

HOT NEWS

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WORLD ASSOCIATION OF SOIL AND WATER CONSERVATION

Global Eco Forum held successfully

On July 8, the 2023 Guiyang International Forum on Ecological Civilization, sponsored by the Guizhou Provincial People's Government, hosted by the Guizhou Provincial Water Resources Department and the World Association of Soil and Water Conservation, was held in Guiyang on the theme of "firmly establishing the concept of 'Lucid waters and lush mountains are invaluable assets' - building a beautiful China in harmony with people and water.

The main purpose of this forum is to firmly establish and practice the concept of "Lucid waters and lush mountains are invaluable assets", discuss advanced concepts and practices in the construction of ecological civilization and soil erosion management, reform and innovate institutional mechanisms, and promote high-quality development of water conservancy.

In recent years, China's soil and water conservation has made remarkable achievements in effectively preventing the increase of manmade soil erosion, continuously reducing the stock of soil and water erosion, and providing strong support for the comprehensive promotion of the rural revitalization strategy.



Chengqing Zhu, the deputy minister of Ministry of Water Resources of China, is giving a speech

At the forum, the participants focused on the four units of "academician perspective lecture, domestic experience exchange, social responsibility, international experience sharing", with an overall vision, strategic thinking and global perspective, and made suggestions for the construction of ecological civilization. Prof. Miodrag Zlatic, the former President of the WASWAC, attended the conference and gave a keynote speech.

"This is a spiritual feast of emancipation! The 12 speakers and exchange speakers, closely following the theme of the forum, contributed valuable wisdom to the construction of water ecological civilization." Prof. Ning Duihu, the president of WASWAC and the moderator of the forum, said.

Guizhou Province is located in the hinterland

of southwest China, and the terrain is mainly mountainous and hilly, which is one of the most typical areas of karst landscape development and is very prone to soil erosion.

In recent years, Guizhou has continued to implement many soil erosion control projects such as sloping arable land control, rock desertification control, returning farmland to forest and grass. Through a series of powerful measures to protect water and soil, the province's soil erosion area has been reduced from 55,300 square kilometers in 2011 to 45,700 square kilometers in 2022, and the soil conservation rate has increased from 68.63% in 2011 to 74.03% in 2022, achieving a "double reduction" in soil erosion area and intensity ", soil erosion has been effectively curbed.



Duihu Ning, the president of WASWAC, is chairing the forum

More than half of the world's largest lakes are drying up

By Nikk Ogasa

Lake loss is a big problem for people who rely on that water for drinking and irrigation.



Lake Urmia in Iran was once the world's second largest salt lake, but since 1998 its area has shriveled by more than 90 percent. (By PAVLIHA/ISTOCK/GETTY IMAGES PLUS)

More than half of the world's largest lakes shrank over the last three decades, researchers report in the May 19 Science.

That's a big problem for the people who depend on those lakes for drinking water and irrigation. Drying lakes also threaten the survival of local ecosystems and migrating birds, and can even give rise to insalubrious dust storms (SN: 4/17/23).

"About one-quarter of the Earth's population lives in these basins with lake water losses," says surface hydrologist Fangfang Yao of the University of Virginia in Charlottesville. Using satellite observations from 1992 to 2020, Yao, then at the University of Colorado Boulder, and colleagues estimated the area and water levels of nearly 2,000 freshwater bodies. That work provided a continuous stream of lake volume measurements. The lakes account for 96 percent of Earth's total natural lake storage and 83 percent of that in reservoirs. The team also used population data to estimate the number of people living by the drying lakes. About 53 percent of the world's lakes have clearly shrunk, the researchers found, while only 22 percent made gains. From these

bodies of water, roughly 600 cubic kilometers of water were lost. The researchers used hydrologic and climate simulations to tease out the processes influencing the fluctuating water bodies. They found climate change and human consumption were the main causes of the decline in natural lakes, while in reservoirs, sediment buildup was the primary driver of storage loss.

CITATIONS

F. Yao et al. Satellites reveal widespread decline in global lake water storage. Science. Vol. 380,

For more details: https://www.sciencenews.org/article/largest-lakes-drying-shrinking-climate

China's lakes become bluer, greener: study

Chinese scientists and their international counterparts have recently discovered that China's lakes have become bluer and greener in recent decades because of reasons that include higher temperatures and rainfall.

Optically active substances in lake water can interact with sunlight, such as light absorption and scattering, making lakes show different colors. Previous studies have mapped the variations in lake colors in China, but their changing patterns and relevant reasons over the past decades remain unclear.

