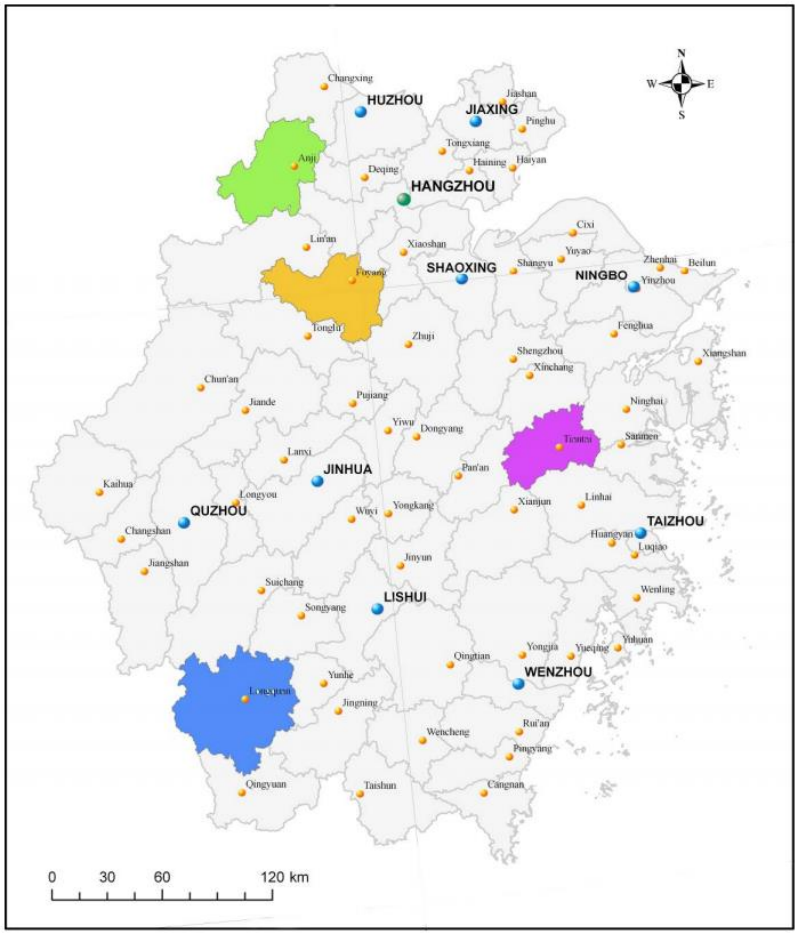
NewTap
Network on Water Technology in Asia and Pacific



Zhejiang Rural Water Supply and Sanitation Project, Zhejiang, China

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Summary

Zhejiang, located in eastern part of China, consists of both rural and urban premises. The economic disparity is evident from the fact that the net income of urban people has been found to be more than double of the average net income of people in rural areas. The geographical disparity has added even more gaps between the two areas. The differences has also been seen in supply of basic prerequisites such as drinking water supply. As the province highly depends on surface water sources, an irregular rainfall and high precipitation only for short rainy seasons have induced irregular water supply. Moreover, the rural parts of the province lack sufficient water storage mechanisms and maintained water distribution pipelines, thereby aggravating the water supply problem. Thus, to cope up the problem, Zhejiang Rural Water Supply and Sanitation Project was initiated by Chinese Government on September 2014 with half of financial aid provided by World Bank through International Bank for Reconstruction and Development (IBRD). The total estimated cost of project amounts to 400 million USD out of which 200 million USD is supposed to be funded through IBRD and the remaining would be covered by local bodies. The project concentrates on water supply to four major counties of Zhejiang, namely Anji, Fuyang, Tiantai and Longquan which on a whole is inhabited by more than 47 million people. The major components of the project include improvement of water supply and sanitation, training and capacity building and management of project with effective supervision. The prime concern of the project is, however, to strengthen the prevalent water supply chain and build new infrastructures (such as water treatment plants or pumping stations) within the projected area. The project is expected to be accomplished by December 31, 2020.

