



OUTLINE OF IRTCES ACTIVITIES

**The International Research
and Training Center
on Erosion and Sedimentation
(IRTCES)**

Content



I. INTRODUCTION of IRTCES

II. CHANGES IN WATER AND SEDIMENT LOAD,
AND RIVER CHANNEL SEDIMENTATION IN
CHINA

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I. Introduction of IRTCES

Inauguration Ceremony of IRTCES (1984, China)



First established Category II water-related centers under auspices of UNESCO

- Resolution of the 22nd Session of UNESCO's General Conference (1983, Paris)
- Agreement between the Chinese Government and UNESCO (1984)
- The Ministry of Water Resources is the governmental executive agency



Inauguration Ceremony of IRTCES (1984, China)



Mr. Amadou Mahtar M'Bow, the DG of UNESCO and Ms. Qian Zhengying, the Chinese Minister of Water Resources, attending the Inauguration Ceremony of IRTCES

UNESCO-IRTCES Agreement Signing Ceremony(2005, China)



- Beijing, Nov. 30, 2005
- Mr. Wang Shucheng, Minister of Water Resources, P. R. China and Mr. Koïchiro Matsuura, Director General of UNESCO signed the Agreement Between China and UNESCO Concerning IRTECS



- The renewed agreement reiterated the objectives and responsibilities of IRTCES, defined the relationship between IRTCES and UNESCO, and confirmed the leading role of IRTCES in the field of international research on sedimentation.



政府和联合国教科文组织关于国际泥沙研究培训中心的协定
签字仪式
CEREMONY OF THE AGREEMENT BETWEEN
THE GOVERNMENT OF P. R. CHINA AND UNESCO CONCERNING IRTCES



中华人民共和国政府和联合国教科文组织关于国际泥沙研究培训中心的协定
签字仪式
SIGNING CEREMONY OF THE AGREEMENT BETWEEN
THE GOVERNMENT OF P. R. CHINA AND UNESCO CONCERNING IRTCES



Functions of IRTCES



IRTCES is a category II centre under the auspices of UNESCO

Functions

1. to promote the scientific research on erosion and sedimentation (including sediment transport theory, fluvial/coastal and reservoir sedimentation, sedimentation engineering, soil erosion, soil and water conservation, environmental and ecological impacts of sedimentation);
2. to provide technical advisory services and to create a mechanism for the exchange of scientific and technical information on the results of research among experts in various countries;



Functions of IRTCES



3. to act as the Secretariat for the International Sediment Initiative, including hosting and coordinating the implementation of projects relevant to sediment, sustainable water management and water environment and ecology;
4. to coordinate international cooperative research activities and to establish laboratory and research centres in order to provide facilities for laboratory and field work for the experts from other countries;
5. to organize international training courses, symposia or workshops on special subjects and international study tour and lecturing activities.

Functions of IRTCES

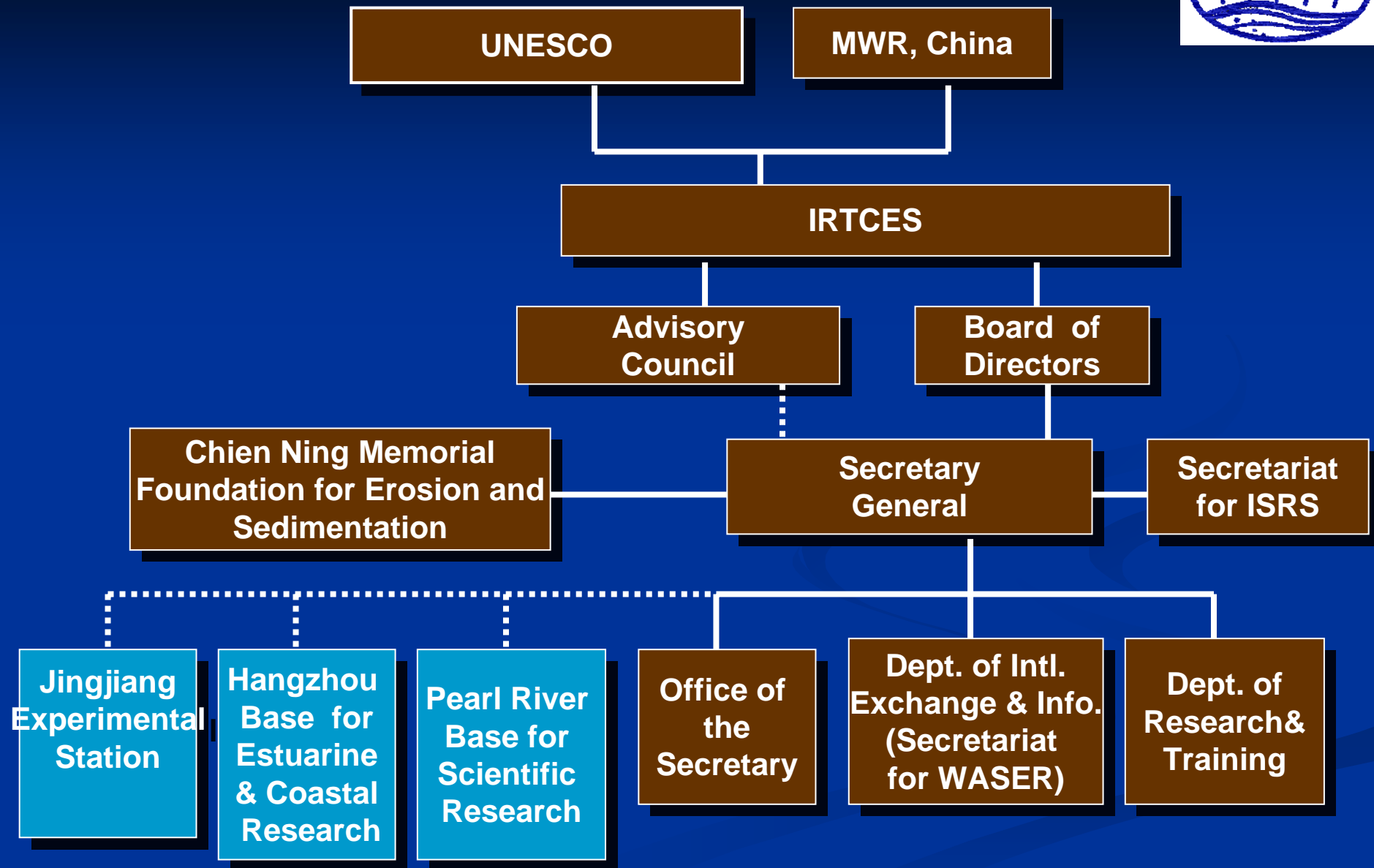


1. serve as the permanent secretariat for the International Symposium on River Sedimentation

2. publish the scientific journal *International Journal of Sediment Research* and other relevant publications;
3. serve as the permanent Secretariat of the World Association for Sedimentation and Erosion Research;



FRAME



STAFF STRENGTH



20 members

- 8 Professors
- 6 Senior Engineers/Associate Professors
- 1 post doctoral fellow
- 5 support staff
- including 7 staff with PhD degree



FACILITIES AND EXPERIMENTAL BASES



- **The Office Building** has a floor area of 4300m², consisting of offices, guesthouses, meeting rooms and a conference hall.
- **The Conference Hall** is equipped with advanced conference services, modern audio and video facilities and a computer management system.

