

**Format for Biennial Reports by UNESCO's Water-related Centres on activities related to the IHP in the period (June 2014 – May 2016)**

**1. Basic information on the centre**

Name of the Centre		International Research and Training Center on Erosion and Sedimentation (IRTCES)
Name of Director		Prof.Dr. Kuang Shangfu
Name and title of contact person (for cooperation)		Prof. Ning Duihu ( <a href="mailto:ningdh@iwhr.com">ningdh@iwhr.com</a> ; cc: Prof. Liu Cheng <a href="mailto:chliu@iwhr.com">chliu@iwhr.com</a> )
E-mail		
Address		20 Chegongzhuang West Road, Beijing 100048
Website		<a href="http://www.irtces.org">http://www.irtces.org</a>
Location of centre		city/town <u>Beijing</u> country <u>China</u>
Geographic orientation *		<input checked="" type="checkbox"/> global <input type="checkbox"/> regional
Region(s) (for regional centres)		
Year of establishment		1984
Year of renewal assessment		2011
Signature date of most recent Agreement		2005
<b>Themes of activities during reporting period</b>	Focal Areas ·	<input type="checkbox"/> groundwater <input type="checkbox"/> urban water management <input type="checkbox"/> rural water management <input type="checkbox"/> arid / semi-arid zones <input type="checkbox"/> humid tropics <input type="checkbox"/> cryosphere (snow, ice, glaciers) <input type="checkbox"/> water related disasters (drought/floods) <input checked="" type="checkbox"/> Erosion/sedimentation, and landslides <input type="checkbox"/> ecohydrology/ecosystems <input type="checkbox"/> water law and policy <input type="checkbox"/> social/cultural/gender dimension of water <input type="checkbox"/> transboundary river basins/ aquifers <input checked="" type="checkbox"/> mathematical modelling <input type="checkbox"/> hydroinformatics <input type="checkbox"/> remote sensing/GIS <input checked="" type="checkbox"/> IWRM <input checked="" type="checkbox"/> Watershed processes/management <input checked="" type="checkbox"/> global and change and impact assessment <input checked="" type="checkbox"/> mathematical modelling <input checked="" type="checkbox"/> water education <input type="checkbox"/> water quality <input type="checkbox"/> nano-technology <input type="checkbox"/> waste water management/re-use <input type="checkbox"/> water/energy/food nexus <input type="checkbox"/> water systems and infrastructure <input type="checkbox"/> other: (please specify) _____
	Scope of Activities ·	<input checked="" type="checkbox"/> vocational training <input checked="" type="checkbox"/> postgraduate education <input checked="" type="checkbox"/> continuing education <input type="checkbox"/> public outreach <input checked="" type="checkbox"/> research <input checked="" type="checkbox"/> institutional capacity-building <input checked="" type="checkbox"/> advising/ consulting <input type="checkbox"/> software development

\* check on appropriate box  
 · check all that apply

	<input checked="" type="checkbox"/> data-sets/data-bases development <input type="checkbox"/> other: (please specify) _____
Support bodies <sup>1</sup>	Ministry of Water Resources, China
Hosting organization <sup>2</sup>	
Sources of financial support <sup>3</sup>	sources of main budgetary: Ministry of Water Resources Other sources: Ministry of Science and Technology, National Natural Science Foundation, UNESCO, IRTCES service rendered
Existing networks and cooperation <sup>4</sup>	<ul style="list-style-type: none"> <li>● World Association for Sedimentation and Erosion Research (WASER)</li> <li>● World Association Of Soil &amp; Water Conservation (WASWAC)</li> <li>● Network of Regional Water Knowledge Hub in Asia-Pacific Region</li> <li>● Network of Asian River Basin Organization</li> <li>● International Association of Hydraulic Engineering and Research (IAHR)</li> <li>● International Association of Hydrological Science (IAHS)</li> <li>● Universiti Teknologi Mara (UiTM), Malaysia</li> <li>● National Centre for Computational Hydrosience and Engineering of the University of Mississippi (NCCHE), USA</li> <li>● National Hydroelectric Power Corporation LTD. (NHPC), India</li> <li>● ICHARM, Japan</li> <li>● RCUWM, Iran</li> <li>● ICIWaRM, USA</li> <li>● Elsevier</li> </ul>
Governance	<input checked="" type="checkbox"/> director and governing board <input type="checkbox"/> other: (please specify) _____ Link to election of board members to the IHP Intergovernmental Council (IGC) and hosting country IHP National Committee  Frequency of meetings: once every <u>  2  </u> year(s) <input checked="" type="checkbox"/> Existence of UNESCO presence at meetings
Institutional affiliation of director	
Number of staff and types of staff	total number of staff (full-time, or equivalent) : <u>  13  </u> number of staff who are water experts: <u>  12  </u> number of visiting scientists and postgraduate students: <u>  5  </u>
Annual turnover budget in USD	1.0 million USD

## 2. Activities undertaken in the framework of IHP in the period June 2014 – May 2016

### 2.1 Educational activities (i.e., those with accreditation) that directly contributed to the IHP-VIII (Appendix 1) and WWAP