Researchers from Nanjing Institute of Geography and Limnology under the Chinese Academy of Sciences and other institutions in China, as well as those from the United States and Estonia, used satellite images to track annual trends of colors of more than 2,500 lakes in China since the 1980s.

According to the study published recently in the journal Geophysical Research Letters, the colors for 68 percent of the lakes from 1984 to 2021 shifted toward shorter visual wavelengths. The blue lakes in western China, such as the Qinghai-Tibet Plateau, became bluer, while the green-yellow lakes in eastern China shifted to greener colors.

The researchers also revealed the reasons behind such color changes. Most of the lakes on the Qinghai-Tibet Plateau are deep, and their colors are mainly blue. Their colors turning bluer in the past 40 years are mainly related to lake expansion and increased transparency caused by climate warming and humidification.

In eastern China, lakes are mainly shallow and their colors are green or yellow. The decrease in wind speed in most areas in the past 40 years has weakened the sediment resuspension, while the increase of vegetation in the basin reduces the particulate matter entering the lake. They both have made the lakes turn greener.

The findings can help to understand the changes in lake colors and their responses to climate change and human activities, according to the study.



A boat carrying tourists on Lugu Lake in Yunnan province's Lijiang ancient town. [Photo provided to China Daily]

For more details: https://www.chinadaily.com.cn/a/202305/08/WS6458a681a310b6054fad1b34.html

Saving our soil: How to extend US breadbasket fertility for centuries

The Midwestern United States has lost 57.6 billion tons of topsoil due to farming practices over the past 160 years, and the rate of erosion, even following the U.S. Department of Agriculture's guidelines, is still 25 times higher than the rate at which topsoil forms.

Yet, we need not despair: researchers from the University of Massachusetts Amherst recently reported in the journal Earth's Future that notill farming, which is currently practiced on 40% of cropland acres in the Midwest, can extend our current level of soil fertility for the next several centuries. This has implications for everything from food security to climatechange mitigation.

The vast majority of the food we all eat is grown in topsoil, that carbon-rich, black earth that nurtures everything from watermelons to brussels sprouts. What most of us call topsoil, scientists call A-horizon soil, and these Ahorizon soils, whose fertility has developed over eons, are susceptible to erosion.

"When most people think of erosion, they think wind or water," says Jeffrey Kwang, currently a postdoctoral fellow at the University of Minnesota who completed this research as part of his postdoctoral studies in Isaac Larsen's Geomorphology Research

By University of Massachusetts Amherst

Group at UMass Amherst and is lead author of the paper. "It turns out that the far greater driver of soil erosion in the midwestern U.S. has been conventional agriculture."

But what that current rate of erosion is has been very difficult to pin down precisely, though, as the Geomorphology Research Group has shown over the past few years, soil erosion in the U.S.'s breadbasket is far greater, and occurring at a far faster rate, than had previously been suspected.

A brief history of soil loss in the Midwest

Since 2021, members of Larsen's research group, including Kwang, Evan Thaler, Caroline Quarrier and others, have been breaking new ground in the world of soil science.

The group's initial study showed that more than one-third of the Corn Belt in the Midwest—nearly 30 million acres—has completely lost its carbon-rich topsoil, that rich Ahorizon layer. Furthermore, the team showed that the erosion was likely due to contemporary tillage practices, in which plows are dragged through fields, moving topsoil from higher to lower elevations. Unfortunately, the USDA's own assessments don't include erosion due to tillage, and so the agency has missed a major driver of erosion.

A year later, the team discovered that the Midwest has lost 57.6 billion metric tons of soil since Euro-American cultivation of the region began, approximately 160 years ago. This historical rate of loss, which is mostly due to tillage, is nearly double the rate which the USDA considers sustainable.

Finally, the team recently showed that Midwestern soil is eroding between 10 and 1,000 times faster than it did in the pre-agricultural era, and that the USDA's current upper-limit of sustainable erosion -1 mm per year - is an average of 25 times more than what is actually sustainable.

Modeling the future

"We already discovered how the history of erosion in the U.S. has shaped our present reality," says Isaac Larsen, associate professor of



Cerro Gordo County, Iowa and detail of individual farms (inset) soil loss over next 160 years under a conventional plowing scenario. Dark red areas show soil loss of 32.5 cm, blue show gain of 32.5 centimeters. *Credit: Jeffrey Kwang*

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ture?"

earth, geographic and climate sciences at UMass Amherst and the paper's senior author. "But what's going to happen in the fu-

For this latest research, Kwang, Larsen and the Geomorphology Research Group relied on the insights of their earlier work into historical rates of erosion to predict future scenarios. Their first breakthrough was to finally determine the current rate of tillage-driven soil erosion. It turns out that the Midwest loses 1.1 kilograms of soil and 12 grams of soil organic carbon (SOC) per square meter every year, which far outpaces the rate at which new topsoil is created.