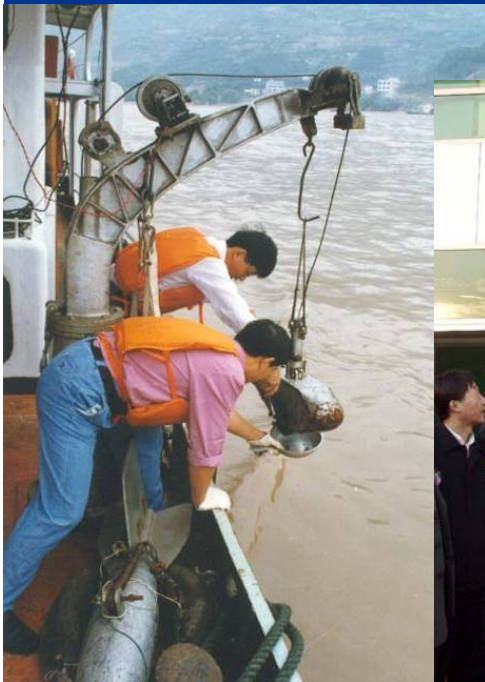


FACILITIES AND EXPERIMENTAL BASES



Three bases for experimental studies, training and international co-operative projects.

- Jingjiang Experimental Base in 1996
- Hangzhou Base for Estuarine and Coastal Research in January 1999
- Pearl River Base for Scientific Research on Dec. 14, 2005.



ACHIEVEMENTS



- In the past 2 decades, Chinese government has supported IRTCES with resources and financial input.
- Especially under the leadership of Ministry of Water Resources, P. R. China and UNESCO and with the support worldwide, IRTCES has conducted bilateral and multilateral collaborative research and training.



Chinese Premier Li Peng and Pakistan Premier Benazir Bhutto attending the signing ceremony of the memorandum between IRTCES and the Pakistan Commission of Water Resources (Dec.1993)

ACHIEVEMENTS



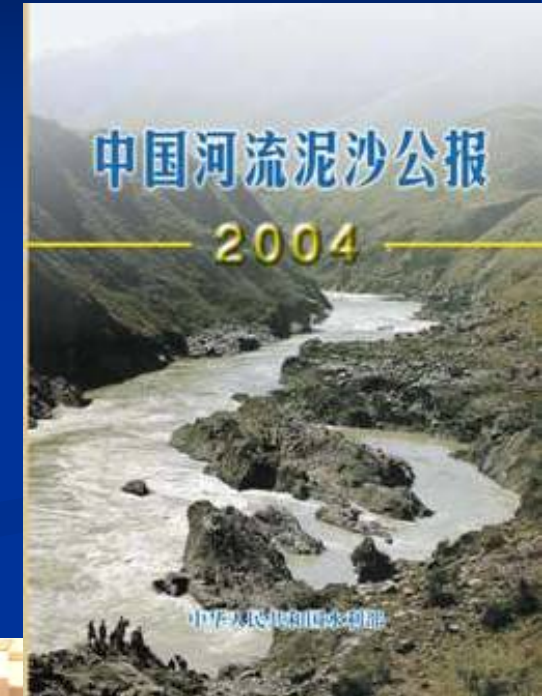
- IRTCES has conducted 100 research and consulting programs, organized 43 training courses with a total 2100 trainee from 33 countries, sponsored and co-sponsored 84 symposia and workshops and organized over 130 technical tours.



ACHIEVEMENTS



- IRTCES serves as the permanent Secretariat of the *International Symposia on River Sedimentation, International Conference on Estuaries and Coasts* and *World Association for Sedimentation and Erosion Research*, it is also responsible for the publication of the *International Journal of Sediment Research*, *China Gazette of River Sediment* and many other publications.



ACHIEVEMENTS



- IRTCES is also responsible for the management of Qian Ning (Ning Chien) Memorial Prize for Erosion and Sedimentation.
- After over 20 years' development, IRTCES has drawn recognition from sediment experts, won reputation worldwide and become one of the important partners of UNESCO in China.



Research Projects (International)



IRTCES has conducted 100 research and consulting programs, most of the research was funded by UNESCO, UNDP, WMO and the German government, and Japanese government, and Chinese government

- State-of-the-art of studies on soil erosion and its control in Loess areas in China (UNESCO)
- Research on water resources management (UNESCO)
- Analysis on peculiarities of the "92.8" flood event in the lower Yellow River (UNESCO)
- Application of GPS in reservoir sediment measurement (UNESCO)
- Shixia Small Watershed Management Project (UNESCO)
- IHP(fourth term) (UNESCO)
- Study of the protection on White Crane Ridge in the Yangtze River (UNESCO)
- Database of major rivers in China (UNESCO)
- Strategic measures for water management in the Fenhe River Basin (UNESCO)
- River mouth water management strategies for sustainable development of the region along the Bohai Bay of China (phase I & II) (UNESCO)
- Effect of watershed management on the reduction of sediment and runoff in the Jialingjiang River (UNESCO)
- On the 1998 flood in the Yangtze River Basin

Research Projects (International)



- 21st century strategies for mitigation of flood disaster in China (UNESCO)
- Strategy research on the comprehensive management and the sustainable development of the reservoirs on heavily sediment-laden rivers in North China (UNESCO)
- The variation in runoff and sediment load of the Yellow River (UNESCO)
- Strategy for integrated management of the Weihe River watershed (UNESCO)
- Support for sustainable development of the Yellow River Delta (UNDP)
- Sediment movement in unsteady and non-uniform flows in open channels (VW Foundation of Germany)
- Research on marine hollows (Sino-Japanese Joint Research)
- Study on the feasibility of a sediment budget for the Liwagu hydropower station in Malaysia (Malaysia)
- On erosion and sediment (WMO)
- Sediment-water-pollutant interactions in estuarine and coastal waters with particular reference to the Bohai Bay and deep Bay (Hong Kong)
- Construction of Warping Dams and Its Effects on Environment, Economy and Society in Loess Plateau Region in China (2004)
- Case Study on the Yellow River Sedimentation (2005, 2006)
- Yellow River Sedimentation (2005)
- Sediment Management and Wetland Conservation at Yellow River Mouth (2006)
- Integrated Physical and Ecological Management of Rivers – with Particular Reference to the East River—Phase II (2007)
-

Research Projects (Domestic)



IRTCES has performed more than 50 projects on sedimentation, soil and water conservation, and environmental engineering.



