



## **Social contract formulas in rural areas: the India Naandi Foundation water treatment plants**

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**Type of tool:** cost recovery and sustainable financing of water services

**Location:** Andhra Pradesh State, India, Asia

### **Challenges**

The provision of safe drinking water is a key development issue in India, where only 18 percent of rural households have access to clean water and 21 percent of communicable diseases are water-related. Andhra Pradesh is the fifth most populated state in India with 80 million people. Nearly 65 percent of its population has access to water; however, 17 million people (over 22 percent) routinely experience bacteriological contamination of water. Rural households in the coastal districts suffer frequent outbreaks of jaundice, diarrhea, and gastroenteritis. Some of the challenges in providing clean water in rural areas include geographic remoteness, poor maintenance of existing systems, and a paucity of public funds. Social factors also contribute to poor service levels in rural areas, notably the caste system and high rates of illiteracy. Providing safe drinking water to poor families in the coastal area of Andhra Pradesh is critical for the economic development of the region as well as for improving health and living conditions.

### **Drivers of change and objectives**

In 2006 the Naandi Foundation was founded, an Indian non-governmental organisation which describes itself as "one of the largest and fastest growing social sector organisations in India working to make poverty history." Started by an extremely successful businessman, the foundation bases its approach to poverty on using public-private partnerships to create sustainable models for delivering critical services. Safe drinking water is a core programme. Naandi formed a relationship with Water Health India (WH India), a subsidiary of Water Health International (WHI), a disinfection technology provider, and approached Global Partnership on Output-Based Aid (GPOBA) to request funding to pilot rural village water schemes in coastal Andhra Pradesh that combine cost-effective water purification technology with a community-driven and performance-based approach.

The proposal was accepted by GPOBA and, in May 2007, Naandi and GPOBA signed a grant agreement for an output-based aid (OBA) project to improve rural water services in three coastal districts of Andhra Pradesh: Guntur, Krishna, and West Godavari. The Naandi Foundation manages the project and runs programmes to generate awareness about the need for clean water through health educators. These educators work with the community through women's self-help





groups and schools, targeting women as they are the decision-makers for domestic water use. WHI installs and maintains the treatment plants, with the water meeting the quality standards specified by the Bureau of Indian Standards. Given the remoteness of the locations and the lack of technical support, the objective has always been to ensure sustainable delivery of services. Apart from setting up each plant, WHI hired and trained plant operators in each village. The water tariff pays for the ongoing operation and maintenance of the water plants.

The project aimed to establish Community Safe Water Schemes (CSWS) in 25 coastal villages that currently lack access to clean drinking water, benefiting around 12,500 poor households (earning less than \$20 per month). It was estimated that each CSWS would benefit a minimum of 500 poor households. Each CSWS has a water treatment plant connected to a water distribution point from which users will purchase water in jerry cans. Although this project does not envisage domestic connections, it is a first step in providing safe and affordable drinking water in areas where typically the existing water source is of poor quality.

### **The approach: how the financing tool helped overcome barriers to providing safe drinking water for the rural poor**

#### *Public-private partnership*

The community water project employs a community-based public-private partnership model involving the village *Panchayat* (local council), Naandi, and WHI, each with the following roles:

- The village *Panchayat* is required to provide land for the plant to be built on, a treatable water source for the plants, the community financial contribution, and electricity at a pre-agreed tariff for the CSWS.
- Naandi acts as project manager and secures pre-finance for the plant's construction through commercial borrowing. It mobilises the community to raise the necessary community financial contribution and collects water user fees. It trains Safe Water Promoters and Village Health Workers, and develops a communication and awareness campaign to change the behavioural practices of poor families regarding water. Naandi also undertakes monitoring and evaluations to measure outputs and the impact of the scheme.
- WHI is the project operator. It builds and installs the ultraviolet (UV) filter water purification plants and the basic infrastructure needed to operate them (i.e. pumping system, storage tank and shelter); hires and trains a plant operator for each of the 25 villages; and shares project implementation risks by providing Naandi with operational performance guarantees.



