

Chapter I

Introduction

1.1 Statement of the problem

Based on the rainfall Sri Lanka is divided into three major parts: wet zone, intermediate zone, and dry zone. There are two main cropping seasons in the country called Maha and Yala. Maha season is spread from October to January and Yala is spread from February to September. In the dry zone main cropping season is Maha season. At that time there is enough rain but in Yala season rain is very limited. Most of the lowland area farmers cultivate paddy during Maha season. But in the Yala season paddy is cultivated in only irrigated area. However, water is most critical factor in dry zone upland area. There are no proper irrigation facilities. Wet season (October to January) using rain water upland farmers grow some grain crops, pulses and vegetables and obtain some economic benefits from their fields. Dry season (February to September) there is not enough rainfall. Some time mid of the April to end of the May there is some little rain. Using this limited rain farmers grow some short time crops like mungbean, black grams and low water demand crops like sesame. In this period farmers cannot earn enough income from their farmland. Some year they do not get any things. Based on the rainfall, economic benefits of farming systems fluctuate through out the year. To mitigate this problem, 1989 ground water utilization has been introduced by Agricultural Development Authority (ADA).

At the beginning of the program using guidance and some economic helps from ADA, farmers constructed wells in their own land to harvest ground water. Depths of these wells are shallow.

The average circumference of shallow well is 6 meters and average depth is 6 meters to 8 meters (depend on the ground water level). A typical shallow well can irrigate 0.2-0.8 hectares. Generally, these wells are called “agro wells”.

allowing farmers to grow non-rice crops in the dry season, and earn valuable income. Previously, land had to lay fallow, or only low-value drought-resistant crops could be grown. With these shallow wells and pumps, the cropping pattern in the “Yala” season changes from the minimal, extensive cultivation of low-value drought-resistant crops to the intensive cultivation of high-value crops such as onion, chili and banana. After some time farmers use their own money and constructed shallow wells through out the dry zone area. The use of shallow-wells fitted with pumps for irrigation has been mushrooming in a wide scale during the last two decade (see Figure 1.1) (Kikuchi *et al.*, 2003).

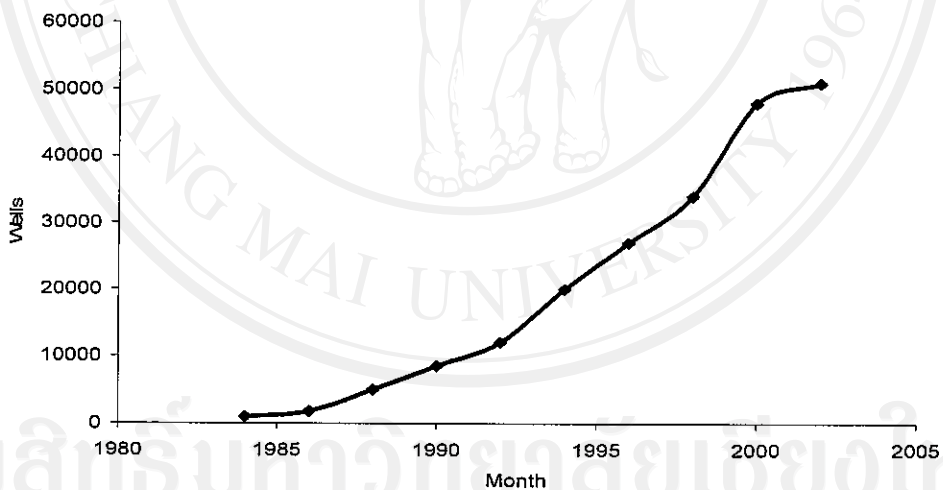


Figure 1.1 Diffusion of shallow wells (agro wells) in dry zone 1985-2000

Source: Kikuchi *et al.*, 2003

Groundwater resources in Sri Lanka, as in many other parts of South Asia, are limited. In the dry zone, ground water table is in shallow depth. The recent development of agro well farming in the dry zone is mostly dependent on this shallow groundwater. Therefore, efficiency use of ground water is very important issue in this

area (Panabokke and Perera, 2005). Farmers were not maintaining the shallow well water efficiently. As there was limited water in the shallow wells, farmers could not achieve the command area by flood irrigation and also most of the water waste through transportation, as they were transporting water from the shallow well to field in open unlined channels and also through evaporation as large area were exposed to the sun. Majority of the shallow well farmers practice the primitive system of water management (flood irrigation). Considering above factors, Agricultural Development Authority started subsidy program to promote the micro irrigation among shallow well farmers in year 2000 (Karunarathne, 2002). Including Central government department of agriculture and provincial ministries of agriculture, many institutes tried to encourage utilization of micro irrigation in different way (Table 1.1).