But no one knows what the future will look like. "Since we don't know how farming practices and policy will change," Larsen says, "we've used the current erosion rate to model a few different future scenarios."

"We looked at the current business-as-usual method, under which approximately 40% of the midwestern U.S."s acres are no-till farmed, all the way up to 100% adoption of no-till methods. We then modeled the erosional rates under each scenario for the next century," says Kwang.

Their initial finding was that, if the U.S.'s current agricultural practices remain largely unchanged, approximately 8.8 billion metric tons of soil and 170 million metric tons of soil organic carbon will be lost over the next century alone.

When the team modeled the impact of a 100% no till scenario, the picture turned rosier. Much rosier.

"Approximately 95% of the erosion we see under the business-as-usual scenario over the next century would be prevented," Kwang says.

Put another way, the soil savings are so significant that if the U.S. adopts no-till practices now, it would take 10,000 years to see the same level of soil and SOC loss that would occur in only a century if our agricultural practices do not change.

Furthermore, the rate of loss decreases over time: the more soil and SOC there is, the faster we lose it, and the rates of loss taper off as there's less to lose. "This means there's real incentive to act now," says Kwang, "when we'll see the most long-term benefit."

For more details: https://phys.org/news/2023-05-soil-breadbasket-fertility-centuries.html

News

Soil erosion is filling vital inland river waterholes, putting the squeeze on fish, turtles and crayfish



By John Tibby and Jonathan Marshall, The Conversation

Credit: John Tibby, Author provided

During droughts, Australia's inland rivers dry up, leaving waterholes as the only wet places in a parched landscape. Fish, turtles, crayfish and other aquatic animals retreat to these vital refuges.

But our research, published today, reveals these waterholes are in danger of filling up with eroded soil from farms. This is putting a big squeeze on life in the river.

When drought breaks, the water flooding into the river carries soil along with it. In theory, soil deposited in waterholes could be flushed out again by large floods.

Studies in the 1990s suggested as long as floods continued to occur, waterholes would

maintain a natural balance of sediment. But these studies focused on the Cooper Creek, in the Kati Thanda (Lake Eyre) Basin, where waterholes have a sandy base underlying claydominated soil that can be easily washed out again. Many Australian rivers are different. So what happens elsewhere?

Our new research investigated waterhole infilling in the Moonie River, in the northern part of the Murray Darling-Basin. The Moonie catchment has experienced extensive clearing of native vegetation for sheep and cattle grazing. Unlike some neighboring catchments, the upper and middle portions of the river have minimal water extraction and so their flow During droughts, Australia's inland rivers dry up, leaving waterholes as the only wet places in a parched landscape. Fish, turtles, crayfish and other aquatic animals retreat to these vital refuges.

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Poking at sediment to understand waterholes

Waterholes in the Moonie River can be more than 5 kilometers long, up to 5 meters deep, and teeming with life. Kingfishers, whistling kites and parrots create a symphony of sound while fish occasionally break the surface of the murky water.

We studied three of the deepest waterholes in the Moonie River, as they are the ones that last longest in droughts. Our initial method was simple. Using metal rods, we probed the soil's depth at evenly spaced points along the waterholes. Our first survey revealed all three waterholes had accumulated at least a meter of soil, with one site showing more than 2.5 meters of infilling, significantly reducing its depth.

To determine the rate of sediment accumulation, we used radiocarbon dating. This technique is commonly used for dating objects thousands of years old such as the Lake Mungo skeletons. However, nuclear weapons testing in the 1950s introduced new radioactive material including radiocarbon into the atmosphere worldwide. By analyzing radiocarbon in the Moonie River sediments, we could estimate their age.



Moonie River's bare banks suffer from erosion. Much of the catchment has also been cleared for grazing. *Credit: John Tibby*

Our sediment dating revealed that, in places, more than two meters of soil had filled the deepest waterholes since the 1950s. Before European occupation, it would have taken thousands of years to deposit this much soil. Our research suggests sediment infilling also sped up over the past few decades.

The accumulated soil reduces the waterholes' depth, preventing them from holding water for as long as they used to during droughts. Our modeling indicated this reduction has shortened the duration waterholes can hold water by almost a year at some sites, bringing them dangerously close to complete drying during the longest droughts.

Do floods remove soil from waterholes?

However, two significant questions remained: does sediment get removed after a large flood? And if it does, does material from upstream simply get dumped downstream? To answer these questions, we needed some luck and a knowledge of cocktails.

