WASWAC

HOT NEWS

ISSUE 11, 2023

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WASWAC

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WASWAC President's New Year's Message

Dear WASWAC Councilors, Advisors, Associate Councilors, and all members,

The 2024 New Year's bells are getting closer and closer. Look back to the year 2023, which will pass quickly, I'd like to express my heartfelt respect and appreciation, to all of you, many thanks for your continuous attention and support to the association.

During 2023, WASWAC has been involved in a number of academic communication activities, including the World Conference V, the National Forum on Soil and Water Conservation and Rural Revitalization in the Yellow River Floodplain Area, the 2023 Guiyang International Forum on Ecological Civilization, Forum of Sustainable Erosion Control and Sediment Management in a Change Climate, etc. Under all of your active participation and support, the WASWAC Assembly has also been held successfully with combined online and offline way, in which, the new term council has been elected for serving the period of 2023-2025. International Soil and Water Conservation (ISWCR), the official journal of WASWAC received the latest impact factor 6.4, which kept the position of Q1 in all three indexed categories of environmental sciences, water resources and soil science.

The 4th International Youth Forum on Soil and Water Conservation (IYFSWC) will be held in Shenyang, China, in autumn of 2024. The first round announcement with more details will be released very soon. I encourage all of our young members to be involved in this important event. I believe that this forum must be a very valuable opportunity to have face to face exchange. I hope to see you then.

With the arriving of 2024, I would like to express my sincerely regards to all of you and all your families. I believe that WASWAC can be move longer and higher under your strong and firmly support.

Duihu Ning

President of the WASWAC

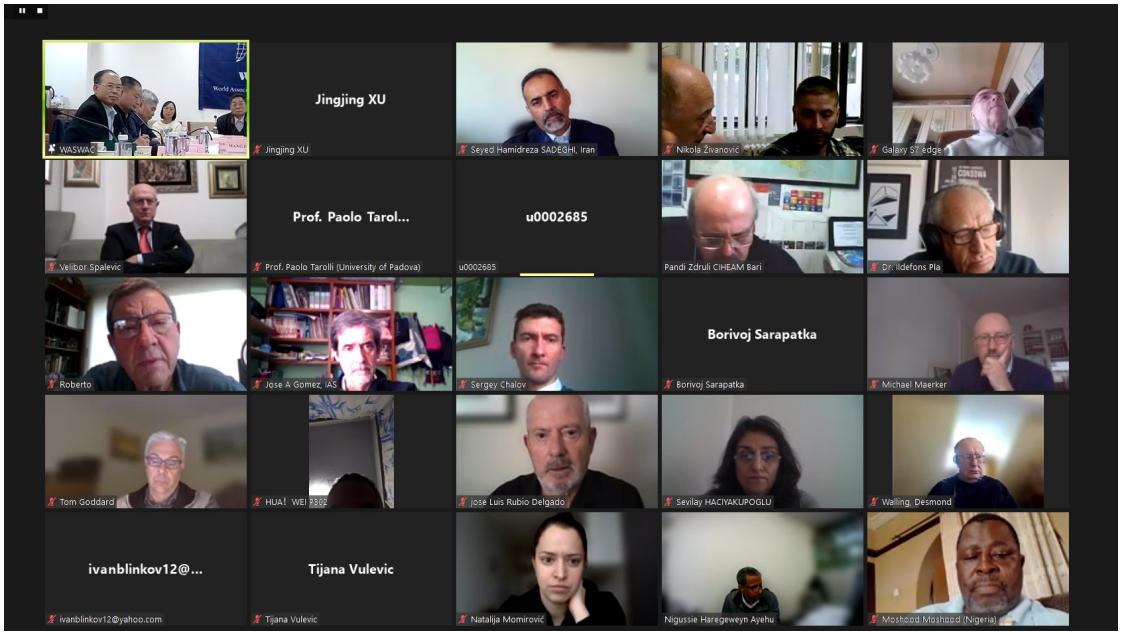
The Fifth WASWAC Assembly Held Successfully

On December 2, the fifth WASWAC Assembly was held in a combined online and offline way. The offline venue is in the International Research and Training Center on Erosion and Sedimentation (IRTCES).

A number of affairs have been discussed in the assembly, participants offered advices and suggestions actively to promote the development of the association.

