

# INTERNATIONAL SEDIMENT INITIATIVE

# NEWSLETTER

*Reporting ISI news to you quarterly*

No. 59 Jun. 4, 2021

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## NEWS

### ISI Advisory Group online meeting convened to discuss ISI activities



On May 11, 2021, an ISI Advisory Group online meeting was organized using Microsoft Teams, to discuss ISI activities. Participants from the Advisory Group in the meeting included Prof. Manfred Spreafico (ISI Advisory Group Chair), Prof. Des. Walling (ISI Advisory Group Member), Prof. Cheng Liu (ISI Technical Secretariat), and Dr. Anil Mishra representing UNESCO-IHP Secretariat.

Dr. Anil Mishra reported on institutional developments related to the UNESCO IHP, the upcoming IHP Council meeting and recommendations based on the IHP initiatives evaluation. The meeting also discussed the planning of current ISI activities, including the Training Workshop, and the ISI expert meeting on Global River Sediment Databases, organized by ICWRGC. Prof. Cheng Liu reported the preparation of the Training Workshop organized by IRTCES, to be held in China in September 2021. A flyer providing details of this ISI Online Training Workshop on Sediment Transport Measurement and Monitoring has been widely circulated via the UNESCO water family network.

### UNESCO-IHP holds Expert Roundtables to highlight climate change and water security in Small Island Developing States (SIDS)

UNESCO-IHP organized a series of expert group meetings on Climate Vulnerability and Water Resilience in SIDS from May to June 2021. The meetings convened experts working on freshwater and climate change issues in SIDS globally, including from UNESCO's Water Family, to exchange experiences and innovations around water resource management in SIDS.

Experts in hydro-climatic and socio-economic vulnerability presented a draft methodology for assessing vulnerability in SIDS in the context of

freshwater. This was followed by the presentation of a methodology for addressing vulnerabilities through legal and policy responses. The discussions convened experts from the Caribbean, Pacific and Atlantic, Indian Ocean and South China Sea drawing from government institutions, academia, civil society, and youth organizations working on hydrology and water resource management to share experiences and perspectives on identifying and addressing vulnerability.

Key points emerging from the discussion will be used to finalize the methodologies which will be later applied in pilot SIDS.

### UNESCO-ISI online training workshop on Sediment Transport Measurement and Monitoring will be held from July 5-9, 2021

8:00-10:00 Coordinated Universal Time (UTC)	11:00-13:00 Eastern European Summer Time (EEST)
10:00-12:00 Central Asia Time (CAT)	08:00-11:00 Western Africa Time (WAT)
10:00-12:00 Central European Summer Time (CEST)	18:00-18:00 China Standard Time (CST)

The ISI Online Training Workshop on Sediment Transport Measurement and Monitoring will take place from July 5-9, 2021, and represents a key initiative of the International Sediment Initiative (ISI) of UNESCO for 2021. It meets the objectives of the new strategy of ISI, which in turn is a contribution to the 8th phase of the IHP (2014-2021), focuses on "Water security: responses to local, regional and global challenges", and addresses the wide-ranging environmental, social and economic impacts of erosion, sediment transport and sedimentation processes. Measurement and monitoring of sediment transport are of critical importance for managing and mitigating these impacts.

The training workshop will extend over five days and will include lectures and discussion. The lectures will address the following topics:

1. Standard measurement and monitoring techniques used to collect data on water discharge and sediment loads for rivers and reservoirs;
2. Recent advances in sediment transport measurement and monitoring: online monitoring

of suspended sediment concentrations in rivers;

3. Sediment measurement and monitoring methods for mountain streams;

4. Measuring erosion and sediment yields on slopes and in small catchments for soil and water conservation; and

5. Application of sediment data in controlling sediment-related ecological problems.

Accessing the online programme at: <http://isi-unesco.iahr.org/>.

### **UNESCO-ISI Training Workshop “River Basin Sediment Monitoring and Management” will be held online from September 6 – 10, 2021**

This training workshop focuses on training and capacity building on the topic of river sediment monitoring and management. During the training workshop topics such as: the relevance of sediment monitoring and sediment management in river basins, sediment monitoring techniques, data analysis methods and an introduction to global river sediment databases will be addressed. This online workshop focusses on the monitoring and management of large rivers rather than monitoring and management of small streams, headwater catchments and soil conservation..

