

Key Issues:

14-Development of Regional Industries

7-Resettlement

Climate Zone:

Af: Tropical Humid

Subject:

- Development of Fisheries Floating Nets for Resettlement Program of Hydropower Project



Cirata Dam

Effect:

- Increase of Income of Resettled People
- Creation of Job Opportunity
- Acceptance and Participation in Hydropower Project

Project Name: Cirata Hydro Electric Power Project (CHEPP)

Country: Indonesia (Asia)

Implementing Party & Period

- **Project:** Electric Power Generation (Electric Power Generation Java-Bali Power, Co., Ltd.)
1984 - 1988
- **Good Practice:** Electric Power Generation (Electric Power Generation Java-Bali Power, Co., Ltd.)
1988 -

Keywords:

Reservoir Type Hydropower Project, Floating Nets, Cage Aquaculture, Resettlement

Abstract:

The Cirata Hydro-Electric Power Project (HEPP), which is mainly a peakload power development project, is located in West Java, Indonesia. Since the project has a huge reservoir with area of 62 km², 7,626 families were forced to relocate by the project. During the construction, several social supports and safety measures were provided and executed to the resettled people in order to increase the community's welfare or at least to maintain the living standard at the same level as before they were moved. As a result, the project has provided the people with the double income by giving them opportunities to engage themselves in fisheries introducing floating nets in the reservoir created by the project.

1. Outline of the Project

The Cirata HEPP, which is located on Citarum River in West Java province, Indonesia, approximately 100km southeast of Jakarta, the capital city of Indonesia, was constructed in the

period from 1984 to 1988, financed mostly by IBRD. The Cirata HEPP has a concrete facing rock-fill dam with a height of 125 m, a crest length of 453 m and a volume of 3.9 million m³. The dam was constructed as a multipurpose dam for irrigation, flood control, water supply and power generation, but its main objective is power generation. The power plant is a reservoir type hydropower plant with an installed capacity of 1,008 MW, which is expected to generate 1,426 GWh of electricity a year, to meet huge demand for electricity in Jakarta area. The generated energy can save foreign exchange by saving oil importation. The Cirata reservoir provides regulated water for irrigation in the northern part of West Java. It increased the volume for irrigation and rice production in the area. The dam has a function of flood control to reduce damages caused by floods downstream. The dam also provides raw water to the capital city Jakarta. Subsequently, seasonal fluctuation of water level of the reservoir creates a drawdown area, which provides a fertile land for agriculture for cultivation of corn and peanuts for about four months. The reservoir of the Cirata HEPP has a gross storage capacity of 2,165 million m³ with a storage area of 62 km² at the normal water level. Figure 1 and Table 1 show the location and the outline of the facilities of the Cirata HEPP.