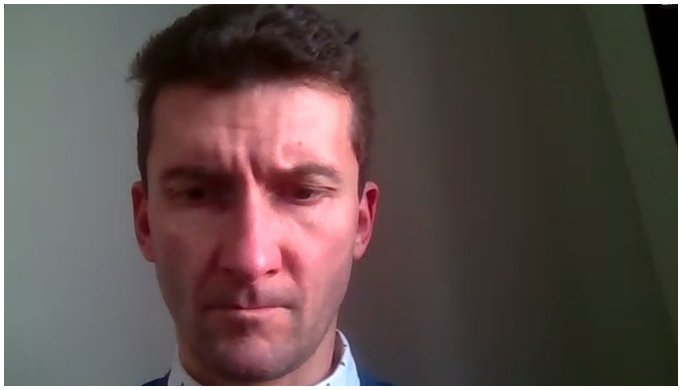
The new term Council for the period of 2023-2025 was also elected. The session change should be completed in 2022, affected by the COVID-19, it has to be postponed to 2023.

Offline venue



Some online participants

Offline participants



Online presentations (Prof. Jean Poesen, Prof. Roberto Peiretti, Dr Sergey Chalov, Prof. Seyed Hamidreza Sadeghi)

Online presentations (Prof. Jose Luis Rubio, Prof. Miodrag Zlatic, Dr. Abdulvahed Khaledi Darvishan, Prof. Paolo Tarolli, Prof. Ildefons Pla Sentis)

Online presentations (Dr. Arora Sanjay, Prof. Carmelo Dazzi, Prof. Pandi Zdruli, Prof. Mahmoud A. Abdelfattah, Prof. Velibor Spalevic)

Application for the next WASWAC World Conference (Prof. Faouzi Bekkaoui) and the next International Youth Forum on Soil and Water Conservation (Dr. Donghao Huang)

Offline presentations (Prof. Duihu Ning, Prof. Rui Li, Prof. Xiaoying Liu Prof. Qingbin Pan, Prof. Baoyuan Liu, Prof. Fei Wang, Prof. Guobin Liu, Prof. Donghong Xiong, Prof. Bin Wang)

Proposal to Initiate a Global Runoff and Sediment Disaster Risk Assessment and Protect Our Planet Together

The global climate change causes the intense surface water cycle and frequent extreme rainfall events, which leads to severe secondary disasters such as soil erosion and sedimentation disasters. These disasters not only threaten the security of soil and water resources, but also the whole ecological system. There are more than 20 million km2 land losing the ecological and economic value. It is necessary to assess the runoff and sediment disaster risk in fragile regions.

The young researchers of International Research and Training Center on Erosion and Sedimentation (IRCTES) have formed a vanguard to tackle the problem of soil erosion disasters caused by extreme rainfall events at the Loess Plateau in China. They went into field several times during the last two years, surveyed the characteristics of local soil erosion and sedimentation, and investigated the following research topics, focusing on different scales from slope, watershed to regional.

Gully erosion of buckwheat field under heavy rainfall

Buckwheat was a significant crop in the sloping arable lands of the Loess Plateau, and buckwheat fields were widely distributed in Shaanxi, Gansu, Ningxia and Shanxi regions, and buckwheat fields were more susceptible to heavy rainfall events and prone to erosion, but their erosion characteristics had not yet been fully understood.

Erosion gully appeared in the junction of Buckwheat field and grassland

Taking the rainstorm event of 10th July 2022 in Dingbian County, Shaanxi as an example, the features of gully erosion on buckwheat land has been analyzed. It relied on a combination of remote sensing and field measurements, and investigated the influences on gully erosion on buckwheat field. The research team found that the gully heads within buckwheat farmland affected by severe rainfall tended to form where they intersect with other land types. The erosion intensity of rill erosion is at a maximum of 20294.66 t/km^2,

whereas the maximum intensity of ephemeral gully erosion was 31629.83 t/km^2. The rill erosion in buckwheat fields was affected by the slope, length of slope, catchment area above, and measures taken by neighboring plots.