The workshop is organized by the International Centre for Water Resources and Global Change (ICWRGC) and German Federal Institute of Hydrology (BfG), and in collaboration with the International Research and Training Centre on Erosion and Sedimentation (IRTCES) and the International Sediment Initiative (ISI, UNESCO-IHP).

We provide the opportunity for selected participants to evaluate a regional sediment-related case study under supervision of a workshop lecturer. A regional study should highlight challenges facing sediment monitoring and management to solve sediment-related issues in a particular region. The focus of the regional case study will be on developing or evaluating monitoring concepts, data presentations and analyses. High-quality regional studies will be included in a joint UNESCO ICWRGC report.

Details can be found at: <https://www.waterandchange.org/en/event/>.

### **China's water diversion project promotes green development**



Xinhua, 2021-05-14, ZHENGZHOU - Xi Jinping, general secretary of the Communist Party of China Central Committee, on Thursday inspected the South-to-North Water Diversion Project in the city of Nanyang in Central China's Henan province.

On Thursday afternoon, he went to the county of Xichuan, where he inspected the Taocha Canal Head, Danjiangkou Reservoir and village of Zouzhuang. Xi listened to the introductions of the construction, management and operation of the middle route of the water diversion project and the ecological conservation of the water source region.

When the water started to gush north through the middle route in December 2014, Xi, also Chinese President and Chairman of the Central Military Commission, described the South-to-North Water Diversion Project as important strategic infrastructure to optimize water resources, boost sustainable economic and social development and improve people's livelihoods.

Six years on, the middle route of the water diversion project, which takes water from Danjiangkou in the middle reaches of the Yangtze, to feed the arid north including Beijing, Tianjin, and the provinces of Henan and Hebei, has proved to be a reliable "lifeline" for water supplies in the recipient regions.

As of March, the mega water project had transferred over 40.8 billion cubic meters of water to the northern areas. More than 130 million people had directly benefited from the project since the first phase of its eastern and middle routes began supplying water.

More than 40 big and medium-sized cities received water from the project, which has also helped ecological restoration of rivers and lakes along its eastern and middle routes.

#### **Greener north**

Major water plants in Beijing have used the supply from the water diversion project in addition to that from Miyun Reservoir in the northeast of the city to provide tap water.

Zhang Ying, a resident in Daxing District, southern Beijing, said local people had to buy purified water for drinking in the past, because of excessive levels of scale-formation in tap water.

"Now the tap water has become clearer and the flow has become bigger," she said.

According to the Beijing Water Authority, the supply of the water diversion project has replenished rivers and lakes.

"The ecological environment around the Miyun Reservoir has been greatly improved, and the species of aquatic animals and plants have increased substantially," said Liu Dagen, director of the Reservoir Management Office.

The water diversion project has also promoted ecological protection and green development in the source area and along the diversion routes.

In Xichuan County, 380 polluting companies have been shut down to ensure the safety of the water source for the diversion project. The county has invested more than 600 million yuan (\$93.24 billion) in the treatment of industrial waste. Catering, fishing and animal husbandry business have been banned in reservoir and river areas.

There are 13 automatic water quality monitoring stations along the middle route. Underwater robots are widely used for monitoring aquatic organism and sediment levels, and checking water gates.

Trees are planted within 100 meters on both sides of the diversion canal in Henan, meandering about 640 km. The afforestation along the canal has formed an ecological zone for water conservation. A section of the canal-side green belt in Jiaozuo city, Henan, has recently been opened as a public eco-park.

Meanwhile, the country has been increasing the awareness of water conservation among citizens.

Zhao Tan, director of the water-saving office of the Beijing Water Authority, said despite the water replenished by the water diversion project, the capital still faces severe water shortage, with the per capita available water resources at about 150 cubic meters.

He said the city has basically realized the collection and treatment of sewage in urban areas. Recycled water has become an indispensable water source in the capital city.

### **Impact of Coal Burning on Yangtze River is Comparable to Natural Processes**

A first-of-its-kind study reveals that fossil fuel

consumption has a major impact on river sediment

A new study finds that fly ash—particles left over from burning coal—make up between 37 and 72 percent of all particulate organic carbon carried by the Yangtze River in China, or around 200,000 to 400,000 tons of carbon per year.