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Acronyms and Abbreviations

BOD	Biological Oxygen Demand
COD	Chemical Oxygen Demand
DWTP	Drinking Water Treatment Plant
GDP	Gross Domestic Product
IBRD	International Bank for Reconstruction and Development
PID	Project Implementation Directorate
PIM	Project Implementation Unit
POM	Project Operation Manual
PPMO	Provincial Project Management Office
RAP	Resettlement Action Plan
RMB	Renminbi (Chinese Yuan)
RPF	Resettlement Policy Framework
USD	US Dollars
WSS	Water Supply and Sanitation
WTP	Water Treatment Plant
WWTP	Waste Water Treatment Plant
ZPAO	Zhejiang Provincial Audit Office
ZPFB	Zhejiang Provincial Finance Bureau

1 Introduction

China has been significantly progressing in sectors of water supply and sanitation (WSS) as observed in improved water supply from 67 to 92 percent while in case of improved sanitation to 65 percent between 1990 to 2012 (The World Bank, 2014). Nevertheless, the statistics miss out rural areas with rural-urban disparities indicating women, children and elderly being most vulnerable. Thus, for the less developed provinces located in central as well as western region of China, a project under the name of Zhejiang Rural Water Supply and Sanitation Project has been initiated. The project aims to upgrade basic infrastructures like water supply services, sanitary latrines and better drainage systems.

Zhejiang covers an area of 105,391 km^2 in east coast with total inhabitants of 54.6 million. With per capita GDP of RMB 63,266 (USD 10,273), it represents fourth largest provincial economy in China. However, the geographical discrepancy in western and southern areas lead to economic dissimilarities resulting in average disposable income of urban areas nearly double than that of rural areas. The disparity is also observed in basic water supply services. The water supply in Zhejiang depends on surface water sources which heavily relies on rainfall. Since more than half amount of rainfall occurs in short rainy season, most of the water storage dams remain dry. Also, the lack of water treatment and distribution facilities result in inaccessibility to safe drinking water to people in rural areas.

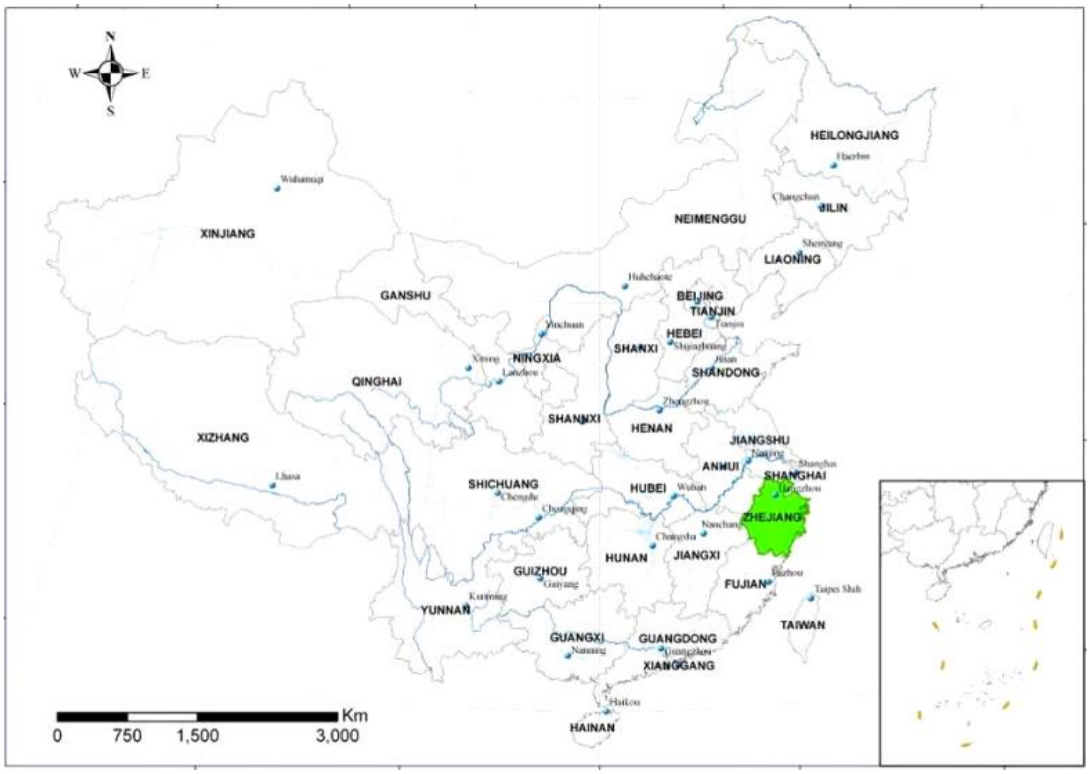

Figure 1: Location of Zhejiang province in China (The Foreign Loan Supporting Project Leading Group Office of Zhejiang Province, 2014)

