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Guidance for Improving Sanitation in El Salvador's Tourism Areas Through Decentralized Wastewater Management Systems

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Introduction

Surface waters in El Salvador are highly degraded, with only a small portion of municipally derived wastewater receiving treatment. Lack of technical capabilities in wastewater management in El Salvador contributes to high child mortality rates[1] and environmental pollution and puts the tourism sector, on which the local economy depends, at risk from adverse publicity about potential disease outbreaks tied to poor sanitation. The concern is especially acute in beach and surfing destinations, such as those around La Libertad, where hotels and other tourist-related facilities continue to discharge septic tank effluent or raw sewage directly to groundwater and surface waters. While the issue is getting more attention, a coordinated effort engaging civil society, the private sector, and local government to improve water quality remains out of reach.

Additionally, there is limited institutional capacity to coordinate public interest, develop public policy that could drive awareness raising, and help local governments create an enabling environment to foster sound wastewater management. Although investment into tourism infrastructure is growing in El Salvador, investment into appropriate wastewater infrastructure to serve this industry is lagging behind. This trend can be quickly and decisively reversed through the introduction of locally manufactured wastewater treatment products specifically developed and marketed to the tourism sector.

Given El Salvador's developing political and economic environment, centralized sewerage management systems are not a realistic solution in the short to medium term for beachfront and remote tourist centers. Instead, tourism-based businesses will require decentralized wastewater management systems (DWMS) to keep recreational waters from being fouled and rendered unsafe from improperly discharged human waste. The advantage of DWMS over centralized systems is that the smaller units can often be designed, installed, operated, and maintained using local materials and labor, and often without any mechanization or power requirements. Along with managing wastewater, DWMS are also significant economic development engines that create jobs and local investment. They use low-cost components that can be produced and installed through a network of local service providers. One decentralized wastewater management technology that is especially attractive and applicable to tourist areas in El Salvador utilizes cocopeat. A waste product from the coconut processing industry, cocopeat forms a low-cost biofilter that treats the polluted discharges from septic tanks.

Key Findings

- El Salvador's tourism industry is at risk from the impacts of poor sanitation, including odors, nuisances, and disease transmission.
- For small municipalities or other areas where large centralized wastewater systems are not available, smaller, simpler decentralized wastewater management systems (DWMS) may be a viable alternative to treat the wastewater.
- DWMS can often be installed using local materials and labor, using passive technologies that do not require electricity or other energy sources.
- Effluent from DWMS can often be reused or recycled for agricultural purposes, such as growing fruits or nuts, which adds value, especially in water-scarce areas or where climate change vulnerability is a concern.
- Local governments can help drive the demand for DWMS by enacting a local sanitation ordinance that sets the procedures and incentives for compliance.
- The private sector can play an important role in developing products used in DWMS and providing services, including designing, installing, and operating DWMS. Often, DWMS serve as drivers of economic development, resulting in job creation and increased standard of living in the community.

Implementing a Sanitation Improvement Program

In any country, treating wastewater presents a coordination problem because no individual benefits from serving as the first to invest. Implementing a program in El Salvador that introduces DWMS to improve sanitation requires an effort that coordinates local governments, environmentally focused NGOs, and service providers, such as system designers, installers, and operators. In El Salvador, there are a number of small to medium-sized engineering and construction firms that, with appropriate training, could implement wastewater management systems and derive profits from this sector. In addition, local governments are increasingly motivated to implement sustainable programs to improve sanitation, although the public remains skeptical in their ability to succeed. NGOs could play the role of the honest broker, generating interest and support for improving sanitation and driving action. Public and private entities as well as civil society organizations can collaborate to develop policy and programmatic opportunities in El Salvador to drive development of appropriate wastewater management systems. NGOs can help by facilitating the following activities:

- **Developing a model sanitation ordinance that local governments can adopt.** The model ordinance is developed through consultation with local governments and stakeholders to address the issues of sanitation for commercial establishments and residences. It defines the institutional arrangements and sets procedures for evaluating sites, designing wastewater management systems, and installing and operating systems, as well as the incentives that drive participation in the program.
- **Implementing promotional campaigns** to educate citizens and business owners about the issues of poor sanitation and motivate compliance. By highlighting the benefits of wastewater treatment, these campaigns increase citizens' and business owners' willingness to pay for improved sanitation.
- **Training, capacity building, and product development.** NGOs can implement programs to train and certify local service providers on the step-by-step procedures for each aspect of the DWMS development process, including source characterization, site evaluation, design considerations, and the best installation practices for various technologies, while utilizing local resources and businesses to commercialize the most appropriate technologies for wide-scale use.

Policy Considerations and Development Steps

The model sanitation ordinance adopted by the local government dictates the design, sizing, permitting, installation, and operation of the DWMS system components. It becomes an important component of the enabling environment. As demand for services rises due to the effective enabling environment, local businesses and service providers enter the market place to offer products and services. Therefore, the model ordinance needs to be developed through a transparent, stakeholder-driven process that defines the institutional arrangements and the step-by-step procedures for implementation. Such procedures include conducting site evaluations; establishing the basis for design of systems; establishing permitting requirements; and determining the procedures used by local government to ensure that the installed product conforms to the approved plans. Successful model ordinances also incorporate incentives, such as positive reinforcement for compliance with the ordinance, as well as graduated penalties and fines for noncompliance.

Typical tourist hotel, La Libertad, El Salvador. Wastewater is treated in septic tanks and discharged to surface water, resulting in environmental pollution.

Developing the model ordinance follows a typical bottom-up planning track with the following milestones:

- Perform a **rapid technical assessment** with local government environmental, planning, and engineering staff to document with photographs and statistics the impact poor sanitation has or could have on health, the environment, or tourism opportunities. Determine if the problem is real, is immediate, and can be addressed through decentralized wastewater management. If so, proceed to the next step.
- **Interview mayors** to determine their interest in improving sanitation within their jurisdiction through adopting a model DWMS program. Identify those mayors who have shown interest and are most likely to commit their resources to develop programs.
- Host **focus group discussions** with those mayors with the goal of forming a coalition of local governments that will work together to develop a model sanitation ordinance that could be individually adopted by each jurisdiction.
- Host a **stakeholders meeting** with local government, business and industry leaders, trade associations, academia, housing coalitions, NGOs, the press, and others to present the findings of the rapid technical assessment. The purpose

of the meeting is to reach a consensus that the problem is real and that the stakeholders are committed to working together to solve the problem.

- Convene a **technical working group (TWG)**, which is a subset of the stakeholders who will be officially recognized by the local government for their service. TWG members will meet regularly throughout the process, discuss key aspects of the ordinance, and make recommendations for final text.
- Define the **institutional arrangements** and the **step-by-step procedures** through which the regulated community will achieve compliance.
- Develop the written text, hold public hearings, and approve a final draft that may be adopted by individual local governments.
- Build the capacity in the private sector for manufacturing systems, supplying the cocopeat, competing in the market to keep prices reasonable, and training service providers to recognize new customer opportunities.

While the activities related to developing the model ordinance are proceeding, local businesses can develop products to satisfy the increased demand.

The Cocopeat Wastewater Treatment Technology

The cocopeat wastewater treatment technology, due to its low cost and ready availability, could be used to drive interest and demand for products and services to improve sanitation in El Salvador's tourist regions. Cocopeat technology was originally developed in Southeast Asia, where coconuts are plentiful and the cocopeat waste material is readily available. Coconut production is also locally important in certain areas of El Salvador. On the Island of the Holy Spirit, for example, near Bahia de Jiquilisco on El Salvador's southern coast, the coconut is a way of life.[2] A little more than 10 percent of the island's 1,800 residents are employed in the coconut industry, and about 9 million coconuts are harvested from the island's trees each year. While many of the coconut husks are collected for commercial use, many more remain in the fields to rot or are discarded along roadways. This represents a rich source of cocopeat material that could be utilized for the construction of low-cost wastewater treatment systems.