<sup>1</sup> please specify bodies that cover the operational costs of the centre, and other essential costs such as salaries and utility bills, and that provide institutional support to ensure centre's sustainability

<sup>2</sup> if different from support bodies

<sup>3</sup> please specify sources of main budgetary and extrabudgetary funds to implement projects

<sup>4</sup> please write international networks, consortiums or projects that the centre is part of, or any other close links that the centre has with international organizations or programmes, which are not already mentioned above

*Please include here those activities which led to accreditation of degrees, or those held in formal school settings.*

The IRTCES is located in the campus of China Institute of Water Resources and Hydropower Research (IWHR) and have a close ties with the IWHR. IRTCES offers a portfolio of graduate degrees (Masters and PhD levels) in collaboration with IWHR. The degree courses on offer are delivered in the IWHR, Tsinghua University and IRTCES. Current students include:

- 1 PhD students.
- 4 Master students.

## 2.2 Research activities that directly contributed to the IHP-VIII activities *Please include research/applied projects outputs such as publications that directly contributed to the IHP-VIII and WWAP objectives*

### **Research projects finished** (Project name, financial supporter, project duration)

- Study on Lower Yellow River channel reconstruction and floodplain management, Ministry of Water Resources, 2013.5~2015.4
- Study on mechanism of water and sediment coupled allocation in the irrigation districts of the Lower Yellow River, National Natural Science Foundation of China, 2014.01-2016.12
- Analysis on water discharge for sediment transportation and changes in erosion and sedimentation of the Yellow River, Ministry of Water Resources, 2012.6-2014.12
- Study on assessment methods of soil and water conservation target-oriented responsibility system for local governments, Ministry of Water Resource, 2014.01-2014.12
- Study on bank collapse mechanism and prediction model for lower reaches of key water control project, National Natural Science Foundation of China, 2013.01-2016.12
- Study on Crucial Technologies of Erosion Prediction for Disturbed Surface under Wind Force, Ministry of Water Resources, 2012.1-2014.12
- Study on Fluvial Processes modeling and regulation techniques of TGP and its lower reaches, Key Projects in the National Science & Technology Pillar Program during the Twelfth Five-year Plan Period, 2012.06-2015.12
- Study on forecast mode and bank failure mechanism in lower fluvial reach of large key water-control project, National Natural Science Foundation of China, 2012.01-2015.12
- Acceptance of soil and water conservation for electric power plant in Yangcheng county, Enterprise, 2012.10-2014.10
- Acceptance of soil and water conservation for the motorway between Yichung city and Suihua city, Enterprise, 2012.05-2014.12
- Acceptance of soil and water conservation for the motorway between Bei'an city and Heihe city, Enterprise, 2012.05-2014.12
- Acceptance of soil and water conservation for the motorway between Neijiang city and Jigedaqi county, Enterprise, 2012.05-2014.05
- Frontier on Research and Applications of Remote Sensing Technology on Monitoring Suspended Sediment Concentration in Rivers, IWHR, 2015
- Research on Key technologies of soil erosion on disturbed surface under the action of wind, Ministry of Science and Technology, 2012.01-2014.12
- Revising "Code of Planting Shrubs On the Loess Plateau", MWR, 2013.01-2015.01
- Sediment transportation study in different space scale, Changjing River Scientific Research Institute, 2012.04-2014.12
- Soil and Water Conservation Evaluation on the Motorway from Beian to Heihe, Company, 2012.5-2014.8
- Soil and Water Conservation Evaluation on the Motorway from Lingqin to Shanyin, Company, 2014.7-2015.12
- Soil and Water Conservation Evaluation on the Motorway from Yichun to Suihua, Company, 2012.10-2014.8
- Soil and Water Conservation Monitoring on the Motorway from Fuxin to Panjin, Company, 2014.8-2014.11
- Soil and Water Conservation Monitoring on the Motorway from Fuxin to Panjin, Company, 2012.10-2014.11
- Soil and Water Conservation Monitoring on the Motorway from Zhangwu to Aerxiang, Company, 2014.8-2014.11
- Strategy for water and sediment variation of China main rivers, China Institute of Water Resources and Hydro-power Research , 2012.01-2015.12

- Study on numerical modeling for water sources protection project of Luanhe estuary wetland of Yuqiao reservoir, Tianjin Municipal Water Conservancy survey and Design Institute, 2014.08-2015.08
- Study on optimizing water and sediment allocation in the Lower Yellow River, Key Projects in the National Science & Technology Pillar Program during the Twelfth Five-year Plan Period, 2011.11~2015.6
- Study on sedimentation and its control measures for Chongqing ports and navigation channel, National Science and technology support plans, 2012.01-2015.12
- Transformation and Its Application on Ecological Recovery Key Technology in the Farming-pastoral Ecotones of the Loess Plateau, MOST, 2013.09-2015.08
- Variation trend of runoff and sediment load and its influence factors, Changjiang Water Resources Commission survey planning and Design Institute, 2012-2014
- Water and sediment variation situation and its coping strategy of China rivers, IWHR, 2012.1-2015.12
- Water resources confirmation on Dongfeng city land development project of Chaoyang District, Beijing Xinghuo real estate development limited liability company, 2015.04-2015.12