The study shows just how big an impact fossil fuel consumption has on the Earth. Beyond pumping carbon dioxide into the atmosphere, coal burning dumps about as much particulate carbon into the Yangtze River as natural processes do.

The findings were published in the Proceedings of the *National Academy of Sciences (PNAS)* on May 17, 2021.

"About one-fifth of the world's coal consumption occurs along this river," says Gen Li, a postdoctoral scholar research associate at Caltech and lead author of the PNAS paper. "We knew that would have an impact on the river; we just had no idea how big an impact it would be."

The Yangtze River is the third largest river in the world, cutting east across central China from the Tibetan plateau to the sea at Shanghai. China is the world's largest consumer of coal today, burning 2,500 megatons of coal in 2008, when the samples for this study were collected, and over 4,000 megatons of coal in 2020. (Although the total amount of coal burned in China increased from 2008 to 2020, the country also improved its regulation, recollection, and storage of fly ash over that period; now, approximately 80 percent is immediately recovered.)

Coal fly ash is the unreactive particulate byproduct of burning coal—the fine grains that do not burn but rather become sooty smoke. These particles, composed of minerals and fossilized particulate organic carbon, are on the same scale as silt or clay particles, and are dangerous when inhaled but are also heavy and settle out of the air.

Most of it is captured for use in industry as an additive to cements and concretes, in which it improves workability as well as overall strength. It is also used in agriculture as a fertilizer. However, a portion of it escapes capture, ultimately collecting in rivers and washing downstream with the normal sediment that erodes out of riverbeds.

"This is a new angle for carbon emissions that we haven't tracked before," says Woodward Fischer, Professor of geobiology and co-author of the PNAS paper. "The fact that human processes are producing about as much as natural processes in this region shows just how much of a problem this is."

Next, the team plans to continue to examine the role of coal fly ash in other large river basins

near dense populations—for example, the Mississippi River. Meanwhile, the researchers will study sediment cores taken offshore from the Yangtze River outflow to see if they can identify coal fly ash there.

"We're just beginning to appreciate how rivers are massive conduits for carbon at the earth surface," Fischer says. "By studying them further, we can quantify, evaluate, and, with future planning, potentially mitigate inimical human impacts on the carbon cycle."

The paper is titled "Coal fly ash is a major carbon flux in the Chang Jiang (Yangtze River) basin." Caltech co-authors include Michael Lamb, Professor of geology, and Xingchen (Tony) Wang, formerly a postdoctoral researcher at Caltech and now an Assistant Professor at Boston College. Other co-authors are A. Joshua West of USC; Valier Galy of Woods Hole Oceanographic Institute in Massachusetts; Hongrui Qiu of Rice University in Texas; and Ting Zhang, Shilei Li, Gaojun Li, Liang Zhao, Jun Chen, and Junfeng Ji of Nanjing University in China. This research was funded by the National Key R&D Program of China; Caltech Geology Option Postdoctoral Fellowship; Foster and Coco Stanback; Caltech's Terrestrial Hazard Observation and Reporting Center; and the Resnick Sustainability Institute. (written by: Robert Perkins)

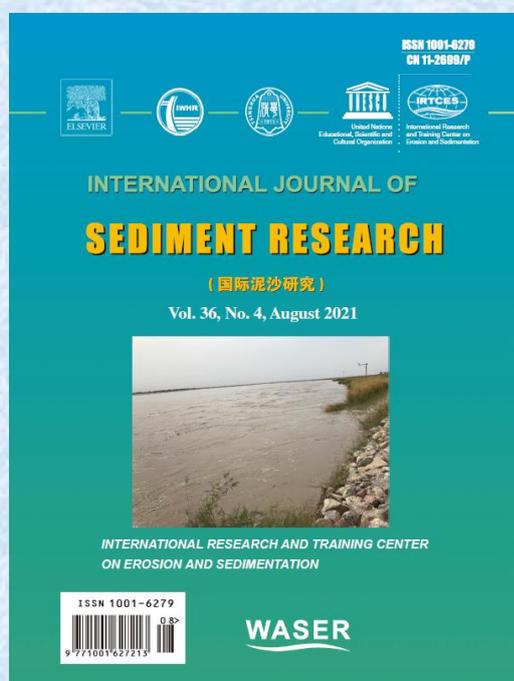
Journal Reference:

Li, G. K., et al. (2021) Coal fly ash is a major carbon flux in the Chang Jiang (Yangtze River) basin. *Proceedings of the National Academy of Sciences of the United States of America*. doi.org/10.1073/pnas.1921544118.

