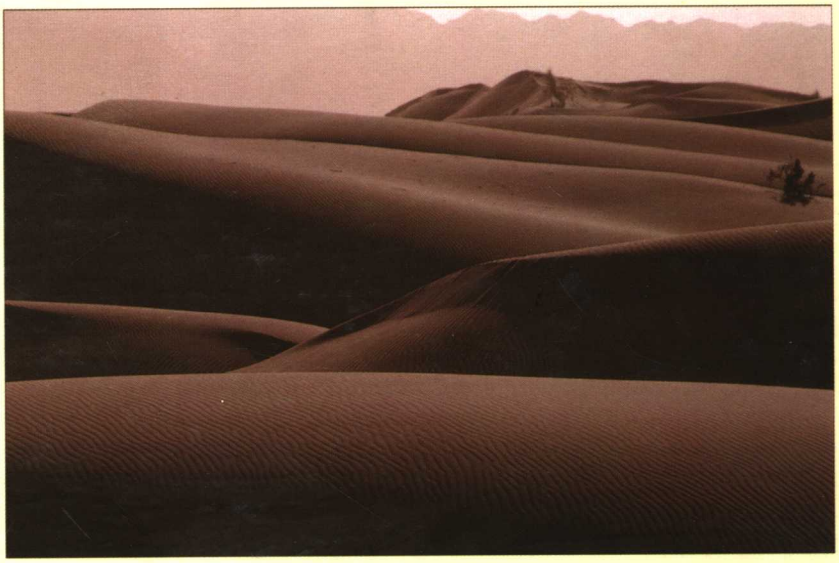
Principles and Practices OF DESERTIFICATION CONTROL



Proceedings of the International Specialty Conference on Science and Technology for Desertification Control

Volume I

Edited by Hu Yuegao, Huang Guohe, Li Zhaohu

STDC

Specialty Conference on Science and Technology for Desertification Control

China Meteorological Press

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(Volume Ⅰ)

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(46 Zhongguancun Nandajie, Haidian District, Beijing 100081, China)
(http://cmp.cma.gov.cn E-mail:qxcbs@263.net)
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Congratulations for the Establishment of China Foundation for Desertification Control

荒漠化控制科学技术国际大会

International Conference on Science and Technology for Desertification Control

2006.10.14-16 Beijing

Organized by

-Desertification Research Center, China Agricultural University;
-Center for Energy and Environment Research, North China Electric Power University;
-International Society for Environmental Information Sciences;
-China Foundation for Desertification Control

Address: Room 435, Agronomy Building, China Agricultural University, No.2 Yuanmingyuan West Road, Haidian District, Beijing, 100094, P.R. China
Tel:+86-10-62733847
Fax:+86-10-62732441
E-mail: iseis_beijing@yahoo.com.cn

Preface

Desertification has become a major global problem and is expanding at the rate of 6×10^4 km^2 or 25% of the land area of the earth. Due to its adverse effects on society and world economy, it has received great attention from the international society. China is one of the countries most affected by desertification, which has directly or indirectly threatened the survival and development of the country.

For decades, many countries in the world have developed several strategies for desertification control. Many basic theories and applied research for controlling desertification have also made some headway.

In order to discuss the reality of desertification, establish scientific policy for its control in China, and communicate developments and theories on desertification control technology with experts within and outside China, the Desertification Research Center of China Agricultural University and Center for Energy and Environment Research of North China Electric Power University, in collaborating with the International Society for Environmental Information Sciences and China Foundation for Desertification Control, organized the conference: Sciences and Technologies for Desertification Control in Beijing from October 14 to 16, 2006.

A total of 125 abstracts were received by the Organizing Committee, mainly from scientists, managers, entrepreneurs, experts from NGO and individuals interested in desertification control. Fifty eight papers were presented at the conference. These proceedings contain 54 papers selected from communications at the conference and are divided into 5 sections: the invited papers, mechanism and principles of desertification, engineering and management systems for desertification prevention and control, leading edge research and others.

