

Guanyinge Multipurpose Dam Project

Report Date: March 2000
Field Survey: May 1998

1 Project Summary and Japan's ODA Loan

This project aimed to construct a concrete gravity-type dam with a water catchment volume of 2.168 billion m³ at Xiaoshi, Guanyinge, 40km up from Benxi on the Taizi River that runs through Liaoning province. The executing agency was Liaoning Provincial Water Resources and Electricity Department (currently Liaoning Provincial Water Resources Department). The project was approved under the Seventh Five-Year Plan in April 1985, and construction began in 1986. The primary objective of this dam is flood control, but it has a number of secondary objectives, such as water supply for urban and industrial demand, water supply for irrigation, power generation and raising aquatic produce.

The ODA loan covered the entire foreign currency portion of the project cost.

2 Analysis and Evaluation

(1) Project Scope

The construction works can be divided into four phases:

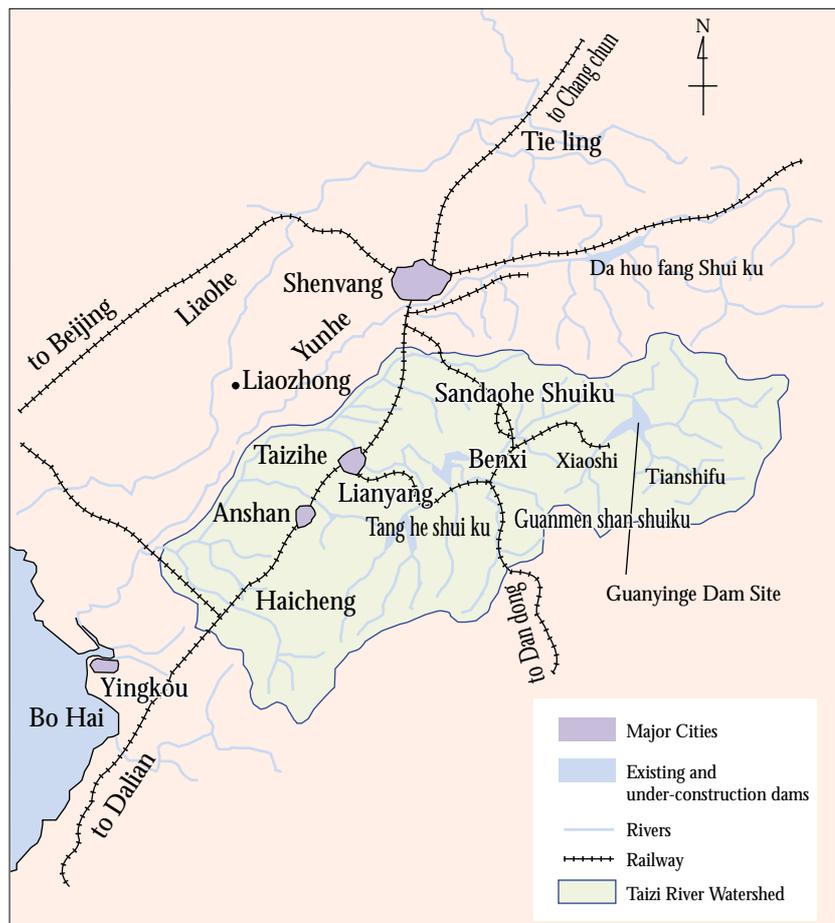
- Preparatory works (including rerouting of rail tracks, outside the scope of the ODA loan).
- Dam construction (Dam wall construction, civil works, curtain grouting, and metalwork).
- Power station construction.
- Flood prediction and warning system.

Most of the construction was carried out as planned, but there was some alteration to the scope of the consultant's work concerning the flood prediction and warning system.

(2) Implementation Schedule

The construction was scheduled for completion at the end of 1995, but it was actually ready by September 1995, when the completion ceremony was conducted. Most of the construction works were completed ahead of schedule. However, the curtain grouting works was delayed by nearly a year because part of the area to be grouted overlapped with

Borrower	Ministry of Foreign Trade and Economic Cooperation , People's Republic of China (currently Ministry of Finance)
Executing Agency	Liaoning Provincial Water Resources and Electricity Department (currently Liaoning Provincial Water Resources Department)
Loan Amount	¥18,225 million
Loan Disbursed Amount	¥18,062 million
Date of Exchange of Notes	(3 times) July, 1988 / May, 1989 / November, 1990
Date of Loan agreement	(3 times) August, 1988 / May, 1989 / November, 1990
Final Disbursement Date	(3 times) August, 1988 / May, 1996 / December, 1997



the area of rail rerouting, and grouting could not proceed until the rail rerouting was finished.

The flood prediction and warning system was modified from the initial plan to use simpler monitoring devices, because it was judged that a modest number of monitoring systems would reduce operating costs. This change delayed both the start and the completion of construction by nearly two years.

(3) Project Cost

The total cost of the projects was 1.205 billion Yuan of local currency and ¥18.062 billion in foreign currency, which puts the equivalent total project cost, when converted at the 1995 rate for the Yuan (1Yuan=¥12.36), at ¥32.959 billion. Comparing planned and actual costs, the local currency cost overran by approximately 10%, from 1.06 billion Yuan to 1.2 billion. The foreign currency portion cost approximately ¥18.06 billion, close to the planned ¥18.2 billion. However, during the project construction period the value of the Yuan against the Yen dropped by nearly two thirds, from ¥34.44 to ¥12.36. Therefore the total construction cost in Yen terms was down to ¥32.96 billion from the planned ¥54.86 billion, a major reduction.