(Source: <https://www.caltech.edu/>)

## PUBLICATIONS

### Papers Published in the International Journal of Sediment Research Volume 36, No. 4, 2021



Pages 449-566 (August 2021)

Interfacial instability of sand patterns induced by turbulent shear flow

Sk Zeeshan Ali, Subhasish Dey

Pages 449-456

Channel morphologic processes of a highly sinuous bend approaching neck cutoff by bank erosion in the middle Yangtze River

Zhiwei Li, Hanyuan Yang, Junqiang Xia, Meirong Zhou, ... Yingzhen Wang

Pages 457-467

Effects of length and application rate of rice straw mulch on surface runoff and soil loss under laboratory simulated rainfall

Misagh Parhizkar, Mahmood Shabanpour, Manuel Esteban Lucas-Borja, Demetrio Antonio Zema, ... Artemio Cerdà

Pages 468-478

Bioremediation perspective of historically contaminated sediment with polycyclic aromatic hydrocarbons

Snežana Maletić, Jelena Beljin, Dragana Tamindžija, Marko Grgić, ... Srđan Rončević

Pages 479-488

Multifractal features of the particle-size distribution

of suspended sediment in the Three Gorges Reservoir, China

Jinlin Li, Xiubin He, Jie Wei, Yuhai Bao, ... Dil Khurram

Pages 489-500

Factors influencing the removal of fine non-cohesive sediment by vortex settling basin at small river abstraction works

Kuria Kiringu, Gerrit Basson

Pages 501-511

Comparative study of multilayer perceptron-stochastic gradient descent and gradient boosted trees for predicting daily suspended sediment load: The case study of the Mississippi River, U.S.

Sadra Shadkani, Akram Abbaspour, Saeed Samadianfard, Sajjad Hashemi, ... Shahab S. Band

Pages 512-523

Adsorption of cobalt by using inorganic components of sediment samples from water bodies

Rocío Montes de Oca-Palma, Marcos Solache-Ríos, Melania Jiménez-Reyes, José Juan García-Sánchez, Perla Tatiana Almazán-Sánchez

Pages 524-531

Phosphate mineral accumulation in lake sediment to form a secondary phosphate source: A case study in lake sediment around Eppawala Phosphate Deposit (EPD) in Sri Lanka

Nimila Dushyantha, Nalin Ratnayake, Hemalal Panagoda, Chulantha Jayawardena, Amila Sandaruwan Ratnayake

Pages 532-541

The settling of resuspended lake sediment related to physicochemical properties of particles of different sizes: Implication for environmental remediation

Zhao Wei, Youze Xu, Yanyan Zhao, Yuanyuan Zhao, ... Changhui Wang

Pages 542-554

The effects of adsorptive materials on microbial community composition and PAH degradation at the sediment cap-water interface

Giovanna Pagnozzi, Danny D. Reible, Kayleigh Millerick

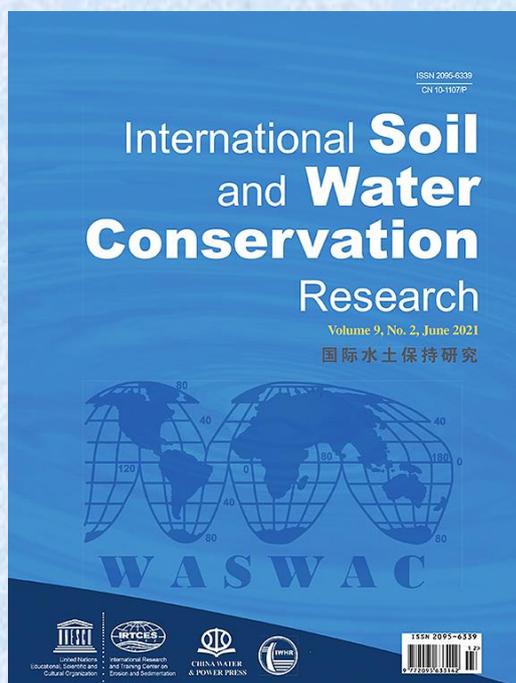
Pages 555-565

Full papers are available at ScienceDirect:

<https://www.sciencedirect.com/journal/international->

[journal-of-sediment-research](#) with free access to the paper abstracts.

