

**China: Water Supply Anshun**

**Ex post-evaluation report**

<b>OECD sector</b>	14020 / Water supply and sanitation – large systems	
<b>BMZ project ID</b>	a) 1993 65 669 (Investment) b) 1993 70 347 (Complementary measure)	
<b>Project-executing agency</b>	Anshun Water Supply Company	
<b>Consultant</b>	CES and CIECC	
<b>Year of ex post evaluation</b>	<b>2005</b>	
	<b>Project appraisal (planned)</b>	<b>Ex post evaluation (actual)</b>
<b>Start of implementation</b>	(a) Q4 1993 (b) Q1 1994	(a) Q2 1994 (b) Q3 1999
<b>Period of implementation</b>	(a) 40 months (b) 12 months	(a) 66 months (b) 36 months
<b>Investment costs</b>	a) EUR 11.9 million b) EUR 0.2 million	a) EUR 11.1 million b) EUR 0.2 million
<b>Counterpart contribution</b>	a) EUR 6.5 million	a) EUR 5.7 million
<b>Financing, of which Financial Cooperation (FC) funds</b>	a) EUR 5.4 million b) EUR 0.2 million	a) EUR 5.4 million b) EUR 0.2 million
<b>Other institutions/donors involved</b>		
<b>Performance rating</b>	4	
• <b>Significance / relevance</b>	5	
• <b>Effectiveness</b>	4	
• <b>Efficiency</b>	3	

**Brief description, overall objective and project objectives with indicators**

The FC project was concerned with improving and expanding the central drinking water supply in the city of Anshun in Guizhou Province. In the first stage of a long-term expansion programme it was planned to overcome the very precarious supply crisis (insufficient water resources, industrially polluted surface waters, falling groundwater table, sufficient water supply for only 35% of the population and intermittent water supply for another 35%, no water supply for 30% of the inhabitants, occurrence of water-induced diseases especially typhus) and to satisfy the demand for drinking water until at least 2005. Moreover, Anshun did not have any proper sewage elimination system. The entire volume of domestic waste water, and with few exceptions (partial pre-treatment) also industrial waste water, was gradually seeping into the soil or flowing into the Youcai stream, which runs across the city and was heavily polluted. Faeces were disposed of via simple cesspools or dry latrines. This precarious sewage disposal situation caused severe health hazards. At the time of the project appraisal the construction of a treatment plant had already been planned. In order to prevent a deterioration in the environmental and health situation following the expansion of the central water supply system, it

was bindingly requested at the time of the project appraisal that the establishment of sewage collection and treatment capacities had to be planned and implemented from 1995 at the latest.

The project objectives were to ensure that the population had a year-round supply of hygienically safe drinking water, to increase the number of connections to the water supply system, to produce more drinking water in keeping with demand, to reduce the use of groundwater and water from an existing agricultural surface water reservoir for the central water supply. The overall project objectives were to reduce the risks to the health of the population, to improve the production conditions for commerce and industry and to conserve local groundwater resources.

No indicators were formulated for the overall objective. Due to the new findings gained at the time of the ex-post evaluation it became clear, however, that in order to be able to assess the achievement of the overall objective it would have been appropriate to define indicators in terms of the reduction of risks to the health of the population and the conservation of local groundwater resources. Accordingly, the following indicators were defined retrospectively at the time of the ex-post evaluation to measure the achievement of the overall objective: a) significant decline in water-induced diseases and b) reduction in the lowering of the groundwater table.

#### **Programme design / major deviations from the original programme planning and their main causes**

The project concept comprised the construction of a raw water withdrawal facility, the construction of (intermediate) pump stations, the construction of a long-distance pipeline, the rehabilitation and extension of the distribution network, the construction of an urban and several village treatment plants as well as supportive consulting services in the planning and supervision of construction. A complementary measure and a training measure were implemented to ensure the proper operation.

The raw water withdrawal facility at the Sousai reservoir and the long-distance pipeline including the intermediate pump stations are functioning and have been in continuous operation since September 1999. The average capacity utilisation rate in 2005 (expansion horizon) was approx. 52%. Some less important control and measurement facilities can be used only to a limited extent or are completely defective. No maintenance was conducted on these facilities because the costs of repairs and spare parts were too high or they were replaced by lower-cost Chinese technology. The corrosion protection of the long-distance pipeline is damaged at some points, where the pipeline runs above ground. Flanges, bolts and slide valves of the long-distance line were partly corroded, though this has so far not affected the proper functioning of the system.

The operating and maintenance condition of the new treatment plant at the Wangchengpo waterworks, however, is deficient. Important control and measurement facilities are defect and in consequence the plant has to be operated manually. Some buildings and secondary components such as stairs, handrails, etc. show heavy damage caused by bad weather. At the time of the ex-post evaluation some parts of the plant were flooded due to leaks. Due to these substantial operating and maintenance deficiencies the water treatment plant functions only to a limited extent. However, due to the high quality of the raw water from the Sousai reservoir, the drinking water quality at the outlet of the water works is not impaired by this. The FC-financed equipment of the laboratory in the Wangchengpo water works is completely available for daily routine analyses and is in a satisfactory condition.