Comparison of Original Plan and Actual

Item	Plan	Actual
1. Project Scope		
	Dam wall construction	} No changes
	Dam civil works	
	Dam curtain grouting	
	Dam metalwork	
	Power generation facilities	
	Flood forecasting and warning system	} Partly changed
2. Implementation Schedule		
Preparatory works	July. 1986 to Dec. 1992	Jul. 1986 to Apr. 1992
Dam wall construction	Jul. 1986 to Dec. 1995	Jul. 1989 to Oct. 1995
Civil works	Oct. 1989 to Oct. 1995	Oct. 1989 to Oct. 1995
Curtain grouting	Jul. 1991 to Sep. 1995	Jul. 1991 to Jul. 1996
Metalwork	Jul. 1991 to Dec. 1995	Jul. 1991 to Sep. 1995
Power generation/transmission facilities	Apr. 1992 to Dec 1995	Apr. 1992 to Jul. 1995
Forecasting and warning system	Feb. 1991 to Sep. 1996	Feb. 1991 to Jun. 1998
Consultant	Aug. 1988 to Dec. 1995	Aug. 1988 to Oct. 1995
3. Project Cost		
Foreign currency	¥18,225 million	¥18,061.55 million
Local currency	1,063.77 million Yuan	1,205.30 million Yuan
Total	¥54,861.24 million	¥32,959.06 million
Exchange Rate	1 Yuan = ¥34.44	1 Yuan = ¥12.36

(4) Project Implementation Scheme

Liaoning Provincial Water Resources and Electricity Department (currently Liaoning Provincial Water Resources Department) established Guanying Dam Management Office (in February 1989) to handle the operation and maintenance of the dam. The office has a staff of approximately 300.

(5) Operations and Maintenance

The operations and maintenance costs (recorded figures for 1988) were 16.59 million Yuan (not including depreciation costs) and there was a further personnel cost of 580,000 Yuan. These costs are covered by income from irrigation water supply and power generation (48.04 million Yuan), which means the operation and maintenance budget is sufficient. As the equipment is still new, there is apparently little expenditure for replacement parts and other costs. There are no problems with the generation equipment, or with maintenance from the Dam Management Office.

(6) Project Effects and Impacts

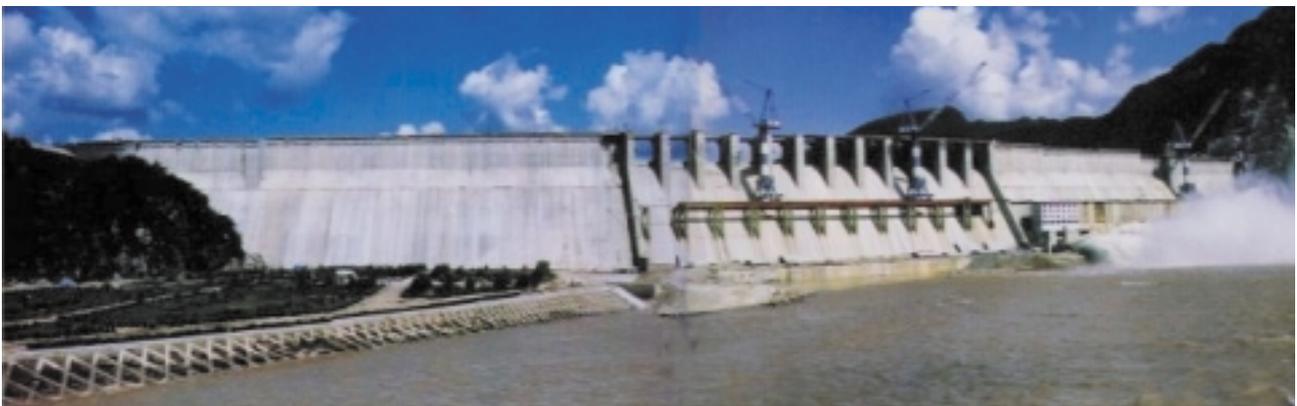
(i) Quantitative Effects

The Economic Internal Rate of Return (EIRR) for the project was calculated for a project life of 50 years, taking the benefits as construction, operation and maintenance costs for alternative facilities and the average value of flood damage, and the costs as dam construction cost and operation and maintenance costs. This EIRR was put at 12.6% at the time of the appraisal, but

when EIRR was reviewed in 1998 with the benefits limited to the sale of electricity, the figure was down 4.5 points, at 8.1%. However, when the EIRR was calculated with all benefits taken into account, EIRR rose to 15.5%. This figure was strongly influenced by the dam's role in preventing flooding in 1997 (averting damage estimated at 860 million Yuan).

(ii) Qualitative Effects

Standards of living have been improved by water supplies for homes, industry and agriculture, and progress in industry and agriculture has been promoted. The lives of farmers before the dam were poorly provided with water supply, electricity, gas and roads, as well as with facilities such as schools, hospitals and community centers. The standard of their housing was also low. The huge investment involved in the construction of this dam has enabled a major improvement in social and economic infrastructure.



A General View of Guanying Dam



Water being Discharged



The Power Station