Owing to upon limitation and some technical and some other problems, we were wanted to accommodate all the papers presented of the conference.

The proceedings benefited from the help of experts who attended the conference, and also received great supports from sponsors and assistants. We sincerely thank all the authors and presenters for their hard work and contribution to the success of the conference.

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Part Ⅲ Engineering and Management Systems for Desertification Prevention and Control

Part Ⅳ Leading Edge Research

Part Ⅴ Others

Part I

The Invited Papers

Opening Speech

Sun Qixin

China Agricultural University

Respected guests, friends, experts and all representatives,

As autumn draws its close with a fruitful harvest, we warmly welcome all of you both from China and abroad to Beijing, to communicate and discuss the specific issue of desertification control. On behalf of China Agricultural University, I am very pleased to support this Conference on Science and Technology for Desertification Control; congratulations to the organizers.

The status of global desertification is getting severe at the beginning of 21st century. As we all know, the problem of desertification control is the concern of not only some government departments and/or industry groups but of all people in the world. China is one of the countries with large areas under desertification and the influence of population has made it more severe. More and more people are starting to pay attention to the issue of desertification. Therefore, the international conference holding today with the main theme: "Engineering of management and prevention of desertification", is closely concerned with the development and construction of social, economic and ecological functions in desert areas of China. It will surely be of benefit to desertification control in both China and other affected countries.

The origin and control of desertification is hardly connected with agriculture. It is popularly held that to reclaim grassland, forestry and wetland or develop agriculture leads to desertification in the interaction between agricultural and nomadic civilization in history. Over use, over logging and overloading have caused desertification with the increasing population and attendant requirement for food and agricultural products in northwestern China since 1949.

There is an old saying that "In order to get the bell down the tree, the only person to do so is who hung it". Since desertification is strongly related with the unsuitable agricultural practices, it is necessary to reduce the crisis through agricultural modernization. On the other hand, nearly all areas affected by desertification are in poor villages and/or nomadic regions. Survival is often the first consideration for local people under a heavy economic pressure. For them, it is reasonable to neglect ecology and environment. Thus, a thriving economy is the key to success in desertification control. However, agriculture and animal husbandry are major sources of income part in local production systems. Therefore, it is necessary to develop modern, sustainable agriculture. Further more, it is important to combine progress in modern science and technology and cooperate among disciplines, departments and countries to form a complete engineering system to manage and prevent desertification in the world in the future.

China Agricultural University (CAU) is a comprehensive university with a unique

characteristic of agriculture in China. Several disciplines have been formed for more than 100 years, such as Agronomy, Life Science, Science of agricultural resource and environment, Informatics, Agricultural engineering and automatics, Agricultural economy management and rural sociology. In desertification control, a series of work has been done by CAU for many decades. Many experts have been actively doing pioneering work on desertification control. They have set up a number of social relationships and formed a solid foundation to deal with desertification in both theory and practice. In facing this new challenge, we will collaborate with all friends and value their contributions as much as possible in desertification control.

Ladies and gentlemen, we face a really serious situation. The way to manage and prevent desertification is not all that straight-forward. Even so, I believe we have a bright future. We will certainly find an effective way to complete the task of controlling desertification through cooperation. Let's work for it.

Wishing you all a successful conference,

Thank you!

Man's Common Mission to Combat Desertification

An Chengxin

Board Chairman of the Anti-Desertification Foundation of China

Respected guests and friends,

As autumn draws its close, we have the grand commencement of the International Conference on Science and Technology for Desertification Control. All guests both at home and from abroad are welcome to enjoy a happy get-together here to discuss important issues concerning desertification control during this special conference. On behalf of the Anti-Desertification Foundation of China and the Organizing Committee, I'd like to express our sincere thanks to all friends at home and abroad for your concern, support and participation in China's effort to combat desertification. I'd also like to give hearty congratulations for the successful commencement of this conference.

