

# By Breaching Through Ideas And Innovating Technique, Constrtcting A Project With Both Nature And Society In Harmony

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**Abstract:** Under the guidance of certain engineering ideas, projects are creative practice activities which are organized purposefully and cosmically by human. In traditional engineering ideas it is unilaterally emphasized that how to conquer and transform nature. With traditional engineering ideas, people can not properly understand and treat the relationship among project, nature and society, so that conflict will occur usually. Because Xiang Jia Ba Hydropower Project is faced with special society environment, both nature environment and society environment in harmony are considered seriously during the project decision-making, design and constructing. When planning river basin, arranging hydro-junction, implementing resettlement and controlling construction, the river bain economy, human environment and nature environment are reasearched deeply. Insisting the ideas of sustainable development in Xiang Jia Ba Hydropower project, not only technology and management innovation but also engineering ideas breaking-through are realized.

**Keywords:** innovation, engineering ideas, sustainable development, Xiang Jia Ba Hydropower Project

## 1. Introduction

Social engineering is the basis of the existence and development. Human beings fully understand nature and grasp the laws of nature. On this basis, the benefit of mankind is created by changing nature and using the laws of nature through the project. At the same time construction is closely related to social and nature. However, when looking back on the past project, we find that

people often ignore that all construction projects must be based on the natural conditions and protecting and improving the natural environment, and that people often emphasize project concept of “conquering nature”. As a result, it produces many adverse effects on the environment, or even permanent damage to the environment. At the same time, people often ignore the purpose of projects for the existence and development of human

beings of projects, and blindly pursuit of maximum economic benefits. It basically has deviated from the construction activities that benefit the human.

Xiang Jia Ba project has the benefit of power generation, flood control, irrigation and anti-regulation for the upper power station. The total installed capacity of power plants is 6.4 million kW. Excavation of earth and stone works is more than 40 million cubic meters. Concrete pouring is nearly 14 million cubic meters. The quantities are so large. The influence is so tremendous. The quantities are so large. The influence is so tremendous. The importance of the project is so special. If it dealt with the relationship between construction, social and nature badly, its impact will be far-reaching, and its consequences will be serious. At the same time, the power station is near to a town. We must be concerned about the harmony between nature and social in construction and operation.

In the face of great challenges, power station builders breakthrough the traditional concept that is "conquering nature", and propose new concept that is building a power station, driving provincial economy, improving an environment and bringing benefits to

migrants, and adhere to the sustainable development of hydropower development. We consider improving environment and promoting social development as important condition in the process of engineering decision, design and construction. We full study area of economic, social environment and the natural environment, and adhere to the reunification of economic, social and ecological benefits, and innovate in management and technique. Project truly reflects the characteristics of modern hydropower project, that is people-oriented, friendly environment, significant benefits.

## **2. Driving Economy and Building a Harmonious Project**

### **2.1 Improving People's Livelihood by Irrigation Projects**

The planning irrigation region of Xiang Jia Ba hydropower station is major grain-producing areas, but also industrially advanced areas of mechanical, electrical, chemical, food and beverage, and is also well-known old rainless region .At present the area economy is relatively backward. Parts of area are state-level poverty-stricken areas, and these regions have their own rich resources and are in an excellent condition for development.

The project can irrigate 4 cities and

21 counties. These area resources are in a relatively rich. Soil is fertile. Light and heat resources are sufficient. Transportation is convenient. Food production has a long history. However, these areas are lack of water resources. Water conservancy infrastructure is weak and drought happens frequent. Water source become one of the constraints of agricultural development. With the implementation of industrial strategy accelerating, cities and towns expanding, economic and social development and people's living standards improving, water supply and demand is more and more contradictory. Especially the serious pollution of water sources, excessive extraction of groundwater, urban and rural life and production seriously lack of water, the situation poses a grave threat to people's survival and development.