### Contents of ISWCR (Vol. 9, No.2, 2021)



GIS-based soil maps as tools to evaluate land capability and suitability in a coastal reclaimed area (Ravenna, northern Italy)

Mauro De Feudis, Gloria Falsone, Massimo Gherardi, Maria Speranza, ... Livia Vittori Antisari  
Pages 167-179

Event-based hydrology and sedimentation in paired watersheds under commercial eucalyptus and grasslands in the Brazilian Pampa biome

Éderson Diniz Ebling, José Miguel Reichert, Jhon Jairo Zuluaga Peláez, Miriam Fernanda Rodrigues, ... Raghavan Srinivasan  
Pages 180-194

Changes of soil quality induced by different vegetation restoration in the collapsing gully erosion areas of southern China

Hui Wen, Shimin Ni, Junguang Wang, Chongfa Cai  
Pages 195-206

New approach for obtaining the C-factor of RUSLE considering the seasonal effect of rainfalls on vegetation cover

Pietro Menezes Sanchez Macedo, Paulo Tarso Sanches Oliveira, Mauro Antonio Homem Antunes, Valdemir Lucio Durigon, ... Daniel Fonseca de Carvalho  
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Piotr Kostencki, Tomasz Stawicki, Aleksandra Króllicka  
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Determinants of adoption of multiple sustainable agricultural practices among smallholder farmers in Nigeria

Zainab Oyetunde-Usman, Kehinde Oluseyi Olagunju, Oyinlola Rafiat Ogunpaimo  
Pages 241-248

Near-saturated soil hydraulic conductivity and pore characteristics as influenced by conventional and conservation tillage practices in North-West Himalayan region, India

Deepak Singh, Alok Kumar Mishra, Sridhar Patra, Sankar Mariappan, Nisha Singh  
Pages 249-259

Crop productivity, soil health, and energy dynamics of Indian Himalayan intensified organic maize-based systems

Raghavendra Singh, Subhash Babu, R.K. Avasthe, Gulab Singh Yadav, ... Puran Chandra  
Pages 260-270

Carbon sequestration benefits of the grain for Green Program in the hilly red soil region of southern China

Xiaoqian Hu, Zhongwu Li, Jia Chen, Xiaodong Nie, ... Ke Ning  
Pages 271-278

Potential of conservation tillage and altered land configuration to improve soil properties, carbon sequestration and productivity of maize based cropping system in eastern Himalayas, India

Gulab Singh Yadav, Anup Das, Subhash Babu, Kamal Prasad Mohapatra, ... Dipjyoti Rajkhowa  
Pages 279-290

Predictions of soil and nutrient losses using a modified SWAT model in a large hilly-gully watershed of the Chinese Loess Plateau

Wenhai Shi, Mingbin Huang  
Pages 291-304

Free full papers and open access are available at ScienceDirect :

<https://www.sciencedirect.com/journal/international-soil-and-water-conservation-research>.

## COMING EVENTS

### UNESCO-ISI online training workshop on Sediment Transport Measurement and Monitoring (July 5-9, 2021)

**Date:** July 5-9, 2021

**Online Platform:** <http://isi-unesco.iahr.org>

#### Topics of the workshop

The training workshop will extend over five days and will include lectures and discussion. The lectures will address the following topics:

1. Standard measurement and monitoring techniques used to collect data on water discharge and sediment loads for rivers and reservoirs;
2. Recent advances in sediment transport measurement and monitoring: online monitoring of suspended sediment concentrations in rivers;
3. Sediment measurement and monitoring methods for mountain streams;
4. Measuring erosion and sediment yields on slopes and in small catchments for soil and water conservation; and
5. Application of sediment data in controlling sediment-related ecological problems.

