

PROPOSAL TO ESTABLISH A GLOBAL CHANGE REGIONAL RESEARCH NETWORK FOR EAST ASIA AND WESTERN PACIFIC REGION

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IGBP Report No. 12 emphasized that in order to obtain the necessary understanding of global change processes, researches must be carried out in all regions of the world. The regional differences in such as biogeography and climate characteristics should be taken into consideration in developing a global perspective. The regional response to the global change is a most practical capacity which will be of greatest value to decision makers in the regions.

To promote regional cooperation and in particular to further supporting the scientific communities in developing countries to allow them to fully participate in the international research effort, the Scientific Committee of IGBP in cooperation with WCRP and HDP propose to establish a global system of regional networks dedicated to analysis, research and training, i.e. Global Change System for Analysis, Research and Training (START).

To support strongly the concept of START and to develop the regional cooperation for global change studies in the Pacific area, China Beijing Committee of IGBP and China Beijing Committee for PSA (Pacific Science Association) now propose to establish a regional research network (RRN) for East Asia and Western Pacific Region with a regional research center (RRC) mainland in China.

1. Rationale for an RRN of East Asia and Western Pacific (EAWEP)

The region of East Asia and Western Pacific is a unique one in the study of global change both in nature and in human impact.

- (1) This region is characterized by strong seasonal variation of climate, the famous monsoon climate, and by the typical ecosystem driven mainly by the monsoon climate.
 - * The release of huge amount of latent heat into the atmosphere from the monsoon rainfall plays a profound role in the global atmospheric circulation. Because of the thermal driven feature of the monsoon system, some evidence indicates the sensitivities of monsoon system in response to global warming. On the other hand, the high frequency of the occurrence of drought and flood in relation to the strong interannual variability of monsoon activities has significant influence on the human life in this region. Therefore monsoon studies are an important component in global change.
 - * The monsoon forest, one type of tropical forest, serves as the huge evapotranspiration source in the global hydrological cycle (BAHC) and plays a crucial role in the global carbon cycle (IGAC). It also preserves most of the species to maintain the global biodiversity (GCTE).
- (2) This region, mainly in East Asia, has very dense population. The large portion of the countries in this region is classified into third world. The ever-growing population and the rapidly expanding economy make this region being one of the most strong human activities of the world (HDP).
 - * The large area of rice paddy in this region releases large portion of the global biogenic CH₄. Therefore this area is important for the study of global biogeochemical cycle as one of the major source regions for the methane production (IGAC).
 - * The changing land use patterns due to mainly the strong human activities are particularly significant in this region, such as the deforestation and the desertification in relation to the over-grazing, over-cultivated and over-cutting, which would change the physical properties of the land surface, such as the albedo, soil moisture and surface roughness, therefore changing the surface energy balance (GEWEX and GCTE). On the other hand, it would also change the trace gases flux on the ground surface and the nutrient flux in the soil and the vegetation. Such processes are crucial to the global biogeochemistry study (GCTE and IGAC).
- (3) In relation to both the natural land-ocean distribution and the fluvial system and the strong human activities, the most well-developed coast zone in this region is an ideal area for the study on the land-ocean interaction, especially to study how will changes in the climate, land use and sea level alter the biogeochemical processes in the coast zone (LOICZ).

- (4) This region also provides a very good opportunity to study how to harmonize the relationship between the problem of continuous economic development and the problem of maintaining a good environment sustaining the development (HDP). With the experiences of the most developed country in their history of industrialization and the present situation of the developing countries, the South-North cooperation in this region would provide some experiments how to coordinate the continuous development of economy in the developing countries with the protection of the global environment in cooperation of developed countries.

2. Central Scientific Themes for RRN of EAWEP

The following scientific themes are related to three international research programmes of global change study, i.e. WCRP, IGBP and HDP in the focus of interdisciplinary research and training.