**Research projects being carried out** (Project name, financial supportor, project duration)

- Collaborative Study on Changes in Runoff and Sediment loads of Global Rivers and Integrated River Sediment Management, Ministry of Science and Technology, PR China, 2014-2017.
- Study on model of dynamic optimization for water and sediment resources in irrigation area of the Lower Yellow River, National Natural Science Foundation of China, 2014.01-2016.12
- Response of Runoff and Sediment Process from a Typical Watershed on the Loess Plateau to Land Use/Land Cover Change, National Natural Science Foundation of China, 2016-2018
- Change of Erosion Status and Assessment of Ecological Risk for a Typical Hilly Watershed in Southwest Mountain Region, 973 National Programme, 2015-2017
- Study on Technologies of Monitoring and Evaluation for Soil and Water Conservation Ecological Effects, Ministry of Water Resources, 2015.1-2017.12
- Specification for Measurement and Estimation of Soil Loss in Soil Disturbance of Engineering Construction, Ministry of Water Resources, 2015.1-2017.12
- Collection and release of data for global soil erosion and river sediment, Ministry of Water Resources, 2016.1-2018.12
- Study of Sediment Source at Different Temporal and Spatial Scales in a Typical Watershed in the Black Soil Region of Northeast China, National Natural Science Foundation of China, 2016.1-2018.12
- Study of Sediment Source at a Typical Small Watershed Based on the Method of Fingerprinting, China Institute of Water Resources and Hydropower Research, 2016.1-2016.12
- Demonstration Assessment and Technical Consulting on Ecological Reconstruction for Soil and water conservation at Zhidan County in the Loess Plateau, Zhidan County People's Government, 2012.01~2018.12
- Erosion and sedimentation Calculations for the Dongzhuang Reservoir on the Jinghe River and the Lower Weihe River, Yellow River Design Company, 2013.4-2022.3
- Management technology on the Lower Yellow River floodplain protection and sediment transportation, Ministry of Water Resources, 2013.5-2016.12
- Studies on problems of the Lower Yellow River channel reconstruction and floodplain management, Ministry of Water Resources, 2014.10-2019.10

**2.3 Training activities that directly contributed to the IHP-VIII and WWAP objectives**

- An International Workshop on Sediment Management in Water Resources and Hydropower Projects: Beijing, China, August 18-22, 2014. The workshop was organized through a partnership between the World Bank and IRTCES, with support of the Asia Sustainable and Alternative Energy Program (ASTAE). Forty two participants (including one woman) of the workshop included: managers and experts of hydropower projects from 13 countries - Afghanistan, Bangladesh, Bhutan, Cambodia, India, Indonesia, Laos, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand and Vietnam; energy specialists from the World Bank; trainers who specialize in sediment management from USA and China; IRTCES experts; and PhD students from the Tsinghua University.

- Training on assessment of acceptance for soil and water conservation engineering of development and construction projects: Jan. 27-30, 2015, Nanning, China. 322 Participants, among which 218 participants are women.

### **3. Collaboration and linkages**

#### **3.1 Participation in major international networks, programmes, partnerships with other UN or other International Agencies, media and professional bodies**

- UNESCO-IHP International Sediment Initiative (ISI) Technical Secretariat at IRTCES
- World Association for Sedimentation and Erosion Research (WASER) Secretariat at IRTCES
- Water and Soil Conservation Association (WASWAC) Secretariat at IRTCES
- Participation in Network of Regional Water Knowledge Hub in Asia-Pacific Region
- Participation in Network of Asian River Basin Organization (NARBO)
- Partnership with International Association for Hydro-Environment Engineering and Research (IAHR)
- Partnership with International Association of Hydrological Sciences (IAHS)
- Partnership with Universiti Teknologi Mara (UiTM), Malaysia
- Partnership with National Centre for Computational Hydroscience and Engineering of the University of Mississippi (NCCHE). USA
- Partnership with National Hydroelectric Power Corporation LTD. (NHPC), India
- Partnership with Regional Centre on Urban Water Management (RCUWM), Iran
- Partnership with International Centre on Qanats and Historic Hydraulic Structures (ICQHS), Iran
- Partnership with International Centre for Water Hazard and Risk Management (ICHARM), Japan
- Partnership with International Center for Integrated Water Resources Management (ICIWaRM), USA
- Partnership with Elsevier

#### **3.2 Participation in meetings related to the IHP and UNESCO (e.g. the UNESCO General Conference, the UNESCO Executive Board, the IHP Intergovernmental Council and/or other meetings organized by IHP)**

- The 21st session of the International Hydrological Programme (IHP) Intergovernmental Council of the UNESCO was held in Paris on 18 – 20 June 2014. Prof. Hu Chunhong, IRTCES and ISI Secretary-Generals, and Prof. Liu Cheng, IRTCES Deputy Division Chief and ISI Secretary and Steering Committee member, attended the meeting as representatives of Chinese Delegation and UNESCO Category II Centers.
- The meeting of water related UNESCO Category II Centres was held in Koblenz, Germany, on December 15-17. IRTCES Deputy Director Prof. Ning Duihu participated in the meeting and introduced activities of IRTCES and IHP – International Sediment Initiative (ISI) and had discussions with other centers.
- Prof. Ning Duihu attended COP 21 in Paris, France, December, 2015.

