

WATER QUALITY MANAGEMENT FOR THE CITARUM RIVER BASIN
(Implemented by Jasa Tirta II Public Corporation)

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INTRODUCTION

Physical Features of The Citarum River Basin.

Citarum River Basin and Regional Water District (extended river basin) is located in West Java Province while Citarum River Basin and Regional Water District (extended river basin) the service area covering two provincial administrative, i.e. West Java and DKI Jakarta. Annual precipitation depth is 3,000 mm per year in the mountainous range and 2,500 in the lowland. Relative humidity is 80% and daily temperature of 25°C in the lowland and of 18°C in the mountainous area.

The Citarum River Basin and Regional Water District (extended river basin) measures over 11.000 km². The Citarum river is 270 km in length. Three large, multi purpose dams (reservoirs) in the Citarum river, namely Saguling, Cirata and Ir. H. Djuanda (Jatiluhur) reservoirs to regulate the flow.

The seasonal variation in river run off closely follows the rainfall distribution, marked by a distinct dry and wet season. Rainfall in the basin varies from about 4,000 mm/year in the mountainous areas in the upper catchments to about 1,500 mm/year along the coast. Total divertible run off from the unregulated river amounts to 1,800 million m³ annually. A relatively small amount of water (average 3,4 m³/s or 107 million m³/year) is transferred into the upper Citarum Basin from the neighboring Cilaki and Cibeet basins located to the south.

There are nine rivers traversing the area from mountainous range in the south to the north and terminated in Java Sea. Citarum River is the biggest one connected with four rivers to the west namely Cibeet, Cikarang, Bekasi and Ciliwung, and four rivers to the east namely Ciherang, Cilamaya, Ciasem, and Cipunegara by manmade canals namely West Tarum Canal (WTC) and East Tarum Canal (ETC) respectively formed a unit of hydrological boundary of Citarum integrated basin of 12,000 km².

WATER QUALITY ISSUES

Water Quality Issues

Over recent years the demands for water in the Citarum drainage basin have changed and increased very rapidly in parallel with the economy expanding of Indonesia. The irrigation canals of the East, West and North Tarum Canals were originally designed for rice irrigation. This is still the main user of water volume, but economic evolution

has created different types of industrial and municipal users whose demands will continue to increase. Manufacturing activities and expanding populations produce pollution which is discharged from point or diffuse sources into the Citarum Rivers and into the smaller Cikao, Cibeet, Cikarang and Bekasi rivers. The Citarum river is mostly polluted by urban effluent in the upper part of the catchment areas, particularly in the Bandung area. All these wastewater effluents will continue to increase unless preventive measures are taken. The economic value to the region of new commercial developments is now must be greater than that of the agricultural output. The irrigated rice agriculture in the lowest parts of all the rivers also contributes considerable organic pollution load.

The Government of Indonesia has taken a number of measures to control water pollution in the area. The main measures have been to create legal effluent and river water standards, come to an understanding with industry about pollution control, and to operate a monitoring program which checks industrial adherence to these regulations (PROKASIH). There is also an institution being established, such as Jasa Tirta II Public Corporation, which has the responsibility to maintain supply of water at a good quality. In spite of these measures water quality in the rivers continues to deteriorate.

The very large economic development in the catchment areas of the Cikao, Cibeet, Cikarang and Bekasi relative to the discharges in these rivers means that there is either unacceptable pollution now or that there will be increasing amounts for the future development of the area. The pollution load is expected to almost double by year 2025. Provision of dilution water for effluent will not solve the problem of pollutants at their production source. Therefore it is important to develop a management program which encourages reduction in their production, and at the same time provides treatment systems for those, largely domestic, polluters who are not in a position effectively to deal with their wastewater themselves.

