The Sixth Scientific Advisory Committee Meeting
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in East Asia
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Joint Research Project with Thailand on Catchment Analysis

Network Center for EANET

1. Introduction

Integrated monitoring based on the biogeochemical elemental cycle should be considered for the total evaluation of ecological impacts of acid deposition. Catchment-scale monitoring is one of the solutions for this purpose but has not enough been promoted in tropical region. A study site was established in 2005 in a dry-evergreen forest in the Sakaerat Silvicultural Research Station, Nakhon Ratchasima Province, Thailand, in cooperation with Royal Forest Department (RFD), Environmental Research and Training Center (ERTC), Department of Environmental Quality Promotion, and Kyoto University.

2. Outcomes of the study

Field surveys on input (atmospheric deposition), output (discharge from a stream) and biogeochemical processes are carried out in the selected catchment area (approx. 50 ha).

As for the input, precipitation samples including throughfall (TF), stemflow (SF), and rainfall outside the forest canopy are collected basically at two-week interval in wet season. Measurements of air pollutants, such as SO_2, NO_2, NO_X, NH_3, and O_3, are also carried out using passive samplers to estimate dry deposition in dry season. As for the output, continuous monitoring of the discharge and measurement of the stream water at two-week interval are carried out in wet season. The data of the stream water in wet season showed that pH, EC, and alkalinity of the water were low, 5.68, 1.94 mS m^{-1}, and 0.06 meq L^{-1}, respectively. The stream might be very sensitive to acid deposition.

In addition to these continuous surveys, to assess and predict the impacts of acid deposition at a catchment scale, it is required to clarify the temporal and spatial heterogeneities in soil acidity and the related parameters. The spatial variation in soil properties may be linked to differences in geology, soil type, topography, and species composition and structure of vegetation. By the intensive survey in wet season, we tried to make clear the scale-dependent spatial variation in soil acidity and its determining factors at a catchment scale. Soil samples were collected using an auger at each point of 10m-interval grid at the different depths (0-5cm, 5-15cm, 25-35cm, 45-55cm) in a plot (40m x 350m) crossing the stream. The value of pH (H_2O) and pH (KCl) of the surface soil were high in the upper most slopes

and bottom slopes, and low in the mid slopes (Fig. 1). For the surface soil the spatial distribution of exchangeable basic cations was related strongly with the pH value. Soil acidity and exchangeable basic cations might be affected by topography and different status of forest structure, simultaneously.

3. Perspective

In a seasonal tropical forest, gaseous and particulate pollutants may accumulate on plant body or forest floor during dry season due to limited discharge. The study site has very high-weathered soil with low nutrients, and pH, EC, and alkalinity of the stream water are also low. Distinct seasonal changes of elemental flux could be seen in such ecosystem especially from dry season to wet season. Outcomes of this project will be imperative to evaluate impacts of acid deposition on terrestrial ecosystems in tropical region including Thailand as well as other regions in East Asia. A monitoring guideline for the catchment analysis in the tropical ecosystems will also be developed for EANET.

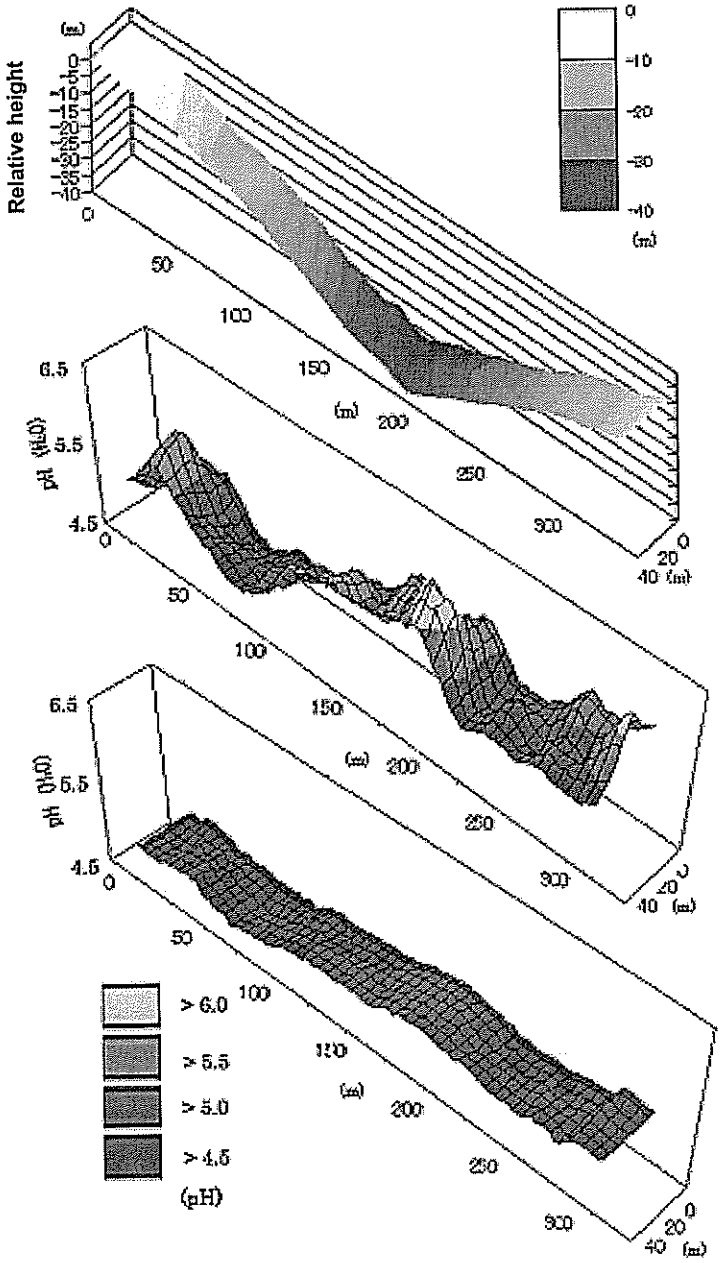

Fig. 1. Topography (upper) and spatial variations of pH(H_2O) at the depths of 0-5 cm (middle) and 45-55 cm (lower)