#### **3.3 Collaboration and networking with other UNESCO category 1 or 2 institutes/ centres**

##### **3.3.1 cross-appointment of directors of the category 1 or 2 institutes or centres on the governing board**

- Prof. Gao Zhanyi, formal Deputy Director of the IRTCES, serves as one of the members of the Governing Board of the ICQHS.

##### **3.3.2 exchange of information on activities such as training/educational materials, and funding opportunities**

##### **3.3.3 exchange of staff, most notably professionals and students**

##### **3.3.4 implementation of joint activities, such as workshops, conferences, training programmes, joint projects, field visits, software and data sharing, knowledge exchange and publications**

- Discussion on joint activities with IHE, ICHARM, RCUWM, ICIWaRM, and other related institutes.

- Joint research project with ICIWaRM: Collaborative Study on Changes in Runoff and Sediment loads of Global Rivers and Integrated River Sediment Management supported by the Ministry of Science and Technology, PR China.

### 3.4 Relationships with the UNESCO field and regional office whose jurisdiction covers the country of location

IRTCES keeps closed cooperative relationship with UNESCO Office Beijing. A good and regular communication has been built to exchange ideas and information and discuss some important events and special cases between both sides.

### 3.5 Relationship with the UNESCO National Commission and the IHP National Committee in the country of location and with other organizations of other countries

Chinese National Commission for UNESCO and Chinese National Committee for IHP provided lots of guidance to IRTCES in capacity building and development of IRTCES and also gave full supports to IRTCES activities.

### 3.6 Relationship with other UNESCO-related networks, such as UNESCO Clubs, ASPnet, and UNESCO chairs

Some contacts with related UNESCO chairs.

## 4. Communication

### 4.1 Communication and knowledge dissemination activities undertaken in the framework of IHP

- The UNESCO – IHP - International Sediment Initiative (ISI) 'Programme Planning Workshop': Beijing, China, 25-28 May 2015. The workshop brought together members of the ISI advisory and expert groups, representatives of relevant UNESCO Category II Centres and Chairs and other partner organizations, as well as other stakeholders to discuss action plan for the future ISI programme, set priorities, and explore opportunities for collaborative projects with partner agencies within the framework of the ISI objectives. 25 participants.
- The ISI Steering Committee Core Group Meeting: Beijing, China, August 5 – 6, 2014. Participants 7. The past ISI activities and achievements, and ISI Technical Secretariat were reviewed. The ISI objectives and overall strategy were reviewed and the need for updating discussed.
- The Fifth International Conference on Estuaries and Coasts (ICEC-2015): Muscat, Oman, November 2-4, 2015. The ICEC-2015 was organized by the Sultan Qaboos University (SQU), and sponsored by IRTCES. About 150 participants from more than 20 countries and regions around the world participated in the ICEC 2015.
- International Youth Forum on Soil and Water Conservation: October 16 -18, 2015, Nanchang, China. IRTCES sponsored the forum. More than 150 participants distributed in 20 countries have attended this forum.
- International Workshop on Construction of Clean Small Watersheds and Beautiful Countryside: September, 2014, Beijing, China. IRTCES co-organized the workshop.
- Prof. Ning Duihu and Dr. Du Pengfei attended the ISCO 18 Conference in El Paso, USA, June, 2015 and made presentations.
- Prof. Ning Duihu and Prof. Liu Xiaoying attended the 9th International Soil Congress in Antalya, Turkey, October, 2014 and made presentations.
- Prof. Chen Jianguo attended the 2nd Conference on the Status and Future of the World's Large Rivers in Manaus, Brazil, July 2014 and made presentations.
- Prof. Liu Guangquan, Prof. Liu Cheng and Prof. Shi Hongling attended the 5th International Conference on Estuaries and Coast (ICEC2015) November 2-4, 2015, Muscat, Oman and made presentations.
- Dr. Jerome Delli Priscoli, Senior advisor of the U.S. Army Corps of Engineers at the Institute for Water Resources visited IRTCES on June 4, 2014. Dr. Liu Cheng, IRTCES Deputy Division Chief had a meeting with Dr. Priscoli in the afternoon, collaborations and joint research projects between IRTCES and the International Center for Integrated Water Resources Management (ICIWaRM) were discussed.
- Dr. Wen Huei Chang, Senior Economist / Technical Team Lead of the Institute for Water Resources, U.S. Army Corps of Engineers, visited IRTCES on December 12, 2014. IRTCES Deputy Directors Prof. Ning Duihu and Prof. Liu Guangquan welcomed

him and held a meeting with him. Prof. Ning and Prof. Liu introduced IRTCES and its activities, and discussed the potential for substantive cooperation between the two UNESCO Category II Centres with Dr. Chang. IRTCES division chiefs Prof. Chen Jianguo, Prof. Liu Cheng and Prof. Liu Xiaoying also participated in the meeting.

