

Ultraviolet (UV) Waterworks

Location: Rural villages in Guerrero, Mexico, and Manila, the Philippines

Type: Water disinfection system

Size: 57,600 gallons per day, per installation;
175 installations

Funding: Total: US\$5,690,000
Private: US\$4,605,000
Public: US\$1,085,000

Objective: To provide safe drinking water.

Duration: 1993–1999

Scale: Urban and rural

Summary

The UV Waterworks project uses an innovative ultraviolet water disinfection system to provide safe drinking water for more than 300,000 individuals in rural and urban communities in Mexico and the Philippines. Over the course of one year, 175 disinfection units were installed in Guerrero, Mexico, and in Manila, the Philippines. The community-level focus of this project and the sustainable clean drinking water management prospects helped attract almost US\$5,000,000 in private-sector investment.

In-Country Principles That Attracted Nondonor Financing

- Capacity building and informed decision making
- Public participation in, and support of, sustainable development

Key principles that helped attract private-sector financing included training of local community members and technicians for installation and maintenance of the systems and presentation of detailed information about the project and



alternative options to the State Government of Guerrero and individual communities in Manila.

Disinfection installations in Manila resulted from a partnership between the local branch of the Rotary Club and the local communities, whereby the Rotary Club facilitated access to capital through a revolving loan program. This facilitated the establishment of a sustainable system of access to and allocation of water through a formal water market. Local community members who became entrepreneurs in the communities served by the clean water own their own kiosks.

The installations in Mexico also focus on strengthening human capacity for sustainable water management, using a public-sector approach. The state government purchased the systems, and a private local entrepreneur distributed, installed, and provided follow-up maintenance on the systems.

Broad stakeholder participation and empowerment are evidenced by an emphasis on decision making and authority at the lowest appropriate level. In Mexico, the local Health Committee, composed of village women with young children, is the primary body in charge of supervising the functioning of the units and coordinating their maintenance.

The direct involvement and ownership of the units on a community level in both Mexico and the Philippines reinforce accountable, participatory, and sustainable management and minimize opportunities for corruption, making the investment safer for funding agencies.

Financing

Total project investment was US\$5,690,000. More than 80% came from the private sector, which included the Bendix Corporation (Philippines) (US\$1,000,000), WaterHealth International (US\$3,500,000), and private foundations, such as Pew, Gilmore, and Rockefeller (US\$105,000). Public funding sources included Guerrero State in Mexico (US\$750,000) and United States (US) government agencies (US Agency for International Development [USAID] and US Department of Energy [USDOE]) (US\$335,000).

Roughly US\$440,000 went to research; US\$1,750,000 went to capital costs (175 units at US\$10,000 per unit); and US\$3,500,000 went to product development and equipment manufacturing. Operations and maintenance costs average \$100 per month, per unit.

The Project

Each UV disinfection system can meet the daily drinking water needs of a community of 2,000. The units were installed

in areas where centralized water piping is prohibitively expensive for local governments, and chlorination is not feasible because of an unstable chlorine supply and the impracticality of having a trained operator continually present.

The units, which have been tested by 11 laboratories in 5 countries, have been installed according to 3 separate approaches. In Manila, approximately 90 units were installed privately, on a for-profit basis. The Rotary Club installed another 10 in the slums in and around Manila through a revolving loan. The State Government of Guerrero purchased and installed 75 units in rural villages in Mexico.

The systems benefit both the residential and commercial sectors. Families benefit from safe drinking water without having to boil it. To boil drinking water, 3 kg of scarce fuel wood is needed per person, per day. Boiling water over a biomass cookstove creates substantial smoke inhalation for the family, thus making the process economically and environmentally unsustainable on a long-term basis.

The Manila operation generates income for local entrepreneurs and workers, and the Mexican project creates employment for local distributors and technicians.

Technical Data

The UV disinfection systems use about 60 W of electricity for disinfection and about 150 W for pumping (when needed) for about 4 hours per day. The effectiveness of the systems exceeds US Environmental Protection Agency (USEPA) and World Health Organization (WHO) disinfection standards.

Performance Data

The 175 installed units serve more than 300,000 individuals. Compared with boiling water for disinfection, the UV systems consume 6,000 times less energy (excluding the power for the pump).

Rural Mexican communities have reported a 90% decrease in gastrointestinal disorders since implementation of the new systems.

Participants and Roles

Lawrence Berkeley National Laboratory (LBNL) performed the technological research, funded by the USDOE, USAID, and private foundations, including Pew, Rockefeller, and Gilmore. The Natural Resources Defense Council helped with field-testing. WaterHealth International, Inc., developed the product and marketed it, along with Bendix Corporation in the Philippines and WaterHealth Mexico in Mexico. The State Government of Guerrero, Mexico, and the Rotary Club



and Bendix Corporation in the Philippines facilitated the purchase of the units.

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