With objectives to enhance access for sustainable water supply and sanitation services in certain rural areas of Zhejiang province, the Zhejiang Rural Water Supply and Sanitation Project was approved on September 25, 2014. The project has a long-term goal in facilitating 259 natural

villages and 9 rural towns in four counties namely Anji, Fuyang, Tiantai and Longquan of Zhejiang province through improved water supply and water safety via construction and/or rehabilitation of raw water mains, water distribution networks and water treatment plants (WTP). The total project cost was estimated to be USD 400 million and would be accomplished by December 31, 2020.

Table 1: Overview of the water supply project

Items		Description
Project Name	:	Zhejiang Rural Water Supply and Sanitation Project
Type	:	Water Supply and Water Treatment Upgradation
Donor Name	:	World Bank and Local bodies of People's Republic of China
Project Components	:	i. Improving Water Supply and Sanitation ii. Training and Capacity Building iii. Project Management and Supervision
Project rationale and objectives	:	To improve access to sustainable water supply and sanitation services in villages and towns in rural areas of Zhejiang Province
Project Fund	:	USD 400 million
Project Duration	:	From September 25, 2014 to December 31, 2020

2 Technical and Technological Brief

With increased urbanization, a number of rural inhabitants are migrating to towns. Thus, increasing demands of safe and reliable water supply in towns have equally shifted the concentrations of authorities to clean water supplies over there in addition to the critical needs in villages. For that purpose, in Longquan county, rehabilitation and expansion of WTP of quantity 50,000 m^3/day and construction of water distribution pipelines have been proposed in Longquan town. Similarly, in Xiaomei town, proposals have been made for construction of WTP of 3000 m^3/day channelled to entire town via water distribution pipelines. Likewise, Anren town and Badu town are proposed to have construction of WTPs of capacity 5,500 m^3/day and 4,000 m^3/day respectively. Each house in town is expected to be connected to WTP via water distribution pipelines.

In Anji county, Meixi town would have construction of distribution pipelines connecting water supplies to 7 villages using 21.4 km running pipes while Tianhuangpin would have construction of water supply, pumping stations and distribution networks to the region and to two nearby villages using 23 km running pipes. Likewise, in Fuyang county, 12 villages would have rehabilitation of water distribution pipelines while Dayuan town would cause rehabilitation and redistribution of water pipelines to 9 villages. Two types of pipeline materials were considered for the distribution channels; one being polyethylene having cost advantage of 12-35 percent over the other ductile cast iron which can be used for the water mains.