- Prof. Viollette Geissen and Prof. Coen Ritsema, Wageningen University Netherland, visited IRTCES in October 2014. Seeing opportunity for future cooperation.
- Jimmy Ocana, Hermilio Valdizan University, Peru, visited IRTCES in September, 2015. Visit WASWAC Secretariat.

#### 4.2 Policy documents and advice

See list of publications under 8.1.

### 5. Update on Centre Operations

#### 5.1 Membership of the Board of Governors between designated period

IRTCES is administrated by a Board of Directors, which is appointed by the Ministry of Water Resources, P. R. of China. The Secretary General presides over the routine work of IRTCES. The Board consist one director and three deputy directors.

Director: Prof. Kuang Shangfu

Deputy Directors: Prof. Hu Chunhong (Secretary General), Prof. Ning Duihu and Prof. Liu Guangquan

#### IRTCES' Advisory Council (2005-2011):

13 members including one representative of the Chinese Government, one representative of the Director General of UNESCO, six members elected by the IHP Intergovernmental Council and five members selected by the Government in consultation with the Director-General of UNESCO.

New IRTCES Governing Board will be formed after the Agreement between UNESCO and Chinese Government on IRTCES is renewed.

#### 5.2 Key decisions made (attach minutes of meetings)

### 6. Evidence of the Centre's Impacts

#### 6.1 Science Impacts (Major contributions to the science, technology, education, and regional and/or international cooperation in the field of water)

- Contribution to the science development on erosion and sedimentation: All activities conducted by IRTCES not only focused on study of traditional sediment theories, such as sediment transport, fluvial processes and related topics, but also put great efforts into combination of traditional theories with engineering problems and solution of natural problems in erosion and sedimentation management of river basin. In recent years, IRTCES organized some research projects and important conferences and themed workshops for studying and discussing some key issues and advanced concepts on ecological environment, river system management, river channels training and environmental sedimentation, etc. These activities made a great impact on erosion and sedimentation research in the future.

See list of research projects under 2.2.

#### 6.2 Knowledge Transfer Impacts (Major achievements in the dissemination of knowledge and technology transfer)

- Publication of a quarterly *International Journal of Sediment Research*. 31 volumes of the journal have been published till 2016.
- Publication of a quarterly *International Soil and Water Conservation Research* since 2013. 4 volumes of journal have been published.
- Publication of annual official publication *China Gazette on River Sedimentation* since 2000. 15 issues of gazette have been published.
- Organization the triennial International Symposia on River Sedimentation (ISRS). The 12<sup>th</sup> ISRS was held in Kyoto, Japan with 388 participants from 28 countries/regions on September 2-5, 2013. The next symposium will be held in Germany in September 2016.

- Organization the triennial International Conferences on Estuaries and Coasts (ICEC). The 5<sup>th</sup> ICEC was held in Muscat, Oman, November 2-4, 2015, with 150 participants from 20 countries and regions. The next conference will be held in France in 2018.
- Organization the triennial WASWAC World Conference. The 3rd WASWAC World Conference will be held in August 22-26, 2016 in Belgrade, Serbia with the theme of New Challenges and Strategies of Soil and Water Conservation in the Changing World Sustainable Management of Soil and Water Resources.
- Proceedings of above mentioned conferences have been published containing a wealth of knowledge, practical experience and theoretical information.
- Knowledge dissemination through WebPages of IRTCES (<http://www.irtces.org/>), UNESCO-ISI (<http://www.irtces.org/isi/>), WASER (<http://www.waser.cn>) and WASWAC(<http://www.waswac.org>), as well as ISI Newsletters, WASER Newsletters and WASWAC Newsletters.
- Free access database “Global Data on Erosion and Sedimentation” (<http://data.irtces.org/>).

### 6.3 Policy Impacts (advice sought by government and other bodies and evidence of inputs into policy arena)

- Synthesis of the ISI Case Study Reports: Case studies prepared as a key component of the ISI, have been produced for the Nile River Basin, the Mississippi River Basin, the Rhine River Basin, the Volga River Basin, the Yellow River Basin, and the Haihe and Liaohe River Basins. These case studies are available online from the ISI website. The synthesis of these existing case studies is intended to provide an accessible overview of sediment problems and sediment management around the world for water managers and policy makers. Key issues relating to sediment management are explored using examples from the various case studies and recommendations for developing management strategies have been extracted from these experiences.
- Technical support to the Sedimentation Panel of the Three Gorges Project under State Council of China: IRTCES is responsible for Sedimentation Panel of the Three Gorges Project. Before and during construction of TGP a large number of research projects including physical and mathematical models on TGP sedimentation problems were organized. The research results and analysis reports were directly submitted to the State Council for decision making on Project operation and utilization.
- China Gazette of River Sedimentation for Ministry of Water Resources: Since 2002 IRTCES has been in charge of editing Gazette of River Sediment in China for collection and analysis of erosion and sedimentation data in main river systems in the country. It provided observation data for governmental decision makers in dealing with problems of river regulation, water resources management and investment.