- (1) Impact of global change on the sustainable development of EAWEP region
 - * Regional research of EAWEP climate and environment to global climate change (i.e. global warming), such as changes of the monsoon system, sea level, water resources, frequency of natural disasters and ecosystem function and structure and so on.
 - * Impact on the development of economy of EAWEP region, such as the agricultural development and economic development in the coastal zones and islands.
 - * Impact on the human society, such as food, nutrition, public health and habitability, etc.
- (2) Regional problems in EAWEP which have global significance
 - * Role of changing monsoon system in the global hydrological cycle and global climate (WCRP).
 - * Biogenic CH₄ from rice paddy area in the global biogeochemical cycle (IGAC and GCTE).
 - * Changing land use patterns, such as the deforestation and renewability of tropical monsoon forest (GCTE, BAHC and HDP).
 - * Land-ocean interaction in the coastal zone of Pacific (LOICZ).
 - * Past global change from historical and geological records, such as those from Tibet plateau, loess plateau and deep sea core and proxy data from the historical literature (PAGES).
- (3) Development of human resources for global change study in EAWEP, especially for developing countries through North-South cooperation.
 - * To establish an international school for global change which will address all levels of the training.
 - * To open a research fellowship programme, especially for young scientists, through Pacific Science Association with the financial support from developed countries of EAWEP region and other international foundations.
- (4) Policy and strategies for global environmental issues
 - * Harmonizing the relationship between the sustainable development of economy and society and the protection of environment and natural resources.
 - * North-South cooperation in the global environmental issues, such as the technique transfer and personal training.
 - * Study on mitigation and adaptation to the environmental changes.

3. Structure and Function of RRN for EAWEP

Following the START model with a slight modification, RRN for EAWEP will establish a regional network as follows:

One regional research center (RRC), located in one developing country (proposed in China, Beijing).

One associated-regional center (Associated RRC), located at one Pacific island.

A number of regional research sites (RRS) located in the EAWEP region, such as in China (both China, Beijing and Taipei), Japan, Korea (both South and North), Far east part of Russian, Mongolia and some Pacific islands and so on.

Functions of RRC for EAWEP:

- (1) Facilitating coordination of global change research which contributes directly to the global and regional scale scientific objectives of international global change programme and defining regional research priorities and identifying regional questions that have global significance.
- (2) Designing and coordinating education and training activities that support the scientific needs of countries within the region by establishing training and exchange program, especially providing the necessary facilities for visiting scientists in the region working in the center to use new technologies and data and making synthesis analysis and modeling.
- (3) Establishing and maintaining a data management and information system that focuses on regional phenomena and but contains also global scale data information through the continual exchange of data with other regional centers and IGBP-DIS, which will furnish for the use of the scientists in the region.
- (4) Synthesizing the scientific information at the regional level and serving as the center for modeling activities related to global changes within the region.
- (5) Developing mechanisms for distributing research results to scientists within the region and promoting the clear communication of the scientific results to decision makers of the region in their making strategies for mitigation and adaptation to global environmental changes.

Functions of a sub-RRC for Pacific Islands

To assist RRC in dealing with special issues of island other than common interesting problems of the region.

4. A Proposed Regional Research Center of EAWEP in China Beijing

The RRN for EAWEP located in China Beijing will be based on the National Center for Global Change Research in Chinese Academy of Sciences, Beijing.

(1) Background

China Beijing has been involved in the international projects of global change from their very beginning. We have participated in the rationale studies and the planing activities, and contributed some important ideas in the research plans. China Beijing established her national committee for both IGBP and WCRP very early and has developed national research projects of global change studies.

The Chinese government in Beijing is now paying more attention to environmental problems. The protection of ecological environment has become a national policy. Very recently, Song Jian, Minister of Commission of Science and Technology, Councilor of State Council, took the position of Honorary Chairman of National Committee for IGBP. Other officers from Chinese Academy of Sciences, State Commission of Science and Technology, China Association of Science and Technology and National Natural Science Foundation took the positions of vice Chairman in supporting Professor Ye Duzheng, Chairman of this committee.

The Chinese Academy of Sciences has long been very active in the areas of natural resources, environmental and earth sciences and ecological sciences in which it has established a number of national laboratories equipped with advanced instrumentation and other facilities. The scientists working in those fields have accumulated abundant experience and data which are very valuable for global change studies.

The Chinese Ecological Research Network (CERN), established by Chinese Academy of Sciences, has 52 research sites located in different ecosystems. This unique system provides a good base for the establishment of the regional research network for global change studies. An international linkage of CERN with other similar systems is being developed.

The China Center for CODATA, WDC-D (a Sub-Center of World Data Center) and a Chinese Branch of GIS are all located in the Chinese Academy of Sciences and have the responsibility for both regional and global data exchange. They will also serve the components of RRC in the aspects of data management and information system.

For international cooperation in this region, the Pacific Sciences Association (PSA) headed by Professor Zhou Guangzhao, President of Chinese Academy of Sciences, will be an effective mechanism for regional coordination in the global change studies.

