Cooperation Fund for the Water Sector

Pilot and Demonstration Activity

Activity Title: Enhancing Sustainability of the Decentralized Wastewater Treatment Facility at the Lilo-an Public Market	
Proposer (Name, Div/Dept): Municipality of Lilo-an, Cebu Province	
Request Date: December 15, 2006	
Country (DMC): Philippines	**Region:** Southeast Asia
Activity Proposed Start Date: February 1, 2007	**Activity Proposed Duration:** 6 months
Cost Estimate: US$25,000	
Proposed Executing Authority and Contact Details: Lilo-an municipality, Office of the Mayor, tel: 032-5643785	
Consultant Identified?	**If so, Consultant(s) Contact:**
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Short Description:

1. Background and Rationale:

This proposal supports strengthening of the sustainability of a decentralized wastewater treatment facility (WTF) for the Lilo-an[1] public market in Cebu province funded under a previous PDA. Prior to this PDA, Lilo-an was suffering from deteriorated quality of its coastal water. The wastewater outfall pipe coming from the public market was identified as the main contributor to the coastal pollution, adversely affecting livelihood and tourism opportunities in the area. The WTF was constructed at the town center in the amount of US$48,622. It has a capacity of about 120 cu.m. a day and currently, treats 100 cu.m. of wastewater a day. It serves the public market and about 200 households around the area. The PDA also funded the improvement of communal toilets in the public market. The project was completed in March 2006.

The innovations supported by the completed project are in the technical and institutional aspects. The project involved piloting of a low cost technology wastewater treatment using a mechanical-biological process called rotating biological contactor (RBC) serving mainly the public market, as against a typical centralized system that could have been too expensive and unaffordable to a small municipality like Liloan. The project also involved a consultative process in the planning, implementation and operation of the facility. Operation of the facility was outsourced to a cooperative of market vendors which was established for this purpose. A user fee mechanism is being implemented to recover the operation and maintenance (O&M) costs of the WTF and the public toilets. Initial studies conducted during the commissioning period have shown that fecal coliform cell counts along the Liloan shoreline improved significantly as a result of the project. The project completion report can be accessed at www.adb.org/Water/Pda/.

Issues encountered todate on the project

a) There is a need to enhance sustainability of the WTF by looking at additional ways of increasing revenues and decreasing costs. At present, there are two main sources of revenues which were established on a voluntary basis at the Lilo-an community during the previous PDA. The first one is a WTF user fee system being implemented among the members of the market vendors' cooperative. The second one comes from the operation of the renovated communal toilets. On the average, annual net income from the operations of the

[1] Lilo-an is a municipality with a population of approximately 70,000, located on the east coast of Cebu Island, some 19 km from Cebu City.

WTF is P66,000 after recovering O&M costs[2] (see Table 1 attached). To improve financial sustainability of the WTF, the following activities have been identified: (i) capacity building of the cooperative on book-keeping and financial management; currently, accounts are not differentiated between WTF O&M and those relating to the cooperative's regular activities; (ii) widening the base of revenue payers by reaching out to other market vendors, small businesses, and neighboring households via awareness raising campaigns (currently, only 50% of market vendors are paying and fees are not being collected from connected households); (iii) fees can be collected for trainings conducted to LGU personnel and school children; (iv) collected sludge recovered from the WTF's RBC tanks and sedimentation tanks can be sold as organic fertilizer.

b) There is increasing interest on the technology from neighboring municipalities and schools. However, Lilo-an LGU has not been able to respond to requests in the absence of an IEC program, as training facilities and capabilities are lacking. It is proposed to support the local IEC activities through the construction of an open-shed-type training cum resource center at the WTF site. Aside from being venue for training, the new structure would also provide the cooperative's O&M personnel with a properly assigned and sheltered place where they can hold office, keep their equipments and training materials. This would encourage personnel to stay around the WTF for informing interested passers-by on the project. New instructive billboards explaining the project could be put up. With these measures, the IEC activities would become much more structured and transparent to the public and with the landscaping involved, it would result in an overall beautification of the project site. Two cooperative members will be trained as trainers to conduct trainings on basic issues of wastewater treatment. Fees would be collected for the trainings conducted, thus further adding to the financial stability of the project.