## 7. Future activities that will contribute directly to IHP and/or to WWAP

### 7.1 Operational Plan (attach if available)

- (1) Fulfill responsibilities for serving several secretariats:
  - For ISI technical secretariat, IRTCES will continue to provide technical services to ISI activities including assisting in organization and arrangement of ISI Steering Committee meeting, update of webpage and Sediment Information system, editing Newsletter and other necessary jobs;
  - For WASER and WASWAC secretariats, IRTCES will assist WASER and WASWAC Councils to keep good operation and develop network and related projects.
- (2) Conference organization
  - The 13th International Symposium on River Sedimentation to be held in Stuttgart, Germany in 2016.
  - The 6<sup>th</sup> International Conference on Estuaries and Coasts to be held in France in 2018.
- (3) Research projects
  - Carry out research projects being listed in 2.1.
  - Try to have more international research projects and collaborate project.



- (4) Publications
  - International Journal of Sediment Research
  - International Soil and Water Conservation Research
  - China Gazette of River sedimentation
- (5) Training workshops organization
  - To organize International and National training workshop on relevant themes.
- (6) Networking
  - Collaboration and networking with other UNESCO's water related centers (Category I and II), such as exchange visit and staff and students exchange.
  - Collaboration with ISI to continue ISI case studies.
  - Collaboration with IHP member states to further develop the database of Global Date of Erosion and Sedimentation.
  - Promote WASER and WASWAC activities and capacity building in networking
  - Collaboration with all hubs in Network of Regional Water Knowledge Hub in Asia-Pacific Region, such as exchange visit and mutual supportive of activities

7.2 Strategic Plan linked with IHP-VIII (Appendix 1). Focal areas within IHP-VIII the centre plans to contribute to and specific actions the centre will undertake to align its activities with the strategic plan for IHP-VIII

Same as the Operational Plan

## 8. Annexes

8.1 List of publications released by the centre (there can be overlap with those listed in 2.3 above)

### Journal Paper

- Chen, Jianguo et al. 2014. Some laws on flow and sediment transport in Sanmenxia Reservoir - study for effects of retrogressive erosion in reservoir on sedimentation of the Lower Yellow River. Journal of Hydraulic Engineering (Shuili Xuebao), Vol. 45, No. 10 (in Chinese)
- Chen, Jianguo et al. 2015. Ponderations and suggestions on operation mode of Xiaolangdi Reservoir in its second stage of sediment retaining. Journal of Hydraulic Engineering (Shuili Xuebao), Vol. 46, No. 5 (in Chinese)
- CHENG Shi-you, LIU Guang-quan, GONG Li-qun. A Study on Biomass and its Nutrient Accumulation of Sharptooth Oak Stands at Luoyuan in South Slope of Qinling Mts. [J]. Journal of Southwest Forestry College, 2016,02 "in Chinese"
- D.E. Walling, P. Du, P. Porto, Y. Zhang, 2014. Upscaling the application of fallout radionuclides to support catchment sediment management programmes, in: Managing soils for food security and climate change adaptation and mitigation, Edited by L.K.Heng, et al., FAO and IAEA, Rome, 99-105.
- D.E. Walling, P.Porto, Y. Zhang, P. Du, 2014. Upscaling the use of fallout radionuclides in soil erosion and sediment budget investigations addressing the challenge, International Soil and Water Conservation Research, 2,3, 1-21.
- Hu Chunhong, Wang Yangui. Sediment Problems and Relationship between River and Lakes Since the Operation of Three Gorges Project [J]. Journal of Yangtze River scientific institute, 2014, Vol.31 (5), in Chinese
- Hua Li, Shunbo Yao, Rensheng Yin, Guangquan Liu. Assessing the decadal impact of China's sloping land conversion program on household income under enrollment and earning differentiation[J]. Forest Policy and Economics, 2015
- JIAO Xing, LIU Guangquan, TU Xiaoning. Estimating water resources carrying capacity for revegetation in the Loess Plateau[J]. Journal of Hydraulic Engineering, 2014, 45(11): 1360-1367 "in Chinese"
- Liu Xi, Wang Yangui. Comparison of analytical methods of runoff and sediment load mutation and periodical variation. Advances in Science and Technology of Water Resources, Vol.35 (2). 2015.04, in Chinese
- Liu, Cheng et al. 2015. Review of estimation of global fluvial sediment discharge to oceans. Advances in Science and Technology of Water Resources, Vol. 35 (5). (in Chinese)
- Tu Xiaoning, Liu Guangquan, Liang Yue, et. al. Landscape Arrangement of Efficient Plant Species for Soil and Water Conservation in the Loess Plateau[J]. The Global Seabuckthorn Research and Development, 2014, 12(2): 29-34 "in Chinese"
- WANG Yangui, JIN Yakun. Application of Analytic Hierarchy Process in Evaluation of River Bank Stability [J]. Zhejiang Hydrotechnics, 2014(5), 2014.11, in Chinese