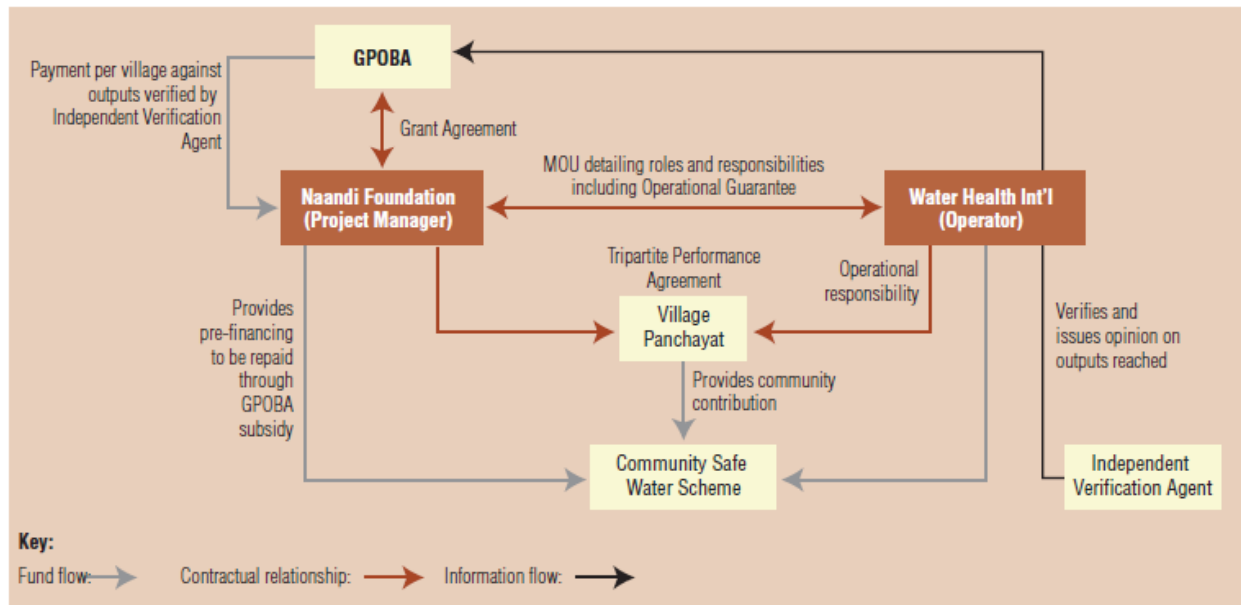


Figure 1. Project arrangements

### *Output-based aid approach*

Enhancing the sustainability of the pilot water schemes through an output-based approach has been a key part of the project design. GPOBA subsidizes the cost of setting up the water treatment plants with ultraviolet (UV) purification technology 25 villages through a US\$800,000 grant. This subsidy is performance-based and linked to the delivery of pre-agreed outputs which include three months of billed water services (see Table 1). The output-based approach requires that tariffs paid by users for consumption cover the costs of operation and maintenance, user-fee collection, and education and communication activities with key stakeholders and vulnerable groups such as young mothers, infants, and families living below the poverty line. Tariffs also cover loan repayment, thus helping to ensure the long-term sustainability of the services.

The GPOBA subsidy is paid to Naandi in instalments after independent verification of three pre-agreed outputs which Naandi pre-finances through commercial borrowing. Notably, a significant part of the subsidy is payable only after each CSWS proves it has provided reliable water services for at least three months after becoming operational. Together with an independent verification agent, the World Bank's Water and Sanitation Program (WSP) will conduct ex post reviews of the completeness, accuracy, and authenticity of the documentation provided for each village, and undertake ex post physical spot checks of the outputs. Payments by GPOBA are made only after these conditions have been met.





As the subsidy is mainly linked to service delivery (rather than constructs, as input-based schemes), if WHI does not perform, Naandi will not receive the subsidy from GPOBA and therefore will be unable to repay the loans it take acquired to pre-finance the schemes. Naandi relies upon the operational guarantee provided by WHI to protect itself against this risk.

Indicator #	Output Item	Description of the Output	Means of Verification	% Disbursed
1.	25 UV water purification plants/ CSWSs installed	Construction and installation of the complete CSWS	Completion report for each plant available from the Independent Verification Agent	20
2.	Registration of the households	Paid subscription fees	Minimum 500 Below Poverty Line households registered for paid usage of water; subscription fee available from such households	60
3.	Three months of billed user fee consumption	m <sup>3</sup> of water sold	Continued usage of paid water by a minimum of 500 households; billing records	20

Table 1. Schedule of outputs and disbursements

### *Selecting eligible households*

The project uses various techniques to target the poorest households. The three project districts were chosen because of their high poverty rate and lack of access to quality water services. Within this geographical area, villages were selected based on the presence of a water source that could be purified by ultraviolet technology, and the willingness and ability of the village to adopt a fee-for-service scheme. To target individual beneficiaries in the villages, the project uses the government's 'white ration card', a system that entitles low-income individuals to obtain basic commodities (e.g. rice, flour) at a reduced price. Other indicators considered include family size, construction of a house from low-cost material, limited or no possession of durable goods such as a TV, and time spent by women and children of a given household in fetching water. As project manager, Naandi does the targeting in close collaboration with the village *Panchayat*. The process is verified by the independent verification agent.