c) Sludge management: compared to other WTF technologies, the RBC produces rather small amounts of surplus sludge. In the case of the Lilo-an RBC, it is estimated that the volume of surplus sludge would be approximately 14 cu.m per year. However, for making the Lilo-an treatment system more complete, a proper sludge management system should be implemented. Surplus sludge from both the RBC tanks and the old septic tank (which is now used for sludge accumulation) in fact represents highly organic materials, thus its beneficial use as organic fertilizer should be considered. As this requires an efficient method for sludge drying, a sludge filter press would have to be installed for dewatering the sludge. Installation and operation of the filter press would be directly at the WTF site. Final sludge drying then could simply be done via sun drying on the concrete top of the old septic tank. While there are no market studies available on the potential for sale of the sludge as organic fertilizer, based on a German Development Service (DED) funded composting project in Bais City, Negros Oriental, the price for compost given to farmers as soil conditioner was set to P2 per kilo.[3] Also, sludge treatment would support the wastewater treatment efficiency of the WTF. Sludge collected from the screen at the WTF influent (0.25 cu.m per week) consist mainly of garbage such as plastics, sand, litter, etc., thus it is useless materials that has to be dumped at a landfill.

d) Lack of <u>regular</u> monitoring and documentation of the WTF performance in terms of impact on the environment, in particular, the water quality of the Liloan coastline. These data are vital in documenting the efficacy of the adopted technology. Renewed WTF monitoring is needed to complement the results from an earlier monitoring of the WTF's running-in performance (conducted during the first 5 months of operation of the facility). The cooperative will also be taught to conduct self monitoring activities, and to set aside a budget for it, an eventual requirement under the Clean Water Act.

2. Objectives:

[2] Fees are being collected from about 100 vendors in the amount of ₱3 per day per vendor; cooperative members pay ₱10 a day of which ₱7 goes to their savings pool. Served households are currently not being charged. A fee of ₱2 per use of the public toilet is also being collected. The cooperative has a total savings of about ₱150,000 as of December 2006, although it is not clear whether this has been generated from operations of the WTF and public toilets solely or from other activities of the cooperative.

[3] An option that could be considered rather than selling it as organic fertilizer is to give the sludge to mountain farmers in exchange for agricultural products, i.e. farmers and vendors would be supporting each other directly via a money-less system. Such a system of sharing resources is already being practiced, thus one can expect the local people being comfortable with it.

The objective of this project is to further support the technical innovation and financial sustainability of the project to strengthen its viability for replication elsewhere in the country and beyond. This will be achieved through the following activities:

(a) Financial sustainability
  (i) Capacity building of the operator (co-operative) on proper bookkeeping and financial management, including proper setting of user fees according to the following cost recovery options:
    - revenues cover only O&M (including monitoring)
    - revenues cover O&M + depreciation
    - revenues cover O&M + depreciation + capital cost
  (ii) Expanding the revenue base to other market vendors, small businesses, neighboring households and to assist the LGU administration in drafting an ordinance for collection of WTF user fees
  (iii) Expanding user fee arrangement to the training center
  (iv) Sale of dried WTF sludge as fertilizer to local farmers
  (v) Consider expanding cost recovery towards full cost:

(b) Technical sustainability and innovation-
  (i) Extension of two discharge pipes from the shoreline into the sea
  (ii) Establishing of a WTF sludge management system, based on landfill disposal
  (iii Establishing a simple database/MIS for regular monitoring and documentation of the WTF performance

