

Chapter 1

Introduction

1.1 Background

The main global issues today are the supply of food, shelters, and other basic requirements for the ever-increasing population. Agricultural systems that have been built over the past few decades have contributed greatly to the alleviation of hunger and raising living standards of people by substantially increasing total production and per hectare yield of major crops. Providing the most of the basic requirements based on supply of natural resources, the problem is the scarcity of natural resources and their degrading quality. Land, water, and labor are very important in food production and all kind of other development activities. However, in the process numerous problems such as productivity decline and instability are presently encountered in view of natural resource degradation particularly soil erosion. These problems attracted the attention of planners, policy makers, researchers and development experts.

Sri Lanka is an island located between 6° and 10° N, and 79° and 82° E. Out of 6.85 million ha of total surface coverage of the island, 6.56 million ha are lands and the rest is water surface (Abeyratne, 1962 cited in Bandaratillake, 1995). The agricultural lands are confined to 3.7 million ha, which include all cultivated lands, sparsely used croplands and home gardens. About 11% of the agricultural lands are irrigated (Somasiri, 1979 cited in Bandaratillake, 1995). The total land area of the country falls within 103 river basins/watersheds (Nawarathne, 1985 cited in Bandaratillake 1995), found in three major pen plains in the island. The population of Sri Lanka is 18.6 million. The gross land man ratio in the country is 0.35 hectare and this extent is to be shared among various land uses such as agriculture, forestry, wildlife, housing, infrastructure etc.

Land is one of the most important natural resources in Sri Lanka. 37.9% of the population is still dependent on land-centered activities for their sustenance. At present, out of 6.5 million hectares of land in the country only about 33% of proportion is considered as arable land. The total extent of steep uplands where the average slope gradient generally exceeds 30% is about 1.45 million hectares. That is about 22% of the total land area of the country. The populations who depend on this sloping land agriculture are 29%.

1.2 Present policies to protect the steep lands of Sri Lanka

Several policies, acts and regulations are formulated to protect the steep lands of Sri Lanka. The Soil Conservation Act No. 25 of 1951 (Amendment of 1996) is the most important policy guideline to protect the steep highlands in Sri Lanka. The regulations will apply to general soil conservation measures that have to be adopted throughout Sri Lanka in private and state lands under any form of cultivation, or land uses for other development purposes by public and private sectors, individually or collectively. According to the act, it will restrict to use of lands steeper than the 60% slope and lands above 1500 m msl for the agriculture and other development activities. However it is inactive with several reasons up to now.

Other acts and regulations include the Forest Ordinance of 1907, Land Development ordinance of 1935, Fauna and Flora protection ordinance of 1937, Mines, quarries and minerals ordinance of 1947, The National Heritage and Wilderness Act of 1987 and the National environment Act of 1980 which was amended in 1988 to include Environmental Impact assessments for use the land and water resources for the industrial purposes (Bandara1999).

The mountainous watersheds are extremely important because their watersheds provide storage for bulk of the country water supply. The dry zone of Sri Lanka almost provided more than 80% of rice and other field crop production requirement which is completely depends on rainfall and water diverted from up and

mid country watersheds. The livelihoods in those watersheds are very important because about 30% of agricultural farmers in Sri Lanka are living in these watersheds.

Mid country intermediate zone of Sri Lanka is a very critical in soil erosion during maha season. Almost all mid country areas are identified as erodible areas. The elevation between 670-762m, rainfalls varies from 1750-2500 mm, but during Northeast monsoons (October to March) provides the highest rainfall. The prominent soils are immature brown loam, and reddish brown earth with well drained because sandy loam textures. The rains during maha season from October to March (monsoon rains) are very erosive to this region. The landscape is hilly steep to rolling. This condition accelerated by present land use system they are practicing, that the cultivation of annual crops, mainly vegetables and tobacco in steep highlands without adopting the proper soil conservation measures.

Establishment of crops in rainy seasons is normally done after the burning of whole lands. About 50% of the total soil erosion taken place during the time of land preparation. Adoption of soil and water conservation measures in the lands is very low. In addition, the adopted soil conservation measures also not functioning because they are not maintained. In case of biological conservation measures in most places they are die- back during the dry seasons. Those lands are severely eroded by annual cultivations in mid country zone, are almost rain fed. Vegetable and tobacco cultivation during these 4-5 months of period (during rainy season) is the main source of income for the farmers during whole year.

The majority of farmers in this region are not landowners. Earlier they were shifting cultivators mixing with field crops and vegetables, but with time they were changed to tobacco and vegetable cultivation in the past 40 years in order to have highest profit from their lands. In most of the areas they are doing this as large areas. Agriculture department and other government organizations gave them awareness and training on soil conservation. Now they are familiar with soil erosion and soil conservation methodologies.

Several kinds of soil and water conservation measures were introduced for better land use practices to solve the problem including mechanical, biological and agronomic measures especially (*Gliricidia sepium*) hedgerows, Vetiver grass hedgerows, contour drains, contour flat forms and stone terraces through soil and water conservation demonstration techniques. In addition to that incentive payment scheme also provide to help poor farmers who establish the conservation measures.

However, adoption rate of soil and water conservation measures is still not at a satisfactory level. Some farmers did establish them in correct way, some do not maintain the established measures, and after one season they were completely destroyed with several reasons. This soil erosion status has direct on-site effect of reduced the crop productivity by degrading the fertility and biodiversity and farmers cannot achieve the economic output from these lands.

Further it has off-site effects such as siltation of major water reservoirs in mid country intermediate zone of Sri Lanka which directly affecting on generation of hydro power, lowering the water quality in downstream by siltation and eutrofication and the irrigation of dry zone of Sri Lanka where contributes three fourth of food production especially for paddy cultivation.

In this research the emphasis is given on the following soil conservation measures namely, the “Sloping Agricultural Land Technology” (SALT), stone terraces, and contour drains. In the SALT system, the farmer has to mark a contour line according to the recommended vertical interval and keeping about 1.5 feet spacing between two hedgerows by *Gliricidia* or another suitable type of species. In between those two hedgerows mulch is spread in order to drain off the runoff water slowly to facilitate the infiltration in steep lands. And also it is recommended as a fertility improving system by adding organic matter and usually uses nitrogen-fixing hedgerows like *Gliricidia*, *Caliendra*, and *Acacia* species. Most of the watershed management projects are recommended this and promoting this system.

Contour drains are constructed along the contours in order to collect the runoff water to the drain and it will collect the sediments in the drain. It facilitates the infiltration for long interval and reduces the slope lengths. Stone terraces are bunds made of stone across the slope on contours.

Understanding of the real situation of the soil erosion and the problems behind the low adoption rate may help enhance the adoption of these soil conservation measures in the future watershed management programs to protect the five large water reservoirs and also enhance the livelihoods of farmers.

1.3 Objectives

The specific objectives of this research are as follows:

- To identify the extent of soil erosion problem and perception of farmers on soil erosion problem in mid country intermediate zone of Sri Lanka.
- To determine factors affecting the adoption of soil conservation measures.