### *Sharing the investment costs*

The total project cost is US\$1.25 million. The cost per CSWS (US\$50,000) covers investment, community awareness, and running costs. Tariffs are set at an affordable rate and cover the initial investment (net of subsidy) and operation and maintenance costs. Sustainability of the service is thus ensured through user fees which average US\$0.03 for a consumption of 20 litres. Since the three project districts are contiguous, the cost per CSWS is almost the same across all the project villages.





The share of investment costs is shown in Table 2. The community contribution (which is at least 20 percent of the total capital cost) may come from user fees, and/or from local government funds, and/or from donations from philanthropists and charitable organizations. The commercial loan sourced by Naandi is payable over a period of approximately seven years. During this period the assets remain with the community and Naandi, and WHI has full operational responsibility. After the loan is re-paid, the *Panchayat* may choose to renew the operation and maintenance agreement with Naandi and WHI. The life of the plant system is expected to be at least 15 years.

Source of funds	Per village (US\$)	Total Project (US\$)	Share of total (%)
Community contribution	10,000	250,000	20
GPOBA subsidy	32,000	800,000	64
Long-term commercial loans sourced by Naandi	8,000	200,000	16
<b>Total</b>	<b>50,000</b>	<b>1,250,000</b>	<b>100</b>

Table 2. Share of overall investment

### Evaluation

The project provided access to safe water through the construction and installation of 25 UV water purification plants in 25 villages in Guntur, Krishna and West Godavari districts. By grant closure, all water plants were fully operational and serving a total of 16,104 poor households (or 77,878 people), which is 29 percent higher than the original target of 12,500 households. Household surveys conducted after grant closure found that 98 percent of the households reached by the project still continue to use water from the new plants for drinking purposes (i.e. they have not reverted back to existing contaminated sources). This implies a high community awareness of the health risks of contaminated water, and evidence of the effectiveness of the awareness campaign which complemented the hardware component.

Evidence from household surveys also suggests that the project has led to health and economic outcomes (see Table 3), which can be reasonably and directly linked to the project outputs.

Before the project	After the project





<ul style="list-style-type: none"> <li>• Average time spent collecting water was estimated at 61 minutes.</li> <li>• Incidence of water borne diseases in children and adults was 68 percent and 84 percent respectively.</li> <li>• On an average a family was spending around Rs.300-400 for treatment on these diseases for a single visit.</li> </ul>	<ul style="list-style-type: none"> <li>• Average time spent collecting water estimated at 20-22 minutes which shows that there was a time saving of around 40 minutes per trip of fetching of water.</li> <li>• Overall, the incidence of water borne diseases has dropped by 85 percent (figure collaborated by health workers in the village health centres).</li> <li>• Household savings on medical expenses alone was Rs 650-750 a year.</li> </ul>
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Table 3. Evidence of economic and health benefits from household surveys

*Economic analysis*

The project provided significant short and long-term benefits with many positive spillover social and economic impacts at the individual and community levels. Health and environmental benefits and cost saving from medical and health related expenses are the largest benefits of any water supply and sanitation project, but they are difficult to quantify in entirety.

A benefit-cost framework using a ‘with’ and ‘without’ project methodology has been used to calculate the Economic Rate of Return and the Net Present Value (NPV) of the project, ex post. The economic analysis covers a project life of 15 years. Cash flow is discounted at 12%, which is the estimated cost of capital. A conservative inflation rate of 6% per annum is assumed for cash flow analysis. Without project situation is what would have been prevailed without the project vis-a-vis factors such as population increase, continued exposure to contaminated water, and economic growth. The quantifiable economic benefits include: (i) water sold at flat tariff rate established by the operator which comprise of economic value of incremental water consumptions by households with access to safe water; (ii) health benefit of the project for the beneficiaries; and (iii) potential time cost saving for collecting water from distance. The economic value of cost of time saved is estimated using the opportunity cost of labour or the income foregone in other income generating activities; which is considered benefits to the households and the society.

The ex post economic analysis yield a positive and significant NPV of Rs.199 million (or US\$4.4 million) and an overall Internal Rate of Return (IRR) of 71% (against IRR of 73% for ex ante economic analysis at appraisal). The economic benefit of the revenue generated from water sold alone at the established tariff rate is also significant with NPV of R.113.9 million (or US\$2.5 million) and an InternIRR of 38% (against 31% at appraisal). When the net benefits (over and above their willingness to pay) of time cost saved to fetch water are added, the IRR







increases to 49% and with added net benefits from improved health, the overall IRR reaches to 71%.

