Rice cultivation land abandonment and resilience along the left bank of Benthara River, Sri Lanka

[1]Ranjana U.K. Piyadasa and [2]S.A.D.V.K.Wijesundara

[1]Department of Environmental Technology, University of Colombo, Colombo, Sri Lanka
Email - ranjana@et.cmb.ac.lk
[2]Sri Lanka Land Development Corporation, Sri Lanka

Abstract: *Abandonment of agricultural land has been a commonly observed trend in many parts of the coastal regions. Rise cultivation is the most important subsistence agricultural product in the Sri Lankan economy from ancient times. Rice is more water consuming than many other crops. Rice is cultivating in all agro-ecological zones for two seasons which is called Yala and Maha. Paddy farming has spread 34% of whole area in Sri Lanka. During the gap Between Yala and Maha seasons, Paddy lands become abandonment in natural. Other than seasonal fallowing, natural, socio – economic, technological and institutional matters cause for fallow lands. The main objective of this study is to examine the determinants of abandonment and under-utilization of paddy lands and identify the important Factors for Abandonment of paddy Lands. The research is conducted in the Ambalangoda irrigation area, Galle district in the southern province of Sri Lanka. Irrigated paddy land of the Dedduwa, Ranthotuwila and Thunduwa which laying along Benthara river were selected as the study area. The questionnaire was the main method of primary research and focus group interviews, in-depth interviews conducted with agrarian service Department officers and self-observation techniques together with secondary data gathered supported the main questionnaire survey along the Benthera river. In addition to that water samples were collected from each paddy field and water ways. Salinity data of the river were taken as secondary data for the analysis. Collected data was analyzed by using SPSS and GIS. The results revealed that lack of land management maintenance unique reasons for Rice land abandonment with the common factor of saline water intrusion. Sea water intrusion, lack of labour and transport problems are the main problems faced by Dedduwa, Ranthotuwila and Thunduwa irrigation sachems respectively.*

Key words*: agro-ecological zones, GIS, paddy, Salanity, SPSS.*

1. INTRODUCTION:

Paddy rice or 'rough rice' is produced to varying extents in all twenty-five districts of the nine provinces in Sri Lanka during both 'Yala' and 'Maha' cultivation seasons. In lush tropical Sri Lanka, paddy cultivation took deep root, transforming into the life blood of the islanders and setting the pace for a national culture embellished with elaborate rituals centered on the preparation of the fields and the harvesting of the grain. As per records of agrarian services department, rice is the single most important crop occupying 34 percent (0.77 /million ha) of the total cultivated area in Sri Lanka. About 1.8 million farm families are engaged in paddy cultivation island-wide. Sri Lanka currently produces 2.7 million ton of rough rice annually and satisfies around 95 percent of the domestic requirement. Paddy lands are abandoned due to various reasons. Annually, paddy lands are fallowing between seasons of Yala and Maha. Land degradation in coastal area is a major problem of most countries in the world including Sri Lanka and it is widely accepted that, land degradation is one of the major critical problems affecting the future economic development of Sri Lanka (Ministry of Land, 2000).

"Anomalies in land ownership, poor soil conditions, have been identified as hindrance to increasing productivity. Of the total cultivation expenditure, over 50% represents labour charges and solution for same is to use high- tech machinery, availability of which yet remains a problem. This could be attributed to farmers in the wet zone keeping away from paddy cultivation. Poor relationship between the farmers and relevant institutions cause institutional problem" (www.agridept.gov.lk). "Abandonment results from sea water intrusion, water logging, soil related problems, flood hazards, use of poor salinity irrigation water, poor maintenance of irrigation and drainage systems, water stagnation as a result of infrastructure development and also due to lands not being cultivated for a longer period of time. Abandonment is mainly confined to the wet zone" (www.agrilearning.goviya.lk). Identifying abandoned agriculture land is vital due to its influences and consequences on the environment such as soil and water quality, carbon sequestration, biodiversity and nutrient cycling (Benayas et al. 2007; Koulouri and Giourga 2007; Alcantara et al. 2012).

The main economic activity along Benthara River is cultivating paddy in Dedduwa Thunduwa and Ranthotuwila paddy lands. Salinization in the river affects cultivation with saline water flowing in to irrigation canals which distribute water to paddy lands. There are mainly two paddy fields named Dedduwa and Ranthotuwila along the west bank of

Benthara River. Dedduwa paddy field extends over 2000 acres but only 600 acres are being cultivated. 1000 acres are cultivated in Ranthotuwila paddy field which spreads over 2200 acres. In addition to that Cinnamon and vegetables are cultivated along the river.