ORGANIZATION, COORDINATION AND PARTICIPATION IN DOMESTIC PROGRAMS



- Organization, coordination and participation in the national program of "**Sediment Research for the Three Gorges Project**" under the leadership of the Sedimentation Panel of the Three Gorges Project Construction Commission, the State Council of China.
- Coordination and participation in the study of "Variation in Runoff and Sediment Load of the Yellow River", a program of the Ministry of Water Resources of China.
- Organization, coordination and participation in the Major Research Project of the National Science Foundation of China (NSFC) and the Ministry of Water Resources "Mechanism of River Sedimentation Disasters and Control and Mitigation Strategies"



三峡工程泥沙专家组人员合影



“十.五”三峡工程泥沙研究课题交流会



建设中的三峡大坝
←三峡泥沙试验模型

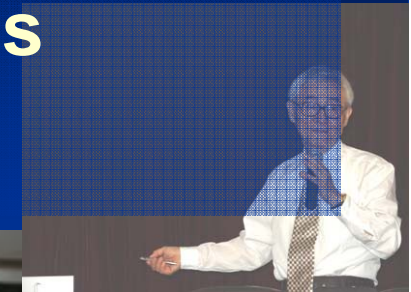


- Since 1985, IRTCES has organized 20 training courses
- Training on water resources for DPRK Engineers (2002)
- Mongolian Engineers Training (2002)
- International training course on sedimentation engineering in Pyongyang (2003)
- International Training course on river sedimentation and flood control (2003)
- International training on landslide and debris flow in Pyongyang (2004)
- Research study under UNESCO fellowship programme No. 303-1b(DPRK) (2004)
- International Training Workshop on Watershed Eco-Environment and Water Resources Management (2005)
- Flood Forecasting and preparedness at DPRK(2006)
- Advanced training workshop on reservoir sedimentation management (2007)

TRAINING



International Training Workshop on Watershed Eco-environment and Water Resources Management Beijing, Sept. 11-19, 2005



FIGURES	UNIT	Year	
		1960	2004
LEVEL	M	53,40	31,0
E	KM	1083	112,8
CE	STH	0	14,29* (2,86)*
ALIZATION			90*17**
INFLOW	KM		(127)



INTERNATIONAL SYMPOSIA /WORKSHOPS



- IRTCES has organized or co-organized 46 international symposia, workshops and seminars



Conferences



- 3 international conferences and 1 domestic conference (2002~2007).

- ① 10th International Symposium on River Sedimentation
Aug. 1-4, 2007, Moscow, Russia
- ② Ninth International Symposium on River Sedimentation
Oct. 18-21, 2004, Yichang, China
- ③ International Conference on Estuaries and Coasts
Nov. 9-11, 2003, Hangzhou, China
- ④ National Workshop on Advanced Sediment Measurement Techniques
November 23-25, 2005, Zhengzhou, China



INFORMATION EXCHANGE



- IRTCES exchanges data and information with 60 domestic institutes and 84 institutes from 48 countries throughout the world.
- The library of IRTCES has 50,000 books, and 125 periodicals.
- IRTCES constructed and maintained International Network on Erosion and Sedimentation (<http://www.irtces.org>)



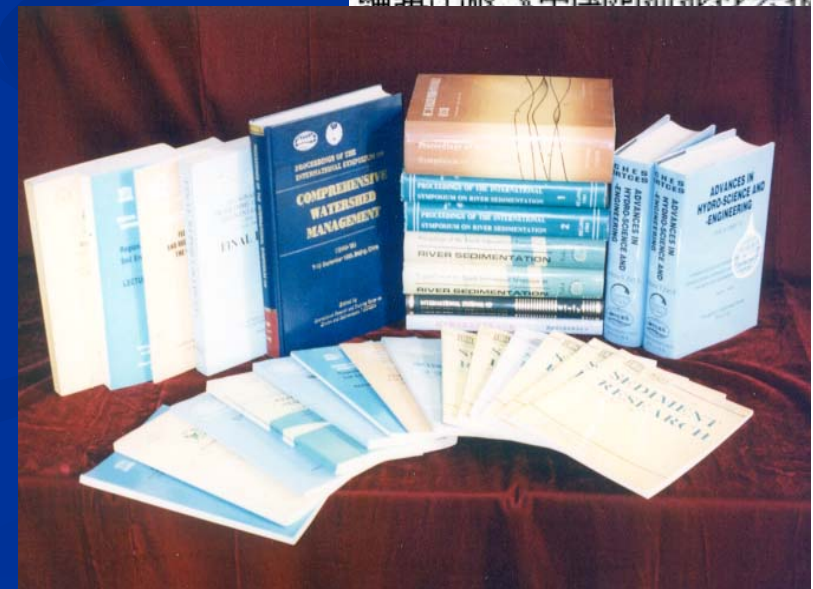
PUBLICATIONS



- Publication of the quarterly journal of the *International Journal of Sediment Research* began in 1986. Papers published in this journal are included in the Engineering Index (EI).
- IRTCES began publication of the Gazette of River Sediment in China in the year 2000. The data extend from 2 rivers to 11 rivers
- From time to time, IRTCES edits and publishes Chinese or English publications, including IRTCES circulars and monographs, proceedings, and lecture notes of training courses.



编辑出版《中国河流泥沙公报》



ISI Technical Secretariat (cont.)



ISI Steering Committee Core Member Meeting

(May 26, 2006, Beijing)

- The meeting is a symbol that the ISI Secretariat was formally put into operation, and IRTCES takes responsibility as the ISI Secretariat.



ISI Technical Secretariat (cont.)



ISI URL : <http://www.irtces.org/isi/>

INTERNATIONAL SEDIMENT INITIATIVE

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About ISI

- History
- Objectives of ISI

Structure

- UNESCO-IHP
- Steering Committee
- ISI Technical Secretariat

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[Yellow River] [USGS]
[GEMS]

MISSION STATEMENT

The International Sediment Initiative is expected to add a new dimension to ongoing efforts aiming at sustainable sediment management, in the context of sustainable water resources development at global scale. Hence, its mission directly relates to the commitments of the international community expressed in major documents such as the Millennium Development Goals, the Rio Declaration of Sustainable Development, the World Water Assessment Programme, World Water Development Reports, etc. By its activity, the International Sedimentation Initiative aims to uphold the importance of sustainable sediment management within the context of the two United Nations decades which have set-up in 2005: the 'Water for Life Decade' and the 'Decade for Education for Sustainable Development'. With direct access to stakeholders represented in the IHP National Committees and the Intergovernmental Council, ISI should be viewed as a vehicle to advance sediment management at the global scale.

IN FOCUS



[The 17th session of the Intergovernmental Council of the IHP was held at UNESCO Headquarters in Paris from 3 to 7 July 2006](#)

Thirty-five Member States that are members of the Council sent delegates. Forty delegations from Member States that are not members of the Council attended. Twelve governmental and non-governmental organizations and seven UN organizations were also represented.