Irrigated areas of Xiang Jia Ba Project include 4 cities and 21 counties. Water for irrigation of 371.78 million mu of arable land of 205 towns and the problem of shortage of water can be settled. The population of irrigation district is 5665400 in 2005, and is 52.8 percent of the total population in county. The agricultural population is 5183200, and is 59.8 percent of the agricultural population of county. Arable land in the

area of irrigation district is 383.22 million mu, and is 55.7 percent of the total area under cultivation in county. Grain output is 2711200t, and is 61.1 percent in county. GDP is 30.272 billion Yuan, and is 40.2 percent in county. Clearly, Xiang Jia Ba Hydropower station irrigation district is the main grain production areas of the involved town, and the county of HeJiang is the food production base in Sichuan province. Therefore, planning irrigation is involved in the counties' economic base. Construction of project is related to the county economic development lifeline, and takes a pivotal position and role in the future social and economic construction.

Irrigation project of Xiang Jia Ba is an important condition for optimizing allocation of water resources and strengthening agricultural infrastructure construction. It can Enhance agricultural development potential, guard against natural disasters and promote economic development and social progress of irrigation area, and maximize the overall efficiency of projects, and reflect the harmony between construction and society.

## **2.2 Construction to Promote Local Economic Development**

Reservoir area of Xiang Jia Ba is the

remote poverty-stricken mountain areas in Sichuan and Yunnan provinces. By the restrictions of historical, geographical and other conditions, counties surrounding the reservoir area are still in the traditional agricultural economy and these industrial bases are weak, and these areas are polluted seriously by chemical, energy and other industry. The area of western Sichuan- North Yunnan Province where the reservoir locates is one of the rich recourse regions. Per capita gross domestic product (GDP) is far below the average level of 2 provinces and the national average. XiangJiaBa Hydropower station construction exercises a great influence on improvement of local infrastructure, industrial structure readjusting, rural labor transfer and so on.

In the construction period, that is, 2006-2012, the GDP of the two places increases 900 million Yuan every year by investing in fixed assets. After power station completed, the total output value increase at least 1.5 billion Yuan every year. In the long run, the role is not only confined to the local GDP and financial revenue, but also promoting local transportation, water conservancy, collecting and moving people, goods, capital flow, information flow.

### **3. Challenge the World Problems,**

### **Build a Harmonious Works**

The maximum height of dam is 162 m, The largest flood flow discharged 48660 m<sup>3</sup> / s. The maximum velocity is up to 42 m / s. The high dam main use flip trajectory bucket at home and abroad. The way erodes riverbeds and banks little, and it is good to stability and to protect lower reach. However, the Xiang Jia Ba Hydropower station is close to the county and factories, so pulverization and heavy rainfall caused by flip trajectory bucket have an influence on the living and producing of urban residents, and even strong community response will occur. In order to reduce the influence on construction and the surrounding social environment of mutual, the Xiang Jia Ba Hydropower station uses bottom current dissipation. The way of dissipation relatively calm can settle the problem of pulverization. However, the research and practice of bottom current dissipation is limited to the discharge project which is mid-head and low-head and small unit discharge, and operation damage of bottom current dissipation used in the project which is high-head and large discharge occurred much at home and abroad. The frequency of flood discharge, capacity, and unit discharge are very rare. Adopted at the end of flood flow of energy dissipation,

here exist a series of world-class technical problems such as spillway building security and stability, lower banks stability, the impact of transportation

To solve these problems, a large number of numerical analysis and model test adopted to solve these problems one by one, and the report 《Special Reports on Environmental Impact and Measures of Pulverization in the Xiang Jia Ba Hydropower Station to the Jinsha River》 has already been reviewed by the departments, and the tender design work of relevant structure has been completed. Contrast hydropower projects at home and abroad, the Xiang Jia Ba Hydropower station at the end of energy dissipation in the same areas have reached world leading level. At the same time, this flood of international advanced form of energy dissipation has been authorized by the broad masses of people surrounding the dam area, and provide a reliable guarantee to build a harmonious society, to ensure stability and unity and the smooth progress of works.

#### **4. Innovation Project Management, Construction Harmonious Works**

Xiang Jia Ba Hydropower station is the last level of Jinsha River Power Station. It is located at the area of the most densely populated, agricultural and

industrial concentration, arable land resources tight, low forests cover, rich water and bio-affected area and a variety of rare and unique economic and fish spawning and feeding grounds. Its population and the number was constantly decreasing trend in recent decades. These valuable resources once were destructed, it would be difficult to resume.

Meanwhile, the dam site is near the county town, and the distance from residents living areas is less than 100 m. Social conditions around the dam area are very complicated. It is a severe test of construction management.

