will give impact to water security in the basin, since water resources in the basin is very important input of agriculture production, water quality degradation has occurred in the basin and threaten the health and welfare of the poor and the water related hazards such as extreme floods and landslides etc. happen frequently.

5.1 Water scarcity

The first main issue and challenge is related to water scarcity in the Brantas and Bengawan Solo River basin in the near future that will cause the difficulties to allocate water due to increasing water demand and limited supply capacity. Growing population require more calories and their increasing wealth spurs demand for fruits and vegetables as well as animal products, whose feed requires more land and water resources. In case of serious drought and unexpected drought year, shortage of water would become more serious for meeting the expanded water demand.

This situation will lead to conflict of interest among users. The limited supply capacity is caused by the decrease of effective storage capacity of the reservoirs in the basin due to severe land erosion and sedimentation. Watershed degradation has become an important constrain, since erosion (related to land use and spatial management) and natural forces (volcanic debris) enhances sedimentation that shortens economic life of major dams in the basin and natural base flow degradation during dry spells.

The Brantas River basin has eight reservoirs with a total initial gross storage capacity of 647.0 million m^3 and effective storage capacity of 479.6 million m^3. Because of sedimentation, the gross and effective storage are now decreasing to 390 million m^3 (60%) and 341 million m^3 (71%) respectively. The remaining effective storage of Sutami Reservoir is only 56.1% of its original. While in the Bengawan Solo, the sole water storage at the present moment is the Wonogiri Reservoir, situated far up-stream in the basin, unable to secure flows downstreams for a lengthy period.

5.2 Water quality degradation

The second main issue and challenge is related to water quality deterioration in the Brantas and Bengawan Solo River Basin. Increase of population at the Brantas River Basin and various economic activities, has direct impact on water quality in the basin, and could be foreseen in the following facts:

a. Domestic bulk water supply for Surabaya City is provided mainly from Brantas surface water, as Surakarta City from the Bengawan Solo. As a matter of pollution accumulation, the river's water has a low dissolved oxygen (DO) level, thus creating water purification difficulties and raises the cost of water treatment.

b. Increased water pollution is frequently worsened by shock loadings, especially in the dry season when natural flows in the rivers are at the minimum.

c. The occurrence of increased turbidity during the rainy season inflicts the increase of sediment contents caused by degradation of the upstream catchments area.

d. Eutrophication symptoms at the Sutami Reservoir in the Brantas River Basin due to accumulation of nitrates (N) and phosphates (P) elements, are an basin-wide risk of water bodies.

5.3 Water Related Hazards

The third main issue and challenge is related to water related hazards in the Brantas River basin.

The land development for farming and illegal logging in the mountainous area has brought about increase of flood magnitude in the downstream, land erosion, landslides and thus debris discharge increase. Flood control works such as the construction of dikes, revetment and other facilities has brought about accumulation of people and properties in surrounding area of river. This means increase of flood damage potential. The more safety is required to protect the people and properties from flood.

The water related hazards such as extreme floods and landslides etc. happen frequently in the Brantas River basin. Extreme flood usually happen in some small tributaries e.g. Amprong, Bogel, Sadar, Batan, Gunting Rivers etc. The flood occurrence in the tributaries couldn't be avoided due to lack of flood control structures.

5.4 Climate Change

Water resources face more delicate problems caused by climate change. Rainfall will increase in some areas and decrease in others. Changes – both increases and decreases - in average rainfall of up to 20% are predicted in many cases. The size of extreme water events such as floods and droughtswill be more powerful, intense, and longer.It is predicted thatextreme events will occur more often; floods and droughts that previously occurred once in a lifetime, every 50 years, may now occur every 5 or 10 years.

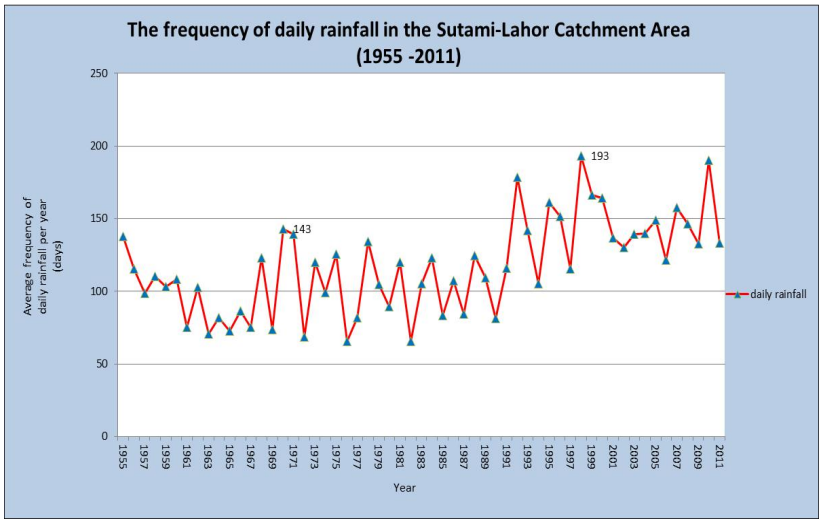

Figure 4 – Frequency of daily rainfall (Sutami-Lahor Catchment Area)

As an example in the Brantas River Basin, the annual frequency of daily rainfall during 1955-1989 is 100 days with maximum of 143 days in 1970. Between 1990-2011, the annual average became 146 days daily-rainfalls per year, with maximum of 193 days in 1998. Therefore, it can deduce climate variability that will affect the hydrological pattern of the basin.