According to the Irrigation Department office at Kaluthara, high tide can always be seen in the first four kilometres of Benthara River and the water rises up to 0.6 to 1 meter. Highest intrusion can be noticed in February (Padmasiri, Irrigation Department, Kaluthara). Tide causes sea water intrusion in Benthara River. Dedduwa, Thunduwa and Ranthotuwila paddy fields provide habitats for wildlife species that include fish, plants, amphibians, reptiles, mollusks, crustaceans and insects. These animals and plants lost their habitats due to abandonment of these paddy lands.

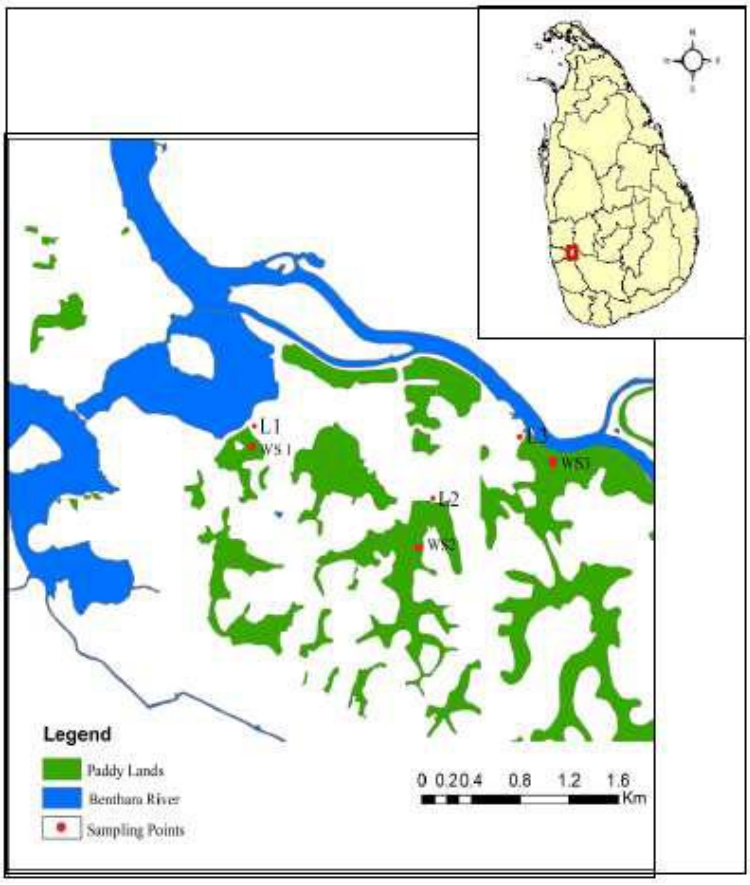
2. OBJECTIVES:

The main objective of the study was to examine the contributory factors for the abandonment of paddy fields in Benthara area. Sub objectives were, study the impact of seawater intrusion on the abandonment of paddy fields in the Benthara area and study the Socio-Economical status of the abandonment paddy lands in Benthara area. Selected paddy lands are the three main paddy lands along the left bank of Benthara River. Height of the level of land in the lower part of the Benthara River is 0 – 20 m. Other tributaries, streams are lower than the 100 feet contour.

3. METHODOLOGY:

The research was conducted in the Ambalangoda irrigation area, Galle district in the southern province of Sri Lanka. Study area was located in the paddy lands of left bank of the Benthara river basin. Cultivating paddy in large areas as Dedduwa, Ranthotuwila and Thunduwa was the reason for selecting left bank of Benthara River as the study area.

