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Postprint of the Key Laboratory of Coastal Zone Environmental Processes and Ecological Restoration, Chinese Academy of Sciences

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Abstract

Key Laboratory of Coastal Zone Environmental Processes and Ecological Restoration, Chinese Academy of Sciences

Full Text

Preamble

Key Laboratory of Coastal Environmental Processes and Ecological Remediation, Chinese Academy of Sciences
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The Key Laboratory of Coastal Environmental Processes and Ecological Remediation, Chinese Academy of Sciences was established on December 31, 2010. The current director is Dr. Yongming Luo, and the academic committee is chaired by Academician Jing Zhang, with Academicians Delu Pan and Bojie Fu serving as deputy chairs.

The laboratory focuses on investigating coastal environmental processes and ecological remediation under the influences of human activities and global climate change. It aims to elucidate multi-media environmental processes, mechanisms, and effects in coastal zones; develop technologies for land-sea environmental monitoring and ecological restoration; establish coastal environmental information and integrated management systems; and advance the development of coastal environmental science, engineering, and management technologies to enhance scientific support for sustainable coastal development.

1. Main Research Directions

Coastal Pollution Processes, Monitoring, and Remediation
This direction investigates the biogeochemical processes of nitrogen and phosphorus, heavy metals, oil spills, organic pollutants, and emerging contaminants in coastal zones. It seeks to identify pollution sources and the dominant factors controlling their spatial-temporal distribution, estimate fluxes of riverine and atmospheric pollutants into the sea and environmental capacity, and clarify the biological and ecotoxicological effects of pollutants. The research develops new materials, methods, technologies, and equipment for coastal environmental monitoring and remediation, establishes environmental risk assessment methods and criteria, and proposes strategies and approaches for coastal pollution prevention and control, providing scientific support for coastal environmental protection and ecological civilization construction.

Coastal Ecosystem Evolution and Ecological Restoration
This direction examines the response characteristics of biogenic elements and biological communities, ecosystem evolution processes, and their driving mechanisms in coastal wetlands and intertidal zones under the influences of reclamation, aquaculture, industrial development, rapid urbanization, and water-sediment regulation. It assesses the impacts of hydrodynamic changes and sea-level rise on coastal ecosystems, reveals the influence patterns of large-scale engineering projects and global climate change on coastal ecosystem functions, and develops bioremediation and ecological restoration technologies for degraded coastal wetlands and intertidal zones, providing scientific basis and technical methods for coastal biodiversity conservation and ecosystem health.

Coastal Environmental Information Integration and Sustainable Management
Based on "3S" technology (Remote Sensing, Geographic Information Systems, and Global Positioning Systems), modeling, and network information technology, this direction studies integration methods and application systems for multi-source land-sea environmental information in coastal zones under intensive human activities and global climate change. It builds coastal environmental databases, visualized network sharing platforms for land-sea environmental information, and decision support systems for sustainable coastal management. The research reveals spatio-temporal distribution patterns of human activities and their ecological-environmental impact mechanisms in coastal zones, proposes approaches for coastal disaster risk analysis, damage assessment, and emergency management, and enhances macro-level decision-making for coastal ecological environmental protection to serve national and local sustainable coastal management and ecological civilization construction.

2. Team Building

The laboratory currently has 83 permanent staff members, including 22 full professors and 25 associate professors. Among them are one leading talent in the

first batch of the National Ten Thousand Talents Program, one recipient of the National Science Fund for Distinguished Young Scholars, two selected for the National Thousand Talents Program, three selected for the National New Century Hundred-Thousand-Ten Thousand Talents Project, ten introduced through the CAS Hundred Talents Program, and four selected as Shandong Distinguished Young Scholars. Additionally, there are six CAS International Visiting Professors, with staff holding 49 positions in domestic and international academic institutions or journals. The laboratory has formed a talent team dominated by young and middle-aged scientists with strong independent innovation capabilities and team spirit.

The laboratory leads major national projects including the Ministry of Science and Technology' s 863 Program, National Key Technology Support Program, and Special Program for Basic Science and Technology Work, as well as CAS Strategic Priority Research Programs and key deployment projects. In 2015, it had 182 ongoing projects with a total contract funding of 200 million RMB, with projects from national ministries, the National Natural Science Foundation, and CAS accounting for 80% of the total funding. Between 2010 and 2015, the laboratory published 1,005 important papers, including 710 SCI-indexed and 295 CSCD-indexed papers; obtained 51 authorized patents and 10 software copyrights; and edited or co-authored 21 monographs, including one English monograph. It organized nine international academic conferences on topics such as "Land-Ocean Interaction in the Coastal Zone," "Coastal Biogeochemistry and Ecosystems," and "Coastal Science and Sustainable Development," as well as three cross-strait academic conferences. Significant progress has been achieved in research areas including coastal pollution processes, monitoring and remediation, coastal delta soil pollution and bioremediation, coastal wetland degradation and ecological restoration, intertidal and nearshore environmental elements and ecosystem changes, microplastic pollution characteristics and control in coastal zones, coastline changes and coastal management planning, and oil spill prediction, damage assessment, and control remediation. The laboratory has received five scientific and technological awards, including the First Prize of the Chinese Soil Science Society Science and Technology Award and the Second Prize of the Shandong Provincial Science and Technology Award.

The laboratory has established cooperative and exchange relationships with coastal research institutions in Germany, the United States, United Kingdom, France, Italy, Canada, Australia, New Zealand, Japan, South Korea, as well as in Taiwan and Hong Kong regions. It hosts the East Asian Regional Office of the Future Earth Coasts (FEC) international program [formerly the Land-Ocean Interaction in the Coastal Zone (LOICZ) program], the Coastal Science and Engineering Branch of the China Ocean Engineering Consulting Association, and the Coastal Science Management Branch of the Pacific Society of China.

3. Graduate Student Training

The laboratory has doctoral programs in two first-level disciplines: Environmental Science and Engineering, and Marine Science, with four second-level doctoral programs in Environmental Science, Environmental Engineering, Marine Chemistry, and Marine Biology. It also has a master' s program in Geography (first-level) with a second-level program in Cartography and Geographic Information Systems, as well as two professional master' s programs in Environmental Engineering and Bioengineering.

In 2016, the laboratory had 133 graduate students, including 72 master' s students and 61 doctoral students. Among 163 graduated students, four received the CAS Presidential Special Award, nine received the CAS Presidential Excellence Award, and four received the CAS Outstanding Doctoral Dissertation Award.

4. Capacity Building and Technical Platforms

The laboratory currently owns 2,511 sets of fixed asset equipment, including 61 sets valued above 300,000 RMB. In 2015, it added 260 new research equipment sets, including four valued above 300,000 RMB. The laboratory operates the CAS Yellow River Delta Coastal Wetland Ecological Research Station, the CAS Muping Coastal Environment Comprehensive Research Station, the 500-ton research vessel "Innovation No. 1," coastal ecological environment monitoring and observation platforms, a public technology service center, a data analysis and numerical simulation center, and the editorial office of *Coastal Science* journal.

(See the inside front cover for related images)

Note: Figure translations are in progress. See original paper for figures.

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