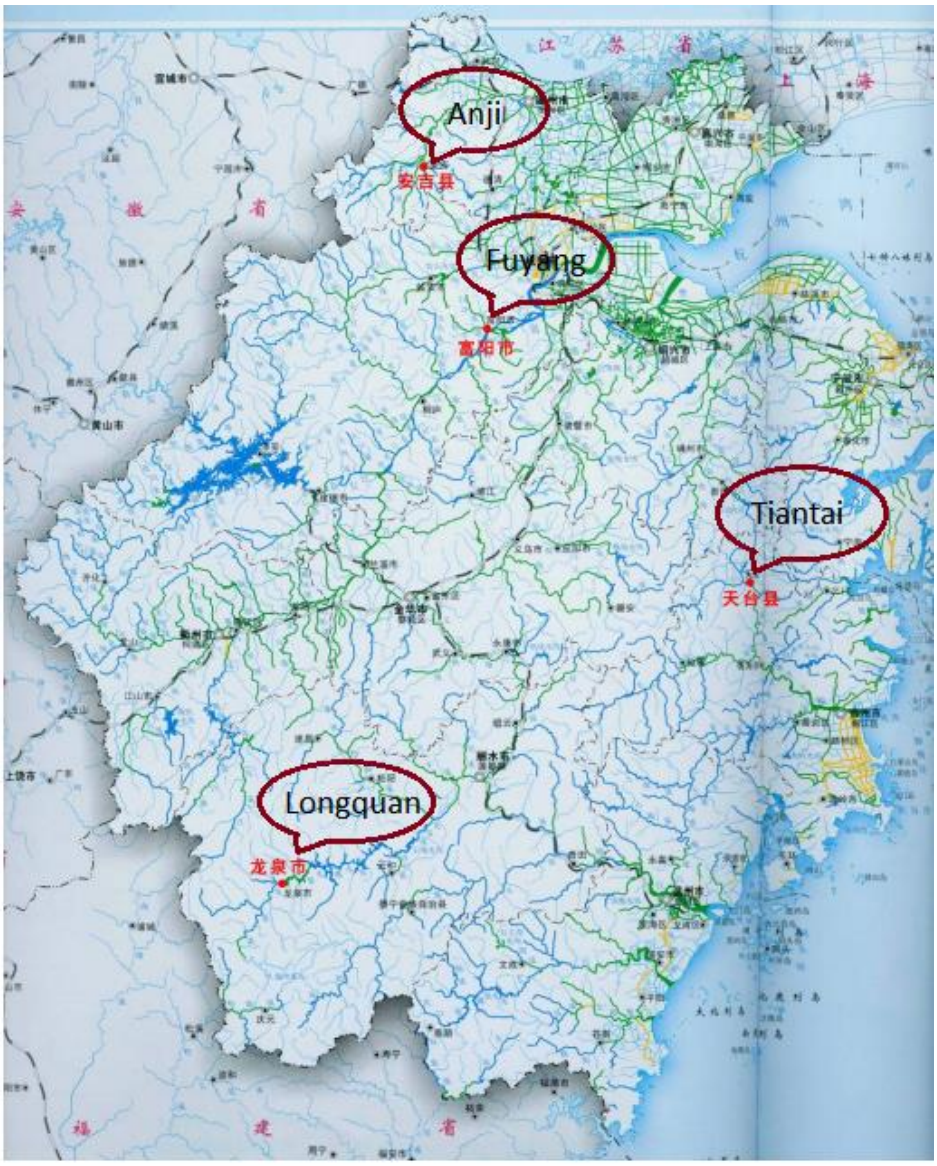

Figure 2: Location of four counties in River System of Zhejiang Province (Zhejiang Huanke Environmental Consultancy Co. Ltd., 2014)

3 Financial brief

The Zhejiang Rural Water Supply and Sanitation Project has been financed by the World Bank with a total investment of USD 200 million (including 0.25% front-end fee). The Loan Agreement was made on November 25, 2014 and has been made effective on February 2, 2015 for improving the safety of water supply and water use in rural areas. The initial cost estimate made for the project was USD 400 million (or RMB 2.46 billion) among which half of the amount is to be funded by IBRD loan under World Bank and the remaining amount to be mobilized by the Project Counties and the Provincial Government. The gross investment in the project can be divided into four sub-parts as per the sites. The Anji Subproject amounts to USD 102.71 million, Fuyang subproject to USD 115.11 million, Tiantai Subproject to USD 78.66 million and Longquan Subproject to USD 59.39 million. Moreover, in Longquan county, USD 14 million has been allocated for rehabilitation and expansion of WTP, construction of water supply, pumping stations, distribution networks and pipelines in Meixi and Tianhuangping towns of Anji county.

Likewise, USD 5.96 million has been allocated to 12 villages of Xindeng and 9 villages of Dayuan in Fuyang county for rehabilitation of water distribution pipelines. **Table 2** indicates the project cost allocation for different components of the project.

Table 2: Project cost and financing plan as per component (The World Bank, 2014)

By components	Total Project Cost (in million USD)		
	Total	IBRD (World Bank)	Local
Component 1: Improving Water Supply and Sanitation			
a. Anji County	102.71	53.21	49.50
b. Fuyang County	115.11	58.05	57.06
c. Tiantai County	78.66	43.54	35.12
d. Longquan County	59.39	38.70	20.69
Sub-Total	**355.87**	**193.50**	**162.37**
Component 2: Training and Capacity Building			
Sub-Total	**2.50**	**2.50**	**0**
Component 3: Project Management and Supervision			
Sub-Total	**3.50**	**3.50**	**0**
Baseline Cost	**361.87**	**199.50**	**162.37**
Physical and Price Contingencies	35.60	0	35.60
Total Project Costs	397.47	199.50	197.97
Front-end Fee	0.5	0.5	0
Interest During Construction	2.03	0	2.03
Total	**400.00**	**200.00**	**200.00**

