

Land Degradation in Tank Village Eco-systems Dominantly under Large-Scale Maize-Sesame Cultivation in the Dry Zone of Sri Lanka

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The contribution of the Dry Zone for annual rice production in Sri Lanka is significant and it is within the 75-78%. The majority of farmlands in the dry zone depend on ancient irrigation systems that evolved during the period from 300 BC to 1200 AD. in response to the erratic rainfall pattern of the zone. The irrigation systems consist of a large number of interconnected reservoirs (weva or tanks) and water from upstream tanks is successively stored and used in those downstream. Each tank system in a cascade has a

small catchment, the reservoir, a small land area with trees, paddy fields, and the village. The village temple was located in the highest point of the village and this piece of land mainly consists of rock and was the most unproductive area in the village. The temple and associated jungle was considered holy, and thus they always protected both these land pieces knowing that those are their livelihoods. Conventional communities had made every effort to conserve soil, water, and natural habitat, and hence the tank village ecosystem is a unique ecosystem occurring within the northern dry zone of Sri Lanka which has been sustainable over centuries.

The tank-village ecosystem system comprised of three main physiographical components, namely the uplands where surface runoff is generated, the tank or the reservoir that stored the runoff generated by its immediate catchment, and the down stream paddy land which is irrigated by the tank water storage. Uplands or the highlands form the catchment of the tank and it was utilized for numerous uses. In several decades back, the highlands were mostly under forest and a suitable section was utilized for village settlements. Moreover, the highlands were utilized to grow variety of crops such as maize, cowpea, green gram etc under rainfed conditions. This was a low input form of cultivation carried out

merely for family consumption which is popularly known as the traditional chena cultivation or the shifting cultivation. The particular land was cultivated with mixture of annuals for a period of two to three years and left to fallow for ten to fifteen years to rejuvenate.

However, with the population growth, the lands were not available to practice traditional shifting cultivation which necessitates fallowing of lands, but consequently the farmer had to settle to a particular location. This form of cultivation was also not for large scale commercial use, but for limited small scale commercialization coupled with family consumption. Although this form of cultivation, caused the degradation of land resource-base due to inadequate land care, this degradation was gradual and not highlighted as it was carried out in a scattered manner in a particular landscape and the scale of the activities were not extensive.

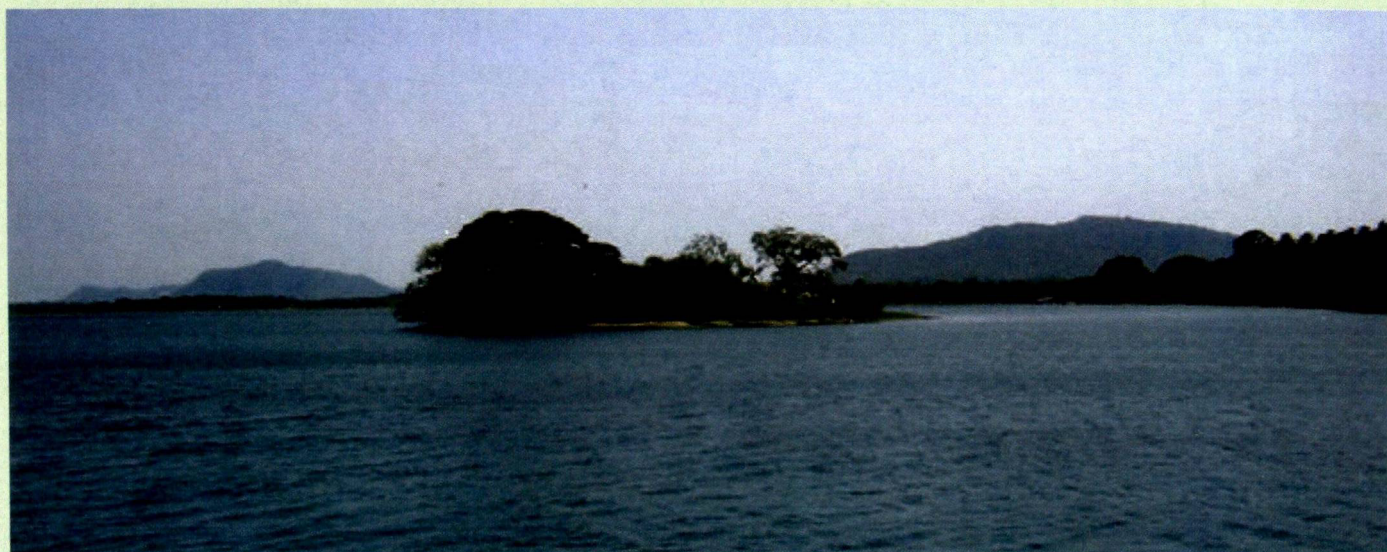
However, with the recent price hike of food items due to high demand in the world market and thereby in the local market, the process has taken a new turn and the farmers or the farmer groups have started to grow food crops extensively within a stretch of land, by clearing the secondary forest and scrublands which had been in between the cultivated lands and basically the watershed of the village tank. This form of cultivation is widespread at present and activities such as land preparation are being carried out without paying much attention to natural depressions, drainage lines etc. occurring within the landscape. Therefore, this has lead to a disastrous situation due to enhanced soil erosion which has affected the sustainability of the highly fragile tank village ecosystem. It will not only degrade the uplands through enhanced soil erosion, but also will reduce the tank storage due to increased sedimentation. The reduced water storage capacities of the tank will eventually jeopardize the paddy culture which is the livewire of the dry zone peasant. Moreover, reduced storage will affect the domestic needs and faunal habitats.

