The Association of Academies of Sciences in Asia (AASA)

TOWARDS A SUSTAINABLE ASIA

ENVIRONMENT AND CLIMATE CHANGE

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Beijing

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With 38 figures

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TOWARDS A SUSTAINABLE ASIA: ENVIRONMENT AND CLIMATE CHANGE

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Abbreviations

AASA	Association of Academies of Sciences in Asia
ADB	Asian Development Bank
AEC	Asian Economic Community
APSC	ASEAN Political and Security Community
ASCC	ASEAN Socio-Cultural Community
ASEAN	Association of Southeast Asian Nations
BYD	Build Your Dreams
CACE	China-ASEAN Cooperation Center for Environmental Protection
CDM	Clean Development Mechanism
CEP-BCI	Core Environment Program and Biodiversity Conservation Corridors Initiative
CH_4	methane
CLRTAP	Convention on Long-Range Transboundary Air Pollution
CO	carbon monoxide
CO_2	carbon dioxide
CTI	Coral Triangle Initiative
EANET	Acid Deposition Monitoring Network in East Asia
EAS	East Asia Summit
E-HII	estimated heat island intensity
EMM	Environment Ministers Meeting
ENSO	El Niño-Southern Oscillation
EPA	Environmental Performance Assessments
EST	environmentally sound technology
GDP	Gross Domestic Product
GEO-4	The Fourth Global Environment Outlook
GHG	greenhouse gas
GLIMS	Global Land Ice Measurements from Space
GMS	Greater Mekong Subregion Cooperation
HII	heat island intensity
IAI	Initiative for ASEAN Integration
IPCC	Intergovernmental Panel on Climate Change
IPCC AR4	Intergovernmental Panel on Climate Change, The Fourth Assessment Report
IUCN	International Union for Conservation of Nature
IWRM	Integrated Water Resources Management

MDG	Millennium Development Goals
MEP	Ministry of Environmental Protection of the People's Republic of China
NASA	The National Aeronautics and Space Administration
NEASPEC	North-East Asian Subregional Programme for Environmental Cooperation
NGO	non-governmental organization
NO_x	nitrogen oxide
N_2O	nitrous oxide
NSEC	North South Economic Corridor
OECD	Organisation for Economic Co-operation and Development
PDP	Power Development Plan
$PM_{2.5}$	fine particulate matter
PM_{10}	particulate matter < 10μm
RAINS-Asia	Regional Air pollution INtegration and Simulation-Asia
RPTCC	Regional Power Trade Coordinating Committee SEA
SEA	Strategic Environmental Assessments
SGD	Submarine Groundwater Discharge
SMCA	Spatial Multi-Criteria Analysis
SO_2	sulfur dioxide
SRES	Special Report on Emissions Scenarios
SST	sea surface temperatures
TAR	Third Assessment Report
TEMM	Tripartite Environment Ministers Meeting
UHI	urban heat island
UN	United Nations
UNCCD	United Nations Convention to Combat Desertification
UNEP	United Nations Environment Programme
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organization
UNSD	United National Statistical Data
UNSO	United Nations Statistical Office
USD	United States dollar
WDI	World Development Indicators
WHO	World Health Organization

Foreword

Asia is not only the largest and most populated continent in the world, but also the region with the most diverse development models and most dynamic economies. In the past half century, Asia has been witnessing rapid economic growth and playing an increasingly more important role in world's political and economic arena. At the same time, Asia has developed the commonly-called "Asia Model", which has attracted worldwide attention. The Asia Model shows a new way for the developing nations or late-development countries on how to realize industrialization and modernization. All these achievements are made by Asian countries with a focus on the advantages of their late development, re-examination of their internal cultural values, active absorption of modern S&T and management experiences and constant exploration and innovation.

These social progresses have made great contributions to the realization of the UN Millennium Development Goals and have played a pioneering and demonstration role on what can be accomplished in today's world. However, Asia is facing big challenges. The most prominent one is that the rapid development of Asian economies is based on large input of production factors at the huge expense of natural resources and environment, which has been sharpening the conflicts in population, resources, environment, socio-economic development. The sustainable development in the region is being severely threatened and challenged. The rethinking and questioning of the Asia Model in the international community is growing especially in the era of post Asia Financial Crisis and Global Financial Crisis.