[UNESCO IHP ISI Workshop on Sediment Management in South and Southeast Asia Held in Bangkok](#)

UNESCO International Hydrological Program (IHP) International Sediment Initiative (ISI) Workshop on Sediment Management in South and Southeast Asia was held in the Conference Centre of the Asian Institute of Technology (AIT) from April 24 through 25, 2006. This workshop is one of the activities of the UNESCO IHP ISI.

[There are more news in focus.](#)

Definitions

- Sediment** is any particulate matter that can be ...
- Sedimentation**: The act or process of depositing sediment...
- Erosion**: is the displacement of solids ...

[MORE >](#)

[The ISI Newsletter is sent quarterly to ISI members and interested experts](#)

The UNESCO IHP-ISI has a quarterly newsletter which brings you the latest news, information and events.

[Access the online version](#)
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Coming Events

- Erosion and Torrent Control as a Faction in Sustainable River Basin

ISI WebPages

News, events and information are updated regularly

国际泥沙项目

首页 关于ISI 主要活动及项目 ISI结构 新闻及大事 ISI信息系统 出版物

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ISI任务

国际泥沙项目 (International Sediment Initiative, 简称ISI) 的目标是可持续泥沙管理, 为全球范围可持续水资源开发的内容之一。因此, 国际泥沙项目的目的直接支持“新千年发展目标”、“里约可持续发展宣言”、世界水资源评估计划、“世界发展报告”等表述的任务密切相关。在联合国于2006年制订的“生命用水十年”和“可持续发展教育十年”两个十年框架内, 国际泥沙项目将通过其活动, 重视和支持可持续泥沙管理的重要性。通过直接与国际水文计划国家委员会和政府间理事会联系, 国际泥沙项目可以视为在全球范围促进泥沙管理的有效工具。

名闻定义

- Sediment**: is any particulate matter that can be ...
- Sedimentation**: The act or process of depositing sediment...
- Erosion**: is the displacement of solids ...

ISI简报

ISI简报一年四期, 发送给ISI专家指导委员会及感兴趣的专家。

联合国教科文组织国际水文计划 (IHP) 第17届政府间理事会会议在巴黎联合国教科文组织总部召开, 三十五个理事国会员国和四十个非理事国会员国代表参加了会议。十二个政府和非政府组织和七个联合国组织也派遣代表出席了会议。

[订阅](#)

your e-mail



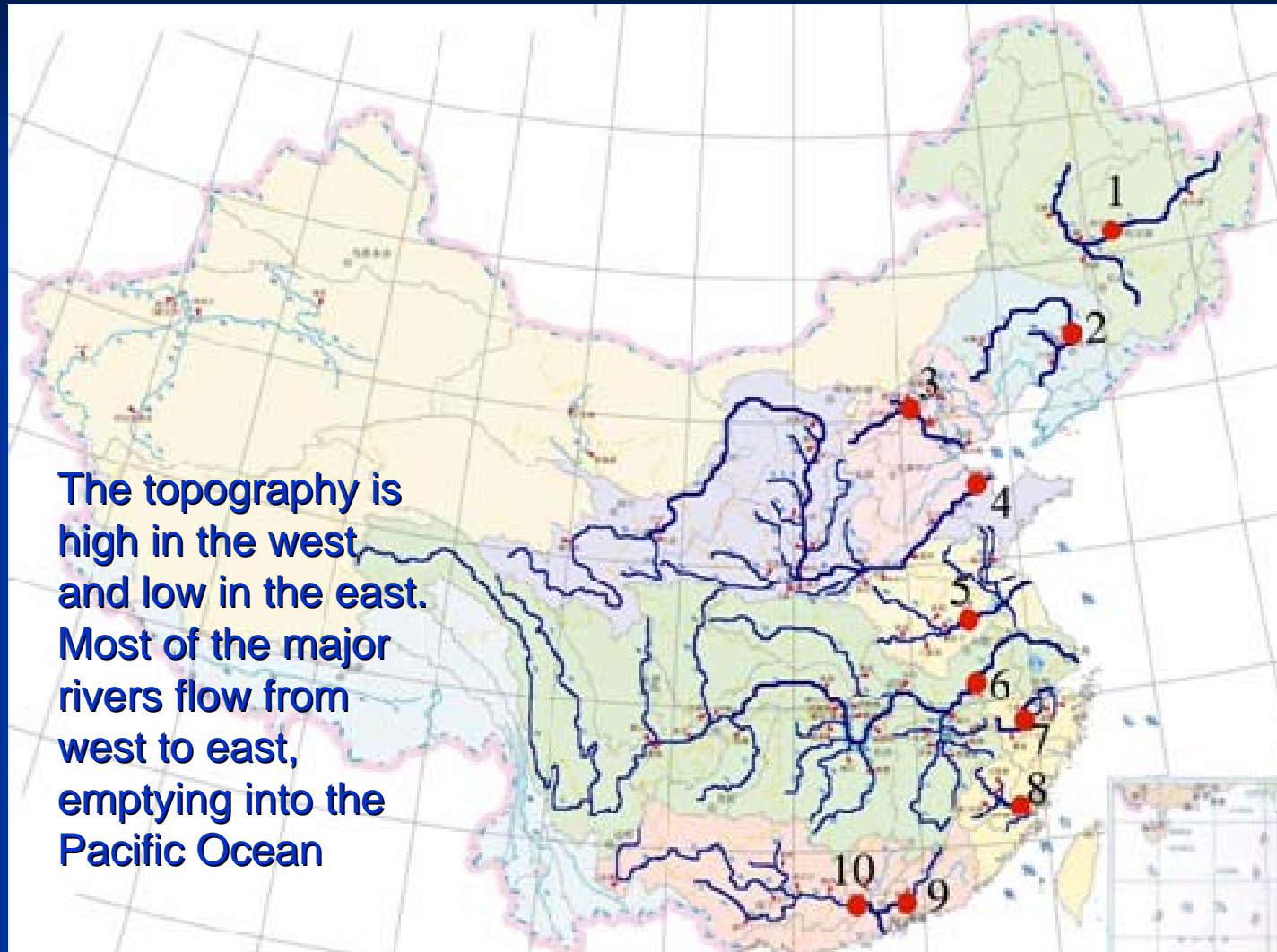
II. CHANGES IN WATER AND SEDIMENT LOAD, AND RIVER CHANNEL SEDIMENTATION IN CHINA

- **Changes in water and sediment load**

Changes in water and sediment load



■ General situation of major Chinese rivers



1. Songhua River 2. Liaohe River 3. Yongding River 4. Huanghe River 5. Huaihe River 6. Changjiang River 7. Qiantang River 8. Minjiang River 9. Dongjiang River 10. Xijiang River

Changes in water and sediment load



- Most of the territory is in the northern temperate zone and subtropical zone. East-Asian monsoon is the principal factor affecting the climate.