#### Date/Time

Five days, July 5-9, 2021, two hours for each day, with an additional 40 minutes on the final day. The core time slots are:

- Coordinated Universal Time (UTC): 8:00-10:00
- West Africa Time (WAT): 9:00-11:00
- Central Africa Time (CAT) / Central European Summer Time (CEST): 10:00-12:00
- Eastern European Summer Time (EEST): 11:00-13:00
- China Standard Time (CST): 16:00-18:00

#### Participants

The total number of registered trainee participants will be approximately 30. These participants will have to register (no fees) by submitting an application indicating their interest in attending the Training Workshop. The organizers might need to select potential participants based on their background.

Interested participants should submit an application to attend the Workshop using the enclosed form as soon as possible and by a final deadline of June 18, 2021.

### ISI – Training Workshop on ‘River Basin Sediment Monitoring and Management’ (Online, postponed from 2020)

**Date:** September 2021

**Venue:** Online conference

**Organizer:** International Centre for Water Resources and Global Change under the auspices of UNESCO, German Federal Institute of Hydrology

**Co-organizer:** UNESCO's Intergovernmental Hydrological Programme, International Research and Training Center on Erosion and Sediment Research (IRTCES)

**Summary:** This training workshop focuses on training and capacity building on the topic of river sediment monitoring and management. During the training workshop topics such as: the relevance of sediment monitoring and sediment management in river basins, sediment monitoring techniques, data analysis methods and an introduction to global river sediment databases will be addressed. This online workshop focusses on the monitoring and management of large rivers rather than monitoring and

management of small streams, headwater catchments and soil conservation.

Originally, the workshop was scheduled in a physical form for September 2020, but due to the Covid-19 pandemic and its uncertain future development, the meeting was converted to a virtual workshop.

#### Organization & Contact:

The workshop is organized by the International Centre for Water Resources and Global Change (ICWRGC) and German Federal Institute of Hydrology (BfG), in collaboration with the International Research and Training Centre on Erosion and Sedimentation (IRTCES) and the International Sediment Initiative (ISI, UNESCO-IHP).

This workshop will target professionals who deal with sediment-related issues and sediment management in their current or future job.

Local organizers are Thomas Hoffmann, Stephan Dietrich and Renee van Dongen. For application or questions please contact them using the following email: [events-icwrgc@bafg.de](mailto:events-icwrgc@bafg.de).

### World's Large Rivers Conference 2021 (Russia, August 2-6, 2021)

**Date:** August 2-6, 2021

**Venue:** Moscow, Russia

**Summary:** This WASER, UNESCO-IHP, and other organizations co-sponsored conference aims to provide a global forum for a wide-ranging discussion of key issues related to research on large rivers and to their effective and sustainable management, involving both scientists and decision makers. The conference will be organised by MSU - Lomonosov Moscow State University, Russia, and BOKU - University of Natural Resources and Life Sciences, Vienna, Austria. We kindly ask all interested authors to submit their work within the topics of

- Hydrology, Hydraulics & Hydroclimatic Impacts
- Sediment Transport & River Morphology
- River Pollution, Ecology & Restoration
- Integrated River Management

Special focus will be given this time to **Climate Change** and its impact - not only in general, but also specifically related to **Russian and Arctic Rivers**.

**Supported by:** WASER World Association for Sedimentation and Erosion Research; UNESCO United Nations Educational, Scientific and Cultural Organization; IAHR International Association of Hydro-Environment Engineering and Research; IAHS International Association of Hydrological Sciences; IAG International Association of Geomorphologists. All WASER- and ISI-members can benefit from a reduction of conference fees of 10%.

