

A PROGRESS REPORT ON GLOBAL CHANGE STUDIES IN CHINA, BEIJING

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1. Introduction

Since the Asian Planning Meeting for IGBP in Singapore in December 12-14, 1991, a significant progress in the global change research activities has been made in China, Beijing in the following main aspects:

- a) A pilot study report which has two volumes (dealing with the general issues of whole eco-environmental system in mainland China and the main components of the system) and a detailed review of global change studies in China, Beijing have been published in Chinese. These two reports address two strategic topics: the role of mainland China in the global change and global change studies; and the major scientific issues of global change studies for China, Beijing.
- b) A core project of global change studies in China, Beijing and a sets of related research projects have been established and funded by State Commission of Science and Technology (SCST), National Natural Science Foundation (NNSF) and Chinese Academy of Sciences (CAS). Most of them are directly or partially related to the core projects of IGBP.
- c) Preparation to the establishment of Global Change Research Network in the East Asia and West Pacific Region.

This progress report gives a brief summary focusing on:

- (1) A Research Project on Future Trend of Changing Eco-environmental System in mainland China in the Next 20-50 Years;
- (2) Other research project related to global change;
- (3) On the preparation to establish the Global Change Research Network in the East Asia and West Pacific Region.

2. A Research Project on Future Trend of Changing Eco-environmental System in Mainland China in Next 20-50 Years

Nature of Project

This is a core project of Global Change Study in China, Beijing on national level which focuses on the regional problems which have global significance. As a project of mainly basic science with potential prospective application, it is funded by the State Commission of Science and Technology for the period of 1991 to 1995 with possible renewal for another 5 years or so.

Objectives

- (1) To evaluate the present position in the history of changing environment of mainland China and the impact of human activities in its long-term evolution.
- (2) To detect the most sensitive areas and the early signal and abrupt features of environmental changes.
- (3) To understand the major processes of environmental changes, with focus on the role of biological process in the climate change and hydrological cycle.
- (4) To develop the methodology to project the large-scale feature of environment changes in mainland China in next 20-50 years.

Main Research Activities

- (1) Reconstruction and analysis of the history of changing environment in mainland China.

Researches focus on locating its present position and developing the historical analogues about climate-soil-vegetation interaction, climate-atmospheric composition interaction and man-environment interaction in the long-term evolution.

Present activities are undertaking mainly in the semi-arid zone of northern mainland China to establish a representative curve of climate change over this region and thereafter to derive the environmental modes for selected episodes.

- (2) Monitoring and detecting the large-scale changes of land surface physical properties and biological characteristics based on the development of new techniques to retrieval above information from satellite.

The high resolution AVHRR data from three HRPT stations of mainland China and the calibration methods from the surface ecological stations are under development. Some progresses has been made recently in development of the software to establish high resolution AVHRR data set for China and surrounding areas. The retrieval models for some surface properties, such as vegetation index, soil moisture and biomass and so on are being developed.

- (3) Measuring the biogenic trace gases (CH_4 , CO_2 , NO_x) and detecting their sources

The measurement of CH_4 discharge from rice paddy has been taken in a new site of Hunan Province since April 1992 to study the origin, oxidation and transport process. The relationship of CH_4 discharge with the atmospheric and soil conditions, and type of rice species has been addressed.

The measurement of NO_x from soil has been undertaken in an agro-ecological station in the suburb of Senyan of northeast area of mainland China.

There is also an experimental study on the depression of CH_4 discharge from rice paddy by applying coal fly ash to the soil. The result is very promising.

The isotopic techniques in distinguishing biogenic sources and anthropogenic sources for CH_4 are being developed.

- (4) Field experiment in climate-ecosystem transitional zone to study the response of ecosystem to the climate change

An area with strong ecological gradient in northern mainland China with the enhancement of observation and measurement in three ecological stations located in three representative areas: temperate coniferous forest, temperate grassland and semidesert have been chosen for this purpose and measurements are under preparation.

- (5) Simulating the climate-vegetation interaction on regional scale, with focus on the development of regional climate model at higher resolution and taking account of the major processes in atmosphere-soil-vegetation interaction layer.

The region climate model would pay more attention to the physics of monsoon climate driven ecosystem and the influence of strong ecological gradient.

- (6) Projecting the future trend of environmental change based on the development of historical analogues and the regional correction of global simulation. Studies are being planned on the predictability of environmental change on decade to century scale, and the adaptation process between biosphere and atmosphere.

3. Other Related Projects in Global Change Studies

- (1) Climate dynamics and the theory of climate prediction, funded by SCST.
- (2) Experiment and demonstration researches on the ecological research network in their support to the sustainable development, funded by CAS.
- (3) The formation, evolution, the environmental changes and ecosystem of Tibetan plateau, funded by SCST.
- (4) Biological resources and ecological environment of Antarctic and global change, funded by CAS and National Antarctic Office.
- (5) Comprehensive study on Loess plateau, funded by SCST.
- (6) Comprehensive administration and recovering of fragile eco-environment regions, funded by SCST.
- (7) Climate changes and their impacts, funded by SCST.

- (8) Application of remote sensing techniques to the resources and environmental studies, funded by CAS.
- (9) Palaeo-environmental study in the arid zone in past 150,000 years, funded by NNSF.
- (10) Ocean flux study over the Pacific, funded by NNSF.

There are many other research activities which are more or less related to the global change, but they are undertaken in individual institutes and agencies.

4. Progress in Preparation to Establish the Global Change Research Network in the East Asia and West Pacific Region

To support strongly the START programme and to promote the regional activities for global change studies, China, Beijing has made a preliminary proposal in early March 1992 to establish a Global Change Research Network for the East Asia and West Pacific Region. We have received very positive comments from IGBP Secretariat and the Standing Committee of START/IGBP.

The preliminary proposal has been sent to National Committee of Japan, IGBP Committee of China, Taipei, North Korea Academy of Sciences, Russian Academy of Sciences and its Far East Branch and to the Pacific Science Association. Contact has been made with South Korea and Mongolia through their Embassies in Beijing. We have received support from most of them.

In a recent START/IGBP Standing Committee in May 1992, "START-SC decided to offer formal encouragement to the Chinese Academy of Sciences for continued development of a proposal for the establishment of a regional research center and network for the region with special emphasis on need to collaborate with other countries of the region".

A recent visit of Professor Thomas Rosswall, Acting Director of the International START Secretariat, in Beijing in October during the CEC-China meeting on global change provided further liaison on this issue.

It is planned to discuss this issue in a meeting of Academy Presidents for the Asian region in next spring in China, Beijing.

We have proposed four steps toward the establishment for this network:

- (1) Communication between the countries in the region;
- (2) A workshop to form a joint working group of representatives from each country to draft a joint proposal;
- (3) To submit formally a joint proposal to START Standing Committee and its secretariat and to ask for further consultation; and
- (4) To raise funding for the establishment of RRC and RRN for the region of East Asia and West Pacific.

We are ready to have further cooperation with all the countries in the region as well as the others all over the world.