Figure01: Water sampling points in study area



Source: Prepared by the authors using GIS, 2015

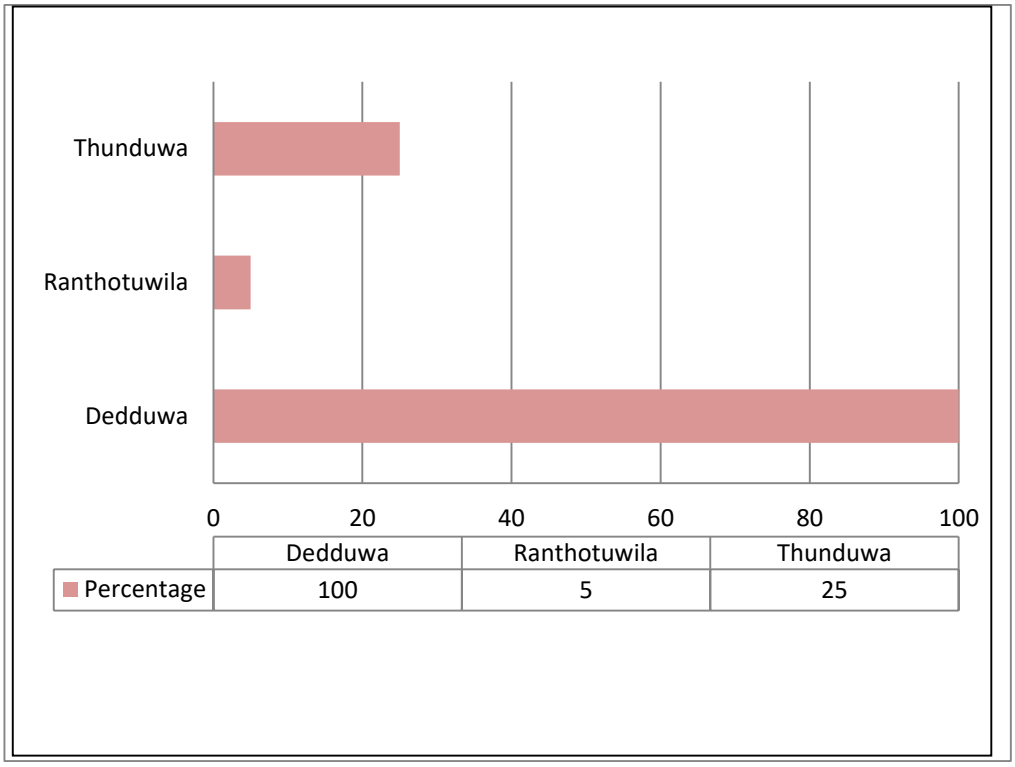
A pre- tested, semi – structured questionnaire survey was carried out to assess the present socio - economic problems and factors related to paddy land degradation. A total number of 85 farmers was selected randomly, 10% farmers from each paddy field – Dedduwa, Ranthotuwila and Thunduwa, to collect qualitative data for questionnaires. Other than the primary survey, a focus group interview was conducted and the third important mode of research was done by conducting in-depth interviews with agricultural officers in charge of Dedduwa, Ranthotuwila and Dedduwa paddy fields. Finally the writer's own self-observations were also used to identify the extent and the nature of abandoned

and uncultivated paddy lands in the selected area. For check out the relationship between saline water intrusion and paddy land abandonment, Electrical Conductivity and Chloride values of Benthara River and irrigation canals were collected from the study of - **"Natural Reasons for water salinity in Benthara River – 2012"** as secondary data. Three Water samples were taken from each paddy field as WS1, WS2 and WS3 and from irrigation canals L1, L2 and L3 for checkout the salinity in paddy lands and water ways (Figure 01).

4. RESULTS AND DISCUSSION:

Main contributory factor for fallow lands in study area is saline water intrusion. In Dedduwa area, all the paddy lands are abandoned due to sea water intrusion and Ranthotuwila and Thunduwa paddy lands are also affected by salinization."High tide was beginning in the morning. Tide has flown up to the 9th kilometer along the river bed. (SEAWE-11, 2014).

Graph 01: Salt water intrusion as a factor for fallow lands



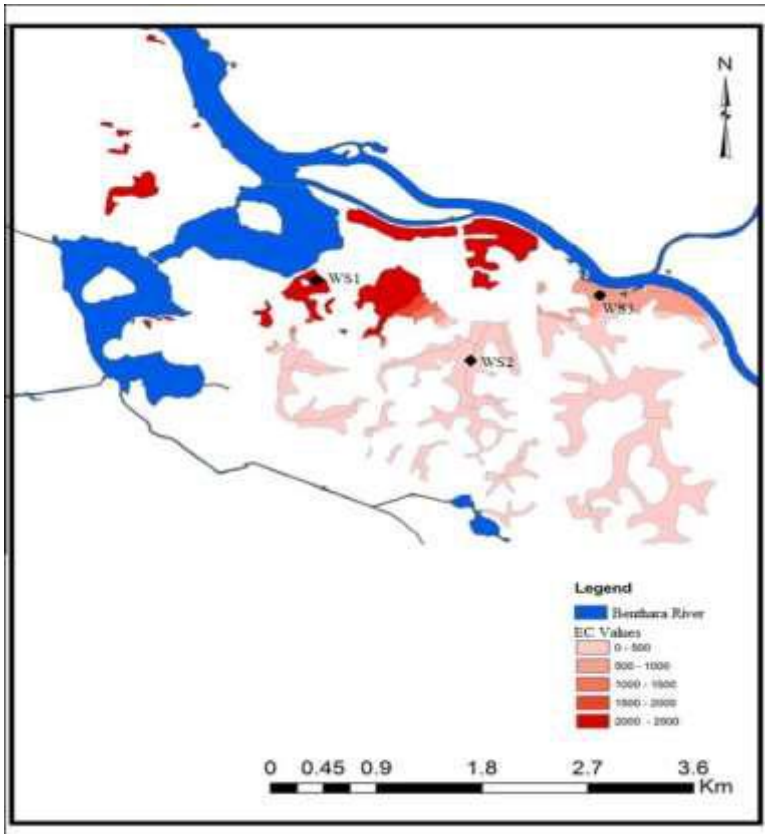
Source: Prepared by the researcher using primary data, 2015