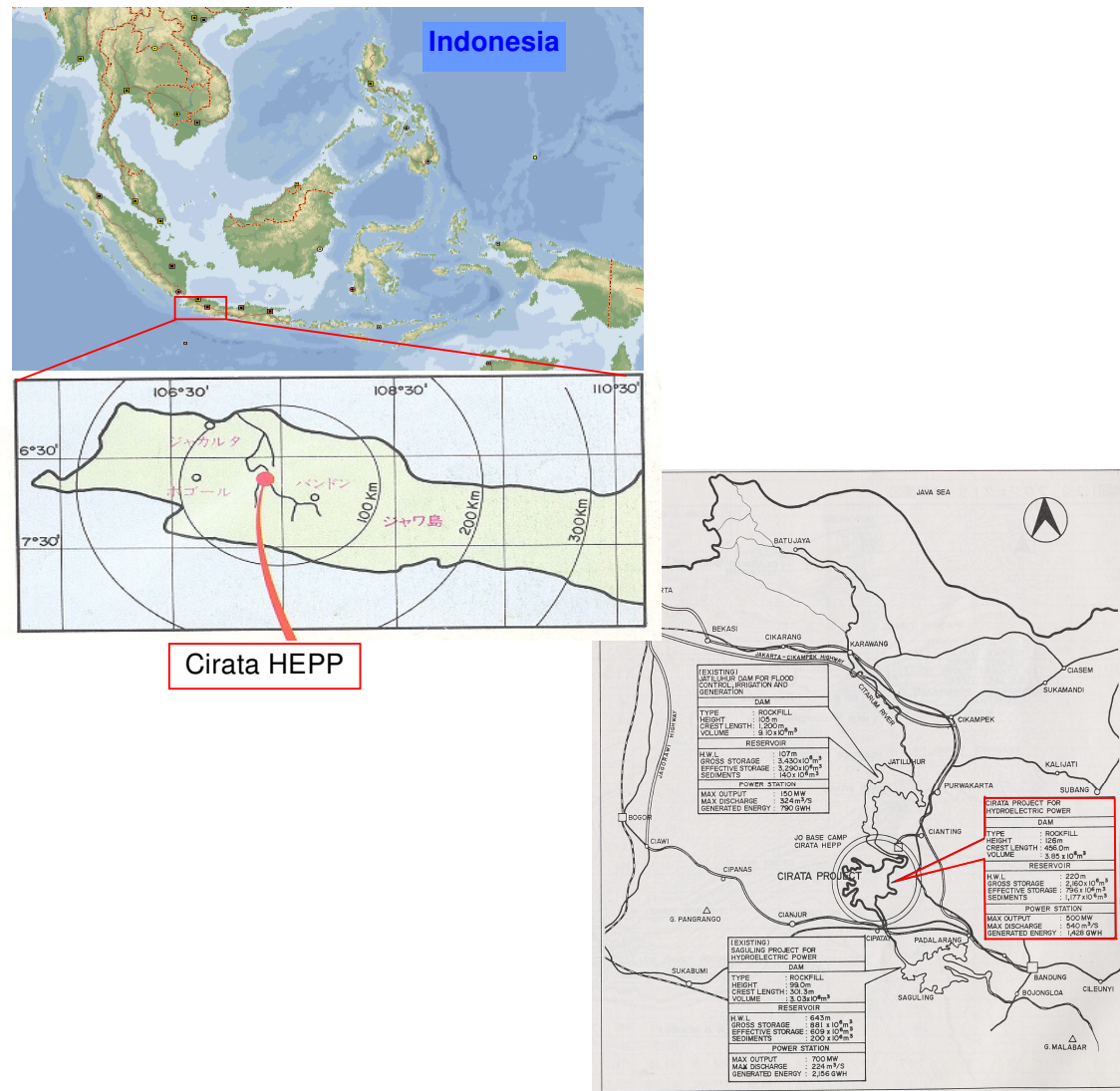


Figure 1 Location of Cirata HEPP

Table 1 Outline of Cirata HEPP

Item		Specification
River System		Citarum River
Catchment Area		4,119 km ²
Power Station	Maximum Output	1,008 MW
	Maximum Discharge	540 m ³ /sec
	Effective Head	112.5 m
Dam	Type	Rock-fill Dam with Concrete Facing
	Height	125 m
	Volume	3.9 million m ³
Reservoir	Reservoir Area	62 km ²
	Available Drawdown	15 m
	Gross Storage Capacity	2.165 million m ³
	Effective Storage Capacity	796 million m ³

2. Features of the Project Area

The Citarum River, which is running from Mount Wayang in the south of Java Island to the north, is the biggest river, with river length of 350 km in West Java. The catchment area at the dam site is 4,119 km². The average annual rainfall over 12 years from October 1994 to July 1997 is 1,973 mm. The topography of the area is mountainous and the geology is performed by Tertiary Rock, which is composed of interblended Breccia, Sandstone, Clay and Tuff.

There were 32 villages in Bandung, Cianjur, Purwakarta District, which were affected by the project. These areas were mostly used as farmlands such as paddy field.



Photo 1 Cirata reservoir

3. Benefits

Environment Impact Assessment (EIA) study of the project was conducted in 1982. The main conclusion of the EIA study is that considerable benefit can be obtained from the project, but several environmental impacts are identified.

The biggest environmental impacts and concerns of the project were issues related to resettlement of displaced people. The total affected area by the project was 6,612 ha of



Photo 2 Floating Nets

which 6,176 ha was inundated by the reservoir. Residents of 6,335 households inside the inundation area and 3,776 households outside the inundation area, totally 10,111 households were forced to relocate to other areas. In order not only to avoid any difficulties on the project implementation but also to positively enhance acceptance and participation of such affected people in the project, special attention was taken to the resettlement program.

