Soil erosion was known as one of important factors for controlling soil physical properties and nutrient conditions. Serious soil erosion by agriculture activities and changes in vegetation types could result soil degradation and loss of soil productivity. Although vegetation and litter cover are important controls on soil erosion and nutrient accumulation, interactions among vegetation, soil erosion, and macronutrient levels have rarely been investigated. Most of the previous studies have focused only on the relationships either between vegetation cover and soil erosion, or between vegetation and soil nutrient levels. The comprehensive interactions among soil erosion, nutrient levels, and vegetation were rarely investigated. An understanding of these factors and complex interactions for different land use and/or land cover is important for developing site specific soil conservation practices and sustainable resources management. Therefore, the objectives of this Ph.D. thesis were (1) to characterize land use type and the interaction among vegetation, soil nutrient, and soil erosion, (2) to investigate spatial patterns of soil erosion and nutrient accumulation under various vegetation ground covers in a headwater catchment, (3) to estimate soil erosion rate with comparison of global soil erosion and production rate, and (4) to provide management application for controlling soil erosion and soil conservations in plot and catchment scales.

First of all, I conducted study in Luot Mountain in northern Vietnam located 30 km from Hanoi. I selected 10 dominant land use types (3 plots of each type). Understory vegetation biomass, litter biomass, canopy openness, soil moisture content, soil pedestal height, soil hardness, soil bulk density were measured at site and samples. For long-term soil erosion rate, I estimated $^{137}$Cs and $^{210}$Pb$_{ex}$ activities in soil surface. For nutrient accumulation, I analyzed soil carbon and nitrogen. Understory biomass ranged from 2 to 375 g m$^{-2}$ with greater values of forest and shrub lands than in agriculture fields. The height of soil pedestals (0-3.3 cm) indicating short-term soil erosion was negligible when understory biomass was greater than 130 to 150 g m$^{-2}$. 

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$^{210}\text{Pb}_{ex}$ indicated widely different erosion rates across the land uses with low values in the agricultural lands and two types of forest plantations. Soil organic carbon significantly correlated to soil organic carbon, but did not relate to soil organic nitrogen. Principal component analyses showed that soil organic carbon and nitrogen were positively correlated to understory biomass and strongly and inversely influenced by bulk density. This finding showed that understory biomass and bulk density are the most important parameter for preventing soil erosion even in forested landscape.

Secondary, I focused on the spatial patterns of soil erosion, vegetation, ground cover, and nutrients in 7.0 and 4.6 ha headwater catchments in the Oobora-zawa watershed, Tanzawa Mountain, Japan. We collected 58, 12 and 12 spatially distributed samples in 2010, 2012 and 2013, respectively. We collected 12 soil profiles with 30 cm soil depth including 2 reference sites. Understory biomass ranged from 1.4 to 95.5 g m$^{-2}$ for all plots. $^{137}\text{Cs}$ reference inventories in 2010 ranged from 20 to 54 Bq kg$^{-1}$, while $^{137}\text{Cs}$ reference inventories became 610 to 932 Bq kg$^{-1}$ in 2012 after deposition of accident of Fukushima Daiichi Power Plant (FDNPP). When the biomass was greater than 100 g m$^{-2}$, no soil pedestal was formed based on the continuous monitoring in 2010 to 2013. For the depth profile in various land cover, depth profiles of $^{137}\text{Cs}$ and $^{134}\text{Cs}$ were inconsistent to the reference profiles. Principal component analysis showed that soil total carbon and total nitrogen were correlated to soil erosion estimated by $^{137}\text{Cs}$ in 2010. This suggested that accumulations and storage of soil nutrient associated with long term soil erosional processes on hillslope. Because the vegetation ground cover tended to be low in near stream channels in the watersheds, sediment supply to headwater channels occurred by soil erosion on hillslope adjacent to the channel.

In the third, I estimated soil erosion rate in different land surface condition using data from Vietnam and Japan and compared the global data sets. Based on the diffusion and migration model using $^{137}\text{Cs}$ and $^{210}\text{Pb}_{ex}$ proposed by Walling and He (1999), estimated soil erosion in Vietnam was low in Eucalyptus plantation with 1.2 mm yr$^{-1}$ and high in bare land with 32.4 mm yr$^{-1}$. Estimated soil erosion rate in bare land located near stream channels in Tanzawa ranged from 1.4 to 3.1 mm yr$^{-1}$. No differences of soil erosion rates were found among understory cover conditions. Estimated values in forested areas in Vietnam and Japan were within the ranges of the previous studies of global soil erosion rate. Hence, bare land and shrub land of Vietnam had greater soil erosion rate compared to the global data sets of soil erosion.

Finally, I summarized the findings and management implication in the following way. This study provides snapshots about the vegetation and soil condition in Northern Vietnam and the central Japan. The vegetation biomass was strongly correlated with short-term soil erosion in both Vietnam and Japan. The simplest way to reduce soil erosion is to maintain understory biomass above 150 g m$^{-2}$ in tropical region like Vietnam or above 100 g m$^{-2}$ in temperate region like Japan. Ground cover is a key factor controlling soil erosion on hillslope. Hence, comparing the findings between Vietnam and Japan highlighted that climate and topographic conditions alter the accumulations of soil nutrients on hillslopes because of differences of productions and storage of nutrients. Findings of this study, therefore, can be important for appropriated land management practices and soil conservations in both hillslope and catchment scales.