Out of the three selected paddy lands, Dedduwa is the mostly affected paddy land due to salinization. Highest salinity level can be seen in Dedduwa water way, and it is 1.15ppt (Figure 02).

Thunduwa paddy field, which is cultivating adjacent to Benthara River, also has 0.237ppt of salinity level. Ranthotuwila area, which has almost no threat from salinity issue, has the lowest salinity rate among the study areas. pH which is always varies with salinity, shows more acidic in the study area. Dedduwa has highest TDS (Total Dissolved Solids) values again in both paddy land and in the water way.

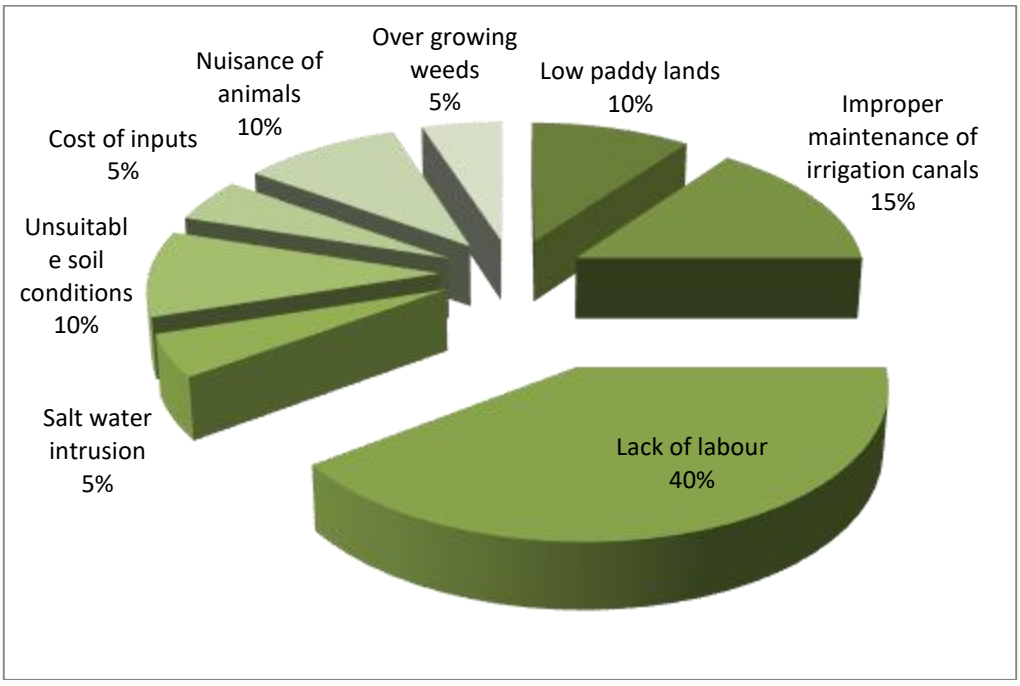
Improper maintenance of irrigation canals is the main reason for salt water intrusion in all areas. Soil and ground water is also affected by salt water intrusion. Contamination of ground water can identify by analyzing collected ground water data. Colour of the water, taste of the water and colour and taste of well water in Dedduwa are the reasons for abandoning wells. Turbidity causes for changes in the colour of water and salinization of ground water changes taste of water. In Dedduwa, where is the main issue of salinization has the highest percentage of change in taste of well water. It is accounted as 100% of the all interviewed persons. The taste of water in Dedduwa changes due to ground water contamination of saline water. The data revealed that 70%, 20% and 10% of well water tastes brackish, salty and brine respectively. Apart from salinization, socio-Economic reasons are also affected for paddy land abandonment in study area.

