

Environmental Science Research at Xiamen University

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1. Introduction to Environmental Science Research Center of Xiamen University

Founded in 1992, Environmental Science Research Center (ESRC) was expanded from the institute of Environmental Science established in 1982. As one of the main facilities of College of Oceanography and Environmental Science of Xiamen University, ESRC is carrying out research related to environmental science especially marine environmental science. ESRC comprises six research divisions: Marine Biogeochemistry, Marine Microbial Ecology, Environmental Ecology, Environmental Chemistry, Environmental Planning & Management, and Environmental Engineering. It also administers the Key Laboratory for Marine Environmental Science of Ministry of Education of China, Xiamen International Training Center for Coastal Sustainable Development, and Environmental Impact Assessment Service Center.

Research scopes within ESRC include estuarine, coastal and near-shore environments. ESRC experts have tackled such crucial subjects as the processes and mechanisms of biogenic elements and trace organic pollutants, environmental processes of microbial ecology, physiological ecology of harmful algae and algal toxins, the ecosystem protection and biological refreshment in fragile coastal zones. ESRC has developed a range of advanced environmental monitoring techniques applicable to pollutants such as trace organic pollutants. ESRC admits postdoctoral fellows, Ph.D. students, and master students as well as undergraduate students. Along with Peking University, Nanjing University, City University of Hong Kong, and National University of Singapore, Xiamen University is a major member of an environmental science and education union.

To focus the interests of “ALERT” of China-US Roundtable Discussion, main projects of three research areas in ESRC are introduced as follows.

2. Land Resources and the Built Environment

2.1. Integrated Dynamic Environmental Assessment System (on-going project)

Integrated Dynamic Environmental Assessment System (IDEAS) provides a framework within which modeling tools are developed to answer real watershed questions about cumulative causes and effects of a mosaic of watershed developments. IDEAS allows appropriate models, both biophysical and socio-economic, to be linked in order to test alternative development scenarios. IDEAS will provide a suite of products consisting of models

and decision support tools for better use available information in a raw form. ESRC has attempted to apply IDEAS to perform in-depth analysis of the interactions among social, biophysical and economic processes within the Jiulong River (Fujian, China) watershed.

Soil Water Assessment Tool (SWAT) has been selected to simulate water flow, sediment, nutrient and other contaminant flow after calibration and validation; to investigate impacts of climate change on water availability and flood incidences; to address socio-economic impacts on watershed and coastal water quality by linking SWAT to a coastal circulation model. A statistical approach will be developed to downscale climate change scenarios to the Jiulong River watershed from Global Circulation Model (GCM) simulation.

2.2. Possible Collaboration and Cooperation between China and the US

We see potentials for both countries to cooperate in the following areas: (a) building an integrated water quality monitoring network; (b) modeling yield and transport of sediment, nutrient delivery to coastal area; (c) identifying critical source area and linkage between sources and receiving water bodies; (d) exploring the cumulative effects of land and water use; (e) building future land use and climate change scenarios for environmental impact analysis; (f) establishing Best Management Practices (BMPs) to mitigate contamination; and (g) environmentally and economically evaluating riparian vegetation (bamboo forest) and multi-pond system in the watershed. Possible funding can be from each NSF and other funding agencies.

3. Biodiversity and Ecosystem Functioning

3.1. Community-Based Biodiversity Conservation in Coastal Areas (on-going project)

Current projects in ESRC are being conducted to investigate species biodiversity and develop molecular protocols for determine genetic biodiversity in coastal regimes. The initiative work includes: (a) development of new protocols for biodiversity assessment; (b) census of species biodiversity; and (c) development of biodiversity database.

3.2. Marine Ecosystem Structure and Function in South China Sea (initiative project)

South China Sea (SCS) is one of the largest semi-enclosed marginal seas in the world, and is characterized by oilgo-trophication, stratification and low phytoplankton biomass. Our knowledge of the SCS ecosystem in terms of its structure and functioning remains primitive especially when the microbial community is involved. Our intention also points towards researches upon the coupling of biological and physical processes.

The on-going research at ESRC focuses the role of microbial food web in carbon and nutrients cycling, including primary productivity processes (size-fractionated), interaction between different microbial functional groups (e.g. heterotrophic bacteria, pico- & nanophytoplankton, flagellate and ciliate). Further research will adopt state of art molecular biological techniques such as biomarkers to investigate the microbial community structure (e.g., coccolith and N-fixation microbes) and their roles in the carbon and nutrients cycling.

3.3. Possible Collaboration and Cooperation between China and the US

The collaborations can be carried out in the research upon microbial community structure and functioning, and biodiversity conservation management in coastal areas. Both sides may be benefited from the technology and database sharing. Possible funding will be from each side's NSF and other funding agencies such as UNDP, UNEP, GEF, and IMO.

4. Environmental Education in ESRC

4.1. Graduate Programs in Environmental Management Cooperated Between Xiamen University (XMU), China and The University of San Francisco (USF), USA (on-going project)

XMU and USF have set to cooperate to carry out a joint Master's program in Environmental Management, and have been approved by both parties' authority. Under this joint program, all courses shall be taught at the Xiamen University campus, except for one elective course per year offered during the summer at USF. USF shall arrange a 3-week field work course at USF for the students enrolled in the program.

4.2. Serial Curriculum of Environmental Planning and Management for Distance Education (June 2001-December 2002)

The project was initiated and sanctioned by the Ministry of Education, and granted by Xiamen University, as a sub-project of New Century Net-Courses Construction Project. The objective is to promote long distance education in China. Six courses have been developed thus far as the first period of serial curriculum, namely, Introduction of Sustainable Development; Environmental Economics; Integrated Coastal Zone Management; Environmental Assessment; Environmental Planning; and Environmental Management. The course materials can be used by undergraduate and graduate students majored in environmental planning and management, and/or professionals whose work is related city and regional planning, watershed management and marine environment management.

4.3. Community-Based Conservation Management (CBCM) Program (on-going project)

CBCM Program (# UPCD Tier 1 Program 01843-S53305) is an international cooperation program sponsored by the Canadian International Developing Agency. The participants include Saint Mary's University, the University of New Brunswick, the Nova Scotia Agricultural College, DalTech University (in Canada), Xiamen University, Fujian Agriculture University (China) and the National University of Vietnam. Saint Mary's University is the leading agency for this program. The purpose of the program is to further build the capacities of universities in the field of community-based conservation management, and to enhance their interdisciplinary abilities and promote communication and cooperation. The project emphasizes education of the community, such as policy-makers, managers, local residents, women and youth, in the sustainable usage of natural resources and in the environmental protection.

4.4. Further Possible collaboration and cooperation between China and the US

Programs similar to the above three projects can be expected to be handled successfully based on the experiences and capacity built in XMU. Other types of joint programs between two countries, such as mini-university, distance education, study tour and public activities are also considerable.