CNC-IHDP National Report No. 1

Chinese National Committee for the International Human Dimensions Programme on Global Environmental Change

Research on Human Dimensions of Global Environmental Change in China

Edited by LIU Yanhua LU Dadao
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Brief Introduction

This report is the first one of a series of national reports that CNC-IHDP will compile successively in the future. It describes the research programmes on HDGEC in China. The report consists of two parts. The first part introduces challenges, opportunities, and research strategies in China. The second part introduces the current progress and problems of the research, key scientific issues, priority research areas, measures of capacity building and cooperative opportunities from seven aspects, i. e., LUCC, Coastal Zone, industrial transformation, urbanization, human health, risk governance, and service of data and information.

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Preface

Responding to the great challenges of global environmental change and sustainable development that the human society faces, the International Human Dimensions Programme on Global Environmental Change (IHDP) has been implemented since 1990 as one of the four global environmental change research programmes, i. e. WCRP, IGBP, IHDP, and DIVERSITAS. IHDP has played an irreplaceable role in the global environmental change research because it emphasizes the inter-disciplinary research between natural science and social science, science and policy, and serves as a bridge to link scientific groups and decision-making groups.

The natural environment in China is complex and sensitive to global change. The population in China is numerous and still increasing in a relative high rate. Over the past half century, social and economic development in China has taken place rapidly, and the human activities have influenced natural environment significantly. Now, China is entering a new-style industrialized period for building a harmonious society with the guidance of the conception of scientific development, which puts forward higher demand for Human Dimensions of Global Environmental Change (HDGEC) research in China. In recent years, several governmental agencies, such as the National Natural Science Foundation of China, the Ministry of Science and Technology, the Chinese Academy of Sciences, etc. have paid great attention and provided considerable support to HDGEC research in China. In order to ensure China's HDGEC research in line with international standards and the unblocked intercommunion, make China's HDGEC research better organized, and strengthen China's international influence in this field, the Chinese scientists had called upon and schemed the foundation of Chinese National Committee for International Human Dimensions Programme on Global Environmental Change (CNC-IHDP), and looked for the suitable opportunity to enter the international area for many years. In July 2003, 28 famous Chinese scientists, led by Academician SUN Honglie, jointly called on setting up CNC-IHDP. The suggestion had received positive response and considerable support by many agencies and institutes such as China Association for Science and Technology, Ministry of Science and Technology, Ministry of Education, Chinese Academy of Sciences,

Chinese Academy of Social Sciences, National Natural Science Foundation of China and China Meteorological Administration, and many scholars and individuals. On July 9, 2004, China Association for Science and Technology officially approved the establishment of CNC-IHDP. It is highly expected that CNC-IHDP will not only provide a good environment for HDGEC research in China but also open a window of opportunities for HDGEC research in China.

The 6th Open Meeting of IHDP, entitled "Global environmental change, globalization and international security: new challenges for the 21st century", will be hold in the University of Bonn on October 9 – 13, 2005. To promote the CNC-IHDP to the international community is one of the main tasks of CNC-IHDP in 2005. CNC-IHDP decided to prepare the "National Report of CNC-IHDP" (in English) with an emphasis on the "Capacity Building of Research on HDGEC in China" for the Meeting. According to the decision on the first meeting of the Standing Committee of CNC-IHDP, the editing committee of the national report was established in February 2005. Professor LIU Yanhua, the chairman of CNC-IHDP, was appointed as the chief editor. Academician LU Dadao and Professor CAI Fang, the vice-chairmen of CNC-IHDP were appointed as the vice-chief editors. Committee members consisted of chief scientists of each working group of CNC-IHDP, principal authors of the report and the members of Secretariat. The final editing work was done by the Secretariat. The report-editing group drafted the outline and invited authors in March 2005, finished the first draft in May, and finished the English draft according to the suggestion of the reviews in July. The final report was reviewed and approved in August. Through the hard work of many contributors for more than half a year, the report was finally finished.

This report is the first one of a series of national reports that CNC-IHDP will compile successively in the future. It introduced the general situation of the research on HDGEC in China roundly. The main focuses are the challenge and opportunity that China will face in the research on HDGEC, and some major scientific issues of the research on HDGEC in China. The report consists of two parts. The first part that is divided into two chapters introduces the challenge and opportunity that China's research on HDGEC faces, and research strategy on the whole. The second part is divided into eight chapters. It introduces the current progress and problems of the research, key scientific issues, priority research areas, measures of capacity building and cooperative opportunity from seven aspects according to the working groups that CNC-IHDP set up, i.e., LUCC, Coastal Zone, industrial

transformation, urbanization, human health, risk governance, and service of data and information, in addition to rest major problems related to the HDGEC in China. The appendix introduces the Chinese National Committee for the International Human Dimensions Programme on Global Environmental Change (CNC-IHDP).