A large user of the Citarum river is Electricity State Company (PT.PLN) for hydropower generation from upper two hydro power reservoir (Saguling and Cirata Dams). The Ministry of Public Works through Jasa Tirta II Public Corporation also generates electricity from the lower reservoir (Jatiluhur/Ir. H. Djuanda Dam). The chemical pollution effect of this use is not great, although the natural environment of the river is modified by the discharge regime from the dams. After the irrigation water abstraction, the city of Jakarta is by far the greatest abstracter of the Citarum river water. The planned new large industrial estates in the basin will increase this municipal demand still further, so that the future uses of the Citarum and the other river waters will become increasingly devoted to these municipal and industrial demands.

In terms of organic material the planned by passing of the polluted rivers of the Cibeet, Cikarang and Bekasi from the West Tarum Canal will relieve an organic pollution load from the drinking water supply to Jakarta by about 11 % of the present total. This is presently a relatively small proportion and the Citarum river will continue to supply the greatest loading of organic material. The low present proportion is due to the far greater hydraulic discharge of the Citarum than the other rivers. However, future industrial development in the basin will probably increase the

percent contribution from the smaller rivers because of the expansion of commercial development in their catchment areas.

The most important single source of pollution to the Citarum river is the Bandung district as a whole, but especially the municipal area. This is followed in importance by the Purwakarta urban area further downstream, Discharge from Bandung area have been responsible for the extreme eutrophic deterioration of the waters of the three Citarum hydroelectric reservoirs. This deterioration has negative impacts upon the operations of the hydropower stations and on order productive uses of the lakes for fishing and recreation. The lowest reservoir, Jatiluhur/Ir. H. Djuanda , is at present not greatly affected in this way but in the course of time its deterioration will be more evident if no action is taken for the management of all three reservoirs. The most important one is at the uppermost of Saguling reservoir.

Reservoir and Catchment Area Erosions

These reservoirs are very important in interpreting the environmental impacts of pollution and of monitored water quality data. The most important management action is to control the amounts of plant nutrient most passing from upstream, from the Bandung urban area and district.

Land clearing and deforestation of the upper catchment areas have increased soil erosion and the silt loads in the rivers. Silt station of the river and irrigation canals can lead to flood problems, and to extra cost in managing the water supply treatment facilities. The nature of the geology and steep slopes means that the upper catchments are susceptible to erosion and have always yielded large silt loads to the rivers. Soil conservation is therefore especially important in the area for maintaining good water quality. It is recommended that more attention should be given to reforestation and higher input farming projects.

WATER QUALITY MANAGEMENT

Control Program

A good anti-pollution Clean River Programme (Program Kali Bersih/Prokasih) has been initiated by Environmental Impact Control Agency/BAPEDAL (under Ministry of Environment). The technical aspects of this program have been designed and organized by the Center of Water Environmental Unit (Balai Lingkungan Keairan) of the Research Institute for Water Resources Development (Puslitbang Pengairan) under the Ministry of Public Works. The Program is presently coordinated by Environmental Bureau (Biro Lingkungan Hidup) which is the local or district agency of Ministry of Environment. Major factories are required to have their effluents sampled and analyzed, and the water characteristics in receiving water are also measured. Polluters contravening regulations are identified and publicly advertised to try to encourage compliance with regulations. Public exposure of this sort has had limited but very significant success, and appears to be a valuable action for Indonesian circumstances.

Management approach to water quality, which attempts to control pollution predominantly through penalizing effluent violations. Maintenance of good water

quality requires management of a great diversity of different activities which occur in the catchment.

Independently have become involved with water quality protection. This tends to generate conflicting sectoral interests. Improved coordination of the necessary activities could be achieved by a single institution having ultimate responsibility for both pollution control and supply of water. The most suitable agency for this purpose would be the Water Resources Unit (Dinas PU Pengairan). Day to day management of water quality control or supply may be delegated to other agencies.