Universally acknowledged as cancer of the earth, land desertification causes direct destruction of the foundation of human survival and development, and threatens the whole ecological domain on earth, namely, man's overall living environment, and it is a key factor leading to poverty and hindering the sustainable development of economy and society. According to statistics from the UN, desertification adversely affects two-thirds of the countries and regions of the world, one-fifth of the population and one-third of the land. In essence, dry lands in 110 countries in the world are facing potential danger with survival of more than one billion people under threat, more than eight billion people severely lacking food supplies and 135 million people leaving their native places. What's more, with desertification expanding at the rate of fifty to seventy thousand square kilometers a year, it causes a direct economic loss of USD 42.3 billion annually. It is really an aggressive threat to the whole earth.

China is one of those countries most severely affected by desertification with large areas and extensive distribution in the world. Up to 2004, there were 2 636.2 thousand square kilometers of desert land in the country, which equals 2.5 times as the total area of nationwide farm land and accounts for 27.46 percent of total national territory. About 400 million people in the whole country are affected by desertification, and a direct economic loss of about RMB54 billion is incurred annually. Severe land desertification is now posing a great threat to China's ecological safety and sustainable development of economy as well as the survival and development of Chinese nation. Last year, Premier Wen Jiabao made comments and instructions in a written material saying that desertification control is of vital importance to people's livelihood and national development.

The Chinese government and people have made serious efforts to combat desertification and achieved a remarkable effect. But there is still a long way to go to control desertification, for the main causes which exacerbate it still exist, such as population pressure, economic poverty, poor utilization of farmland resources, blind pursuit of fast economic

growth, great demand for timbers, over-grazing in grassland and illegal mining. In order to extensively mobilize non-governmental forces to participate in desertification control and promote the drive for scientific desertification control, we sponsored and established the Chinese Foundation to Combat Desertification.

Authorized by State Forestry Administration and registered in Ministry of Civil Affairs, the Chinese Foundation to Combat Desertification is a nationwide non-governmental and non-profit origination as well as an independent social organization. The aim of the foundation is to subsidize and reward those institutions, organizations and individuals that made contributions to the cause of China's desertification control, enhance the management of China's desert land and scientific research as well as launch all kinds of activities related to desertification control, for example, public campaigns, talent training and academic exchanges.

The foundation is focused on non-profit undertakings. Derived from society, the fund of the foundation also serves society. Strictly abiding by Welfare Donations Law of the People's Republic of China and Regulation for the Management of Foundations, the foundation raises funds according to law, catering to all enterprises, institutions, organizations and friendly personality both at home and abroad who are enthusiastic to the cause of desertification control. The foundation practices democratic management by establishing a strict system of fund raising, management and use as well as publishing accounts of revenue and expenditure at regular intervals. It is also subject to supervision by the Registration Organ, Competent Department and departments in charge of tax and finance. Furthermore, we will publish our annual work and financial reports through the media which are designated by the Registration Organ as well as on the foundation's website.

We are confident and determined to make the Chinese Foundation to Combat Desertification an international one with fresh ideas. The foundation will focus on implementing the following works in the three aspects in the future:

(1)Publicize far and wide. We will sufficiently rely on all kinds of media; extensively publicize the conception, degree and dangers of desertification as well as the necessity to combat it in various forms like movie works, news reports, large-scale activities and Internet to make not only the decision-makers but the masses come to understand desertification, pay attention to it and vigorously take part in its control.

(2)Assemble technologies. There are countless individual technologies involving desertification control at home and abroad, but what's important is how to assemble them so as to apply and promote them in the light of local conditions. The foundation is going to cooperate with research and development institutes at home and abroad and form an advantage in technology assembly with joint efforts. In order to realize the high unity of ecological effect, economic benefits and social results, especial attention is focused on desertification control and development of comprehensive operation mode and benefit mechanism of industrialization.

(3)Demonstration pilot project. We are picking up some typical and model desertification types in the whole country for the preparation of pilot projects. For example, in