(c) Information dissemination -
  (i) Construction of a training center at the WTF site, incl. minor landscaping activities
  (ii) Support for dissemination of the PDA and of local IEC measures via providing of training materials and training of cooperative members as trainers
  (iii) Start up of regular training activities at new WTF training center

3. Scope and location of Work / Description of Activities:

(a) Financial sustainability
  (i) Social preparation activities with market vendors, small businesses, neighboring households; advising of the LGU administration
  (ii) Build capacity of the operator (cooperative) for proper bookkeeping and financial management
  (iii) Develop a simple financial model to provide a clear picture of the financial status of WTF, including identifying simple performance indicators
  (iv) Establish a system for collection of fees for trainings conducted
  (v) Review of the project's financial viability (O&M, depreciation, capital costs) and propose cost recovery options

(b) Ground development activities
  (i) Extension of concrete old culvert and new PBC WTF discharge pipe
  (ii) Construction of a concrete 30 m² open shed training center building incl. minor landscaping activities

(c) Support for local IES initiatives and improved financial sustainability
  (i) Preparing of training materials (billboard-type posters, leaflets)
  (ii) Training of two cooperative members as trainers
  (iii) Start-up of regular training activities (other LGUs, schools)

(d) Sludge management
  (i) Transport and final disposal of the sludge collected at the WTF influent screen at the municipal landfill
  (ii) Installation of a sludge filter press at the WTF site for dewatering the highly organic sludge from RBC tanks and old septic tank (sludge storage tank)
  (iii) Preparing an area for final sun drying of the dewatered sludge at the WTF site
  (iv) Packaging of the dried sludge as agricultural fertilizer
  (v) Developing a manual for the operators on the sludge management process

(e) Documenting the WTF's performance
  (i) Establishing the baseline

(ii) Conduct water quality testing for four (4) samples (twice per month for four months) of WTF influent and effluent
(iii) Conduct water quality testing for four (4) samples (twice per month for four months) of coastal water (two sampling sites)
(iv) Laboratory analysis of BOD_5, COD, DO, TSS, ammonia, nitrate, phosphate, surfactants, fecal coliform counts
(v) Written assessments of WTF performance (on quality of influent and effluent) and coastal water quality

4. Implementation Schedule, Institutional Management Arrangements, and Proponent Qualifications:

Implementation Arrangements:

The Municipality of Lilo-an will execute the project and will tap personnel from the office of the municipal engineer and the market vendors' cooperative for the implementation of the project, in coordination with the Environmental Management Bureau of Region VII, Department of Environment and Natural Resource (DENR/EMB-7). A contractor will be selected via a public bidding procedure for the construction works and following ADB procurement guidelines. Together with the contractor, DENR/EMB-7 will assist the Lilo-an LGU and the cooperative in technical and socio-economic issues during project implementation. Attached is the endorsement of the Mayor.

Lilo-an municipality will also be responsible for establishing an ordinance for the commercialization of dried sludge as fertilizer and collection of fees for trainings conducted. The Office of the Mayor will take a leading role until the ordinance is approved by Sanguniang Bayan. The cooperative will be responsible for implementing the ordinance. Lilo-an municipality will be responsible for procurement relating to the physical adjustments of the WTF and supervision of construction works. After construction is completed, the cooperative will be responsible for operating the sludge drying and commercialization with mountain farmers.

DENR/EMB-7 will be responsible for the monitoring of the WTF performance on water quality for its effluent and coastal water quality. DENR/EMB-7 will establish monitoring indicators and collection methods, including frequency of collection. Analyses will be carried out at the DENR/EMB-7 laboratory. Written WTF assessments and coastal water quality reports will be prepared. DENR/EMB-7 will also conduct the training for the trainers at the new WTF training center. Attached is the endorsement of DENR/EMB-7.