Measures in the water supply network (main conduits, distribution network, elevated tank) had to be modified in accordance with the changed urban development and, thus, were not implemented in line with the project concept agreed at the time of the project appraisal. The originally planned expansion of the city area towards the east was implemented only partially, and in consequence the plan to construct a pressure mains from the Wangchengpo water works to the eastern expansion zone was dropped. Instead the city area was further expanded towards the west and the feeder and distribution system was expanded accordingly. The construction of a new elevated tank was not realised; instead the volume of the existing elevated tank was increased. The planned maintenance yard was not built because the available local funds were not sufficient. At the time of the ex-post evaluation the maintenance vehicle was defect and no longer in use and the repair of the vehicle was considered as uneconomical. A modern control room for the central supervision and control of the main water supply facilities (water works, pumping station) was not installed. All facilities are supervised and controlled locally. The coordination is done by telephone.

In the framework of a complementary measure a specific operating training was provided during the phase when the facilities were put into operation (1999-2002). While the main focus of the complementary measure was on the handling of the individual facility components, a further training measure was implemented in the years 2002 and 2003 which was targeted at optimising the overall operation of the Wangchengpo water works.

On the whole, the technical concept of the project and its implementation is rated as satisfactory. According to this project concept the most important measures required to achieve the project objectives were implemented, or adjusted due to changed framework conditions, in order to ensure that the objectives were reached. The FC financed electro-mechanical regulating and measurement facilities were not in line with the qualification level of the operator. It would have been more appropriate to introduce manual regulating facilities. This was not done, however, because from the beginning the Chinese side had been in favour of the automatic control technology. Insistence on a simpler technology might have impeded the implementation of the project and would have been disproportionate in view of the minor scope and importance of this component for the established system as a whole.

### **Key results of the impact analysis and performance rating**

The project contributes to improving the overall health situation of the population in the city of Anshun. By opening up the Sousai reservoir for the central water supply it was possible to protect the groundwater resources. Given the improved drinking water quality it can be assumed that the health hazards from serious water-induced diseases were reduced, even though seasonally high concentrations of coliform bacteria were measured at some points in the drinking water network.

According to the project appraisal report the project objectives did not target gender equality. However, the project did indeed show the potential to improve gender equality in the sense that women derive above-average benefits from improvements to the water supply and the sanitary conditions in their living environment. Particularly in the poorer areas in the project region, women are traditionally responsible for taking care of the drinking water in the home and for hygiene and health in the family, including taking care of sick relatives. As a result of improving the availability of hygienically safe drinking water and general health, it can be assumed that an improvement in the situation of women has been achieved.

By developing the social infrastructure in order to satisfy the basic needs in one of the poorest regions of China (at roughly EUR 324, per capita GDP in Anshun is less than a quarter of the national average and exceeds the 1 US-dollar threshold per capita/day only marginally), the

project has made a direct contribution to poverty reduction. Experience has shown that the permanent and sufficient availability of hygienically safe drinking water makes an above-average contribution to improving the living conditions of poor sections of the population.

As an equally important overall objective, reducing the excess use of groundwater resources was also the focus of the project. By opening up the Sousai reservoir for the central water supply it was possible to substitute groundwater by surface water. In 2005, however, still about 19% of the drinking water for the central water supply was gained from groundwater reserves. Moreover, industry still covers its water demand mainly from the groundwater (around 74% of total industrial consumption in 2005). This continued misallocation of water resources is further aggravated due to the fact that the tariff for raw water extraction has not changed for ten years and that the same tariff applies to groundwater and water from the Sousai reservoir. Increasing the tariff for groundwater extraction could provide additional economic incentives to protect the natural resources. The tariff increase planned at the time of the ex-post evaluation is basically to be welcomed; from our point of view, however, it is not sufficient to effectively contain the excessive use of groundwater.

Due to the insufficient and heavily delayed implementation of the requirement to establish sewage treatment facilities the project has produced severe environmental and health risks for the people living downstream the river Youcai-Bach and the river Guancheng. Both rivers are heavily contaminated with pollutants and have been classified into the lowest water quality class (V) according to the Chinese classification system. Intensive irrigation farming (mainly rice-growing) is conducted along the Guancheng river in the areas below Anshun, which makes the occurrence of diseases induced by polluted water in areas outside of the project area likely. However, it was not possible at the time of the ex-post evaluation to collect specific data on the extent of environmental and health hazards caused by the discharge of untreated waste water into the Youcai stream, which flows into the river Guancheng.