Management Policy

A water quality management program must be supported within a legal policy and action strategy. The principle of "Polluter pays" currently used by the Government of Indonesia, can be made to work effectively for large factories, but it does not deal satisfactorily with the very large number of small polluters. The current anti-pollution policy could be improved through greater encouragement to industry for better treatment of its low grade effluents. With the existing pollution control regulations penalties for contraventions can only be imposed through litigation which is costly and time consuming. Even with the recent increases in fines the penalties are not sufficiently severe to be an effective deterrent. Policy would work better if it focuses on financial incentives which allow potential polluters a limited choice of economic options. Factory management can then judge at which point it is financially more profitable to treat effluent properly than to pay penalties. This is an aspect of the "polluter pays" principle which encourages adherence to regulation and maintenance of the best systems for treating industrial waste.

Institutional Responsibility.

The natural processes and the natural resource uses which directly or indirectly affect the water quality in the Citarum basin, are geographically continuous. Consequently water quality management is not likely to be effective if separated into independent administrative areas of operation. Upper, middle and lower parts of the drainage basins ought not to be distinguished by different water quality management plans. It would be appropriate if different catchment areas within the basin operated under local management, which could be the case with Balai whose boundaries are defined by catchments. But the activities of these Balai would be best placed under the management plans of a single authority such as the water resources Unit (Dinas Pengairan).

It is considered that Jasa Tirta II Public Corporation responsibilities could be clarified if they were to be restricted to instream water quantity allocation, distribution, operation and management, monitoring, and for collection of fees for contracted water supply. Jasa Tirta II is appropriate in this capacity because it already has established departments and sections which can form a suitably structured institution to cover most of the above tasks, and because it was originally set up for such purposes.

Increased responsibility of Provincial government in the management of water quality through the Water Resources Unit will increase the importance of the Basin Water Resources Management Advisory Committee (PPTPA). It has representatives from commerce, industry, communities and university and should act as an advisory body to integrate the management of water quality in the Citarum Basin.

Inspection of factories and of any other pollution source with regard to regulation enforcement is more appropriately placed under the authority of the Provincial government and carried out by the new District Level of Environmental Impact Control Agency (Bapedalda) agency. The Agency should be served personnel ability to inspect and assess the industrial processing which generates pollutants. It should be funded through an enlargement of the existing system of cost recovery for operation and managements.

Environmental and anti pollution laws for water quality management are already existed. These have been developed by the Ministry of Environment through BAPEDAL. There are also provincial government regulation for effluents and receiving waters which follow the national legislation closely. Prosecutions for pollution could be, and have been, pursued through this legislation by the Governor of West Java. However, powers for enforcement of regulation are presently weak. They could be strengthened by reducing reliance on the environmental laws established by the Ministry of the Environment in favor of increasing reliance on the legally binding conditions in effluent discharge licenses.

Monitoring industrial processes, effluents and receiving waters should be operated as an integrated system, and a single organization should report on all of these aspects. The present allocation of responsibility between different agencies prevents improper co-ordination for management. The existing Prokasih program which is coordinated by the presently Unit (Dinas) level of Environmental Bureau, which will be replaced by the BAPEDALDA, should be the basis for the monitoring in the future but operations can be contracted out to other agencies including Jasa Tirta II Public Corporation.

Institutional Strengthening

To carry through a water quality program, it is necessary to strengthen the institutions concerned. Specific urgent topics have been identified which need immediate attention. They involved on job training for field and laboratory staff of Jasa Tirta II Public Corporation and formal instruction for supervisory staff. The training would be based upon specific problems in the Citarum basin.

Public Awareness

Improvement of domestic pollution should be approached through a public awareness campaign and community development. The priority locations for this program would consider the places of highest population densities. These would be at the upper Citarum basin in Bandung district, around Purwakarta and Bekasi catchment.

CONCLUSION

An effective water quality control program in the Citarum basin requires a comprehensive strategy and set of objectives which integrate the different activities in the catchment. This in turn requires institutional adjustments, training and legal improvement. The Government of Indonesia has already taken a number of good initiatives, including: regulations, standards, a monitoring program, and organizing which have responsibility for water quality. But management of water quality in the Citarum basin remains limited and the waters are becoming increasingly polluted.