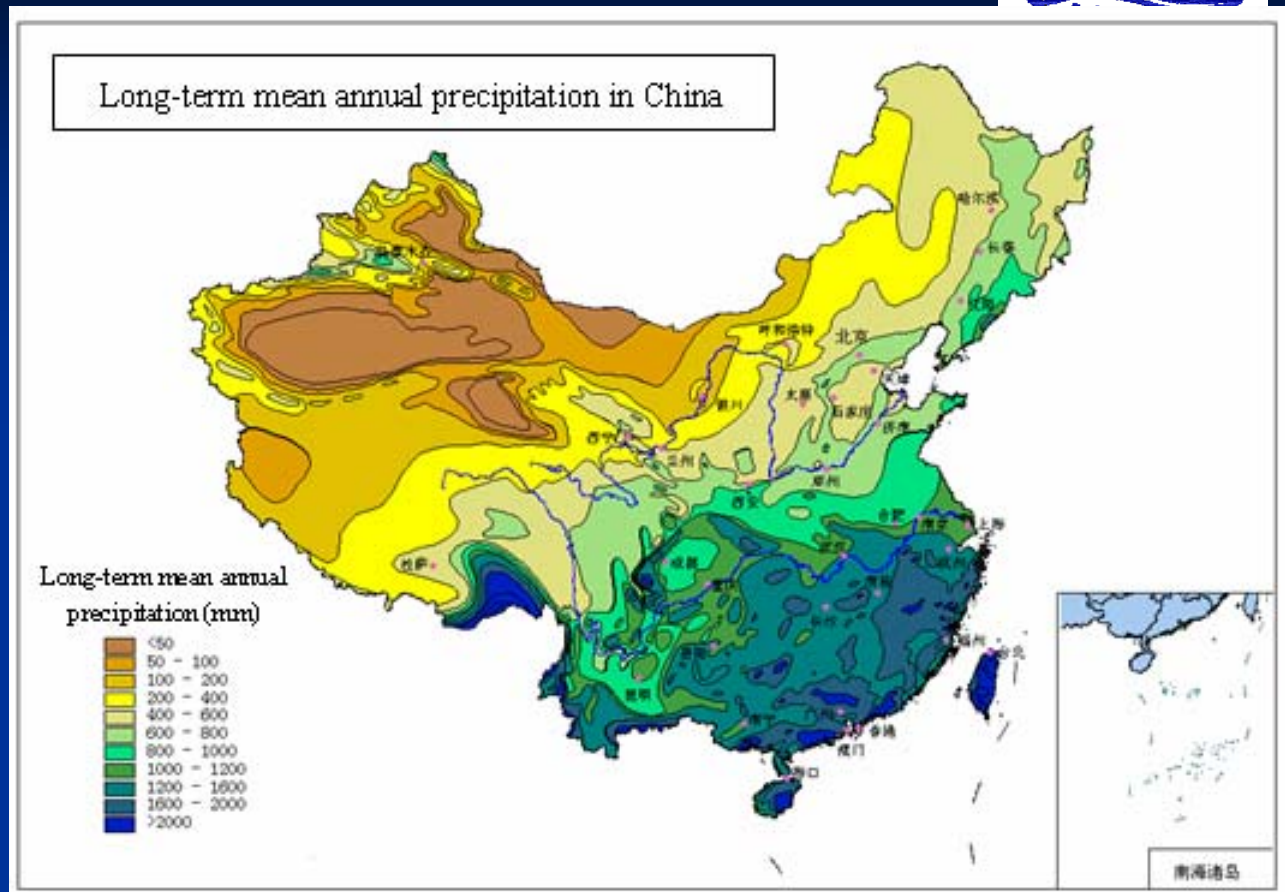


Fig. Long-term mean annual precipitation in China

The mean annual precipitation is as high as over 1500 mm in the regions along the southeastern coast and decreases gradually toward inland, reaching less than 50 mm in northwest

Changes in water and sediment load



- As for erosion rate , the Huanghe River is the largest, the Changjiang River is the second, and the Songhua River is the smallest.
- As for the sediment concentration, the Huanghe River still stands on the top, the Liaohe River becomes the second, and the Changjiang River stands third.
- Annual runoff of rivers in the south and southeast like the Changjiang, Pearl, Minjiang Rivers are stable, while rivers in the north like Huanghe, Liaohe Rivers show declining trend.
- Annual sediment load of almost all Chinese major rivers show decreasing trend.

Changes in water and sediment load

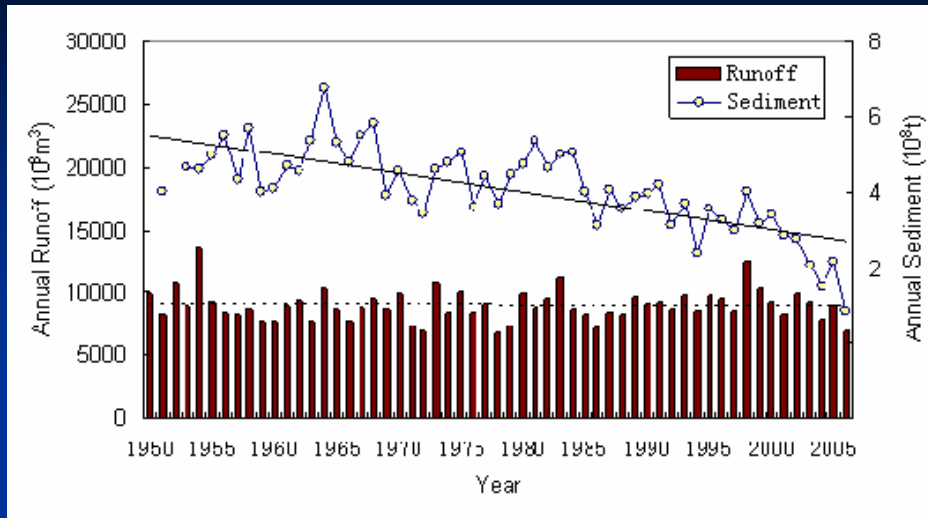


Fig. Changes of annual runoff and annual sediment loads at Datong Station, Changjiang River