During compiling the report, the members of the editing committee and related scientists have given a lot of valuable ideas and suggestions, and each working group cooperated energetically to the compilation. We should be thankful to them heartily. Thanks also go to all authors for the diligent work. Thanks Dr. GE Quansheng, Mr. CAI Jianing, Dr. FANG Xiuqi, Dr. ZHANG Xueqin, Dr. YE Qian, Dr. ZHAO Tianxiao, Mr. TIAN Yanyu, Mr. WANG Dawei and Miss. GAO Dan, in the CNC-IHDP Secretariat for their excellent works on editing. Thanks Ms. YIN Peihong, Ms. YE Yu, Ms. ZENG Zaozao, Ms. DAI Yujuan and Ms. MA Li in School of Geography of Beijing Normal University for offering help to translate and proofread the report. Especially, Thanks Ms. Stewart, Institute for the Study of Society & Environment, National Center for Atmospheric Research, USA, for editing most parts of the draft. At last, we appreciate the considerable support of the Department of International Cooperation and Exchange of the Ministry of Science and Technology of China.

LIU Yanhua

CNC-IHDP Chairman,

Vice Minister of Science and Technology of the People's Republic of China

August 20, 2005

Contents

1 Research Orientation of Human Dimensions of Global Environmental Change (HDGEC) in China[①]

1.1 Strategy of Research on Global Environmental Change in China

Human beings are facing the enormous challenge of global environment change and sustainable development in the 21st century. To cope with the challenge, international global environmental change research has reoriented its strategy, which is signed by the implementation of Earth System Science Partnership (ESSP) and a series of new core projects of global environmental change. In order to meet the new strategy of international global environmental change research and deepen the research on global environmental change in China, the 252nd Xiangshan Science Conference, an academic salon on the strategy of science development in China, characterized by free discussion and interdisciplinary research, was held on April 26 – 28, 2005, in Beijing under the auspices Chinese National Committees (CNC) for the four global environmental change programmes: CNC-IGBP, CNC-IHDP, CNC-WCRP and CNC-DIVERSITAS. The theme of the 252nd Xiangshan Science Conference was "global environmental change research in China". The Co-Chairs of the conference were the Chairmen of four Chinese National Committees for the four global environmental change programmes, Academician LI Jiayang representing CNC-IGBP, Professor LIU Yanhua representing CNC-IHDP, Academician LI Chongyin representing CNC-WCRP and Professor KANG Le representing CNC-DIVERSTAS. More than 60 scientists in global environment change research from all parts of the country participated in the conference by invitation. The conference evaluated global environmental change research in China for the past 20 years, advanced the goal and the key scientific questions of research on GEC of China in future years, and mapped out the strategy of research on global environmental change in China.

1.1.1 Current situation of global environmental change research in China

Global environmental change research in China has its own historical origin and scientific accumulation. Global environmental change research in China can be traced back to the 1920s at least, when Dr. CHU Kochen, the founder of Geography and Meteorology in China, began to research historical climate change in China. In the 1930s, LI Siguang, the founder of Geology in China, began to research the Quaternary glaciation in eastern China. In the 1950 –

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① By LIU Yanhua (Ministry of Science and Technology of the People's Republic of China)

This chapter is mainly based on the author's summery speech at the 252nd Xiangshan Science Conference in April 26 – 28, 2005; and the keynote lecture at the founding meeting of CNC-IHDP and the Chinese HDGEC Research Symposium in August 30 – 31, 2004.

1960s, Academician ZHOU Tingru, former Dean of the Department of Geography, Beijing Normal University, began to research the Cenozoic Palaeogeography of China; and Academician HUANG Bingwei, former Director General of Geography (currently the Institute of Geographical Sciences and Natural Resources Research), Chinese Academy of Sciences, began to research the physical processes, chemical processes and bio-processes of the terrestrial surface. All of the research above can be considered as the beginning of earth system and global environmental change research in China.

China is one of the active proponents of global environmental change research. Academician YE Duzheng et al. have actively taken part in activities since the beginning of international global environmental change research programmes began in the 1980s. They also advocated and promoted global environmental change research in China. For over 10 years, as a country that advocates global environmental change research, China has made prominent contributions to global environmental change research. The basic estimation of global environmental change research in China in the last 20 years is as follows.

1.1.1.1 China has taken part in the international global environmental change research programmes actively

Since the 1980s, the Chinese National Committees for World Climate Research Programme (WCRP), the International Geosphere-Biosphere Programme (IGBP), the International Human Dimensions Programme on Global Environmental Change (IHDP) and the Biological Diversity Programme(DIVERSITAS) have been established respectively. China has already established cooperation in global environmental change research with more than 30 countries. According to incomplete statistics, 27 Chinese scholars have served in international global environmental change research organizations so far. Among them, 20 scholars serve in these organizations at present.

