Decentralized Wastewater Treatment System (DEWATS): San Francisco del Valle, Panama

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ABSTRACT
In developing countries, up to 90% of wastewater flows into local water bodies. Lack of wastewater treatment directly impacts the water quality of these water bodies. The community of San Francisco del Valle, located in an urban slum of Panama City, Panama is home to about 4500 residents. A decentralized wastewater treatment system (DEWATS) was analyzed on behalf of Engineers Without Borders - MTU. The system scope targets treatment for 40 families, approximately 320 people. The existing water treatment system has gone to disuse. A DEWAT system will directly address the environmental, social and economic needs of the community. Wastewater treatment is often disregarded due to a lack of knowledge regarding immediate impacts on the local water quality. The system also educates the community on the importance of treating wastewater, instilling community structure and stability. Biological oxygen demand and chemical oxygen demand are reduced by over 80%, directly reducing environmental impact. The community of San Francisco del Valle has projected the cost of the treatment system at $30,000 including labor, equipment and materials. A DEWATS system is a viable solution to the wastewater treatment problem at the Panamanian slum because it is capable of efficiently servicing many people at reasonably low cost.

BACKGROUND

Scope
• 40 families, 6-8 people per family
• 8 septic tanks servicing 320 people

Purpose
• Analyze the feasibility of DEWAT system implementation at an urban slum in Panama

DEWATS COMPONENTS
• Sedimentation and primary treatment in septic tanks
• Secondary anaerobic treatment in baffled reactors
• Secondary and tertiary aerobic treatment in wetlands/ponds

ENVIRONMENTAL IMPACT
• Fulfills local effluent discharge standards
• 90% reduction of wastewater pollution
• 1000 m³/day treatment capacity
• No power source requirement
• Potential lighting and cooking uses from wastewater re-use & biogas
• Capable of treating/handling inflow fluctuations

DEWATS Treatment Efficiency

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Analytical-Results</th>
<th>Reduction (%)</th>
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</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>°C</td>
<td>Inlet 27</td>
<td>Outlet 27</td>
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<tr>
<td>BOD₅</td>
<td>mg/L</td>
<td>290</td>
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<tr>
<td>COD</td>
<td>mg/L</td>
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<td>Phosphate</td>
<td>mg/L</td>
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<td>3.67</td>
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<tr>
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<tr>
<td>Ammonia</td>
<td>mg/L</td>
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<td>0.07</td>
</tr>
</tbody>
</table>

ECONOMIC IMPACT
• Low operating and maintenance costs
• Locally available materials for construction

San Francisco de Valle Budget:
• Total Budget: $30,000
• Materials: $20,000
• Equipment: $7,800
• Labor: $2,200

WORK CITED

Cost Distribution

Materials: 67%
Equipment: 26%
Labor: 7%