- Wang Yangui, Kuang Shangfu. Study on collapse mechanism and critical caving erosion width of falling failures in typical structure bank [J]. Journal of Hydraulic Engineering, Vol.45 (7), 2014.07, in Chinese
- Wang Yangui, Liu Xi, Shi Hongling. Analytical methods and their comparisons for water and sediment variation trends [J]. Journal of China Institute of Water Resources and Hydropower Research, Vol.12(2), 2014.06, in Chinese
- Wang Yangui, Liu Xi, Shi Hongling. Variation and influence factors of runoff and sediment in the Lower and Middle Yangtze River. Journal of Sediment Research, 2014 (5), 2014.09, in Chinese
- Wang Yangui, Shi Hongling, Liu Xi. Influence of sediment trapping in reservoirs on runoff and sediment discharge variations in Yangtze River. Advances in Water Science, Vol.25 (4), 2014.07, in Chinese
- WANG Yangui, WANG Ying. Variation and development characteristics of four water-related challenges in China [J]. Advances in Science and Technology of Water Resources, Vol.35 (6). 2015.11, in Chinese
- Wang Yangui,, Kuang Shangfu, Chen Yin. Impacts of water level fluctuations on bank stability during flood period [J]. Journal of Hydraulic Engineering, Vol. 46 (12), 2015.12, in Chinese
- Xue Zhao, Qu Liqin, Yang Xiusheng, Potential Production and Spatial Distribution of Hybrid Poplar as a Biofuel Crop in Connecticut, US, Int Agric Bio Eng, 2014, 7(2):10-18

#### **Conference Paper**

- Liu, Cheng et al. 2015. Rough Estimation for Post-dam Global Land-Ocean Sediment Flux. Proceedings of the 5th International Conference on Estuaries and Coast (ICEC2015) November 2-4, 2015, Muscat, Oman
- Chen Jianguo and Wang Chonghao, 2014. Mechanisms of River Shrinkage in the Lower Yellow River, Proceedings of the 2nd Conference on the Status and Future of the World's Large Rivers, 21-25, July 2014, Manaus, Amazonas, Brazil.
- Ning Duihu, Liu Xiaoying, Du Pengfei. Study of classification and estimation models for soil loss in soil disturbance of engineering construction. The 9th International Soil Congress, October, 2014, Side, Antalya, Turkey.
- P. Du, D. Ning, Z. Liu. Using <sup>137</sup>Cs and <sup>210</sup>Pb to investigate recent historical sedimentation records of heavy metals in river floodplains, ISCO18, June, 2015, El Paso, Texas, USA.
- Shi Hongling et al. Trend Analysis on Runoff and Sediment Fluxes and Its Effect on Area of Yellow River Delta [C]. 5th ICEC, Muscat, Oman, 2015.11.
- WANG Yangui, LIU Xi, SHI Hongling. Variations of basin erosion and sediment transport in the Yangtze River [C]. E-proceedings of the 36th IAHR World Congress, 28 June-3July, 2015, The Hague, the Netherlands.

#### **Book Publication**

- Tingwu Lei, Qiangguo Cai, Mingguo Zheng, Liqin Qu et al. 2015. Modeling Method for Soil and Water Loss at Watershed Scale. Science Press. Beijing
- Liubing, Du Pengfei, Zhang Xiaoming, Application of Isotope Tracer Technique and Fingerprinting Method in Soil Erosion Study, Guangming Daily Press, 2015.
- Wang Z.Y., Liu C., Yu G.A. and He Y., (2014): Integrated Management of Water, Sediment and Ecology of Rivers. Beijing, China: Science Press (in Chinese)

#### **Research Report**

- Study on Lower Yellow River channel reconstruction and floodplain management, Ministry of Water Resources, 2013.5~2015.4
- Study on mechanism of water and sediment coupled allocation in the irrigation districts of the Lower Yellow River, National Natural Science Foundation of China, 2014.01-2016.12
- Report of analysis on water discharge for sediment transportation and changes in erosion and sedimentation of the Yellow River, 2014.8.
- Report of study on water and sediment coupled allocation in the floodplain of the Lower Yellow River, 2015.6.
- Report of effects of scouring and sedimentation of the protection scheme for the floodplain of the Lower Yellow River, 2015.11.
- Report of Soil and Water Conservation Evaluation on the Motorway from Lingqin to Shanyin, 2015.12.
- Report of Soil and Water Conservation Evaluation on the Motorway from Beian to Heihe, 2014.08.
- Report of Soil and Water Conservation Monitoring on the Motorway from Fuxin to Panjin, 2014.11.
- Report of Soil and Water Conservation Monitoring on the North Extend Motorway from Fuxin to Panjin, 2014.11.
- Report of Soil and Water Conservation Evaluation on the Motorway from Yichun to Suihua, 2014.08.