It is not only a common challenge for the governments of Asian countries, but also a common task for the Asian scientific communities to cope with the resources and environment crisis and to seek a new way of sustainable development in Asia. AASA, as a non-governmental and regional international scientific organization with 26 member academies, is mandated to initiate and conduct investigation on issues concerning S&T, economic and social development. As early as April 2007, AASA proposed to initiate a project on "Sustainable Development in Asia" (SDA) within AASA framework in the hopes to provide consultation and advice for national and regional governments in Asia and relative international organizations. This study proposal was approved at AASA board meeting held in Russia in August 2007 with the Chinese Academy of Sciences as the initiator. The project covers environment, energy,

resources and culture with the establishment of four working groups among AASA member academies.

Soon after, the SDA project was officially launched and implemented at different levels. The efforts include the clarification of the research content, emphasis, structure and division of tasks. Various meetings at the working level and international workshops have been held to coordinate the research activities and project progress: the first international workshop under this project was held in February 2008; the AASA Workshop on Sustainable Energy Development in Asia in November 2008; the AASA Workshop on Agricultural Culture and Asian Sustainable Development in August 2009; and the AASA Workshop on Environment and Resources in September 2009.

With the joint efforts of AASA member academies, the SDA project has now come up with a series of studies including four thematic reports, namely, "Towards a Sustainable Asia: Energy", "Towards a Sustainable Asia: Environment and Climate Change", "Towards a Sustainable Asia: Natural Resources", and "Towards a Sustainable Asia: The Cultural Perspectives" . Based on these four reports, a synthesis report has also been written entitled: "Toward a Sustainable Asia: Green Transition and Innovation". All these reports have looked deeply into the common issues and challenges for the Asian sustainable development from different perspectives.

The synthesis report is an integration and extension of the four thematic reports. It aims at the major resource and environmental challenges and issues in Asia in the general context of the challenges of financial crisis and climate change, and in line with green transition and innovation in Asia. Of its major findings, it includes: the diagnosis of key resource and environmental issues in Asia, such as water, minerals, land resource, environmental pollution, eco-degradation, energy and environment and climate change, the revelation and reflection of the diverse, different, complicated and severe nature of resource and environmental issues in Asia, the systematic analysis of the main driving forces and future trends of resource and environmental changes in Asia, the empirical analysis and discretion of current evolution of the relationship between environment and development in Asia with the establishment of theoretical and conceptual models, the initiation of principals, strategic framework, focus and advice for promoting the green development of Asia on the basis of summarizing Asia's advantages and disadvantages.

The synthesis report differs from other similar reports. It focuses more on the combination of theoretical and empirical research in the evolution of environment and development, on the combination of trends analysis in time series and comparative study at spatial scale, and on the combination of Asia's integrated analysis and regional and national differences. Besides, attempts have been made here on the innovative modeling of the evolutionary and theoretical relationship between environment and development, analysis of the driving

forces in environmental evolution, and utilization of newly developed composite index to conduct empirical research of Asia's environment and development relation in the evolution.

We hope the reports will be of good value to the facilitation of the green development in Asia, providing advice on dealing with the shortage of conventional resources, environment pollution and climate change, fostering new economic growth and enhancing Asia's competitive advantages. This is the first time that AASA has ever undertaken such a study, and it surely leaves grounds for more detailed study and analysis of various issues and challenges that Asian countries face in the future.

The SDA project is sponsored by AASA. I want to give my special thanks to all AASA member academies for their consistent support, advice and assistance, without which, the accomplishment of such an internationally interdisciplinary scientific project would be impossible. My thanks also go to all the members in the working groups, especially Professors Namık Aras and Yi Wang, co-chairs of this study, without whom, efficiency and quality of the study would not be guaranteed. I also need to thank United Nations Environment Programme (UNEP), InterAcademy Council (IAC) and InterAcademy Panel (IAP) etc. for providing us the references and various advice and inspirations. Last but not the least, I want to express my thanks to all friends and the institutions that have rendered us encouragement and assistance all the way along.

The SDA project features with a wide range of fields and a huge amount of data, some of which are still in their early stage of development. Any comments or suggestions from our friends and various international institutions are warmly appreciated.

Prof. Jinghai Li

President

The Association of Academies of Sciences in Asia (AASA)

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