##### **4.1 Insist on "Conservation Priorities"**

In order to maximize relief adverse environmental effects, we compile a report book that is “environmental impact report of the Xiang Jia Ba Hydropower station on the Jinsha River” We take the demand of environment protection as an important factor at all stages of project design. A large number of project selections and optimization of work carried out. We construct the project under the premise of protection of the environment. It has achieved very good results.

In the dam site selection, the dam site selected was considered multiple dam axes, water line and layout. The

final package was determined by compositing factors that is geological terrain, site layout, construction difficulties, project investment, economic efficiency, environmental impact and migration.

We adjust and optimize the plan repeatedly in the stage of construction general layout. Warehouse and life office are layout around living areas of Yun TianHua and ShuiFu County, to reduce construction noise. We use waste slag of slope excavation at preconstruction stage to fill at LianHuaChi. The filled gully is used as construction site to reduce damage to vegetation and land. We disannul two slag dumps and reduce the occupation of cultivated land area of 863 mu by optimizing. The plan of highway outbound traffic followed the principle that is "little or no occupation of cultivated land of the forest, less damage, or no damage to vegetation". We build bridge and tunnel instead of the road as far as possible. After adjustment and optimization, bridge and tunnel of the outbound traffic of highway of Xiang Jia Ba Hydroelectric Project is up to 47%.

Sandrock used in the project is from the field of artificial materials which is 59 km far. If we used road transport program, investment outlay would reduce

lot .but vegetation is damaged, soil erosion is serious. At last, we adopt the program that is 31 km conveyor belt. The way of 30.4km is tunnel. It reduces its occupation of forest land cultivation about 73 hectares, and reduce exhaust emissions 01,500t. However investment in civil engineering add 180 million yuan, it can reduce soil erosion ultimately and is favorable for water and soil conservation.

## **4.2 Emphasize on process control**

The natural environment will be changed inevitably durring the consttuction period. To minimize the harmful effect on environment, a policy of the simultaneous design, construction and operation of environment protection, soil and water conservation and plant construction has been adopted by power station builders. Also the technical terms of environment protection and soil and water conservation have been introduced in the bidding documents originally, so the protection of the environment and the conservation of soil and water will be carried out spontaneously.

The water environment protection: durring the construction period, the main pollutant source is sanitary waste and the liquid waste from aggregate processing plant and concrete batching

plant. Certain movable water closets have been placed in construction area, and a sewage plant has been set up in construction area, so sanitary waste can be disposed timely. Sewage disposal facilities for aggregate processing plant and concrete batching plant are constructed during the construction period.

The acoustical protection: to protect acoustical environment, several measures have been taken such as emphasize on personal protection, optimization of the construction technics, introduction of machines with low noises, time blasting and split-millisecond delay blasting and strict control of the explosive amount in every blasting, etc. Depository, domestic installation and office building are intentionally placed between local living quarters and construction area to form a noise isolation strip, so the acoustical impact can be reduced.

The atmospheric environment protection: to avoid air pollution by the exhaust gas and dust, watering cart and other dust-reducing methods have been used. The roads in construction area are cleaned and watered timely, and special treatment in the transportation of loose material, like cement and flyash, has

been taken: the trucks are covered with canvas or other covering. Hydromanufacture are adopted in the dust-producing facilities such as aggregate processing plant and concrete batching system.

Domestic garbage disposal: domestic garbage are collected and disposed everyday by the dustman in construction area.

## **5. Conclusion**

Xiangjiaba Hydropower Station is a large scale project with main functions of power generation and with the comprehensive function of navigation, flood control, silt detention, irrigation and cascade anti-regulation. While producing these benefits, Xiangjiaba Hydropower Station has also played a good role in driving the economic of both sides. At the same time, the Hydropower project will profound main influence on regional natural environment, ecological environment and social economic. In order to reduce the environmental influence from the source, through the each project design stage, the requirement for environment protection must be taken as the important factor in project design, a plenty of works in program comparison and optimization must be carried out, and also insisting on the construction ideal

of “norms, orders, harmony, healthy”, making great efforts in the hydropower development ideal of “four one”, performing the social responsibilities consciously, exploring the sustainable development road of Jinsha water

resource and the whole country water resource, promoting the coordinative development of project construction, ecological environment protection and social harmony.