Chinese scientists have contributed a great deal to the proposition of scientific questions in global environmental change research, and have carried out a large amount of practical work in the implementation of international global environmental change programmes. They studied the scientific problems closely, combining them with Chinese features, and have made a series of academic achievements in the fields of past global environmental change, the regional synthesis of Monsoon Asia, LUCC, water resources and water cycles, the carbon cycle and the impact of global climate change on Chinese society and economy, which enriched the contents of global environmental change research. But, on the whole, global environmental change research in China is inappropriate with China's international status. It mainly displays the fact that the influence of Chinese scientists on the organization and implementation of international programmes is weaker, and Chinese scientists lack influential achievements in understanding the operation of the Earth System.

1.1.1.2 Considerable capability of global environmental change research has formed in China

Considerable capability of global environmental change research has formed in China. It is

expressed by the fact that an excellent research team, including a large number of remarkable scholars, has already taken shape in the development of geosciences, intercommunication and cooperation between the natural sciences and social sciences has been promoted, and the capacity of observing and analyzing information has improved notably.

But the research level in different fields is uneven. The research of the IGBP in China is more active than the other three programmes, including the IHDP. At present, natural scientists are dominant in global environmental change research in China. Only a few social scientists have become involved at present. Therefore, it is not enough for communication between the natural fields and the social fields. The intercommunication and cooperation between the natural sciences and social sciences need to be strengthened. The establishment of the "Chinese National Committee for the International Human Dimensions Programme on Global Environmental Change" (CNC-IHDP) would contribute greatly to improve this status. But compared with international global environmental change research, we still have a long way to go.

1.1.1.3 It has offered scientific support for the development of China

Global environmental change involves all aspects of human survival and development. Global environmental change research should offer the scientific background and basis for sustainable development of human society. China is presently facing serious challenges of various environmental problems in its development. For fulfilling the international convention related to global environmental change, China also faces enormous pressures from the international communities. All of these need scientific support for research on global environmental change in China. The research on global environmental change of China has offered scientific bases and technical support to the policymaking community on resources, the environment and economy, and for the negotiation in the UNFCCC (UN Framework Convention on Climate Change). But compared with the enormous social demands, it still needs to continue making great efforts.

1.1.1.4 The national strategic system of global environmental change research is urgently needed in China

China has not raised its scientific cognition and understanding of global environmental change research to a national height. The national strategic system of global environmental change research has not yet formed in China. So the research was not well planned on the national level. Though influx of funds has been invested in global environmental change research in China, the channel of the funding is unstable; on the one hand the fund is lacking, on the other hand, the funds were invested repeatedly in certain fields.

1.1.2 Strategic countermeasures of global environmental change research in China

1.1.2.1 Confirm from following to original innovation as the national strategy of global environmental change research

As a world-class science, global environmental change not only represents the developing

direction and the breakthrough point of geosciences in the 21st century, but also is the scientific base of human social development in the future. China should set up a strategic goal of global environmental change research on the level of revolutionary change in geosciences to fulfill national demands, reflecting the understanding and expectation of the country and society toward the future development of Earth Science and global environmental change studies.

China has already been in the international forefront for more than ten years in global environmental change research. We have already had certain research foundations and experiences, and have formed the Chinese characteristics for the field. In the future, we should not be satisfied with studies that follow other research, and should seize the opportunity for reorientation of international global environmental change research by making innovative contributions that are appropriate to the international status of China to global environmental change research.

The key issue of promoting the position of China in global environmental change research in the world is to promote the scientific view of global environmental change questions. On the one hand, China should further point out unique Chinese characteristics in global environmental change research. On the other hand, China should pay more attention to scientific questions on a global scale.

1.1.2.2 Build up the national predominant administration system of global environmental change research

For a long time, research on global environmental change in China has been pushed by scientists. The Chinese National Committees, corresponding to the 4 international global change research programmmes, have greatly contributed to holding the developmental direction of global environmental change research, leading and pushing global environmental change research in China. But as non-governmental academic organizations, their functions focus mainly on academic supervision. They could not determine the direction of the development, have limited ability in harmonizing various research groups, and even could do nothing for financial support. Such a disadvantage of the scientific research system is one of the important factors limiting global environmental change research in China. In order to make great progress on global environmental change research, the scientific governance system should be solved first. The national government needs to get involved in global environmental change research, by changing the focus of the research from scientific behaviors to national behaviors, by listing it in the national scientific development plan, and by building up coordination systems of global environmental change groups headed by the government. In this aspect, the successful experiences of many countries such as the United States and Germany deserve us to use for reference.