Table 1.1 Institutes involved in promotion on micro irrigation

Name of Institute	Program
Agricultural Development Authority	Subsidy
Sri Lank Samurdhi Authority	Loans
Department of Agriculture	Loans & Subsidies
Provincial Ministries of Agriculture	Loans & Subsidies
Department of Export Agriculture	Loans & Subsidies
Non Government Organization	Loans & Subsidies

Sources: Gunaratne *et al.*, 2004

As the results of this attention, at the beginning using these subsidies and loans, some farmers practiced drip irrigation to utilization of ground water and after that, some farmers spent their own capital to buying drip irrigation technology. Still majority of the farmers use flood irrigation (surface irrigation). Different types of crops are cultivated under these both irrigation methods. Some farmers grow vegetable some grow banana.

Banana is one of the major fruit grown in Sri Lanka (see Table 4.6 in Chapter IV). It is not a seasonal crop; it's gives year round profit. Therefore, shallow well farmers in dry zone trend to cultivate banana as a main economic crop.

At the present, some dry zone shallow well (agro well) farmers cultivate banana under surface irrigation some are cultivate banana under drip irrigation. But sustainable utilization of these two irrigation methods in this area was still not subject to scientific comparison. Surface irrigation method is traditional method but drip irrigation is modern method. Which method has higher overall sustainability with banana cultivation in dry zone upland area? This type of information is needed when new technology is introduced to farming community. Existing knowledge is not capable to answer this question. Therefore, new study is required to fulfill this existing knowledge gap.

1.2 Rationale of the study

Dry zone upland farmers use drip irrigation and surface irrigation to convey water from wells to cultivated plots. They cultivate banana under drip irrigation and surface irrigation. But there were no studies to evaluate overall sustainability on utilization of these two irrigation methods under banana cultivation. Sustainability of the utilization of two irrigation methods can be evaluated using different types of farm level indicators. This study will utilize farm level sustainability indicators under socioeconomic, ecological and agronomic criteria to assess the overall sustainability on utilization of surface irrigation and drip irrigation under banana cultivation. To fulfill the existing knowledge gap this study was conducted to achieve following objectives.

1.3 Objectives

This study has two objectives

- (1) To find out levels of sustainability indicators on utilization of drip irrigation and surface irrigation under banana cultivation.
- (2) To assess overall sustainability on utilization of drip irrigation and surface irrigation method under banana cultivation

1.4 Usefulness of the study

Ground water utilization has been popularized among dry zone upland farmers during last two decades. Farmers use agro wells and pumps to harvest ground water. For agro wells and pumps, invest significant amount of money. To recover that cost they cultivate cash crop like banana. Generally, farmers do not use agro well water in efficient manner. Government agencies and NGOs try to introduced water saving methods like drip irrigation to increase water efficiency of the ground water utilization. They provided subsidies and credits. Some farmers invest their own money to use drip irrigation system. But still majority of farmers use traditional method to deliver water their cultivated plots because drip irrigation is capital intensive technology and it require high level of training to maintain and operation of the drip irrigation systems. Extension and training division of central government department agriculture and province agriculture departments conduct training programs for drip irrigation farmers. Farmers more concern on financial benefits that can be derived from the new technological usage. But utilization of drip irrigation has been recorded numerous benefit in the literature. Saving of ground water, labor saving, effective use of fertilizer, reduce ground water pollution and gain financial payback are some gain from the drip irrigation. These benefits are connected with economic, agronomic, ecological and social themes. Utilization of drip irrigation among banana farmers in dry zone is still not analysis concerning on multidiscipline approach. Results of this type of studies can be used to clarify farmers' adoption, to justify the resource allocation for training and extension activities on drip irrigation, validate government subsidies and credit program on drip irrigation. Not only that also it is providing guideline to farmers selecting of crops for shallow wells (agro wells) lands. It that means field studies which concerning all direct and indirect benefits are necessary to determine overall feature of the utilization of drip irrigation and surface irrigation under banana cultivation in dry zone. Therefore, results of this study will help to fulfill existing knowledge gap in the terms of academic and development.

1.5 Scope of the study

This study is based on the household level sustainability indicators analysis of banana cultivation under two irrigation methods in Anuradhapura district. To assess the overall sustainability of the two irrigation methods, nine indicators were selected under three criteria: socioeconomic, agronomic, and ecological. To determine the indicator values at household level, household information from April 2005 to May 2006 were used.