Implementation Schedule:

Project Phase	Work Description	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6
WTF monitoring	Four WTF samplings and coastal water samplings, laboratory analysis						
	WTF and coastal water quality assessment						
Sludge management *	Installation of filter press and test runs						
	Preparing of an area for sludge drying, sludge packaging for sale as fertilizer						
Physical ground development	Construction of training center building, incl. minor landscaping						
	Extension of culverts						
Local IEC activities	Preparing of training materials such as billboard posters, leaflets, etc.						
	Training of trainers						
	Start up of training operation						
Financial sustainability	Build capacity for proper bookkeeping and accounting of the cooperative						

	Establishing a system for the collection of fees for trainings conducted						
	Social preparation of community on WTF user fees, advising of LGU administration						
	Establishing a system for money-less exchange of fertilizer vs. agricultural goods						
	Municipal council resolution for ordinances						
Final report							

Proponent Qualifications:

The Lilo-an mayor, the municipal councilors and staff are the same personnel who implemented the first PDA. They have showed their capability to adjust to the different requirements during the implementation of the first PDA. This exposure can now be considered as a valuable experience for the LGU personnel when implementing this follow-up project.

The same can be said about the market vendors' cooperative, which was founded during the first PDA. The enthusiasm of the cooperative members and their identification with the PDA was a key factor in success so far of the WTF project. Headed by their pro-active president, the cooperative can be expected to be very supportive in the implementation of the follow-up project.

As already shown in the first PDA, personnel from DENR/EMB-7, Mandaue City, will coordinate the project between ADB and executing agency and beneficiaries. The support will cover technical and socio-economic issues. The EMB-7 laboratory will be used whenever analytical data is needed during the project.

5. Expected Results (outputs/outcomes/effects/impacts):

Expected outputs include:

- A sludge management system incl. installation and operation of a sludge filter press
- New training center/venue at WTF site
- Developed capacities of the cooperative for proper bookkeeping and financial management
- Establish new sources of income generation for the cooperative via collection of fees for trainings conducted at new center
  sale of WTF sludge as compost to farmers in the mountains

Expected outcomes include:

- Demonstration of effectiveness of low-cost, decentralized wastewater treatment facilities using RBC technology
- Following three levels of financial viability will be reviewed when the project ends:
  - revenues cover only O&M (including monitoring)
  - revenues cover O&M + depreciation
  - revenues cover O&M + depreciation + capital cost
- Demonstration of successful O&M of WTF by the cooperative
- Enhanced public awareness on water quality and wastewater treatment technologies
- Increased public participation in wastewater treatment
- Increased willingness to pay for sanitation
- Revival of local tourism
- Dissemination of low-cost decentralized WTF in other places

6. Measurable Performance Indicators:

- Sustained improved coastal water quality at Lilo-an shore line
- Trainers trained, number of trainings conducted at the new training center, number of trainees, collection of training fees
- Visits to training center site by the local people for educational purposes

- Re-sale and usage of dried WTF sludge as fertilizer
- Collected fees for wastewater treatment
- Properly managed sludge disposal

7. Stakeholders Participation:

The stakeholders who will participate in the Project are (a) the Municipality of Lilo-an who will be responsible for establishing the ordinance for collection of fees for the trainings conducted, preparing site for construction works, procuring goods and services, coordinating the construction works with the market vendors and the contractor, supervising construction works, and coordinating training of the cooperative, (b) the cooperative who will maintain and operate the WTF and public toilets, cooperate with contractor during construction works, collect fees and manage operations, and (c) DENR/EMB-7 who will provide technical assistance to Lilo-an and the cooperative, help enhance public awareness on water quality and waste water treatment, help Lilo-an to monitor water quality including laboratory test, and help further promote low-cost, decentralized WTF.

8. Scope for Replication/Use in Other DMCs:

Once the Project proves its effectiveness and sustainability, it can be replicated in other municipalities/communities with adjustments on the institutional set-up according to their respective needs. Neighboring municipalities in the Cebu area will be the next targets since they share the coastal water and tourism is an important industry for these municipalities. DENR/EMB-7 will look for other public facilities that can be equipped with a low-cost, decentralized wastewater treatment facility. Further, it can be expanded to other parts of the Philippines and to other ADB DMCs.