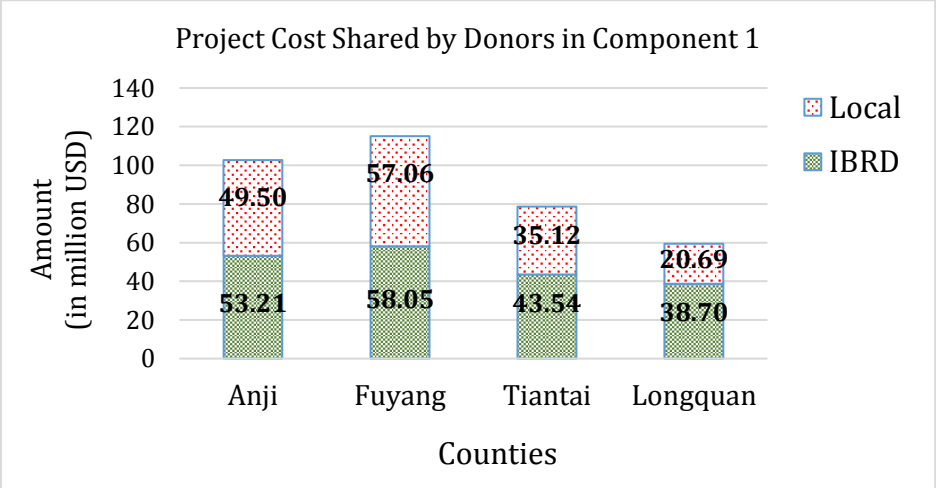

Figure 3: Financing in Component 1 (The World Bank, 2014)

4 Project Features

4.1 Technical and technological features

The project is divided into three components namely, Improving Water Supply and Sanitation, Training and Capacity Building and Project Management and Supervision operational in four counties/cities. Each city has its own technical subprojects concentrating for effective water supply and drainage facility. In Anji County, 14 km major water distribution pipelines would be installed in Tianzihu area while 21 km branch pipes would be set up inside villages. The

implementation of drinking water engineering is expected to improve regional centralized water supply rate and simultaneously, improve and expand the old pipe network in the region.

