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The Institute of Mountain Hazards and Environment

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MountainPlatform

The Institute of Mountain Hazards and Environment

Caring for Mountains and Supporting Their Development

The Institute of Mountain Hazards and Environment (IMHE) was jointly established by the Chinese Academy of Sciences (CAS) and the Ministry of Water Resources in 1966. It is a state academic institution engaged in research on mountain hazards, the mountain environment, sustainable mountain development, and digital analysis of spatial information. Its mission is to conduct innovative research on key aspects and principles of mountain science and serve sustainable development in China. It also aims to play a leading role in related fields and cultivate high-level talent.

Introduction

The Institute of Mountain Hazards and Environment (IMHE) focuses on long-term environmental monitoring, experimentation, theoretical analysis, technology development, and on-site demonstrations. Over the last 4 decades, IMHE has completed about 1000 national and local projects, solving vital scientific problems concerning environmental hazards and engineering security. By 2013, institute researchers had published more than 3000 research papers, over 100 books, and 50 consulting reports for the central Chinese government. IMHE scientists have won more than 120 national, provincial, and other awards.

The institute has 4 research divisions—of which two are Chinese Academy of Sciences (CAS) key laboratories; it also has an analysis and testing center, an information service center, 3 national field experimental stations, 5 regional field experimental stations, and an exhibition hall housing interactive science and technology exhibits.

IMHE has 292 employees, including one CAS member, 44 senior research fellows, 56 associate research fellows, 7 scholars recruited through the CAS Hundred Talents Program, and 3 individuals supported by the National Science Fund for Distinguished Young Scholars. IMHE offers 9 master's degree programs, 4 PhD programs, and a postdoctoral program in academic fields including physical geography, human geography, geotechnical engineering, pedology, cartology, and geographic information systems. It currently has about 200 graduate students and postdoctoral fellows.

IMHE attaches great importance to international cooperation. It has undertaken several projects for the China Committee mandated by the International Centre for Integrated Mountain Development (ICIMOD) and has signed science and technology cooperation agreements with the University of Maryland in the United States, the Technical University of Madrid, and the Korea Institute of Geology, Mining, and Materials. It has conducted cooperative research with universities and other institutions in Canada, Finland, Germany, Ireland, Japan, Nepal, Russia, and the United States, as well as in China's Taiwan region.

IMHE publishes the *Journal of Mountain Science* (Chinese and English editions); the English edition has been included in the Thomson Reuters Web of Science since 2007 and is distributed via Springer.

Research

Research institutions within IMHE include the Key Laboratory of Mountain Hazards and Earth Surface Processes, the Center for Mountain Development Research, the Center for Mountain Digital and Remote Sensing Applications, the Engineering and Technology Research Center for Mountain Hazards Mitigation, and 8 field observation stations.

Key Laboratory of Mountain Hazards and Earth Surface Processes

The Key Laboratory of Mountain Hazards carries out applied and fundamental research for the sake of essential infrastructure and environmental safety in the mountainous regions of China, particularly in the upper reaches of the Yangtze River and Tibetan Plateau. Major research themes include the formation and prevention of debris flows, landslides, and mountain torrents, especially the stability and transfer processes of rocks and soil. The research goal is to reveal slope and valley processes and the emergence of hazards by combining field surveys, simulation experiments, and theoretical analysis, and to develop geotechnical and ecological countermeasures.

The laboratory has made a series of achievements in the study of mountain hazards and earth surface processes and an outstanding contribution to railway and road disaster mitigation, oil and gas pipeline disaster prevention, and Wenchuan earthquake relief and postearthquake reconstruction. The development of techniques for disaster mitigation along traffic lines in the mountainous areas in western China won the national second-class award for science and technology progress in 2009.

Ongoing projects address hazard formation mechanisms and dynamics, monitoring, forecasting,

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risk analysis and risk management, hazard mitigation principles and techniques, structure optimization, reliability analysis of hazard mitigation engineering, and mountain hazard warning systems.

