

## CHAPTER I INTRODUCTION

### 1.1 Background

Soil erosion that occurs under natural conditions is known as geologic erosion in which loss of soil particles is approximately equivalent to the new soil particles that are annually formed. However, when the natural soil erosion is disturbed by increasing human activities especially deforestation and slash and burn agriculture, it becomes the accelerated erosion that upsets the balance of the natural ecosystem. Hazarika (1997) reviewed that soil erosion under natural condition is only at rate of from 0.01 to 1.0 mm year<sup>-1</sup> while the accelerated erosion caused by human activities is up to 40 mm year<sup>-1</sup> or more. The accelerated erosion is one of the most dangerous destructive causes redistributes and removes the soil particles and principal nutrients away from ecosystem.

The upland area plays a very important role in the agriculture production and the overall development of Ba Be district. It covers about 83.3 % of the total natural land area while almost of the farmers living in this areas are seriously facing with soil degradation. This will lead to the increasing cost of production due to losses of soil nutrients, disturbed water holding capacity, exhausted soil organic matter and removal of topsoil depth.

The slash and burn agriculture that provides foods for subsistence of ethnic minority groups referred as a main driving force of soil degradation. For the period of 1980-1993, a large number of the natural forest areas was cleared and burned by local people for agricultural production activities in Ba Be district. More than 70 % of labor force involved in agricultural production and 70 to 90% of the household's income derived from agricultural production. As a consequence of agricultural production

activities, the average yield of upland rice was rapidly reduced from 2.53 to 1.65 ton/ha and maize yield was declined from 2.75 to 1.66 ton/ha for the period of 1985 - 1999 (PARC project, 1999). The expansion of subsistence upland rice and maize cultivation seriously disturbed the balance of upland agroecosystems in this area. This is urgently raising many concerns regarding to the potentially damaging consequences of the current land use in relation to the weak or non-existent land management system.

### **1.2 Rationale**

The upland area covers approximately 83.3 % of total natural land in Ba Be district where the majority of farmer's earnings is generated from there. For the past two decades, the soil degradation was seriously occurred due to shifting cultivation and exploding population. In fact, negative impacts of soil erosion were fatally threatened the livelihood of inhabitants in this area as well as the related environmental problems. Therefore, Protected Area Resource Conservation (PARC) Project was initiated with an aim to maintain the sustainability of the upland based agro-ecosystems. The estimation of spatial distribution of soil loss in this area will provide a basis for local authorities and farmers to decide themselves on alternative solutions of the soil conservation for sustaining the long-term agro-ecosystems production capability.

### **1.3 Objectives**

This study includes the following two objectives

1. To compare different soil erosion models for estimating the spatial distribution of the soil loss in Ba Be district, Bac Kan province, Viet Nam.
2. To estimate the impact of the soil loss on the extra production cost in the agricultural production.

#### 1.4 Assumptions

The following are assumptions that is given in this study

1. Spatial distribution of soil loss was estimated through the sheet and the rill erosion in the study area.
2. Mass of soil particles formed was ignored in the estimation procedure.
3. Amount of the rainfall in the whole study area was assumed identically.
4. Degree of land cover for each land use was assumed the same.
5. Soil characteristics were referred as homogeneousness within each Soil-Mapping Unit (SMU).
6. Nitrogen, phosphorus and potassium directly affected the productivity of the soil.