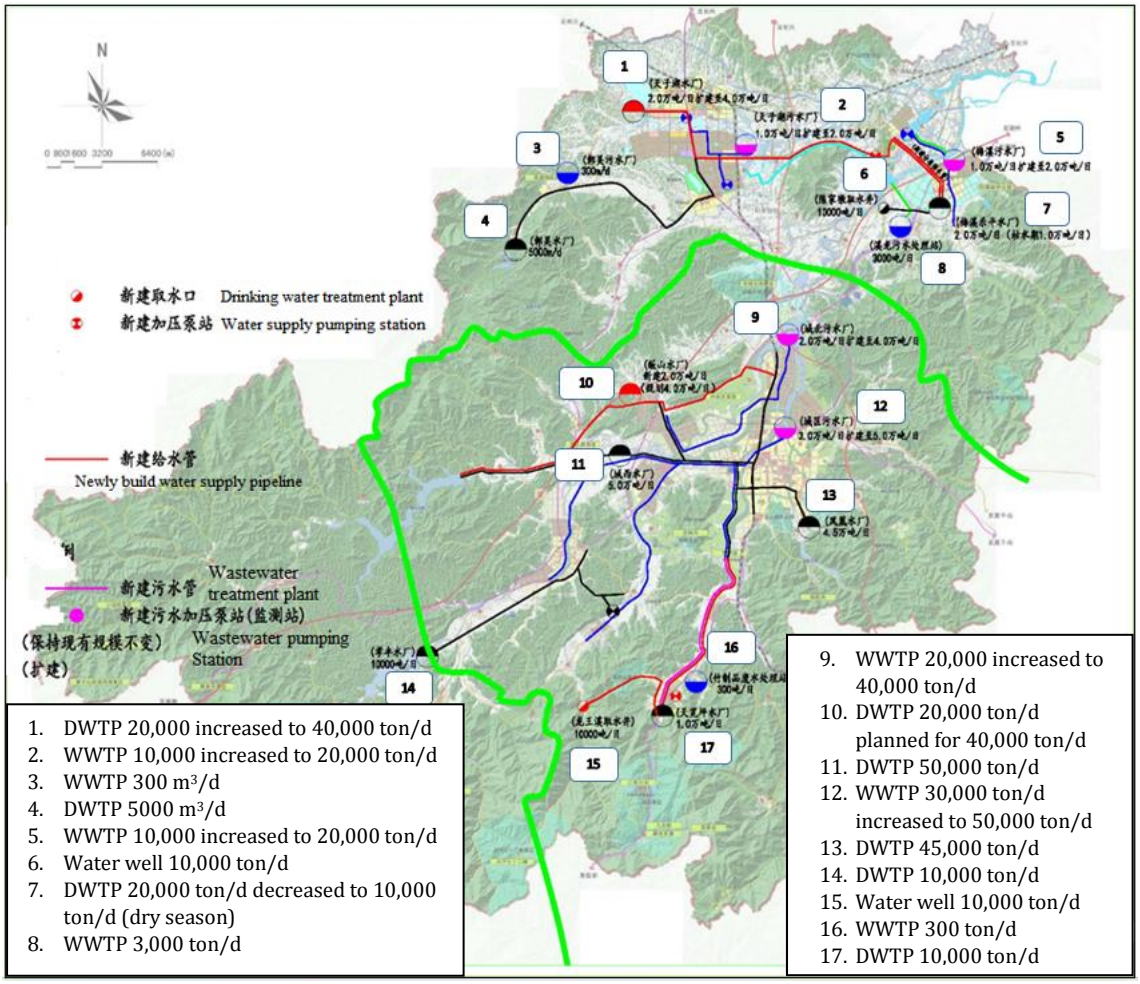

Figure 4: Subproject distribution in Anji County (The Foreign Loan Supporting Project Leading Group Office of Zhejiang Province, 2014)

Similarly, in Meixi area, the project supports the expansion of Gaoyu water plants from existing capacity of 20,000 m³/d to 45,000 m³/d as well as build 38 km new water distribution pipelines. Tianhuangping area would be benefitted by construction of booster pump station for water supply with a capacity of 13,000 m³/d. Likewise, in Banshan area, the building of water treatment plant with capacity of 20,000 m³/d would provide clean drinking water to inhabitants of Xiaoyuan village. Subprojects in Fuyang province include perfection of joint water supply and drainage pipe net for rural area of Fuyang Dayuan with rebuilding of water distribution branch of length 16.5 km and in Fuyang Changkou with rebuilding water distribution branch of length 10.13 km in length. Likewise, in Tiantai County, the western villages of Tiantai Basin would benefit from connection of main water supply pipes to the village. Also, separate 8.6 km trunk sewer form Jietou Town to Pingqiao Town would be constructed such that drinking water would not be contaminated with sewage leakage. Likewise, in Longquan County, the Nandayang Water Plant would be expanded from 30,000 m³/d to 50,000 m³/d while distribution of water carried out through 3.91 km supporting pipelines. Zhatian Town would experience a new water supply plant of capacity 3,000 m³/d and supply pipeline of 5.6 km.

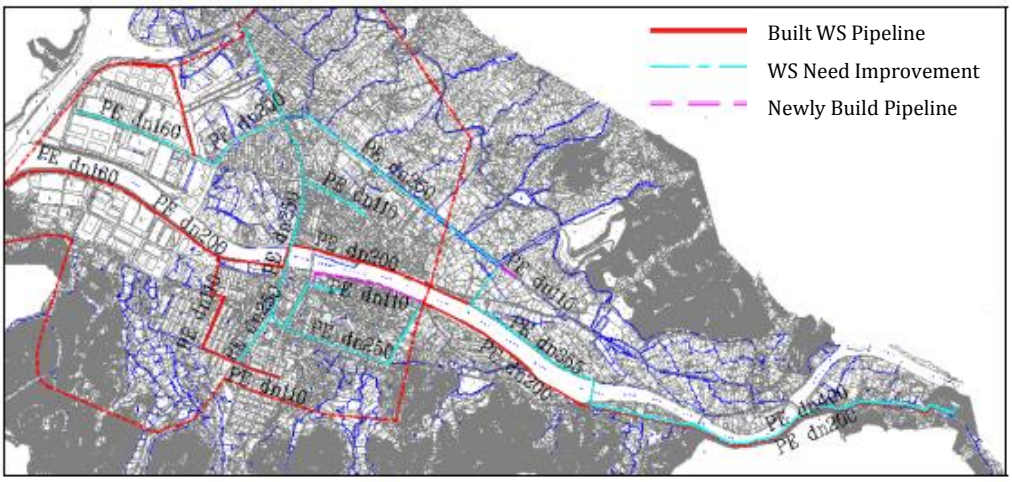

Figure 5: Layout drawing of water supply network of Anren Town, Longquan City (Zhejiang Huanke Environmental Consultancy Co. Ltd., 2014)