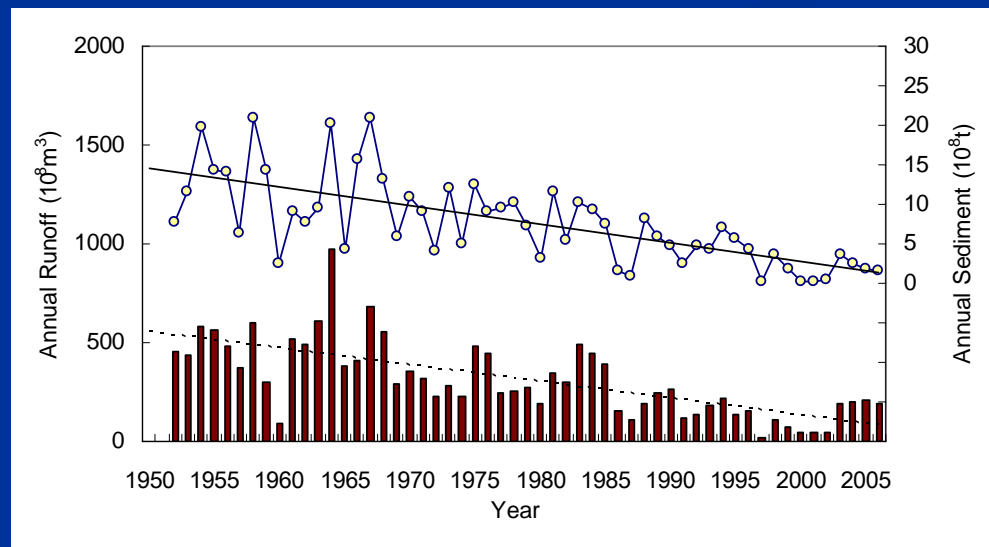
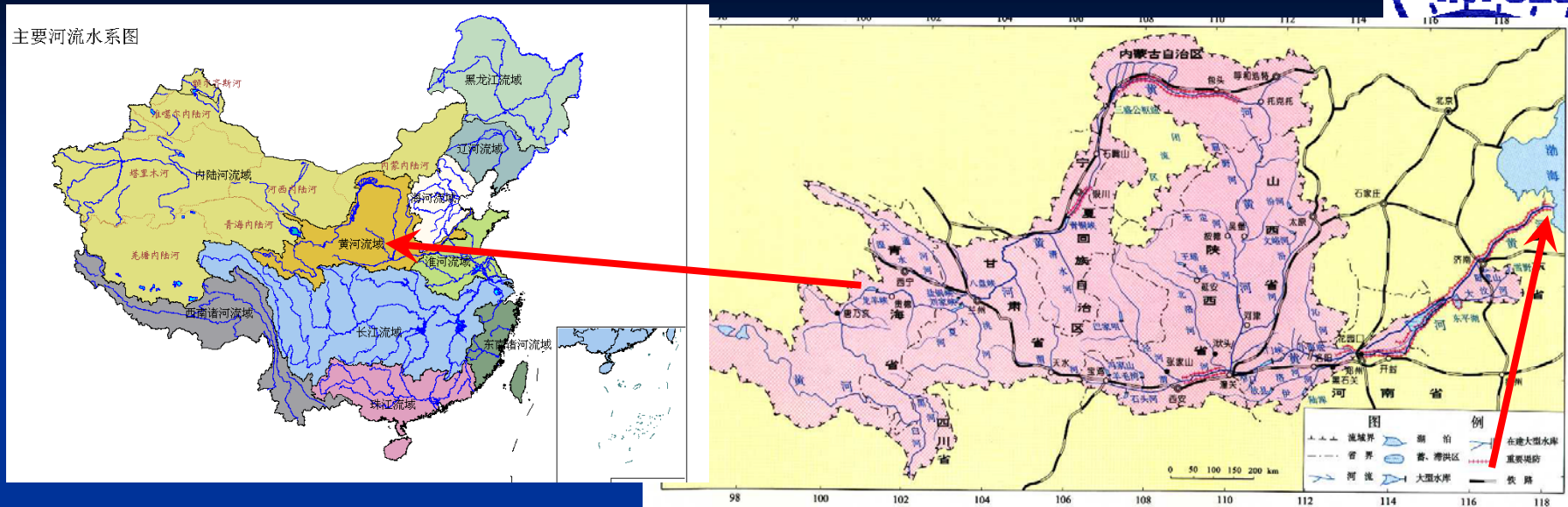


Fig. Changes of annual runoff and annual sediment loads at Lijin Station, Huanghe River



■ River channel sedimentation

Yellow River



With full length of 5464km. It carries an enormous amount of yellow earth and sand(1 billion tons/year). 10% - deposited in the channels; 40% - transport into the sea; 50% - deposited in the delta.
 → create 1 – 2 km²/year new wetland.

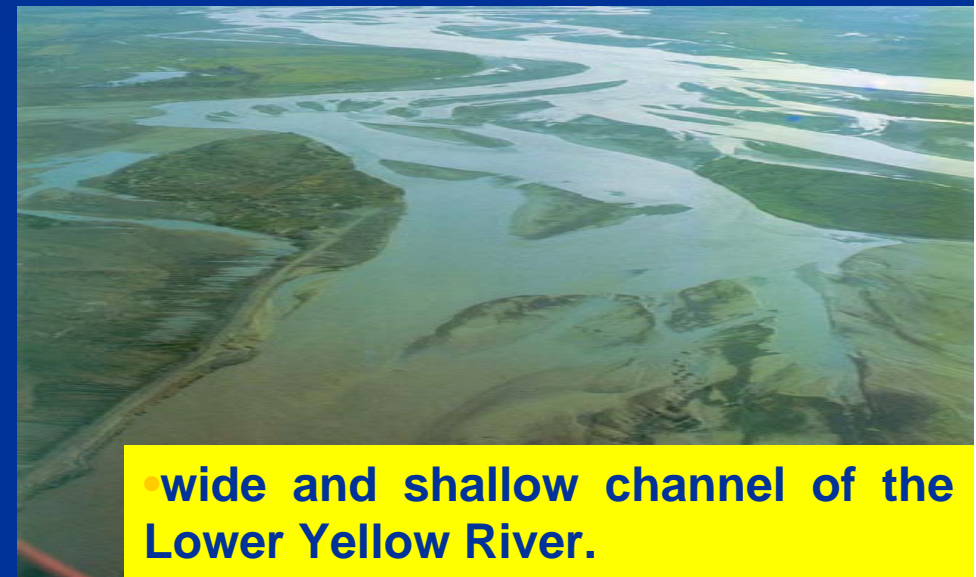


Yellow River



The Lower Yellow River (Menjing ~ Lijing), an alluvial channel, has a total length of 800km and an area of about 4000km²

Its average annual deposition amount is **0.2 billion t**, being in a state of continuous deposition and rising of the channel bed, resulting in **channel shrinkage and reduction in flood discharging capacity** .