VI. Conclusion

1. In the many challenges that face Asia's river basins, the Indonesian experience of managing water resources through three types of RBOs may contribute to the discussion. Indonesia applies three types of RBOs: central government RBO, provincial government RBO and corporate RBO; from whom one can take conclusion on important aspects, that are useful in choosing the correct type or combination between various types (council, government, corporate etc.)

2. Indonesian experience with corporate-RBOs has given focus on the light this type of institution can contribute to integrated water management, provide operator services to commercial and non-commercial water users, as well as supporting the overall basin development plan, in an efficient and effective manner. The example of Jasa Tirta I Public Corporation is prove of the best practice that has been exercised over the years in Indonesia. This RBO manages bulk-water supplies at 2 river basins (Brantas and Bengawan Solo), conduct operation and maintenance as well as other related water resources management activities, in the efficient and effective manner.

3. Cooperation between the three types of RBOs in Indonesia (central government, provincial government and corporate RBO) is an important part of undertaking integrated water resources management at a basin context. In order to provide better services, comprising both fee abstracted water services for commercial users and non-commercial services, the corporate-type of RBO like Jasa Tirta I Public Corporation is required to take far-reaching decisions and timely implementation (as well as comprehensive investments) within water supply; power generation; maintaining storage capacity; flood protection; and morphological management.

4. An important lesson from the benefits of a corporate-type RBO is its mandate, authority and capacity for sharing a finite amount of water, provision of supplies and services, management of the aquatic environment, and expansion of the knowledge-based. A corporate RBO must conducted commercial services within its business plan, but not omit the public services like flood control, environmental flows and other amenities that are related to water in a river basin context. Jasa Tirta I Public Corporation has tried to fulfill this role.

5. Preconditions to develop a corporate RBO in the Indonesian context, comprises but not limited to: (a) political support; with the corporate RBOin particular need of strategic (over-all, long-term) support; (b) good relations with water users and other stakeholders; and (c) good leadership, as the top management of any corporate-RBO must be visionary, make timely decisions and generate internal and external support to their implementation.

6. Water security in the Brantas and Bengawan Solo River Basin is related to increasing water demand and limited supply capacity, water resources degradation in terms of quality, especially in the watershed area, more bigger size and frequent

of water related hazard. These challenges are aggravated by climate change that requires effective implementation of adaptation measures.

7. After a long period and basin-wide span of experiences in managing water resources, the Government of Indonesia has the intention to step-wisely scale Jasa Tirta I Public Corporation in to be a nation-wide corporate RBO with the concession in managing national/strategic river basins.

VII. References

Aldrian, E., dan S. D. Djamil. 2006. Long term rainfall trend of the Brantas Catchment Area, East Java. *Indonesian Journal of Geography* **38**: 26-40.

Boomgaard. P., (2007), *A World of Water: Rain, Rivers and Seas in Southeast Asian Histories*, Koninglijke Instituut voor Taal, Land en Volkunde (KITVL) Press, Netherlands: 248-249. (ISBN 978-9067182942).

Hidayat, F. and R. Valiant. 2011. *The case of the corporate RBO*. Short Publication Series No 42, Center for River Basin Organization and Management (CRBOM), Surakarta, Indonesia.

Nippon Koei K.K., (1961), *Comprehensive Report on the Kali Brantas Overall Project, Government of the Republic of Indonesia*, Ministry of Public Works and Power, Jakarta, Indonesia: 3-14.

Departemen Pekerjaan Umum (PU). 2000. Final Report. Comprehensive Water Resources Development and Management Plan for the Bengawan Solo River Basin. Direktorat Jenderal Pengairan, Indonesia.

Shiklomanov, I. A. 1997. *Assessment of Water Resources and Water Availability in the World*. Jenewa: World Meteorological Organization dan Stockholm Environment Institute. Swis.

United Nations Development Program (UNDP). –. *Water Governance for Poverty Reduction: Key Issues and the UNDP Response to Millenium Development Goals*. New York, United States of America.

United Nations Development Program (UNDP). 2007. *Human Development Report 2006, Palgrave Mac Millian*, New York, United States of America: 3-25. (ISBN 0-230-50058-7)

United Nations Educational, Scientific and Cultural Organization (UNESCO), (2009), *Water in a Changing World*, UNESCO Publishing, Paris, France. (ISBN: 978-9-23104-095-5).

Wirosoemarto, S., 1997a. Perkembangan Pembangunan Pengairan di Indonesia. First Part (2), *Direktorat Jenderal Pengairan, Departemen Pekerjaan Umum*: 6-7.

Wirosoemarto, S., 1997b. Perkembangan Pembangunan Pengairan di Indonesia. First Part (1), *Direktorat Jenderal Pengairan, Departemen Pekerjaan Umum*: 132-133.