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Rapid growth of environmental research in China

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Environmental research in China has grown tremendously over the last thirty years. This rapid and sustained growth has been supported by the remarkable increases in research funding, the number of graduate students, the degree-offering programs in environmental sciences and engineering, the state-of-the-art facilities, and international collaboration.

In 1986 when the National Natural Science Foundation of China (NSFC) was established, its total research budget was only eight million Yuan (CNY), or about one million U.S. dollars at the time. In 2015, the NSFC's research funding for the Department of Chemical Sciences', Division of Environmental Chemistry alone was 208 million Yuan, or about 30 million U.S. dollars! Over the past thirty years, we have witnessed exponential increases in the number of environmental projects funded and the level of funding for each project (Fig. 1). For example, the Division of Environmental Chemistry of the NSFC was only able to support 17 environmental chemistry research projects in 1989. But in 2006, 115 environmental chemistry research projects were funded. This increasing trend continues, with 335 projects funded in 2011, and 379 projects funded in 2015. Importantly, the funding amount from the Division of Environmental Chemistry of the NSFC increased by nearly three orders of magnitude over the three decades, from 0.356 million Yuan in 1989 to 29.9 million Yuan in 2006, 142 million Yuan in 2011, and 208 million Yuan in 2015. In addition, environmental scientists also receive substantial amounts of research funding from the Earth Sciences Division of the NSFC and from other funding agencies and organizations, such as the Ministry of Science and Technology, Ministry of Environmental Protection, Ministry of Education, Ministry of Health, and a variety of provincial and municipal funding agencies.

The nation's tremendous investments in science and technology translate to exponential increases in the research and development (R&D) funding to China's major research institutions. For example, at the Research Center for Eco-Environmental Sciences (RCEES), Chinese Academy of Sciences, its R&D funding has increased at a rate of one order of magnitude per decade, from one million Yuan in 1985 to 13 million Yuan in 1995, and 111 million Yuan in 2005 (Fig. 2). In the most recent decade, the R&D funding at RCEES has tripled to reach the current level of 350 million Yuan in 2015. As a consequence of the various funding programs, major Chinese research institutions are now supported very well.

Education and training of environmental science researchers and professionals in China have also improved over the recent decades. Currently 847 Chinese universities and colleges are accredited to award Bachelor's degrees in environmental sciences and/or environmental engineering. A total of 400 academic institutions, including 193 universities and 207 research institutes, are accredited to grant Master's degrees in environmental sciences/engineering. Fifty-five universities and sixty-five research institutes are accredited to offer doctoral (PhD) programs in environmental sciences/engineering.

The continuing growth of environmental research programs in China has resulted in increased number of graduate students. For example, at RCEES, Chinese Academy of Sciences, there are currently 736 graduate students, supervised by 65 principal investigators with the support of 455 academic members. Back in 1985 when the graduate programs were newly developed in China, there were only 45 graduate students in RCEES, most of whom were pursuing Master's degrees. During the decade of 1985–1995, the

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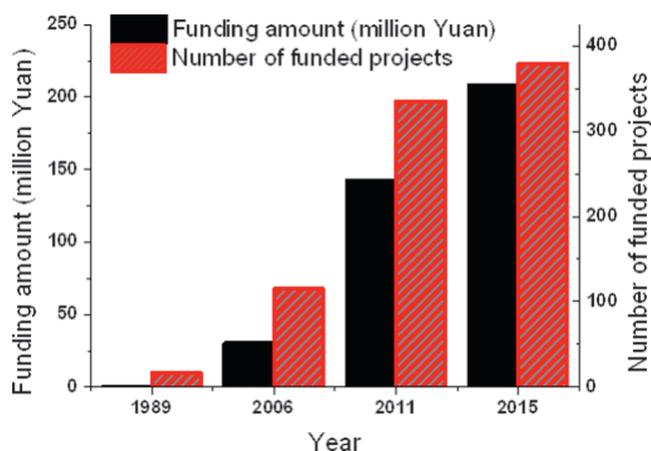


Fig. 1 – The number of research projects funded and the yearly funding amount (million Yuan) by the Division of Environmental Chemistry, Department of Chemical Sciences, National Natural Sciences Foundation of China, in 1989, 2006, 2011, and 2015, representing the rapid growth over the past twenty-five years.

increase in the number of graduate students in RCEES was small, from 45 graduate students in 1985 to 87 graduate students in 1995. Substantial growth of graduate programs occurred in the subsequent two decades, resulting in 473 graduate students in 2005 and 736 graduate students in 2015 (Fig. 2). The growth of the graduate student population in RCEES is typical of most Chinese research-intensive universities and research institutes of the Chinese Academy of Sciences.

RCEES celebrated its 40th anniversary in 2015. In the current issue of the *Journal of Environmental Sciences*, a collection of 27 papers provide a snapshot of the current research activities in RCEES. They cover diverse topics of environmental sciences, ranging from nanomaterials to ecosystems, from the well-established persistent toxic substances to the emerging environmental contaminants, from studies of the fate and behavior to the understanding of health effects, and from detection and characterization to

remediation and treatment. These selected papers represent active environmental research that is being conducted at RCEES, a leading environmental research institution in China.

Through the window of the representative research conducted at RCEES, one can see that environmental research in China is diverse and vibrant. This conclusion is also supported by the 2000 presentations, half of which were oral presentations, and more than 4100 registered participants at the 8th National Conference on Environmental Chemistry, which was recently held in Guangzhou on November 5–8, 2015. More than 30 symposia on various topics of environmental sciences, environmental health, and environmental engineering/technology were complemented with a number of workshops on applications for funding, scientific publication (the editors' forum), research by young scientists and graduate students, and challenges of environmental research. The conference showcased both the quantity and the quality of environmental research in China.

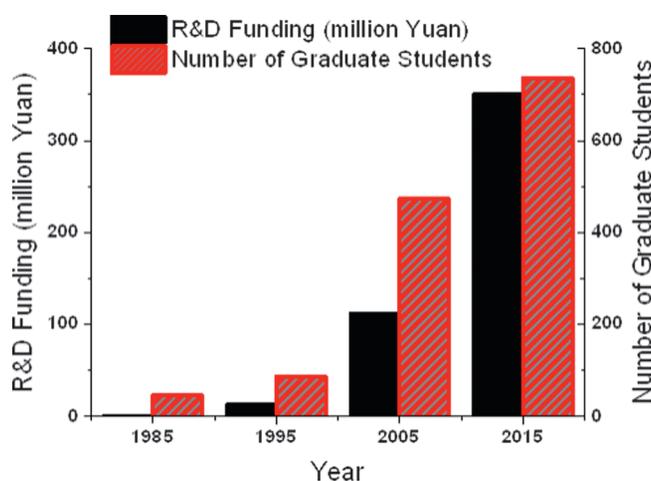


Fig. 2 – The yearly research and development (R&D) funding (million Yuan) and the number of graduate students at the Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences, in 1985, 1995, 2005, and 2015, representing the growth over the past thirty years.

Having experienced the incredible growth in economy and in science and technology, we envision that environmental research in China will continue to prosper. An emphasis will be placed on improving the quality, scope, depth, and translation of research. We are confident that environmental scientists in China will strive for scholarly excellence, address critically important environmental issues, mentor the next generation environmental professionals, collaborate with inter-disciplinary scientists around the world, engage international communities, and

contribute to developing viable solutions to global environmental challenges.

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