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#### Background:

Urbanization has created number of environmental problems due to production of high volume of solid waste and wastewater. Lack of proper wastewater management system has lead to pollute natural water bodies and the environment. A number of cities in Sri Lanka do not have well established sewerage and wastewater management systems. As a solution for indiscriminate wastewater disposal to the environment, sewage treatment plants (STPs) have been constructed in many places where wastewater has become a problem.

Though STP is the most prevalent wastewater treatment technology used in Sri Lanka, information on their effectiveness after construction has not been evaluated. Therefore, this research was conducted to evaluate the performance of selected STPs and identify the factors which influence their performance, assess the socio-economic perspectives of beneficiaries of selected STPs, and recommend criteria to be considered in establishing STP under different technical and socio-economic contexts.

#### Research Methodology

A situation analysis was conducted using Participatory Rural Appraisal (PRA) tools. In addition to beneficiaries of each STP, survey on several stakeholders was conducted to obtain their views on wastewater and improvements of STPs technologies. Data on available STP in Sri Lanka, funding agencies, problems faced during operations, responsibilities of operating staff and major constrains of STP in the society were collected. A performance criterion consisting 109 variables under five categories such as general, technical, physical, personal and operation and maintenance (O & M) was developed and used to assess the performances of eight selected STP for the study. A sensitivity analysis was conducted by changing the relative weightage of tested five performance criteria. Higher relative values (35%, 38%, 41%, 44% and 47%) were given to both technical, physical criteria and personnel and O & M criteria together. The equal lower values (10%, 8%, 6%, 4% and 2%) were given to general, technical and physical criteria in one time as well as general, personnel and O & M criteria. A questionnaire was designed to understand and analyze the socio-economics aspects of beneficiaries of STP. Some of the essential aspects were designed to be considered in establishing a STP based on the observations, checklist survey, questionnaire survey and formal and informal discussion made with key informants, household, STPs care taker, officers in charge and administrative staff during the study. These aspects are discussed under technical, socio economical and institutional aspects.

#### Research Findings:

The results from the study show that only 2 out of 8 STP studies are performing well. In general, physical and technical (hardware) aspects are found to be satisfactory whilst personal, operation and maintenance aspects (software) are poor. This indicates that the construction of technically sound STPs does not necessarily guarantee its success. Results of sensitivity analysis implies that the importance of personnel and O & M criteria for the overall performance of the tested STPs and their sustainability. Though there are good physically and technically sound STPs, lack of trained personnel and inadequate O & M activities diminish the overall performance of STP. Recruitment of trained personal and providing them with responsibilities are required for better performance of STPs. The private sector appears to be performing well in managing the STP compared to government and NGO sectors.

The study also shows that cost recovery is needed to ensure long-term sustainability of STPs. Sewerage charges based on the amount of water used is a good starting point to recover the cost of services. Lack of competent personal for managing STPs could be overcome by handing over STPs to competent organization, such as NWS&DB or a private operator to operate and maintain it.

The public awareness on sewage and wastewater management is very poor. Women (76.9%) in the Raladinugama Housing Scheme which was tsunami affected people resettled, play a major role by participating in activities associated with wastewater management largely due to their non-involvement in economical activities. In addition, majority in the other two housing scheme, both men and women, are employed in government or in private firms. As a result, community people do not have time to address the problem associated with sewerage.

Inability to appreciate the problems created by poor sewerage and wastewater treatment on water resource management, and personal health and environment in general is a serious impediment to effective operation and management of existing sewerage treatment plants.

STP in Raladinugama tsunami affected village was designed and constructed by funds provided by an international non-governmental organization without any consultation with the community who uses it. Had they been consulted before, a more acceptable sewerage treatment method could have been designed and adopted.

Formation of a strong CBO is a pre-requisite for collective, community actions which could have addressed the sustainability of STPs managed by the CBOs and reduced the conflicts. The NGO did not seriously think about the institutional arrangement that should look after the O & M of the STP. There would have been more successful outcome if they trained women of the community rather than a man who has other livelihood activities to look after.

Further research:

The study has provided insights into many aspects which require further research. Among them institutional arrangements, regulation for proper sewerage management and cost recovery from the beneficiary communities are found as priority areas.