### *Financial analysis*

The ex ante financial analysis at appraisal revealed that project was financially sustainable from the operator's perspective. The ex post financial analysis reveals that the operators will be able to cover its operating costs and with a profit margin only starting year 2012. The reasons are: (i) of the 25 schemes constructed 23 are operated and maintained by the operator (2 are operated by the communities); (ii) of the 23 schemes in operations at the project closing in 2010, only 11 covered direct O&M costs and remaining sites did not generate enough revenue to cover operating costs; (iii) plant constructed were in operation only 8 hours a day; (iii) consumption in 9 sites was low due to bad taste of water; and (iv) in 3 sites community is small and therefore insufficient volume of water produced and consumed. All these issues are being addressed, schemes are being upgraded to be operated more efficiently with better quality water, and operational hours of the schemes are being increased to cater increasing demand. With available data on revenue generation and O&M costs as of 2010, the measures being taken to improve consumption and revenue, as well as other relevant information, all 23 schemes are expected to generate enough revenue to cover the cost with a profit margin starting 2012 and in the 15 year of its useful life. The Financial Rate of Return (FRR) is estimated at 23% (against 64% at appraisal) when taking into account the subsidy from the grant; and it is estimated at 3.5% (against 6% at appraisal) without the subsidy.

### **Lessons learnt from implementation**

The design and implementation of the project offers the following key lessons that might be useful in shaping future similar projects:

- ***Rural households are willing and able to pay for clean drinking water.*** This has been a consistent lesson emerging from many World Bank-supported rural water supply and sanitation projects in India. However, in most cases this demand has to be created through community awareness campaigns. In this project, paying a cost recovery tariff was a new concept for the beneficiaries, which for decades have been accustomed to expecting free service delivery from the government. The shift in payment behaviour was made possible by the community awareness and social marketing campaigns carried out by the implementing agencies, and a high level of transparency and accountability ensured through the OBA approach.
- ***A win-win strategic partnership between the grant recipient and the technology provider/operator is critical to success.*** The role of the Naandi Foundation as grant recipient,





administering the project and interfacing with the implementing agency and the Panchayat through a tripartite agreement, has been instrumental for the success of the project. Naandi provided support in selecting communities and in targeting beneficiaries. Throughout the project Naandi conducted visits to beneficiary communities, trained and facilitated community-based health promoters, managed awareness campaigns and helped clarify issues relating to project implementation with the implementing agency. The partnership resulted in a win-win situation whereby WHI benefited from increased demand generated by Naandi's safe-water education campaigns, and Naandi benefited from linking its traditional health education work to new and reliable clean water supplies. However, as operators increase their capacity in using the community approach, the need for tripartite agreements between the operator, an NGO and the village Panchayat becomes less necessary. In such a case a direct contractual agreement between the Panchayat and the operator is likely to be more efficient.

- ***Small grant-financed pilot projects can stimulate discussion on wider sector issues, but Bank teams must be flexible enough to respond quickly and appropriately.*** This project partially contributed to stimulating a wider sector discussion on issues related to appropriate water treatment technology for rural water supply, institutional arrangements for O&M, and improving accountability and transparency in service delivery. However, the Bank team missed an opportunity to engage with the State government agencies (such as the Rural Water Supply and Sanitation Division) regarding the potential benefits of the OBA approach in general and the potential for wider application.
- ***Appropriate application of the Bank's fiduciary procedures to an output-based arrangement minimised the fiduciary risk to the Bank without encroaching on the implementers' freedom to use its own systems to deliver outputs.*** The project has confirmed that paying on outputs effectively transfers procurement and financial management-related risks to service providers.

### Scaling up

The GPOBA subsidy has made it easier for Naandi to borrow funds from commercial banks. The OBA approach is promoting participatory community involvement and building capacity in the villages for managing and delivering efficient services. The grassroots fee-for-service model coupled with a sense of community engagement and ownership will help ensure the long-term sustainability of the water supply schemes.

It is anticipated that the CSWS model can readily be applied to other villages in the State of Andhra Pradesh and ultimately in other parts of India. GPOBA, Naandi, and WHI believe that scaling up is possible, as the impacts of each pilot will motivate adjoining villages to engage in







similar projects, accelerating demand and willingness to pay for clean water through user fees. Lessons from this project may also assist in the design of national programs aimed at achieving the Millennium Development Goals for water and sanitation.

WaterHealth International has entered into similar public-private partnerships in Ghana, the Philippines and India. Naandi is now introducing rural private operators into its schemes in central Vietnam with the aim of improving the financial and technical sustainability of its schemes.

## References

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