Soil and water conservation benefits under different rainfall conditions

Soil and water conservation practices are an effective way to prevent soil erosion. However, as extreme events become more frequent under global climate change, the runoff and sediment reduction effect might change since the extreme rainfall damages those practices. Take Qiaozigou Watershed in the Loess Plateau as an example, the soil and water conservation benefits under general erosive rainfall and extreme rainfall have been analyzed. The frequency of extreme rainfall in the small watersheds increased from 1.23 station days in the last century to 1.82 station days in this century, with an increase of 48%. The east sub-watershed with both channel and slope treatments showed a better runoff and sediment reduction effect than the west sub-watershed with only slope treatments. For both watersheds, the runoff and sediment discharge reduction rates were greater than 70% under general erosive rainfall, but the reduction rates were less than 40% under extreme rainfall.

Formation mechanism and catastrophability of mud-ball in mudflow from extreme rainstorm

Mudflow is a type of debris flow in the Loess Plateau, which is characterized by strong suddenness and great destructiveness. So it is of great significance to study the formation mechanism and hazard of mud ball in mud flow. Based on the field investigation of the rainstorm flood in Dingbian County, Shaanxi Province on July 10, 2022 and relevant literature research data, the evolution process, influencing factors, hazard and prevention measures of the mud ball in mudflow under extreme rainstorm are discussed.

Deposited mud-ball

The formation of the mud-ball in mudflow mainly includes three stages, i. e. gravity erosion (source of material), mudflow formation (dynamic conditions) and mud-ball transport and deposition (shape-shaping) and the whole formation process of the mud-ball in mudflow is affected by the topography, soil properties and hydrometeorology of the Loess Plateau. Extreme storm flood is the trigger condition of mud ball in mud flow formation. It is shown that the occurrence of the mud-ball in mudflow aggravates the water and soil loss in the basin and increases the destructiveness of the mudflow, and then has a serious catastrophe ability. Through adopting the control means of the relevant vegetation measures and engineering measures within both the area of the source of material and the sediment transport area can effectively reduce the frequency and hazard of mud flow.

Through the two-year research, the IRTCES team completed the preliminary investigation of the mechanism of soil erosion and sediment disasters caused by extreme rainfall, and will continue identify the disaster risk in the Loess Plateau in their future studies. In order to enhance the resilience to extreme weather and disasters under global climate change, hereby the research team proposed to initiate a global runoff and sediment disaster risk assessment under extreme rainfall. We do hope through this action to build a government-led, socially participatory and multi-party collaborative mode for extreme weather disaster risk management.

Related information:

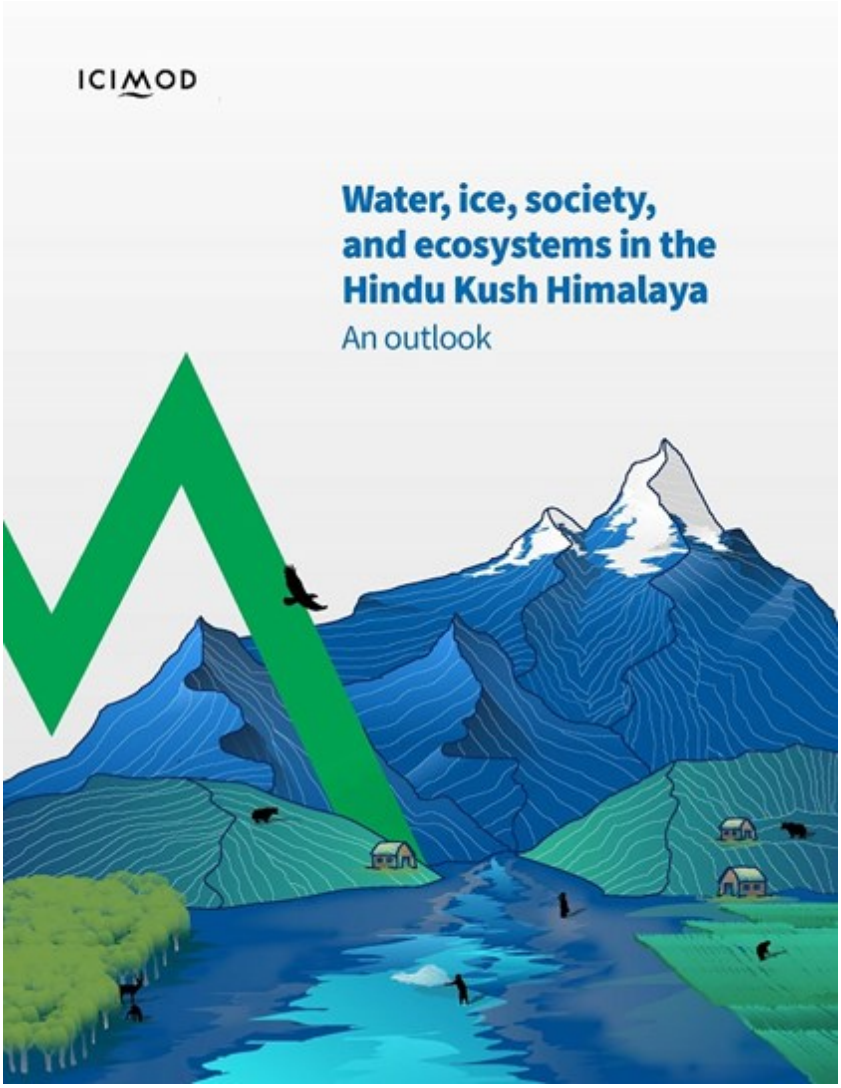
The National Natural Science Foundation of China on "Soil erosion disasters caused by extreme rainfall and the coordinated prevention and control mechanism of storage and drainage on the Loess Plateau" (Grant Number U2243213).

