WASPA ASIA
Wastewater Agriculture and Sanitation for Poverty Alleviation

Summary Assessment

Wastewater Agriculture in Kurunegala City, Sri Lanka

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Introduction

This summary is one in a series written by the Wastewater Agriculture and Sanitation for Poverty Alleviation in Asia (WASPA Asia) project. The project aims to develop and test solutions for sanitation and wastewater management, to reduce the risks from wastewater use in agriculture. The approach involves the development of stakeholder coalitions at town and national level, called Learning Alliances, which will bring together the main stakeholders into a participatory process through which actions will be planned and implemented.

The WASPA Asia project is funded primarily under the EU Asia Pro Eco II Programme of the European Commission. It is being undertaken in Sri Lanka and Bangladesh by the International Water Management Institute (IWMI) and COSI in Sri Lanka; the International Water and Sanitation Centre in the Netherlands; NGO Forum for Drinking Water Supply and Sanitation in Bangladesh and the Stockholm Environment Institute (SEI) in Sweden.

Conclusions and Recommendations

As revealed in focus group discussions and interviews, farmers would prefer not to use wastewater but because the irrigation channel flows through the city they have no choice. They feel that because the channel acts as a storm water drain for the city, and many people have made illegal connections to the channel to dispose of wastewater, the quality of the irrigation water is now very poor. They are particularly concerned about the solid waste and sharp objects entering the canal. They do however admit that they benefit from the regular supply of water and can irrigate more often than the canal water farmers.

The yields in the wastewater and non-wastewater areas were not significantly different but there was a slight increase in yield from the upper wastewater area to the lower wastewater area, which may reflect an improvement in water quality down the canal.

Fertilizer application showed no clear pattern or link to yield, recommendations or irrigation water quality.

Main Findings

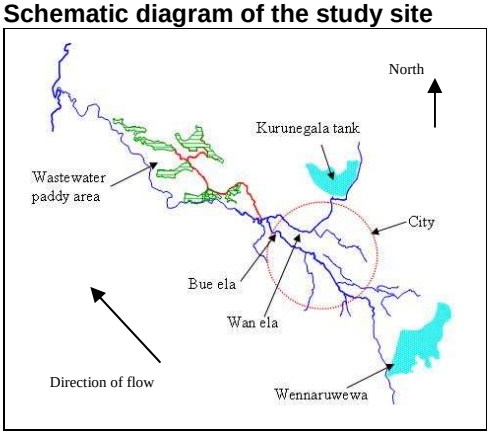
This section summarizes the findings of an agriculture assessment that was carried out in a peri-urban area of Kurunegala city. Information was collected through transect walks, interviews with key informants, and a questionnaire survey. For the survey the area was divided into upper wastewater, lower wastewater and clean water areas, with 17, 21 and 20 farmers responding to the interviews in each of these areas. The specific objectives of the assessment were to:

- Understand the activities and practices of farmers in the urban and peri-urban areas of Kurunegala.

ASIA PRO ECO II EUROPEAID CO-OPERATION OFFICE
NGO FORUM FOR DRINKING WATER SUPPLY & SANITATION
IRC International Water and Sanitation Centre
IWMI International Water Management Institute
SEI STOCKHOLM ENVIRONMENT INSTITUTE
COSI Community Self Improvement

- To investigate the differences between the practices, if any, of different farming groups and to determine whether there are additional constraints to wastewater irrigation as compared to canal water irrigation.
- To understand the problems of nutrient management in the field when nutrient concentrations in irrigation water are highly variable, and to consider whether or not fertilizer application is optimal.
- To investigate whether existing agricultural practices are optimal and are taking advantage of the benefits of using wastewater whilst mitigating potential negative impacts.

Schematic diagram of the study site



Socio-economic Setting

Within the Kurunegala Divisional Secretariat (DS) Division there are three ancient tanks Wennaru Wewa, Thiththawella and Kurunegala Wewa. Wennaru Wewa, which is situated at the southern end of Kurunegala DS Division, has a capacity of 1.8 million m^3 and serves a command area of 186 ha in both *yala* and *maha* seasons. There are two main canals that provide water for downstream irrigation. The left bank main canal feeds Wilgoda Anicut (weir) where this study is undertaken. Water flows via the Beu Ela and irrigates 93 ha. The right bank canal provides irrigation water to an area upstream of the city and is therefore not covered by this study.

Farmers' Profile

In the majority of farming households interviewed the household head was male and over 50 years of age, suggesting considerable local knowledge of farming practices in the area. In households in which the household head was female the agricultural work was mainly undertaken by male household members. Family sizes vary from 2 to 6 in the wastewater area and 3 to 7 in the canal water area with most households in both areas having more than 5 members. Family members are an important source of labour but larger family sizes may cause problems in the future when the already small land holdings, which range from 0.12 to 2 ha, are divided between family members.

Being located close to the city many farmers are engaged not only in paddy cultivation but also in other income generating activities, working as drivers, carpenters or small scale businessmen for example. More than 40% of households in both areas only grew paddy for home consumption and over 60% consumed more than half their yield.