In 2010 and 2011, the Moonie River experienced two very large floods. This gave us the perfect opportunity to find answers. We repeated our waterhole surveys and found even after big floods, there was still a minimum of one meter of sediment across most of the bottom of these waterholes, with much deeper sediment in places.

The missing piece of our puzzle was to determine whether the sediments were mixed together, like a margarita, and deposited by a single flood, or if they were layered, resembling a B52 cocktail (another connection to nuclear bomb testing).

To unravel this, we examined how the sediment had changed since before the floods. We observed distinct layers, like those in a B52 cocktail, indicating the sediments had been deposited over a series of flows and floods since the 1950s, rather than solely after individual floods.



Waterholes were much deeper before European settlement. Credit: Sara Clifford, using resources from the Integration and Application Network, Author provided

How can we solve this problem?

We need to address the imbalance between eroded soil supply and the river's capacity to transport sediment downstream.

In the Moonie River, water extraction for human use is minimal, so the problem is unlikely to lie with the river's flow regime. The main culprit is an increased supply of sediment.

That means the solution lies in better catchment soil management. We need to stop so much soil washing into the Moonie River. This requires further research to find the main sources of soil that fills waterholes. Then determine the most effective ways to prevent erosion and reduce the amount of soil entering the river. This approach also helps preserve precious soils on agricultural land. In some exceptional cases, more extensive engineering solutions may be necessary to restore waterholes.

Given climate change projections for more frequent and longer droughts in the region, taking action to restore and preserve the function of waterholes in dryland rivers like the Moonie becomes increasingly crucial. These actions are essential for safeguarding the diverse aquatic animal life and the people that depend on waterholes for survival during droughts.

https://phys.org/news/2023-06-soil-erosion-vital-inland-river.html

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2023 Calls for proposals NOW OPEN: EU Soil Mission

The EJC has opened a call for proposals for Soil Mission projects for 2023. Proposals areas include these 9 topics:

- Onsite digital technologies to monitor nutrients and chemical or biological stressors in soil and plants with relevance for food safety and nutrition
- Innovations to prevent and combat desertification
- Back to earth: bringing communities and citizens closer to soil
- Discovering the subsoil
- Soil-friendly practices in horticulture, including alternative growing media
- Soils in spatial planning
- Carbon farming in living labs
- Co-creating solutions for soil health in Living Labs
- Soil pollution processes modelling and inclusion in advanced digital decision-support tools

Deadline is Sept. 21, 2023.

Click the following link for more information:

https://nam10.safelinks.protection.outlook.com/?url=https%3A%2F%2Fec.europa.eu%2Finfo%2Ffunding-tenders% 2Fopportunities%2Fportal%2Fscreen%2Fopportunities%2Ftopic-search%3BcallCode%3DHORIZON-MISS-2023-SOIL-01%3BfreeTextSearchKeyword%3D%3BmatchWholeText%3Dtrue%3BtypeCodes%3D0%2C1%2C2%2C8% 3BstatusCodes%3D31094501%2C31094502%2C31094503%3BprogrammePeriod%3Dnull%3BprogramCcm2Id% 3Dnull%3BprogramDivisionCode%3Dnull%3BfocusAreaCode%3Dnull%3BdestinationGroup%3Dnull% 3BmissionGroup%3Dnull%3BgeographicalZonesCode%3Dnull%3BprogrammeDivisionProspect%3Dnull% 3BstartDateLte%3Dnull%3BstartDateGte%3Dnull%3BcrossCuttingPriorityCode%3Dnull%3BcpvCode%3Dnull% 3BperformanceOfDelivery%3Dnull%3BsortQuery%3DsortStatus%3BorderBy%3Dasc%3BonlyTenders%3Dfalse% 3BtopicListKey%3DtopicSearchTablePageState&data=05%7C01%7CElizabeth.Diaz-Clark%40colostate.edu% 7C2f9edc36fbe14aa5d60108db1502b9d4%7Cafb58802ff7a4bb1ab21367ff2ecfc8b%7C0%7C0% 7C638126873668010525%7CUnknown%

7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6lk1haWwiLCJXVCI6Mn0%3D% 7C3000%7C%7C%7C&sdata=XS%2BlMKVc%2BpgQt5vhWkeuT0eS3oG6WSzvX2dGxytO8gg%3D&reserved=0

The Mission Soil Manifesto

EUROPEAN UNION EUROPEAN UNION

Why having the Mission Soil Manifesto?