Figure 02: Electrical Conductivity variation in study area



Source: Prepared by the researcher using GIS, 2015

Graph 02: Reasons for fallow lands in Ranthotuwila area.

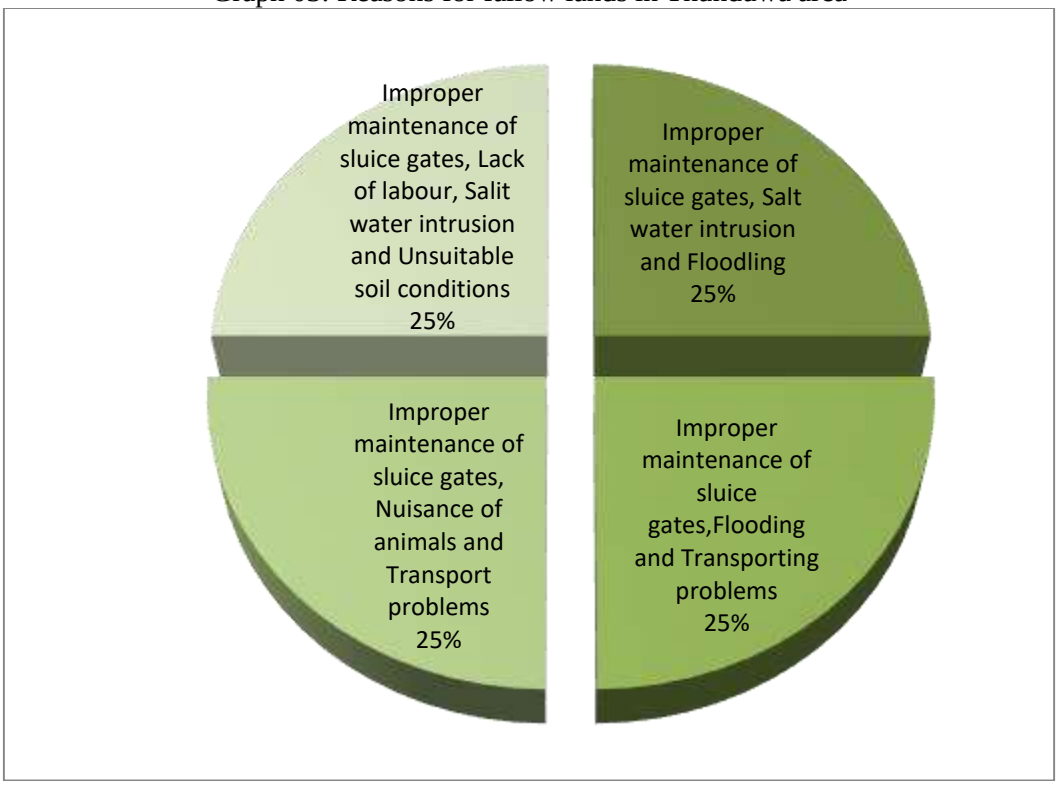


Source: Prepared by the researcher using primary data

Lack of labour is the main socio-economical reason for fallow lands in Ranthotuwila area. Nuisance of animals, migration of people into cities, cost of inputs are some of these socio-economical reasons for abandonment of paddy lands.

Thunduwa is mainly affected by transporting problems. Improper maintenance of the bunt leads to transporting problems in the area. Flooding, nuisance of animals lack of labour are other socio-economical reasons for fallow lands in the area.

Graph 03: Reasons for fallow lands in Thunduwa area



Source: Prepared by the researcher using primary data,2015

Moving to commercial crops from paddy cultivation can be seen in Dedduwa and Thunduwa areas. Coconut, Banana, Lima beans, Okra, Gotukola, Kangkung etc. are cultivating in Dedduwa and Ranthotuwila area as a solution for rice. People collected Kirala and market them in Dedduwa area.

In addition to that, farmers are using both modern and traditional equipments for paddy cultivation in study area. As traditional equipments, mamotee, hoe, reaping hook etc. are used by farmers. So the costs for modern equipments are also an economical issue for farmers.

Due to numerous socio-economic and natural reasons which are getting more crucial with every passing day, farmers deviate from paddy farming to more profitable and more sustainable livelihoods leaving and abandoning their paddy lands, as viability of paddy farming has become questionable in recent times. So the analysis reveals that there are socio-economic and natural influences for the abandonment of paddy lands in study area.

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