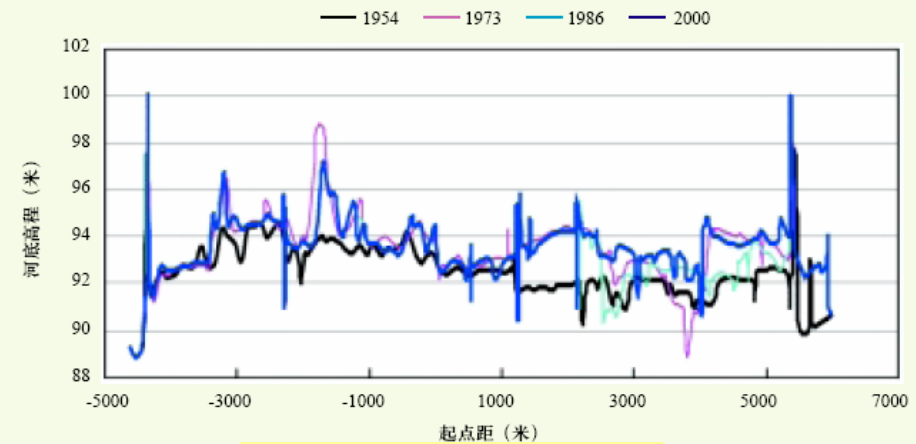
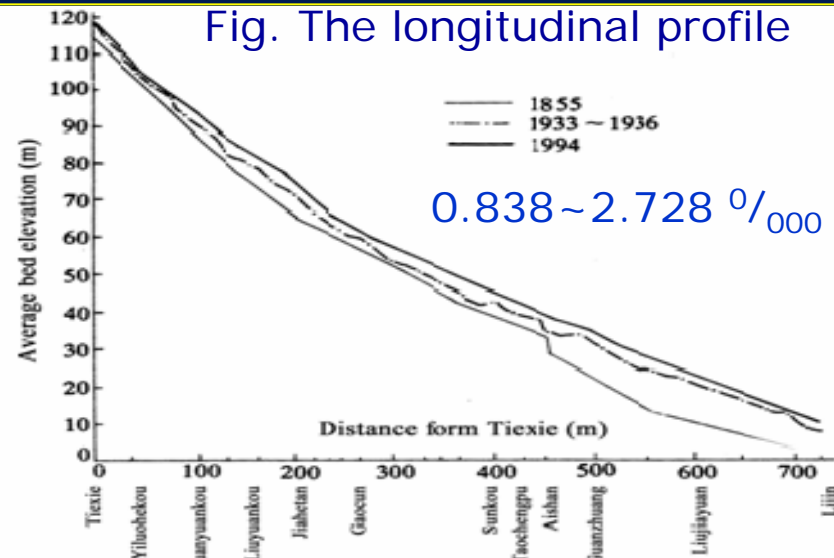


• wide and shallow channel of the Lower Yellow River.