URL: <http://worldslargerivers.boku.ac.at/wlr/>

### The 7th International Conference on Estuaries and Coasts (Shanghai, China, October 18-21, 2021)

**Date:** October 18-21, 2021 (Tentative)

**Venue:** East China Normal University, Shanghai, China

#### Organizers:

East China Normal University

**Sponsors:** International Research and Training Center on Erosion and Sediment Research (IRTCES); World Association for Erosion and Sediment Research (WASER)

**Co-sponsors:** International Association for Hydro-Environment Engineering and Research (IAHR).

**Secretariat:** East China Normal University

**Summary:** The International Conference on Estuaries and Coasts (ICEC) is a triennial event initiated by the International Research and Training Center on Erosion and Sedimentation (IRTCES). Six such conferences have now been held in Hangzhou and Guangzhou, China; Sendai, Japan; Hanoi, Vietnam; Muscat, Oman, and Caen, France in 2003, 2006, 2009, 2012, 2015 and 2018. With support from related international associations, and with the participation of experts and scholars worldwide, the ICEC has attracted wide attention and has become an important and popular event. The ICEC provides an opportunity for scientists, engineers, researchers and decision-makers to exchange ideas, research results and advanced techniques, and develop collaboration and friendships. The 7th International Conference on Estuaries and Coasts (ICEC-2021) will be held in the East China Normal University, Shanghai, China during October 18-21, 2021.

**Overall Theme:**

Anthropocene Coasts

**Topics of the Conference** (tentative):

1. Hydrodynamics in estuaries and coasts: tides, waves, circulations, and their interactions;
2. Sediment transport dynamics: sand, mud and their mixture;
3. Multi-scale morphodynamics: tidal flats, estuaries, deltas, beaches, dunes, eco-morphodynamics...;
4. Coastal management: flood defense, ecosystem conservation, human-nature interactions...

**URL:** <http://icec2021.ecnu.edu.cn/>

**Contacts:**

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Email: [icec2021@ecnu.edu.cn](mailto:icec2021@ecnu.edu.cn)

Tel: +86-021-54836491 Fax: +86-021-54836458

## 15th International Symposium on River Sedimentation (Florence, Italy, September, 2022)

**Date:** September, 2022 (Three consecutive days at the end of August / beginning of September, 2022)

**Venue:** Florence, Italy

**Organizer:** University of Florence and University of Padua

**Sponsors:** International Research and Training Center on Erosion and Sediment Research (IRTCES); World Association for Erosion and Sediment Research (WASER)

**Co-sponsors:** International Association for Hydro-Environment Engineering and Research (IAHR).....(to be invited)

**Secretariat:** University of Florence, Italy

**Permanent Secretariat:** IRTCES

**Summary:** The triennial International Symposium on River Sedimentation (ISRS) was initiated in 1980. Since its foundation, IRTCES has served as the permanent secretariat of ISRS. WASER was inaugurated at the 9th ISRS in 2004, and the ISRS has since become the official Symposium of WASER. The objective of the ISRS is to provide a forum for scientists, engineers, researchers and decision makers to exchange ideas, research results and

technical advances, , and to share experience and information relating to the study of sediment and its management.

**Symposium Theme and Topics:**

The theme of the symposium is Sustainable Sediment Management in a changing Environment (tentative)

The symposium topics include (tentative):

1. Sediment transport
2. Reservoir sedimentation
3. River morphodynamics
4. Coastal morphodynamics
5. Ecomorphodynamics
6. Sediment related disaster
7. Plastic in river and coastal systems
8. Interaction between sediment dynamics and hydraulic structures
9. Integrated Sediment Management at the River Basin Scale
10. Social, economic & political problems related to sediment and water management

**URL:** (to be provided)

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## Climate-Resilient Water Management Approaches: Adaptation in an Age of Uncertainty (Monthly webinar series)

**Date:** January 2021 (please follow the website for updates on the exact date and time)

**Venue:** Online via Zoom

**Organizer:** UNESCO's Division of Water Sciences, the Alliance for Global Water Adaptation (AGWA) and the International Center for Integrated Water Resources Management (ICIWaRM)

**Summary:** Over the past ten-plus years, various organizations have developed a set of complementary resilient water management tools and approaches that work to address climate risks and other uncertainties in a manner that can be integrated within existing planning, design, and operational decision processes. These "bottom-up approaches" differ from the dominant paradigm guiding water management for the past half-century — namely the assumption that we can use past hydrological and climatic data to confidently predict (and plan for) the future. The webinars, intended for technical water management professionals as well as individuals working in climate / water policy and planning, introduce the technical and practical components of bottom-up approaches, spanning a range of topics and underscored by examples of real-world applications.

**URL:** <https://en.unesco.org/news/adaptation-age-uncertainty-tools-climate-resilient-water-management-approaches>

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