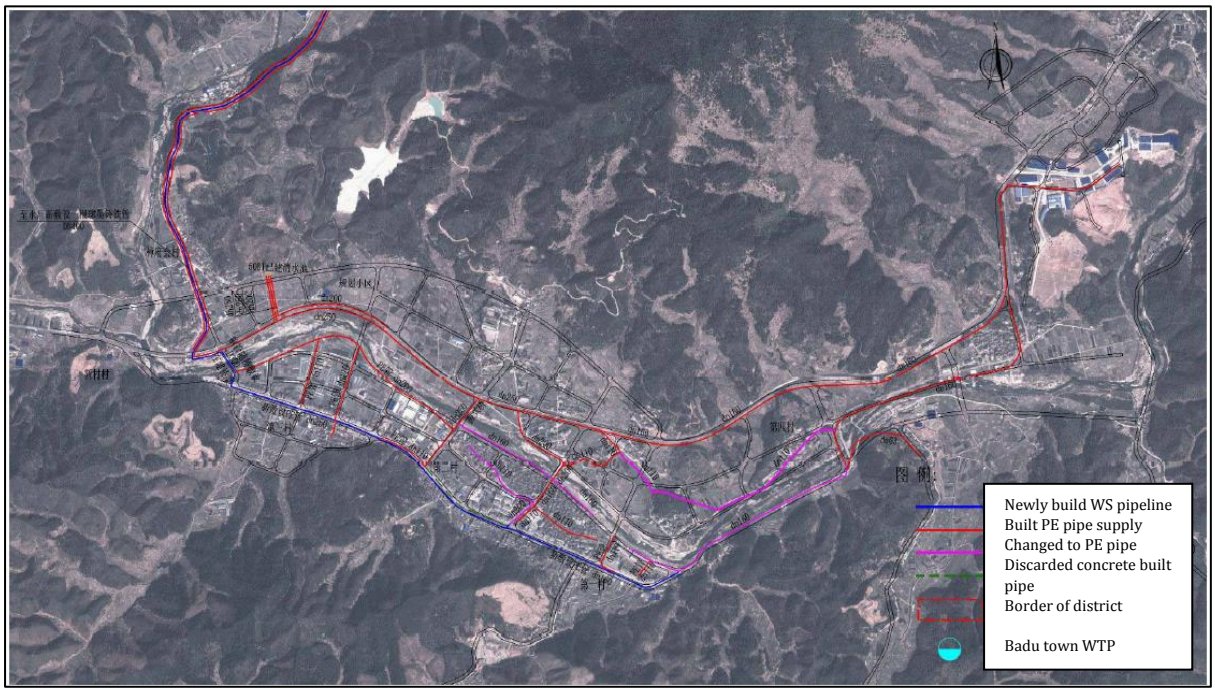

Figure 6: Layout drawing of water supply network of Badu Town, Longquan City (Zhejiang Huanke Environmental Consultancy Co. Ltd., 2014)

4.2 Economic and financial features

Among the total allocated requirement (400 million USD) for project accomplishment, 200 million USD has been funded by IBRD while the other half is expected to be financed by local government. The project incorporates the cost-effective analysis thereby, specifying the viability of total and per capita income. Likewise, all the procurements needed to be in compliance with World Bank procurement policies and requirements or national policies and procedures acceptable to the Bank. Also, the Project Operation Manual (POM) would contain a streamlined approach for procurement that should be in agreement with Provincial Project Management Office (PPMO) and Project Implementation Units (PIUs). Likewise, the project features including financial management guidelines need to be in accordance with the Bank's fiduciary

requirements. In addition to this, the financial management would be carried out by Zhejiang Provincial Finance Bureau (ZPFB) and Zhejiang Provincial Audit Office (ZPAO).

