

## Preface

Rangelands are of vital importance for the production of live stock, and they also have strong impact on the global climate. 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. Also, the rangelands in northeastern Asia have not received attention they deserve in contrast to some of the others. These facts prompted us to organize and carry out a research project called RAISE (the Rangelands Atmosphere-Hydrosphere-Biosphere Interaction Study Experiment in Northeastern Asian) from 2001 through 2007, with scientists from Mongolia, China, Korea and Japan with a background of atmospheric sciences, hydrology, geomorphology, ecology, and soil science. As main research institutes in Mongolia, the Institute of Meteorology and Hydrology (IMH) of Mongolia and Environmental Education and Research Institute ECO Asia participated in field observations, promoted research activities including the organization of international symposiums.

The intensive observations in 2003 and on-going long-term observations through year 2006, together with thorough data analysis and modeling, have produced quite interesting results, and many of the results have already been published in scientific journals (see the publication list at the end of this booklet), including the RAISE Special Issue of the Journal of Hydrology (Volume 333, Issue 1, 2007). However, these articles are intended mainly for scientists within small scientific discipline, and it is often not necessarily easy for a scientist outside the specific discipline or a layperson even to capture the gist and to fully understand the relevance of such an article. This small booklet is intended to overcome this problem, at least to some extent, by providing the summary of each study with minimum details; no equation is used, and each article is one page long. Thus it should be straightforward to digest their content for a novice reader. Moreover, to overcome the language barrier, the article is presented in three languages of Mongol, Japanese, and English. This should help increase the accessibility to the scientific results among those whose main interest is outside science. Of course, if such readers become interested in the content, they can further go into the details by reading relevant scientific paper listed as a reference at the end of each article. I hope this will help communication between scientists and non-scientists, or between people living in Mongolia and those who are interested in Mongolia but living outside of the country.

Finally I would like to express my profound thanks to the many people who have contributed to this booklet, as well as to the RAISE project. In particular, I want to thank J. Asanuma, M. Tsujimura, S. Mariko (Univ. Tsukuba), M. Lu (Nagaoka Univ. of Technology), F. Kimura (Univ. Tsukuba), D. Azzaya (IMH), and Ts. Adyasuren (ECO Asia) who have played a

leading role in coordinating the activities of the sub-study groups, and G. Davaa and D. Oyunbaatar (IMH) for facilitating local logistics and for arranging maintenance of the stations through the activities of Joint Projects Office (JoPO), and K. Mushiake, S. Masuda and all members of CREST Hydrological Modeling and Water Resources System domain who have helped and encourage us to carry out this project in better and more efficient manners. Finally, I would like to express my appreciation to Y. Sawaguchi (JST) for managing various administrative aspects of the RAISE project. This study has been supported, mainly by JST. Partial support came also from the Global Environment Research Fund of the Ministry of Environment of Japan, from the Grant-In-Aid for Scientific Research of the Japan Society for the Promotion of Science, and from UT Research Project A. TERC has also provided a support for this project in various ways.

14 March 2007

On behalf of RAISE Study Team

Michiaki Sugita

Doctoral Program in Geoenvironmental Sciences, Graduate School of Life and Environmental Sciences, University of Tsukuba, Tsukuba, Ibaraki 305-8572, Japan

It is my pleasure to note that in 2002 professors Sugita and professor Tsujimura from University of Tsukuba, Japan visited Ulaanbaatar, Mongolia and they had several meetings on organization and establishment of observational network for implementation of the project, the Rangelands Atmosphere-Hydrosphere-Biosphere Interaction Study in Northeastern Asia (RAISE) jointly with Mongolian scientists from Institute of Meteorology and Hydrology, Environmental Research Institute Eco-Asia and other institutions.

For this research we have selected Kherlen river basin, which has length of 1090 km in Mongolian territory. Kherlen River takes the beginning from the Bogd and Tsagaan rivers, which have elevated at 1750 meters above the sea level. Kherlen River belongs to basin of Pacific ocean and flows to Dalai Lake, which locates in China.

In years 2002-2006 in the framework of the above mentioned project, Institute of Geosciences, University of Tsukuba, Japan and Institute of Meteorology and Hydrology, Mongolia, Environmental Research Institute Eco-Asia, Mongolia have jointly established hydro-meteorological network at Baganuur (Ulaanbaatar), Jargaltkhaan, Undurkhaan, Kherlenbayan-Ulaan, Darkhan (Khentii aimag), Mungunmorit (Tuv aimag) and made meteorological, hydrological and isotope measurements on atmosphere, hydrosphere, biosphere and ecosystems in steppe region of Mongolia.

Based on these measurements scientists have analyzed climate change, water cycle, ecological aspects and their future tendency and have given some models.

According to our cooperative agreement during the project implementation, Institute of Geosciences, University of Tsukuba, Japan has paid much more attention for improving capacity building of Mongolian researchers and has trained several persons in Master and PhD programs and had some visiting researchers, who learned the latest methodology and technology in the Institute of Geosciences, University of Tsukuba, Japan.

Besides research activities we have organized and sponsored 4 international workshops and symposium on “Terrestrial and climate change in Mongolia” in Tokyo, Yokohama, Tsukuba and Ulaanbaatar and have published 4 proceedings of above mentioned workshops and symposium in English, which partly include results of RAISE project in Mongolia. This time, RAISE project publishes the main results of the project on Mongolian study in Japanese, Mongolian and English.

In my understanding during this project we have learned the latest scientific methodology and technology, shared our knowledge and experiences, and exchanged ideas.

Finally, on behalf of Institute of Meteorology and Hydrology, Mongolian scientists I would like to express our thanks to Professor Sugita and all researchers from his group for their great and hard work in Mongolia.

I hope that our cooperation will be continued and developed in the future.

25 April 2007

D.Azzaya

Director, Institute of Meteorology and Hydrology, Mongolia, Ulaanbaatar, Mongolia