Water, Ice, Society, and Ecosystems in the Hindu Kush Himalaya: An outlook

ICIMOD formally launched the HI-WISE report in Thimphu, Bhutan, in the presence of delegates from different ministries, partner organisations, and media from Bhutan, following the report's media launch on 20 June 2023. The report was unveiled by His Excellency Lyonpo Loknath Sharma, Minister of Energy and Natural Resources, Royal Government of Bhutan, on 23 June 2023.

This major new assessment report reveals that changes to the glaciers, snow, and permafrost of the HKH region driven by global warming are unprecedented and largely irreversible. The study draws on recent scientific advances to map for the first time the links between the cryosphere, water, biodiversity, and society in the region, charting the impacts of rapid changes in glaciers and snow on people and nature.

A total of 74 authors contributed to the report.



The Water, ice, society, and ecosystems in the Hindu Kush Himalaya (HI-WISE) report draws on recent scientific advances to map for the first time the links between the cryosphere, water, biodiversity, and society in the region, charting the impacts of rapid changes in glaciers, snow and permafrost and its link to people and nature.

Based on an assessment of the literature, the synthesis report shows that the HKH cryosphere is undergoing unprecedented and largely irreversible changes primarily driven by climate change. Increased warming especially seen at higher elevations is leading to impacts like the accelerated melting of glaciers, increasing permafrost thaw, declining snow cover, erratic snowfall patterns, and changes in water availability.

The report also provides recommendations for policymakers on addressing the cascading impacts of climate change in the critical mountain biome, which will affect a quarter of the world's population.

Details at: https://lib.icimod.org/record/36322

Proposal Invitation for Hosting the 9th ICEC to be Held in 2027

The International Research and Training Center on Erosion and Sedimentation (IRTCES) is inviting interested parties to submit proposals for hosting the 9th International Conference on Estuaries and Coasts (9th ICEC) in 2027. As you may already know, the 8th International Conference on Estuaries and Coasts (8th ICEC) will be held in Quebec City, Canada from August 27 to 29, 2024. We are looking forward to meeting with you there. Although it might seem far away, it is important to begin planning for the 9th ICEC, which is scheduled to be held in 2027.

The ICEC Series, organized by IRTCES since 2003, has become the leading international forum for dissemination of research and industrial practice on estuaries and coasts. IRTCES in Beijing has served as the permanent secretariat of ICEC since its inception. This conference will continue the success of its previous conferences held in Hangzhou and Guangzhou (China, 2003; 2006), Sendai Japan, 2009), Hanoi (Vietnam, 2012), Muscat (Oman, 2015), Caen (France, 2018) and Shanghai (China, 2021). The 8th ICEC is scheduled to be held in Quebec City, Canada from August 27 to 29, 2024. With support from related international associations and the participation of experts and scholars worldwide, the ICEC has become an important and popular event. The conference provides an opportunity for scientists, engineers, researchers, and decision-makers to exchange ideas, research results and advanced techniques, and share their experiences and information across the broad field of estuaries and coasts.