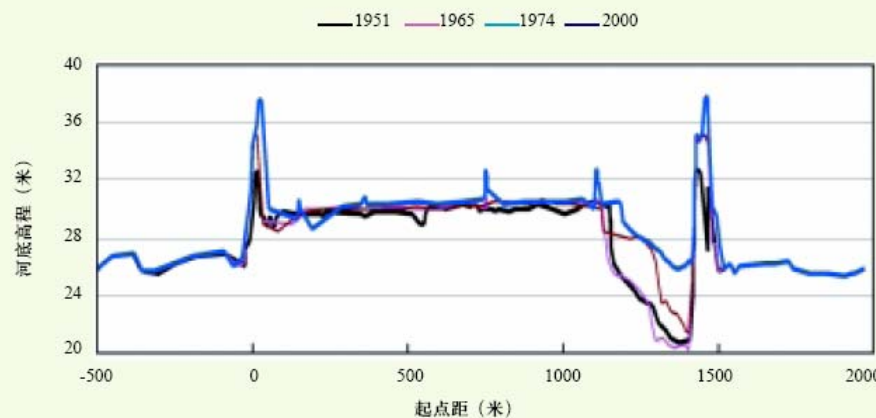
Yellow River



Fig. The longitudinal profile

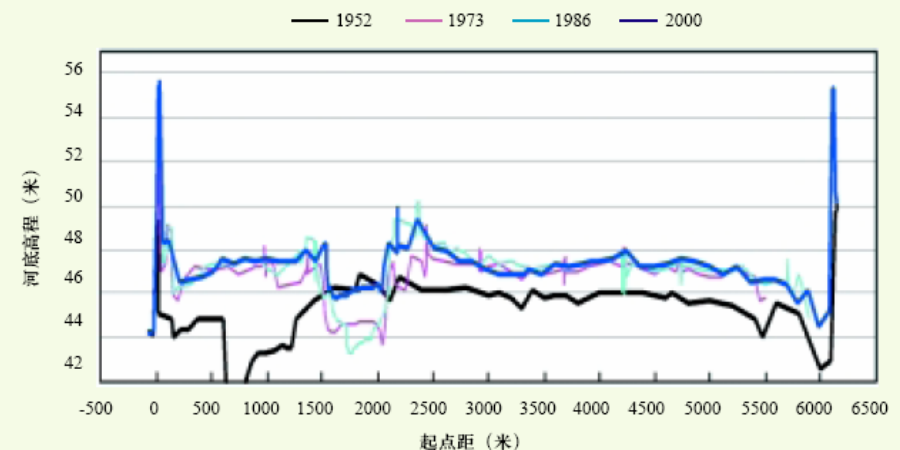


C.S. Huayunkou



C.S. Luokou

Meandering Reach



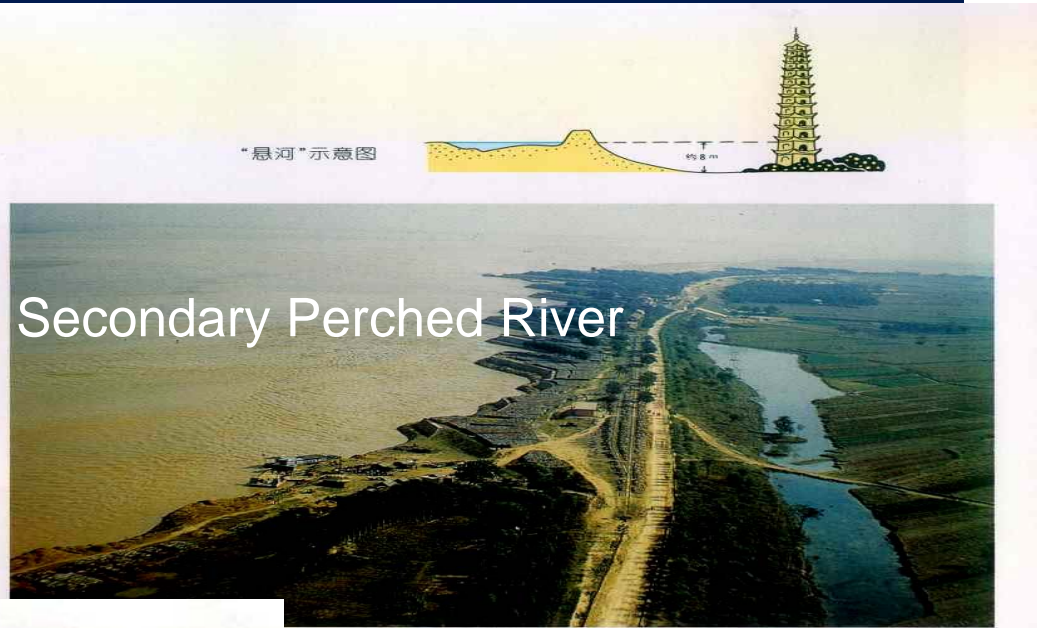
C.S. Sunkou

Wandering Reach

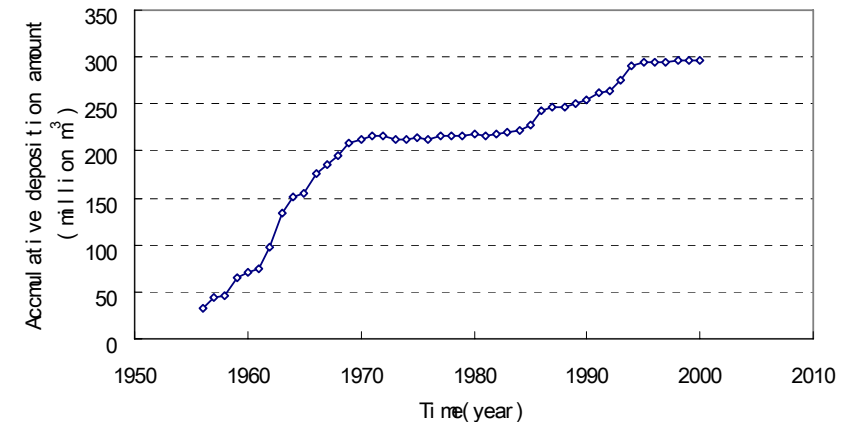
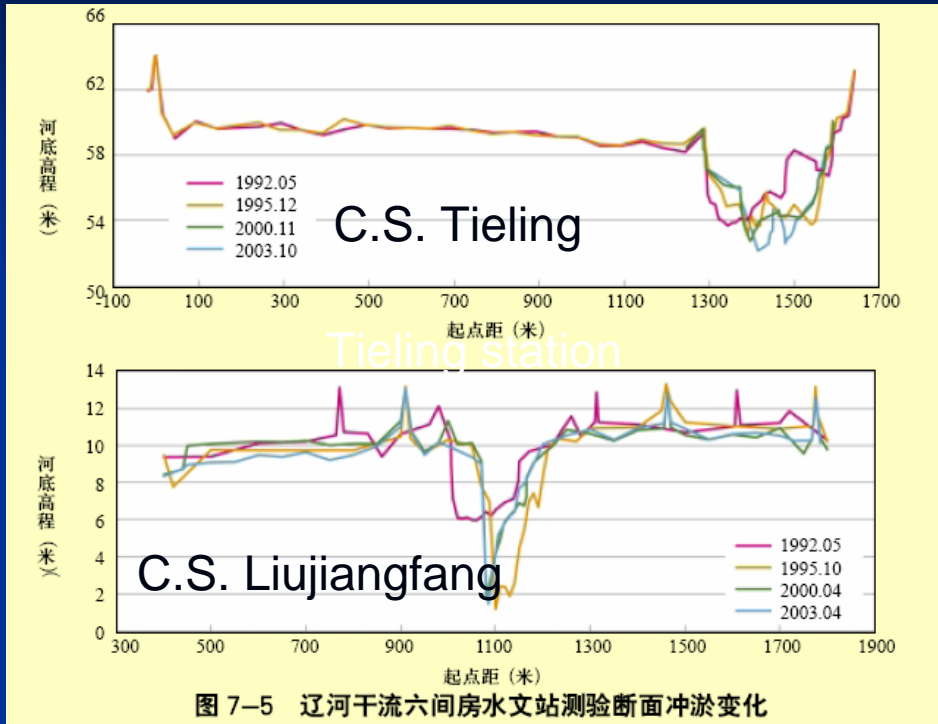
Yellow River



- The channel bed is generally 3 to 5 m higher than that of the ground behind the levees, the maximum 10 m.



Liaohe River



Accumulated erosion & deposition in the lower river

The floodplain of the lower Liaohe River, is 2~4m higher than the ground outside the dike. A perched river has been formed.



III. RIVER BASIN SEDIMENT MANAGEMENT IN CHINA

River Basin Sediment Management



■ Current Policy (for the Yellow RIVER)

The policy "Intercepting flood runoff and sediment load in upper basins, discharging them into the sea and warping and diverting them to both banks for bringing benefits", which is sometime shortly called as five-words policy: **intercepting**
regulating
discharging
warping
dredging.



River Basin Sediment Management



■ Soil and Water Conservation

- ◆ Comprehensive management on small watershed
- Engineering measures: slope-land works (**terraces**) and gully works(**check dams**)
- Vegetation Measures :afforestation, artificial pasture and closing off the natural hill
- Cultivation Measures: soil improvement by deep plough, rotation of fodder and crops, crop interplant and contour tillage





- ◆ Speeding up Construction of Dam System in Gullies : the runoff and sediment load discharging from slope land will be intercepted and reserved.
- ◆ Non-tillage and Afforestation and Artificial Posture on Steep Slope-lands: The erosion modulus of steep slope farmlands might reach 30 t/ km. So, the government forbid tillage on the slope-lands with slopes more than 25, where the cultivated farmland should be return to afforestation or artificial pasture.



■ Construction of reservoir in gorge reaches

◆ The reservoir, constructed on the gorge reach of a heavy sediment-laden river, with operation of " Storing clear water and discharging mudflow" could form a deposition terrain with a deep main channel and two high deposition flood plains,

which can be reserved for a long time and could be used for flood control, irrigation and power generation.

River Basin Sediment Management



- Integrated Regulating Runoff and Sediment Load by Reservoirs
 - ◆ Regulating the unfavourable combination of runoff and sediment load by reservoirs and to change their uneven distribution both in time and space to increase capacity of sediment transport.



Regulation by reservoirs



- **Warping Saline-alkali Lands and Raising and Widening Levees along the Banks**
 - ◆ Diversion sluices for diverting water
 - ◆ Warping on large scale saline-alkali lands outside the levees have been developed by using the turbid water
 - ◆ Making use of diverted sediment load to deposit the dike-footings along the levees



- **Dredging for Mitigating Sediment Deposition in River Channel**
- ◆ Dredging was combined with the engineering measures of raising and widening levees.



IV. Proposal of future strategies

Proposal of IRTCES



- Research work: carrying out pioneering research work
 - ◆ Optimal Use and Apportionment of Runoff and Sediment Resources
 - ◆ Research on global changes in water and sediment load .etc.
 - ◆ Integrated management on small watershed
- Database: ISI database, construction of global sediment database
- Training course: carrying out training course such as water resources management and flood control, watershed eco-environment water resources management , reservoir sedimentation management
- International research cooperation ,etc.



V. Closing remarks



IRT CES will actively take part in activities
organized by NARBO.

IRT CES welcome all of you to participate in
our activities

THANK YOU!
Welcome To Beijing!