The progress of the Project would be periodically reported to National Economic and Development Authority, DENR, Department of Interior and Local Government, and Department of Health in seeking other opportunities to install WTFs.

The key to replication will be the level of cost recovery. If the costs for investment and O&M of the WTF are fully recoverable from users and beneficiaries within a reasonable period, it will not be difficult to promote this kind of WTF nationwide. The revival of tourism will be an incentive to pay for wastewater treatment. Enhancing public awareness on water quality and wastewater treatment is also very important. People's willingness to pay for wastewater treatment will be strengthened through campaign and education. If full cost recovery is achieved, loan financing may become possible for low-cost, decentralized WTF. Successful outcomes of this PDA may then lead to a nationwide loan project to install low-cost, decentralized WTFs in public markets or other public facilities.

9. Cost Estimate:

Inputs / Expenditure category	**Total Costs** (in US$)
1. Civil Works: Extension of old culvert with 6 m reinforced concrete pipe, extension and improvement of the new PBC WTF discharge line (US$500); **Training center:** concrete open shed training center (30 m²) with one closed compartment and fence, roof with GI sheets, plastic chairs and tables (US$6,500); minor **landscaping** activities at project site (US$200)	**7,200**
2. Equipment and Supplies: one filter press (locally made) for dewatering surplus sludge from the WTF, including installation works	**10,000**
3. Training, workshops, seminars, public campaigns: resources persons, technical training specialists, community mobilizers and organizers (cooperative), venue rental, travel, food, trainers training, training materials	**3,000**
4. Specialists Services: researchers for further academic studies on the WTF	**600**
5. Project Management: overall coordination and management of the specific components, travel costs and per diem, stationery and other office items, rentals, O&M, and recurrent costs	**2,400**
6. Other Inputs: laboratory costs and sampling costs for conducting four samplings (once monthly, for four months) at 4 stations (US$1,000); laboratory costs for N/P/K analysis and heavy metal analysis of one sample of dried WTF sludge (US$800).	**1,800**

7. Contingencies (0-10% of total estimated grant fund): Use of Contingencies requires prior approval from ADB.	
Total PDA grant financed	**25,000**

Attachment

Indicative financial status of the completed Lilo-an WTF project

	Pesos per month	Pesos per year	Comments
Revenues			
WTF user fees	9,000	108,000	100 members @ P3 each per day
Fees from use of toilet	6,000	72,000	P2 per toilet use @ 100 uses a day
Total	15,000	180,000	
Expenses			
Electricity costs	4,000	48,000	Based on actual billing
Maintenance costs	5,000	60,000	Figures given by contractor
Maintenance of toilets (water bill)	500	6,000	
Total	9,500	114,000	
Net revenues	5,500	66,000	

Description of proposed training center site

The proposed WTF training center building will be located close to the WTF site. Although the space available in the immediate vicinity to the WTF site is limited, it is believed that there will be a greater impact if the WTF and training center will be presented as one unit rather than being located in distant locations to each other.

The two pictures below (which were taken from the same spot) show the area at the WTF site. On the left picture, the space between the group of people and the WTF is used as an access to the neighbor's lot, thus the area cannot be obstructed by a training center building. Furthermore, the access to the main road (to the left alongside the WTF) is already quite narrow for vehicles to pass. On the right picture, the old public market septic tank can be seen. Basically, the area would provide enough space for the new training center.

Extension of culverts as outfall of treated wastewater

The following two pictures show the outfall area of the treated wastewater during low tide. On the left picture, the two concreted old culverts are shown. The culvert in the background is still actively discharging storm water run-off and therefore should be extended by 6 meters. The right picture shows the PBC outfall pipe of the new WTF, which also should be getting extended accordingly. The purpose of extension of the outfall pipes are safety as well as esthetic considerations.