1.1.2.3 Participate actively in international cooperation

Global environmental change research itself is a large scientific experiment, which depends on extensive international cooperation with various countries. China should develop various levels of international cooperative research on global environmental change, in order to make

the thoughts of Chinese scientists accepted by scientists worldwide, and realize the transformation of the global environmental change research of China in the world from following to leading.

1.1.2.4 Establish a national committee for global environmental change research

Although interdisciplinary research has made progress in global environmental change research in China, there still exist many questions about interdisciplinary cooperation, penetration, combination and integration. The intersection of natural science and social science is especially weak. This is not only the situation of China, but of global environmental change research worldwide. The establishment of Earth System Science Partners(ESSP) is an effort to solve the questions mentioned above. China should draw lessons from international experiences, establish a unified national committee combining the 4 Chinese National Committees for Global Environmental Change research, which are CNC-WCRP, CNC-IGBP, CNC-IHDP and CNC-DIVERSITAS, in order to give uniform guidance and push global environmental change research in China, establish a network of Chinese global environmental researchers, and take part in the activities of intergovernmental global environmental change research networks. The national committee will offer a wide platform for interdisciplinary research of natural science and social science, and meet the development of global environmental change research.

1.1.2.5 Develop cross-project research on global environmental change in China

One of the important successful experiences on global environmental change research is to pull different science fields together by various programmes or projects; that is, to organize joint projects, such as The Earth System Science Partners (ESSP), not only to have global significance, but also to promote the characteristics of interdisciplinary research and application values. Global environmental change research in China should learn from successful international experiences, organize nationwide powers to tackle key research topics with not only Chinese characteristics, but also global significance.

"The regional is global." The research on global environmental change in China should choose the subjects that have Chinese features and global meaning. That is, proceed from questions with global importance and start the research with Chinese data; or proceed from Chinese questions and analyze the global views, such as an environmental system with global meaning (for example, the Tibetan Plateau, monsoonal Asia and Chinese coastal sea), particularly the social and economic process of China (for example, global environmental change and the risk related to rapid economic and urban development in China), and the particular data and techniques in China (for example, loess deposit and historic record in China).

From the viewpoint of national demands, global environmental change research in China should orient towards national demands, in order to offer support to the sustainable development of the country, such as natural disasters and risk under global warming, inter-influences between some great projects (like the Three Gorges Project, South-to-North Water Transition Project) and global environmental change, scientific and engineering technical supports for the mitigation of greenhouse gas emissions, and countermeasures on the adaptation

to global environmental change, etc.

1.1.2.6 Ensure a stable and creative research group of global environmental change research in China

The construction of stable and creative research groups at high levels is the basic guarantee to the healthy development of global environmental change research in China. Through its development for more than ten years, a considerable research group at a high level has come into being in China, in the research field of global environmental change. However, with respect to meeting the demand of the future development of global environmental change research, the group is still urged to be promoted at the present time, especially on aspects of promoting the internationalization level of the research groups, absorbing more social scientists and successive personnel training.

1.1.2.7 Further strengthen construction of observing system, data and information shared platform of global environmental change research

Global environmental change research is based on the modern earth observation system. Presently, the development of basic national spatial information infrastructure has had a preferable base. Ground observation data was abundantly accumulated. More than 40 key opening laboratories at the national and ministerial levels were set up for global environmental change research. Field observation stations of the Chinese Academy of Science, State Forestry Administration, State Oceanic Administration, China Meteorological Administration and State Environmental Protection Administration have had a very important and exclusive function in global environment change research. More than 100 databases involving atmosphere, land and ocean etc. have been set up by the Chinese scientific research institutions and universities. Observation on global environmental change has the characteristics of global, long-term, continuity, synthesize, high technique and high devotion, and it needs to be successfully supported.

1.1.2.8 Further increase financial support of global environmental change research

The Ministry of Sciences and Technology (MOST), the Natural Science Foundation of China (NSFC) and the Chinese Academy of Sciences (CAS) give great support to global environmental change research in China. From 1997 to 2003, there were 240 key projects on global environmental change implemented, involving various fields such as atmosphere, land and ocean. The average investment outlay per year has exceeded 100 million RMB. Because the Chinese economic power is still relatively low, an increase in national support on global environmental change research is a long-term and urgent problem. At the same time, it needs to try various channels of foreign funding institutions.

1.1.2.9 Actively push transformation from scientific fruit to social production

Global environmental change relates to the life and development of human society. To resolve the problem, the efforts of scientists, decision makers and the public throughout the world are needed. Compared with the developed countries, the Chinese public understanding of global environmental change has a very big gap. It means that scientists should not only make