Life on Earth depends on healthy soils. Soil is the living skin of our planet. Healthy soils are indispensable for the provision of food as well as clean water, good air, safe climate, and biodiverse landscapes. Globally, soils store about 80% of the carbon in terrestrial ecosystems, making them the largest terrestrial carbon sink. Soils are fragile, and the impact of our actions on soils are often overlooked or ignored. To ensure a healthy and green future for our current and future generations, we need to protect and care for soils.

Not enough is being done to protect soils from degradation: around 60% of EU soils are currently considered to be in an unhealthy state[1]. Over a quarter of agricultural soils in Europe are eroded, being compacted, suffer #EUmissions #HorizonEU #MissionSoil

from salinisation/alkalinisation and overfertilisation, or are losing soil carbon. Furthermore, soil pollution is a major concern in urban and industrial areas. Increase in extreme weather events with floods and droughts due to climate change further exacerbates soil degradation. Therefore protecting and regenerating soil health becomes even more urgent.

We need your engagement to care for and restore European soils, and to act on soil protection and enhancement globally, nationally, regionally and most importantly locally. With this Manifesto, we invite you to voice your support to the European Mission 'A Soil Deal for Europe'[2] (Mission Soil) and its objectives. You will become an active part of a community of practice on soil health.

The Mission 'A Soil Deal for Europe' Under the Mission Soil, we are creating shared commitment and a strong community of practice dedicated to soil health. Its goal is to create 100 living labs[3] and lighthouses[4] to lead the transition towards healthy soils. This will drive the recovery of soil health in Europe by linking societal action on soils with research, soil monitoring, communication and engagement efforts as well as evidence-based policies.

The Mission's goal is substantiated with eight specific objectives, namely: (1) reducing desertification, (2) conserving soil organic carbon stocks, (3) stopping soil sealing and increasing re-use of urban soils, (4) reducing soil pollution and enhancing soil restoration, (5) preventing erosion, (6) improving soil structure to enhance soil biodiversity, (7) reducing the EU global soil footprint, and (8) improving soil literacy in society.

As part of several EU policy strategies, the Mission Soil contributes to the ambitions of the Green Deal and of the Sustainable Development Goals[5]. The Mission also recognizes the importance of international initiatives that mobilise action towards improving soil health globally. This includes the Global Soil Partnership[6], the 4p1000 Initiative[7] and the Coalition of Action 4 Soil Health[8].

Who can sign the Manifesto?

You can sign the Manifesto as a representative of a legal entity (such as a municipality, a region, a private or public company or organisation, an education or research institution, an association) to become a Signatory. You can also sign as an individual to become a Friend of the Mission Soil. Neither you nor the entity you represent will have any legally binding obligations. However, by signing the Mission Soil Manifesto or by becoming a Friend of the Mission, you are speaking up for the importance of soil health. You are also joining a community that cares for the future of European and global soils. You take on a symbolic commitment to take action and to contribute to soil health protection and restoration.

What is in it for me?

By signing the Mission Soil Manifesto, you will join a vibrant community of soil advocates. You will get first hand access to knowledge on soil health and the Mission Soil, and you will be able to meet with and learn from others. The name of your organisation or authority as a signatory will be publicly visible. This makes it possible for others to become aware of your activities and to connect with you around the topic of soil protection. Signatories (entities) and Friends of the Mission Soil (individuals) will be more easily

connected and able to receive and exchange information through various channels. This will include a Mission newsletter providing information on Mission progress, projects and their results, Mission calls for proposals, events, and policy development. An annual European Mission Soil Fair will stimulate exchanges, sharing of knowledge and experiences among the signatories, participants in Mission Soil projects and other relevant actors, and take stock of the progress made towards the achievement of the Mission Soil objectives. You will have access to the latest information concerning the Mission, its progress, and its activities.

[1] European Soil Observatory Dashboard, https://esdac.jrc.ec.europa.eu/esdacviewer/eusodashboard/

[2] Mission 'A Soil Deal for Europe, https://research-and-innovation.ec.europa.eu/funding/ funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missionshorizon-europe/soil-health-and-food_en

- [3] Places for real-life experimentation, see EU Mission factsheet on Living Labs, https://op.europa.eu/en/web/eu-law-and-publications/publication-detail/-/publication/af34d940-a4d8-11ec-83e1-01aa75ed71a1
- [4] Exemplary sites where to showcase good practices
- [5] Sustainable Development Goals, https://www.un.org/sustainabledevelopment/
- [6] Global Soil Partnership, https://www.fao.org/global-soil-partnership/en/
- [7] 4p1000 initiative, https://4p1000.org/?lang=en
- [8] Coalition of Action 4 Soil Health, https://www.coalitionforsoilhealth.org/

Sign the manifesto here:

https://ec.europa.eu/eusurvey/runner/mission-soil-manifesto#page2

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