(2) Structure of RRC for EAWEP

The organization of RRC for EAWEP will consist of a Board headed by a Centre Director, a Secretariat and five divisions:

- 1) Research;
- 2) Ecological research network;
- 3) Data and information management;
- 4) Education and training; and
- 5) Impact assessment and policy.

(1) Board of RRC for EAWEP

The Board of RRC is the decisions maker body on all major issues of the center, including selecting the Center Director and Deputy Directors if necessary; making appointment of Secretary-general and head of divisions; organizing a Scientific Committee which has the responsibility to guide the programmatic direction of the center and to assess the scientific results and a Financial Committee which has the responsibility of finding the funding sources and making the financial budget for RRC and so on.

(2) Secretariat

The Secretariat of RRC for EAWEP is the administrative support for the center. In addition to the routine secretary works, she should take also the responsibility for international coordination in the region.

There will be small number of permanent resident staffs and some part time appointments jointly from the China National Center for global change studies.

(3) Division of Research

The research division will be based on several national laboratories and research laboratories directly involving the global change studies. There are

National Laboratory of Geophysical Fluid Dynamics and Numerical Simulation, Beijing.

National Laboratory of Paleo-environmental study, Xian.

Laboratory of Numerical Ecology, Institute of Botany, Chinese Academy of Sciences, Beijing.

Laboratory of Climate and Global Change Studies, Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing.

Ecological Environmental Research Center, Chinese Academy of Sciences, Beijing.

etc.

These research unites have the capability to support a number of visiting scientists by providing working space, laboratory facilities and medial level computing facilities as well as the libraries.

The synthesis analysis and modeling activities at regional level will be undertaken in the research division of RRC through the coordination of these laboratories by participating of visiting scientists and scientists at the host institutions and by the collaboration of Core Project scientists of IGBP, WCRP and HDP and other global change programme.

(4) Division of Ecological Research Network

The Chinese Ecological Research Network (CERN) provide an unique system for field experiment and monitoring the change of various types of ecosystem in their structure and function in response to global changes, such as the climate change, changing CO₂ level in the atmosphere and the change of land use.

CERN now consist of 52 stations well-distributed in the representative ecosystems of China, including forest ecosystems, grassland ecosystems, agro-ecosystems, coastal zone ecosystems, a desert ecosystem and so on. The attached map shows the details of CERN distribution with its headquarter in the Commission for Integrated Surveys of Natural Resources, Chinese Academy of Sciences, Beijing. Among the 52 stations, there are about 10 being upgraded by equipping more advanced instrumentation for measurement, data proccession and communication.

CERN can be expanded to the whole region of EAWEP by linking to other ecological research stations in the region.

(5) Division of Data and Information Management

The RRC for EAWEP will establish and maintain a data and information system (DIS/EAWEP) that focus on regional phenomena and global data exchange. Through the China Centre of CODATA and WDC-D in China with the coordination of other national bodies in the region, DIS/EAWEP will provide expertise to develop combined data products for synthesis and modeling at regional level. DIS/EAWEP will also establish appropriate linkage with DIS/IGBP and other global data centers and maintain a catalogue of data sets relevant to global change studies.

The National Laboratory of Resources and Environmental Information System located in Chinese Academy of Sciences will serve as the node of Geographic Information System for RRC of EAWEP.

DIS/EAWEP assure the scientists in the region to access the data set for their global change studies with no restriction.

(6) Division of Education and Training

At present, a strong education programme for global change studies is urgently required at all levels, particularly for developing countries.

It is planned that an international school for global change will be established by the coordination of EAWEP and PSA. To meet the great demand of human resources for global change studies in the developing countries, a first series of school would be on the graduated student level and young scientists who are actually working and studying in the area of global change.

It is also suggested to establish a research fellowship program, especially for young scientists from developing countries to support them working in the laboratories of RRC and world leading institutions for global change studies.

The RRC for EAWEP in China assures the free access to the center for visiting scientists and scholars in helping them go through regular procedure of visa application.

(7) Division of Impact Assessment and Policy

This division should be a joint group of scientists from natural sciences, social sciences as well as administrators. The task of this division is to assess the impact of global change on the regional water resources, agricultural production, and economic and social development and so on, and to study how to harmonize the relationship between the problems of continuous economic development and the problems of maintain a good environment sustaining the development and then to furnish the research results for the decision makers to guide their strategies in the management of natural resources usage, economic development and environment protection.

(3) Budget and Funding of the Centre

to be discussed