Cocopeat wastewater system installed for Putatan Elementary School, Philippines. The system serves 700 students for less than 1 US penny per student per day.

A recent comprehensive study in the Philippines, Vietnam, and Indonesia[3] shows that cocopeat-based wastewater treatment systems can be effectively used for various point sources of wastewater, such as schools, housing blocks, and tourist facilities, at significantly lower costs than other DWMS technologies, such as constructed wetlands, sewage lagoons, or sand filters. As an example of the cost-effectiveness of the technology, the study shows that cocopeat systems can be implemented for less than 1.4 US cents per person per day, which is affordable, even for the poor earning the equivalent of $1 to $2 per day. Additionally, the systems are especially applicable in difficult sites, such as dense urban areas, or sites with high groundwater or shallow soils. The study showed that the removal efficiency of the important wastewater constituents, including organic matter and suspended solids, approached 90%, while the reduction in coliform bacteria approached 99%. These factors make the technology especially applicable in El Salvador's coastal areas, where high groundwater makes installation of wastewater treatment systems difficult.

Related Products and Services

Cocopeat systems are not stand-alone units. They are linked with other components to form complete systems capable of treating wastewater to achieve discharge standards. These other components include

- Septic tanks that can be either prefabricated or constructed in place to provide primary treatment
- Anaerobic baffled reactors, which are improved septic tanks for larger flow volumes
- Grease interceptors for food service operations
- Lint traps for commercial laundry services
- Sewer pipes and appurtenances that move the wastewater from the point of generation through the treatment process and to its final discharge or reuse.

Each of these components can be manufactured in El Salvador using local materials and labor. Service providers that understand how these components work together and are trained in best management practices for system installation and operation can use them to address almost any point source wastewater need.

Commercialization Procedure

The commercialization process for locally manufactured wastewater management products in El Salvador is based on proven technology but uses local materials and is tailored to address local needs. It uses the following steps:

1. Develop the prototype units based on proven technology concepts.
2. Test the prototypes in controlled environments to verify all components integrate properly.
3. Test the prototypes in operational environments to ensure proper function in a variety of real-world applications.
4. Launch the products through a network of local service providers.

Developing a product line for addressing wastewater management needs based on these steps is a 12- to 18-month process, which is about the same amount of time required to develop the model ordinance. Installing systems in operational settings not only helps to test the product under various conditions but can also be used to illustrate how systems can be implemented in accordance with the procedures specified in the ordinance. These pilot systems can serve as the basis of the promotions campaign that details how the technology might be applied to a variety of different situations and reports the benefits derived through its implementation. This promotion, coupled with the creation of the model ordinance and the commercialization of the products, helps to set the stage for rapid, widespread implementation.

Conclusion

Implementing decentralized wastewater management systems to improve sanitation in El Salvador can improve health and the environment as well as increase economic development and job creation. The process requires coordination between the public and private sectors, which is a job ideally suited for the country's environmentally oriented civil society groups and NGOs. When coupled with local policies that encourage their use, commercializing DWMS technologies and training local entrepreneurs and service providers on the best practices for installation and operation allows for widespread application. As investment in tourism-related infrastructure increases, investments in wastewater treatment must keep pace to avoid the catastrophic collapse that could result from disease outbreaks common throughout regions of the world where wastewater is improperly discharged. The program can have a net positive benefit by not only addressing the needs of the facility owners but also strengthening businesses and the local economy through investments in locally derived goods and services. Once they are shown to be a viable and cost-effective paradigm for sanitation improvement, DWMS will spread to other geographic locations within El Salvador and the region.

Key Steps

- Through a stakeholder-driven planning process, prepare a model sanitation ordinance that local governments can adopt.
- Train and certify tradesmen and service providers in the best installation practices for decentralized wastewater management systems.
- Develop promotional campaigns to drive the target audience's willingness to pay for sanitation services.
- Work with local manufacturers to develop a full line of wastewater collection, treatment, and reuse products through a program of prototyping, testing, and commercialization.

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