Chapter 1 Introduction

1.1 Introduction

In the Brundtland report our Common Future (WCED, 1987) the UN World Commission on Environment and Development linked the issues of environmental protection to global environmental economic growth and development. This report reveals that the entire world is threatened by serious environmental problems and scientific evidence illustrates the rapid destruction of air, water and land and the over-exploitation of natural resources. Scarcity of water and degradation of land are among the most prominent issues of discussion worldwide, concerned with sustainable development. The availability of water greatly influences the prosperity of people and their development potential and health. Although water is a renewable resource, it is also finite. The availability of this vital resource is by no means assured for large sections of the world’s population. The requirement of water for irrigation is bound to increase due to population growth and increased demand for food. Over the next two decades, it is expected that the world will need 17% more water to grow food for the increasing population in developing countries and that total water use will increase by 40%. In addition there will be a tremendous pressure to meet water requirements for other purposes, such as for drinking, industrial use, environmental and ecological management. It is estimated that by the year 2025, as much as two-third of the world population will be living in areas facing water stress conditions (WMO, 1997; UNEP, 1999). By the year 2050, the population projected to be living in water-scarce countries will rise to between 1.06 billion and 2.43 billion, representing roughly 13% to 20% of the projected global population. While Africa and parts of western Asia appear particularly vulnerable to increasing water scarcity, the list of potentially affected regions include north-western China, western and southern India, large parts of Pakistan and Mexico, and the western coasts of United States and South America. Water as a scarce and commonly shared resource may become a cause of conflict. To provide water of the right quality to the users, in the right quantities, at the right places and at the right time, by applying environmentally sound techniques and procedures is the challenge in this decade. Hence there is ample need for the effective management of this vital resource.

The degradation of land is a multi-faceted phenomenon, which can be manifested in a variety of forms. It is generally accepted to imply the deterioration of the land surface, by the accelerated removal of soil, the progressive alteration of soil properties, or the loss of vegetative cover from soil. Some of the causes of land degradation are natural, being the consequence of disaster events such as floods, bushfires or drought, whereas others are the consequence of human activities, such as overgrazing, deforestation or poor agricultural practices. Land degradation can itself aggravate the damage caused by
natural disasters, by increasing flood run-off or increasing the potential for serious soil erosion. Land degradation is therefore the consequence of a multitude of causes and effects which all contribute to the reduction of the value of the land for human and ecological purposes (UN, 1997). The total land area subjected to human-induced soil degradation is estimated as about 20 x 10^6 (km)^2 Of which 30 % is agricultural land, 35% is permanent pastures, and 35 % is forest and wood land. The land affected due to soil erosion is estimated as 11 x 10^6 (km)^2 by water erosion and 5.5 x 10^6 (km)^2 by wind erosion (Oldeman et al., 1991, cited in: Lal, 2001). Therefore land degradation is a serious issue of the modern era and will remain so during the 21st century (Lal, 2001). It is estimated that 630 million rural poor live in marginal agricultural, forested and arid lands that are particularly prone to degradation without careful management of land and water resources. Land degradation is estimated at about 35% of agricultural land in Asia, 45% in South America, 65% in Africa and 74% in Central America (CGIAR, 2003). These facts call for the need for its conservation, which is possible only through proper watershed management to conserve the basic natural resources, (land and water) and thus uplift the socio-economic condition of the people by providing health, a hygienic atmosphere, improved water quality, flood and drought control.

The terms watershed, catchment, drainage area and river basin are all used to describe a land surface from which water flows downhill to a specified point on a watercourse. The difference between them is essentially a question of scale, whereby the watershed relates to the smallest size of catchments, generally located on the steepest slopes of a river basin. The watershed contains an array of inter-linked and inter-dependent resources and activities, irrespective of political boundaries. It forms a dynamic and integrated bio-physical, economic, social, environmental and political system containing people, agriculture, forestry, industry, services etc. Managing watersheds is a complex phenomenon. Therefore its management requires a variety of physical, social and economic policies and techniques, all aimed at minimizing the adverse consequences of natural disaster events, to improve and enhance the quality of life of the catchment community. Most, if not all, centrally planned watershed programmes fail due to lack of involvement of people in the projects. People’s participation appears to be crucial in planning watershed programmes as local people are closest to the real problems.

This study aims at investigating the conditions under which sustainable watershed management is possible in Kerala, South India and more particularly to explore the potential of coir geotextiles as a locally available and affordable solution for sustainable land and water management. The objectives, research questions and hypothesis of the study are as follows.
Objectives

➢ To develop a conceptual framework to analyze watershed projects in Kerala to find out problems and prospects in the management of watersheds and to evaluate watershed projects in Kerala implemented through people’s participation.

➢ To study the effect of using coir geotextiles in watershed management for reducing soil erosion and runoff and increasing biomass and thus providing a cheap and effective low cost technology that contributes to sustainable watershed management in Kerala.

Research questions

1. What are the aspects that influence the sustainability of watershed management, based on experiences in India and elsewhere?
2. What are the elements of sustainable watershed management and how can these be incorporated into a conceptual framework?
3. How can sustainable watershed management be implemented including the role of people’s participation in Kerala?
4. How can coir geotextiles be used in watershed management in Kerala?

Hypothesis

It is hypothesized that sustainable watershed management is possible in Kerala:

a) through people’s participation starting from problem identification all the way to implementation of projects

b) by using locally available materials like coir geotextiles and local techniques

1.2 Structure of the thesis

The first research question is answered in Chapter 2, the second is answered in Chapter 3 and the third research question is answered in Chapter 7 building on the results from Chapters 4 and 6. The fourth question is answered in Chapter 5 and 6. Figure 1.1 represents a schematic representation of how each chapter is interlinked.

The first chapter explains the scope of this study in the context of sustainable watershed management, while the second chapter analyses why and how people’s participation is important in the management of watersheds. This chapter also illustrates how participatory research helps in adapting innovative technologies and the importance of environmental services in the context of watershed management. The third chapter defines the term ‘sustainable watershed management’ and derives a conceptual framework for the analysis of watersheds for sustainability. The fourth chapter illustrates
the results of the sustainability analysis carried out in two watershed projects in Kerala. The fifth chapter gives a narrative account of the innovative technology for land and water management using coir geotextiles with case studies from different countries. The sixth chapter presents the results of the experimental study conducted using coir geotextiles in the watersheds of Kerala and the seventh chapter provides conclusion on how sustainable watershed management is possible in Kerala.