Land is both owned and rented in the area but tenants are more common in the wastewater area (55%) than the non-wastewater area (25%). The tenancy agreement usually involves the tenant giving 50% or 25% of their yield to the landlord depending on whether the landlord provides inputs or not.

Cropping Pattern and Yield

Farmers grow paddy twice a year in the *yala* and *maha* seasons. The majority of farmers grow 3.5 month short term rice varieties in both seasons. As wastewater farmers have a regular wastewater supply from the city, their irrigation intervals are short at 7 days in the upper parts and 10 days in the lower parts. In the clean water areas they only irrigate once every 15 days; but these differences may also reflect different soil types.

In Sri Lanka the average rice yield varies from 6 to 8 tons/ha. In Kurunegala District average yields in *maha* are 4.6 tons/ha in major irrigated areas, 3.2 tons/ha in minor irrigated areas and 3.6 tons/ha in rainfed areas (Aheeyar, Henegedara and Rupasena 2005). It was observed in the survey that the average yield from the wastewater area was only 2.3 tons/ha in *yala* and 2.8 tons/ha in *maha*. It was only slightly higher in the non-wastewater area at 2.8 tons/ha. In both areas the yield was higher in the *maha* season than the *yala* season, which is to be expected.

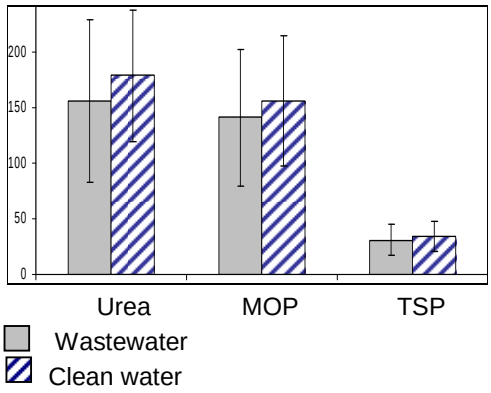
There are many factors that affect the yield in a particular area but since the sites are so close it can be assumed that many of the environmental factors will be no different between the wastewater and canal water irrigated areas, likewise no clear differences were observed in agricultural practices. Statistically there was no significant difference between the wastewater and non-wastewater yields but there was a difference between the upper and lower wastewater areas with higher yields observed in both seasons in the lower wastewater area. This suggests that the quality of irrigation water in the upper area is worse than the lower area and is impacting on yield.

Fertilizer Management

Since the study was designed to determine whether or not farmers benefited from nutrients in the wastewater area, comparisons were carried out for three fertilizer categories:

- Urea, which contains nitrogen;
- Muriate of Potash (MOP), which contains potassium; and
- Triple super phosphate (TSP), which contains phosphorous.

No statistically significant difference ($P<0.05$) was found between the practices of wastewater farmers and clean water farmers or between wastewater farmers in the upper and lower areas.



There was a large variation between application rates of each farmer (shown in the chart by the bars depicting standard deviation) and further questioning revealed that plots near the wastewater canals receive lower fertilizer applications than those further away. Farmers explained that they make crude judgments on the quantity of fertilizer to apply based on previous yields, not based on recommendations provided by the authorities. They feel that the guidance they receive is too general and not specific to the area, so they

prefer to base their application rates on their knowledge of the plots that they cultivate. However, they also admit that this does not always result in a good yield.

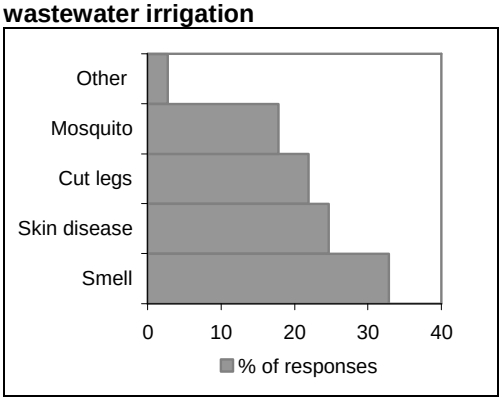
Pests and Diseases

In wastewater areas 88% of farmers apply pesticides compared to just 46% in clean water areas. It is often found that pest attacks are higher in areas where wastewater is used for irrigation due to the high vegetative growth caused by the presence of excess nutrients (IRRI 2003). Discussions with farmers suggested that excessive vegetative growth did appear to be the cause of the problem.

Wastewater Issues

Farmers were asked about the benefits of the use of wastewater and problems arising from using wastewater. From the sample, 95% of farmers said that it contains oil and grease but that they do not know the impact of it on agriculture; and 60% said that solid waste in the irrigation canals is a problem because it blocks the canals, can cut their feet and legs, and they must spend time removing it.

Farmers' opinion of problems due to wastewater irrigation



Implications for WASPA

- Fertilizer application is highly variable and does not reflect either government recommendations or nutrient levels in wastewater.
- Extension services need to be improved to optimize fertilizer use to improve yield and reduce costs, as fertilizer is often over applied.
- Further analysis of nutrients in wastewater should be considered.
- Lack of water quality data needs to be overcome. This could be addressed by relevant authorities such as the Irrigation Department on National Water Supply and Drainage Board.
- Oil, grease and solid waste are clearly problems and need to be reduced through interventions upstream

References

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