Key Laboratory of Mountain Surface Processes and Ecological Regulation

The mission of the Key Laboratory of Mountain Surface Processes and Ecological Regulation is to explore physical change processes and approaches to controlling water, soil, and nutrients on hillslopes. The laboratory focuses in particular on 3 topics related to the evolution of mountain environments under natural and human influences: (1) soil erosion and water and soil conservation mechanisms under the impacts of multiple factors in southwestern China, (2) biogeochemical processes of mountain regions, and (3) natural evolution of forest ecosystems and their ecohydrological effects in the mountains of southwestern China. The laboratory's research on ecological security in Tibet received a national award for science and technology progress in 2009.

The laboratory's main research areas are climate change impacts on alpine ecosystems and the hydrocycle; environmental impacts and evaluation of alpine plateau ecosystems; the ecohydrology of forests in the upper Yangtze Valley; nutrient (carbon, nitrogen, and phosphorous) processes, effects, and regulation on sloping land; and the technology of water and soil loss and conservation on slopes.

Center for Mountain Development Research

This center conducts systemic research on topics related to mountain development. It focuses on spatial patterns and processes in the relationship between people and land in mountainous areas of China, and it seeks to develop positive approaches to sustainability in those areas that integrate natural resource management, poverty alleviation, ecosystem service assessment, urbanization, industrial development, and construction of settlements in mountainous areas. Another research focus is landscape and ecosystem services in mountain areas. It serves as a national center for decision-making support for mountain development in China. In recent years, it has published more than 500 academic papers and more than 30 monographs. It has developed 5 patented inventions and won more than 10 science and technology awards.

Center for Digital Mountain and Remote Sensing Applications

This center aims to construct mountain-related digital systems, conduct remote sensing of mountainous regions in China, and build a platform for data storage, processing, analysis, and sharing. Its scientific staff work to develop quantitative remote sensing, extract information from remotely sensed images and a spatial database, assimilate and simulate the parameters of mountain surface processes, and integrate "3S" techniques and new remote sensing mechanisms; in the terminology of the center, 3S means RS (remote sensing), GPS (global positioning system), and GIS (geographical information system). The center seeks to develop comprehensive and integrated methodologies to support research on mountain environments, mountain hazards, and mountain development based on geospatial information science and technology. Its research areas include remote sensing of mountain resources and environments, digitalized architecture in mountains, digital hazard mitigation and reduction, mountain spatial information integration and sharing, high-resolution remote sensing and virtual simulations, quantitative remote sensing, and identifying and monitoring mountain hazards by remote sensing.

Engineering and Technology Research Center for Mountain Hazards Mitigation

This center was established by the Department of Science and Technology of Sichuan Province and the Chengdu Branch of the CAS in October 2007, with researchers mostly coming from the Laboratory of Mountain Hazards and Earth Surface Processes and CAS. Since its foundation, it has completed more than 300 projects. The center has 80 scientists, experts, and engineers; more than 200 sets of instruments and pieces of equipment; and 3 field workshop platforms. It has 9 first- and second-class national- and provincial-level qualification certificates, including for geological hazard surveying, design and evaluation, mine environment evaluation, and soil and water conservation project design. Work areas include engineering techniques for hazard mitigation; risk evaluation; survey, program, design, construction, and supervision of engineering structures; instruments and techniques of hazard monitoring and forecasting; and consultation and training.

Field observation stations

IMHE's 8 field observation stations in southwest China constitute an important platform for innovative research on mountain hazards, environment, and development. They are the Dongchuan Debris Flow Observation and Research Station, the Alpine Ecosystem Observation and Experiment Station of Mt. Gongga, the Yanting Agroecological Experimental Station of Purple Soil, the Wan Zhou Eco-environmental Experiment Station, the Yuanmou Station of Soil and Water Conservation, the Three-Gorge Observation Station on Soil

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Erosion and Environment, the Xainza Station of Alpine Steppe and Wetland Ecosystems, and the Bomi Geological Hazards Observation and Research Station.

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