The above cropping system is spreading at a significant phase as at present. It is estimated that approximately 25,000 ha of lands are being cultivated annually under this system in Anuradhapura district alone where the practice is in peak. These lands are grown to maize in Maha season while in Yala season those are grown to sesame as large scale commercial cultivations and certain extent of land cultivated with chillies with supplementary irrigation from large dug wells which are commonly called as "agro- wells".



The total maize production in the country is approximately 90,000 tons per year while the total requirement is 170,000 tons per year. The balance of 80,000 tons is imported annually, at the expense of around 2 billion rupees of foreign exchange. However, the requirement will gradually increase with increasing demand for animal feed which is expected with the changing food habits of the people. This situation suggests that, the production can be increased as there will be no marketing problems.

Due to this assured market, this system of cultivation is gathering momentum and there will be more lands under this form of cultivation in coming years. The lands under this form of cultivation are exposed to intensive two season cropping, but adequate attention is not being paid for soil conservation, land management etc. As these lands are situated in the catchment of the village tank, this practice of cultivation leads to siltation of the village tank causing reduction in the tank capacity. Moreover, commercialization will draw heavy doses of chemicals as fertilizers or pesticides to the ecosystem thus will pollute the tank, the main drinking water source of villagers as well as animals. This setup is exhibiting signs of productivity depletion and environmental degradation, which will eventually threaten the village food security, health and nutrition of the dwellers. The productivity depletion of the land resources is best expressed by the yield drops that are being experienced under commercial Maize cultivations, which is raging from 1 – 2 tons per hectare. On the other hand, land degradation in



the form of soil erosion is estimated around 30 – 50 tons per hectare, which not only reduces the onsite land productivity but also reduces tank water storage capacities which will invariably affect minor tank based paddy culture. Therefore, if the system is continued unattended it will affect approximately 25,000 ha in Anuradhapura alone, and eventually nearly 30,000 farm families will be affected as they will be left with unproductive lands where no cultivation is possible.

What has to be done?

However, the said system of extensive cropping is economically viable at present, thus it is not practical to wean it out. Hence, measures are required to mitigate or minimize its adverse effects through development of appropriate crop and land management techniques and their efficient implementation. This approach will not only ensure the sustainability of the evolving sector but also will protect the tank-village ecosystem as a whole.

Evaluation of the Ecosystem and its Degradation Process

A systematic study is needed to evaluate the degradation of the eco system before making any recommendation. Basemap should be prepared identifying ecosystem boundary indicating components such as tank catchment, the tank and the command area of the tank and maps indicating land use, soil distribution, and terrain. Rainfall, tank water storage, surface runoff, degree of sedimentation, irrigation issues, seepage and evaporation should be studied and a total water balance study for each

catchment should be carried out on seasonal basis. In most of the occasions, ground water is also utilized for cropping through open dug wells, thus safe area for construction of wells and their limits should be explored.

Further, socio-economic conditions of a particular area are closely associated with its resources potentials and limitations. Thus an extensive survey should be conducted to determine socio-economic situation of the study area especially needs of infrastructural development, social needs etc. has to be identified with the view of implementing those where appropriate.

Identification and Development of Technological Packages or Mitigatory Measures

Best management practices (BMP) should be developed with farmer participation and a model package of practices including a systematic land use plan, soil conservation plan, water resources conservation and utilization plan (including rainwater, tank water and ground water) and crop management practices should be developed and these identified packages should be tested for its technical and social adaptability before fully implemented. The finalized BMPs should be disseminated to other farming communities of other ecosystems where similar type of cropping is being practiced.