As a result of the study on the above-mentioned resettlement program, a new fishery system utilizing the reservoir created by the project has been introduced for resettled people to increase their income shifting from paddy field farmers to fisheries farmers. According to the experience, live nets culture (Floating Nets) is the most productive and profitable system among the other enclosure systems. Since the fisheries using the floating nets is much more profitable than rice paddy field farming, resettled people have engaged themselves in floating nets fisheries. The

total number of floating nets installed was 27,000 as of 2002, which was 4.5 times more than expected in the Environment Impact Assessment Study. The provincial regulation for Cirata (Governor of West Java Decree No. 593.82/SK-1639 Pem-UM/81, dated July 10, 1982) provides the right to involve in fish cage aquaculture in the reservoir exclusively to the displaced people related to the project. Each family is allowed to have up to four adjoining fish cages, which dimension is 7m x 7m each.

According to the study conducted by International Center for Living Aquatic Resources Management (ICLARM) collaborated with the state-owned electricity company, PT. PLN and Padjajaran University, it was estimated that the net income of fisheries farmers was Rp. 8 million a year excluding initial investment and operating expenses while the one of paddy field farmers was Rp. 2.7 million. It means that resettled people as fisheries farmers can get about three times higher income than as paddy field farmers.

In order to give skills for the new jobs to the people in the surrounding area of the reservoir, PT. PLN, executed several trainings as a resettlement program. The trainings for carpentry, fisheries, farming and guiding for tourism have led to secondary development of regional industries such as house industries, touring facilities, boat factories and pellet (fish food) factories.



Photo 3 Floating Nets



Photo 4 Floating Nets

4. Effects of the Benefits

Main objective of the Cirata Dam is to generate electricity. The Cirata Hydroelectric Power Plant can supply 1,426GWh of electricity annually to the areas in and around the capital city Jakarta. It is equivalent to USD 225 million of foreign exchange saving of Indonesia.

As for the benefits for the people in the surrounding areas of the reservoir, fisheries using the

floating nets brought much benefit to the resettled people increasing their income. They could harvest 158,115 ton of fishes, such as *Tilapia Nilotica*, *Cyprinus Carpio*, *Pangasius Pangasis* and *Osphronemus Goramy*, in 2000.

Aside from the big benefits for the local people, there is a negative impact, which is a deterioration of water quality of the reservoir. The causes of the problem have not yet clarified, but it seems that one of the causes is overpopulation of floating nets. As one of lessons learned from the project, installation of floating nets should be regulated more strictly and water quality should be monitored more adequately.

As a secondary benefit from the project, several industries have been developed so that job opportunity of the people in the surrounding areas was created. House industries such as bamboo products, tailor, compost from water hyacinth, raw materials of plastic from garbage have been developed. Since the Cirata project site is located near the cool resort and well-known place of ceramic factories, the power station and the reservoir have been included in a tour package. So, many tourists visit the area every holiday. Several boat factories have been developed to support water transportation. Also, several pellet factories have been built to supply fish food for the floating nets fisheries.

5. Reason for Success

Full acceptance and positive support from majority of people especially in the surrounding areas of the project is required to successfully implement large-scale projects. In case that the project requires resettlement of residents, special attention to the affected people must be taken.

During the Environment Impact Assessment Study of the Cirata HEPP, introduction of floating nets was identified as a measure for resettled people. In consideration of this outcome from the EIA study, PT. PLN, the implementing firm of the project gave the people to be resettled training for the fishery using floating nets, which was implemented using actual floating nets in the other existing reservoir prior to their resettlements. The fact that shifting their job from paddy field farmers to fisheries farmers would highly increase their income could let them accept the project. Additionally, the development of the floating nets could attract tourist to visit the reservoir and it has provided another benefit to the people who are engaged in the tourism industry in the surrounding area.

6. Outside Comments

Final Report of the Development Aquaculture and Fisheries for Resettlement in Cirata, Padjajaran University - Ecology Department and International Center for living Aquatic resources Management stated that holistic coordination on resettlement process among the agencies related to fisheries, industry, tourism and plantation is necessary.

7. Further Information

7.1 References

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- 2) Padjajaran University - Ecology Department and International Center for living Aquatic

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