4.3 Social and environmental features

Before implementation of the project, a successful sustainability assessment had been done keeping into consideration the socio-economic and environmental impacts. Certainly, the project would directly benefit a large number of population in four cities with strengthened water supply infrastructure, supporting capacities of water and sanitation utilities. In addition to this, the project carefully takes into account for addressing the land acquisition and resettlement in those cities through resettlement action plans (RAP) prepared from guidelines of resettlement policy framework (RPF). All these plans would follow standard compensation rates and mitigation measures for restoring livelihoods as well as emergency institutional and monitoring arrangements. Also, the project components had already appraised 53% of total investment for acquisition of 6.1 hectares of land, which included 3.3 hectares of cultivated land and 2.8 hectares of state-owned land. Of those land, about 75.1 hectares are estimated to be used temporarily during pipeline installation. Similarly, another social feature of the project comprises of involvement of public consultations and participations that incorporate key stakeholder's concerns and demands, refining of project designs and reduction in number of direct impacts to inhabitants. Likewise, the project also explores the possibility of providing training to women so that they can assist with basic maintenance of assets created under the project for provision of additional source of income for women.

However, there are some potential negative environmental and social impacts as well, such as disturbance of rivers and streams ecosystems during construction phases, short-term degradation in water quality, occurrence of soil erosion, prevalence of noise and dust. Likewise, the project may result in problems during shipping and disposal of construction waste. Similarly, operational impacts in wastewater treatment may cause increased nuisance temporarily to the nearby inhabitants.

5 Project Benefits

Several positive outcomes have been thought to be achieved by the project. The project expects to generate either temporary or permanent job opportunities in construction and operation stages with preference to the poor in order to increase their income and reduce financial burdens. Likewise, the design of project would improve local environment resulting in promotion of tourism and its development. Thus, the project would indirectly boost job opportunities through catering, accommodation and cleaning where even individuals with minimum skills can get employed. Similarly, the improvement in living environment and healthy water supply would reduce the medical expenses since the living standard will be raised and the inhabitants would less likely be ill. The rehabilitation of raw water mains, water distribution networks, water treatment plants, end-of-pipe treatment facilities and the establishment of sustainable management systems is also expected to abridge urban-rural gap in water services prevalent within the province (The World Bank, 2014). From the perspectives of women, the project would reduce women's labour intensity as most local women are engaged in household activities and farm work through employing in new jobs in sites. Also, the reduction in women's exposure to domestic wastewater and in process of acquiring of safe drinking water would enhance women's health and reduce prevalent skin and respiratory diseases. Moreover, special skills and trainings, environmental publicity would help enhance health and environmental awareness resulting in improved overall competencies and long-term development. The entire project would benefit 1.5

million people residing in around 500 villages. Water supply capacity would increase by 24.7 million m^3 per year and wastewater treatment capacity would increase to 53.1 million m^3 per year supported by the project. Moreover, the sanitation program within the project would benefit the people with collection and treatment of 13,000 tons of chemical oxygen demand (COD) and 6,000 tons of biological oxygen demand (BOD) thereby reducing a significant amount of water pollution (The World Bank, 2014).

6 Implementation status of the project

After the approval of the Zhejiang Rural Water Supply and Sanitation Project, there have been made some adjustments in regards to water improvement as of Zhejiang campaign of five-water improvement (wastewater, flood water, logged water, water supply and water conservation). This resulted in 49 new contracts being signed under the project by December 31, 2016 (Zhejiang Provincial Audit Office of the People's Republic of China, 2017). Under the scheme, 22 contracts have been signed for Anji Subproject Phase I including 16 civil work contracts, 3 equipment procurement contracts and 3 consulting contracts. In this subproject for Meixi area, 85% of 2 contracts valued works have been completed. Similarly, operation and maintenance work on terminal and pipeline has been started. Likewise, 11 contracted works in Fuyang subproject Phase I are underway while 45% of construction works for wastewater treatment have been accomplished. In Tiantai county, construction of pipelines as per 5 contracts benefitting 21 villages are in progress while 2 prime pipeline construction in 24 villages as per 6 contracts have not yet been started. Furthermore, in Longquan county, water supply and wastewater subproject in Anren town, water supply and wastewater subproject in Badu town, works of Nandayang WSP modification and expansion subproject and Longquan back alley renovation work under 6 planned investment projects have begun their respective construction by December 31, 2016 (Zhejiang Provincial Audit Office of the People's Republic of China, 2017).

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