- Report of Soil and Water Conservation Monitoring on the Motorway from Zhangwu to Aerxiang, 2014.11.
- Report of Soil and Water Conservation Monitoring on the Motorway from Fuxin to Panjin, 2014.11.
- Report of Soil and Water Conservation Evaluation on the Electricity Generating Station in Yangcheng, 2014.11.
- Report of Study on Crucial Technologies of Erosion Prediction for Disturbed Surface under Wind Force, 2014.12.

**Other publications**

- Publication of a quarterly International Journal of Sediment Research. 4 issues of the journal per year are published.
- Publication of a quarterly International Soil and Water Conservation Research. 4 issues of the journal per year are published.
- Publication of annual official publication China Gazette on River Sedimentation. 1 issue of the gazette per year is published.

**8.2 List of training courses conducted (there can be overlap with those listed in 2.1 above)**

- An International Workshop on Sediment Management in Water Resources and Hydropower Projects: Beijing, China, August 18-22, 2014. The workshop was organized through a partnership between the World Bank and IRTCES, with support of the Asia Sustainable and Alternative Energy Program (ASTAE). Forty two participants (including one woman) of the workshop included: managers and experts of hydropower projects from 13 countries - Afghanistan, Bangladesh, Bhutan, Cambodia, India, Indonesia, Laos, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand and Vietnam; energy specialists from the World Bank; trainers who specialize in sediment management from USA and China; IRTCES experts; and PhD students from the Tsinghua University.
- Training on assessment of acceptance for soil and water conservation engineering of development and construction projects: Jan. 27-30, 2015, Nanning, China. 322 Participants, among which 218 participants are women.

## **Appendix 1**

### **Overview of the Core Programme Themes of the Eighth Phase of the IHP (2014-2021) WATER SECURITY: ADDRESSING LOCAL, REGIONAL, AND GLOBAL CHALLENGES**

#### **THEME 1: WATER-RELATED DISASTERS AND HYDROLOGICAL CHANGE**

- Focal area 1.1 - Risk management as adaptation to global changes
- Focal area 1.2 - Understanding coupled human and natural processes
- Focal area 1.3 - Benefiting from global and local Earth observation systems
- Focal area 1.4 - Addressing uncertainty and improving its communication
- Focal area 1.5 - Improve scientific basis for hydrology and water sciences for preparation and response to extreme hydrological events

#### **THEME 2: GROUNDWATER IN A CHANGING ENVIRONMENT**

- Focal area 2.1 - Enhancing sustainable groundwater resources management
- Focal area 2.2 - Addressing strategies for management of aquifers recharge
- Focal area 2.3 - Adapting to the impacts of climate change on aquifer systems
- Focal area 2.4 - Promoting groundwater quality protection
- Focal area 2.5 - Promoting management of transboundary aquifers

#### **THEME 3: ADDRESSING WATER SCARCITY AND QUALITY**

- Focal area 3.1 - Improving governance, planning, management, allocation, and efficient use of water resources
- Focal area 3.2 - Dealing with present water scarcity and developing foresight to prevent undesirable trends
- Focal area 3.3 - Promoting tools for stakeholders involvement and awareness and conflict resolution
- Focal area 3.4 - Addressing water quality and pollution issues within an IWRM framework - improving legal, policy, institutional, and human capacity
- Focal area 3.5 - Promoting innovative tools for safety of water supplies and controlling pollution

#### **THEME 4: WATER AND HUMAN SETTLEMENTS OF THE FUTURE**

- Focal area 4.1 - Game changing approaches and technologies
- Focal area 4.2 - System wide changes for integrated management approaches
- Focal area 4.3 - Institution and leadership for beneficitation and integration
- Focal area 4.4 - Opportunities in emerging cities in developing countries
- Focal area 4.5 - Integrated development in rural human settlement

#### **THEME 5: ECOHYDROLOGY, ENGINEERING HARMONY FOR A SUSTAINABLE WORLD**

- Focal area 5.1 - Hydrological dimension of a catchment– identification of potential threats and opportunities for a sustainable development
- Focal area 5.2 - Shaping of the catchment ecological structure for ecosystem potential enhancement – biological productivity and biodiversity
- Focal area 5.3 - Ecohydrology system solution and ecological engineering for the enhancement of water and ecosystem resilience and ecosystem services
- Focal area 5.4 - Urban Ecohydrology – storm water purification and retention in the city landscape, potential for improvement of health and quality of life
- Focal area 5.5 - Ecohydrological regulation for sustaining and restoring continental to coastal connectivity and ecosystem functioning

#### **THEME 6: WATER EDUCATION, KEY FOR WATER SECURITY**

- Focal area 6.1 - Enhancing tertiary water education and professional capabilities in the water sector
- Focal area 6.2 - Addressing vocational education and training of water technicians
- Focal area 6.3 - Water education for children and youth
- Focal area 6.4 - Promoting awareness of water issues through informal water education
- Focal area 6.5 - Education for transboundary water cooperation and governance