An improvement in participation or governance was not among the project objectives and no effects of this kind can be detected.

The project objectives, which had been adjusted during the ex-post evaluation, have only been partially achieved. During the summer months the current Chinese water quality standards are not being met at some measuring stations at the inlet into the tertiary network. In addition, the central water supply has not been fully switched to the use of surface water, which would have been necessary temporarily to stabilise the groundwater table, and it was not possible to reduce the industrial use of groundwater to the level defined as project objective. Given the serious maintenance deficiencies and the insufficient independence of the project-executing agency from state intervention the project objectives, though formally fulfilled, cannot be regarded as reached on a sustainable basis. Overall, we rate the project's **effectiveness** as slightly insufficient (**sub-rating: 4**).

From today's point of view the project structure was adequate to solve the problem. By switching the water production for the central water supply to the use of surface water from the Sousai reservoir, which is 20 km away, and at the same time aiming to reduce the use of groundwater by households and industry in the project region, priority key development problems (protection of water resources, reduction of the health risk from hygienically unsafe groundwater) were addressed. The overall objective of reducing the health hazards to the population can be considered as partially achieved. However, to meet the objective of conserving the local groundwater resources it would have been required as part of the project design to fully refrain from using groundwater for the central water supply (i.e. to close down the old Suiduicheng waterworks). Thus, due to the continued fall in the groundwater table the overall objective defined as "conservation of the local groundwater resources" was not

achieved. The lack of sewage treatment causes substantial environmental risks on the Youcai stream and the river Guancheng as well as related health hazards to the population in the downstream areas. The project did not help to significantly improve the production criteria for industry owing to the change in the economic structure in Anshun. However, by opening up the Sousai river with its storage capacity of 265 million m<sup>3</sup> for the central water supply, an improvement in the long-term availability of river water for production processes was achieved. With the high connection rate and due to the fact that the project reached the target group very well the project can be said to have a broad impact. Taking into account the substantial environmental and health risks as well as the continued excessive use of the groundwater we rate the **relevance/significance** of the project as **clearly inadequate** (sub-rating: 5).

The specific investment costs are reasonable. The manpower resources used for the operation of the water supply still hold potential for efficiency improvements. Nevertheless, the production efficiency can be judged to be adequate overall. The project-executing agency is able to cover the dynamic operating costs for the water supply fully from tariff revenues. However, depreciations and financing costs are not covered by tariff revenues. Technical water losses account for approx. 22%. The collection efficiency is comparatively high, at approx. 91%. The average capacity utilisation of the extraction, transport and treatment facilities for surface water from the Sousai reservoir, which were set up in the framework of the FC project, was only approximately 52% in 2005 (expansion horizon). After considering the various aspects, the overall allocation efficiency can be said to be sufficient. Overall, we classify the project's **efficiency** as satisfactory (sub-rating: 3).

For the project as a whole, taking account of the sub-ratings, the project can be classified as having a **slightly insufficient developmental effectiveness (rating 4)**.

### General conclusions and recommendations

The following general conclusions can be reached:

- Measures and activities that support the achievement of the project and the overall objective – in the present case the closing down of the Suiduicheng groundwater works and the consistent implementation of the closure of groundwater wells – should as much as possible be integrated into the project concept.

### Legend

Developmentally successful: Ratings 1 to 3	
Rating 1	Very high or high degree of developmental effectiveness
Rating 2	Satisfactory developmental effectiveness
Rating 3	Overall sufficient degree of developmental effectiveness
Developmental failures: Ratings 4 to 6	
Rating 4	Overall slightly insufficient degree of developmental effectiveness
Rating 5	Clearly insufficient degree of developmental effectiveness
Rating 6	The project is a total failure

### **Criteria for the Evaluation of Project Success**

The evaluation of the "developmental effectiveness" of a project and its classification during the ex-post evaluation into one of the various levels of success described in more detail below concentrate on the following fundamental questions:

- Are the **project objectives** reached to a sufficient degree (aspect of project **effectiveness**)?
- Does the project generate sufficient significant **developmental effects** (project **relevance** and **significance** measured by the achievement of the overall development-policy objective defined beforehand and its effects in political, institutional, socio-economic and socio-cultural as well as ecological terms)?
- Are the **funds/expenses** that were and are being **employed/incurred** to reach the objectives appropriate and how can the project's microeconomic and macroeconomic impact be measured (aspect of **efficiency** of the project conception)?
- To the extent that undesired (**side**) **effects** occur, are these tolerable?

We do not treat **sustainability**, a key aspect to consider for project evaluation, as a separate category of evaluation but instead as a cross-cutting element of all four fundamental questions on project success. A project is sustainable if the project-executing agency and/or the target group are able to continue to use the project facilities that have been built for a period of time that is, overall, adequate in economic terms, or to carry on with the project activities on their own and generate positive results after the financial, organizational and/or technical support has come to an end.