IRTCES is currently in the process of selecting a venue for the 9th ICEC that is scheduled to be announced in Quebec City in 2024. Several universities and institutes have already shown interest in hosting the event. However, IRTCES is still open to more proposals for hosting the 9th ICEC in 2027. If you are interested, please submit your proposals to Prof. Hongling Shi, IRTCES before January 31, 2024. The final decision regarding the venue and organizerwill be made by the permanent secretariat of ICEC (IRTCES).

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Global Soil Erodibility

This dataset encompasses global soil erodibility (K) factor maps, with the K factor being estimated through the Wischmeier and Smith (1978) method. The equation incorporates permeability information crudely and indirectly, mainly relying on soil texture details, potentially overlooking factors like vegetation, biopores, and clay minerals. To address this limitation, we integrated measured K_{sat} values, representing soil hydraulic properties, into the Wischmeier and Smith (1978) soil texture-based K factor equation (referred to as $K_{Wischmeier}$ factor) to formulate the $K_{sat\text{-}based}$ soil erodibility (K_{ksat} factor) map. Our dataset consists of approximately 6000 measured K_{sat} samples worldwide, linked with environmental covariates using the quantile random forest algorithm to generate 1 km spatial resolution maps for both K_{sat} and $K_{Wischmeier}$ factors. Additionally, we calculated uncertainty for the K_{ksat} and $K_{Wischmeier}$ factor maps, represented by 90% prediction intervals (PI) through quantile calculations at 0.05 and 0.95. This uncertainty assessment was performed using the quantreg option in the R package 'ranger' (Wright and Ziegler 2015), termed as Uncertainty K_{ksat} and Uncertainty $K_{Wischmeier}$. Comparisons were made between the K_{ksat} and $K_{Wischmeier}$ factor maps and Borrelli et al. (2017) KGloSEM factor map. The results indicated a reduction in K_{ksat} factor values in tropical regions, highlighting differences in soil properties such as clay and iron. In contrast, other climate regions exhibited relatively minor changes compared to both the $K_{Wischmeier}$ factor and Borrelli et al. 2017 KGloSEM factor map.

Important notice: For European use, we recommend the European K-factor dataset

Reference: Gupta, S., Borrelli, P., Panagos, P., Alewell, C., 2024. An advanced global soil erodibility (K) assessment including the effects of saturated hydraulic conductivity. Science of The Total Environment 908, 168249. *https://doi.org/10.1016/j.scitotenv.2023.168249*

Biological Community Protects Great Wall's Earthen Sections from Erosion

A photo shows the Jinshanling section of the Great Wall in Luanping county of Chengde, Hebei province. [Photo by Guo Zhongxing/For chinadaily.com.cn]

New research has revealed that large portions of the Great Wall of China, a UNESCO World Heritage Site, are protected by a biological community found on the surface of the ancient ramparts.

According to a study published on Saturday in the journal Science Advances, the biological soil crusts or biocrusts, consisting of photosynthetic bacteria, mosses and lichens, aid in increasing the ancient structures' stability and fend off erosion caused by rain and wind.

The Great Wall consists of many interconnected walls, some dating back 2,000 years. The existing sections have a total length of over 21,000 kilometers. Its most visible portions were built during the Ming Dynasty (1368-1644).

Many sections of the wall, particularly those in more arid regions, were built with rammed earth, such as soil and gravel compacted into dense earthen formulations.

Some heritage conservationists have conject-

tured that the natural vegetation might accelerate the weathering process. However, the findings of the new study provided a contrary conclusion.

Researchers from the Chinese Academy of Sciences and China Agricultural University examined the structural stability and erodibility of samples taken from eight sections of the Ming-era Great Wall made from rammed earth.

They found that biocrusts covered 67 percent of the studied sections. Also, the cyanobacteria, a group of bacteria containing a blue photosynthetic pigment, dominated biocrusts in arid regions while Pottiaceae mosses thrived in wetter, semi-arid climates.

Overall, the biocrusts, especially those dominated by moss, enhanced the wall's mechanical strength and soil stability by 37 percent to 178 percent compared with bare rammed earth, said Xiao Bo, corresponding author of the study.

They also work to significantly buffer the effects of wind, rain and temperature fluctuations, according to the study. "Biocrusts serve as stabilizers, sacrificial layers and drainage roofs, combining the protective functions of several conventional measures into one eco-friendly approach," Xiao said.

Details at:

https://english.news.cn/20231209/0fe61cf07f274c338d4a181a28974ecf/c.html

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（Names are arranged in alphabetical order）

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