

Chapter I Overview

The Rangelands Atmosphere– hydrosphere– biosphere Interaction Study Experiment in northeastern Asia (RAISE)

Introduction

Rangelands are of vital importance for the production of live stock. Also for the global climate, rangelands have a strong impact. Although there have been numerous attempts to study rangelands, most of them are limited within narrow traditional disciplines, and a full understanding of the complex nature of the rangeland environment and of the various interactions and feedbacks between the different processes are still lacking (Fig. 1). Also, the rangelands in northeastern Asia have not received attention they deserve in contrast to some of the others. In this area, a climatic transition from humid conditions in the northern part to arid conditions in the southern part can be found over a relatively narrow zone. As a consequence, a distinct ecotone of forest-steppe-desert is formed. An ecotone in general is sensitive and susceptible to environmental changes, and climatic changes were already reported. Moreover, the number of livestock has increased drastically in Mongolia as a result of the introduction of the so-called market oriented economy in 1990-91. In the light of the absence of interdisciplinary studies of rangelands, a project called RAISE project was implemented for the period of 2001-2006 with more than 30 scientists of hydrology, meteorology, climatology, geomorphology, soil

science, and plant ecology from Japan, Mongolia, China and Korea.

Strategy

For the implementation of the project, observation/analysis and model construction were the two main approaches to study this region. The Khelren river basin located in eastern Mongolia (Fig. 2) was selected as the target area. Three flux stations and four automatic weather stations were set up for the purpose of obtaining continuous measurements within the experimental area. One flux station was established in a mildly hilly area near Mongenmoryt village in the upper river basin while two others were set up within an extensive steppe area in Kherlenbayan-Ulaan. Four 10-day intensive observations were carried out in 2003 to obtain detailed data set, and a long-term monitoring also took place in the following years of 2004-2006.

Results

The results can be categorized in the following areas: (i) hydrologic cycle, (ii) hydrologic cycle and ecosystem, (iii) surface-atmosphere interaction, (iv) effect of grazing activities, and (iv) future prediction. These results have been published in scientific journals are introduced and reviewed in Sugita et al. (2007).

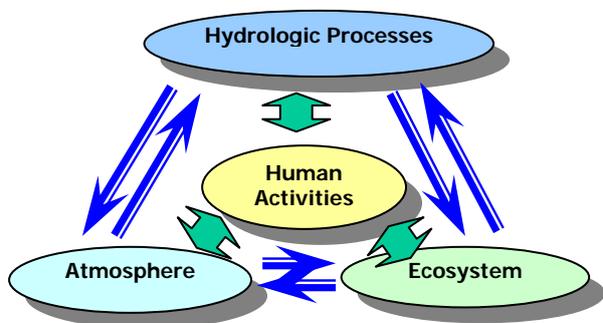


Fig. 1 Complex nature of the environments

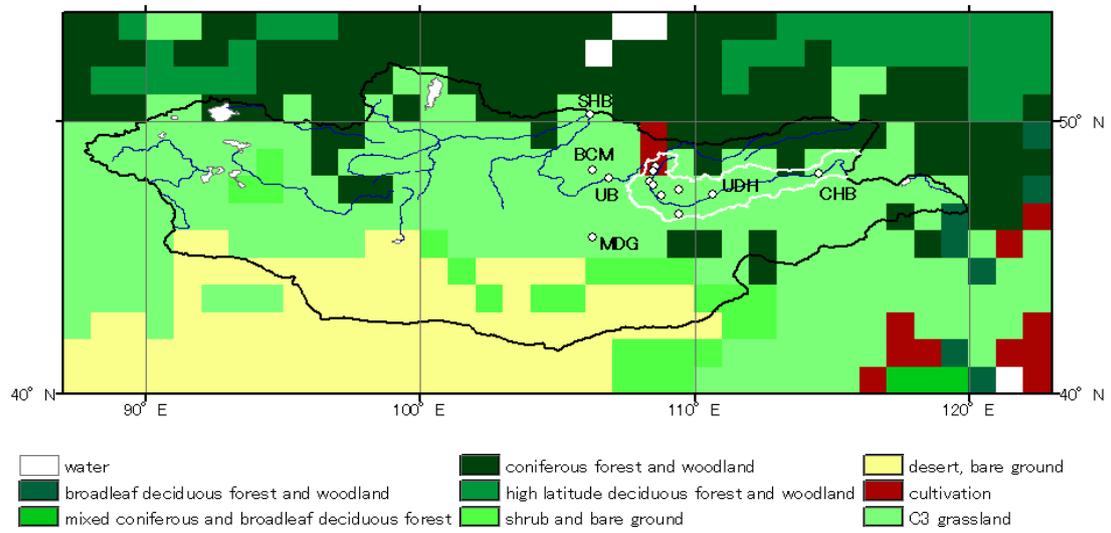


Fig. 2 A map of Mongolia and its surrounding areas. The Kherlen river basin boundary is shown with white lines, with main observation points indicated by the the white circles. The 3-letter names represent the relevant cities. UB: Ulaanbaatar, UDH: Underhaan, CHB: Choibalsan, BCM: Bayanchandmani, SHB: Sukhbaatar.

References:

- (1) Sugita et al., 2007: J. Hydrol., 333, 3-20