WASWAC

HOT NEWS

12, 2025

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ISSUE 12 2025

WASWAC

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WASWAC President's New Year's Message of 2026

Dear WASWAC Councilors, Advisors, and All Members,

As the seasons turn and new chapters unfold, I extend my warmest greetings and best wishes to you all from Beijing on behalf of the World Association of Soil and Water Conservation as we approach the New Year of 2026.

The year 2025 has been one of unity and remarkable achievements for WASWAC, and a year of collaborative progress for colleagues worldwide in the field of soil and water conservation.

In September, the 6th WASWAC World Conference concluded successfully in Rabat, nearly 500 experts and scholars from 21 countries devoted an academic feast, to discuss development, establishing a professional and efficient platform for industry exchange that offered both depth and breadth, under the strong support of the National Institute of Agricultural Research (INRA).

The official journal, International Journal of Soil and Water Conservation Research (ISWCR), delivered positive news, with its 2024 Impact Factor remains stable at 7.3, ranking in the Q1 quartile across three major fields: Water Resources, Soil Science, and Environmental Science. Through its high-quality academic achievements, it continues to lead the direction of disciplinary development, demonstrating the WASWAC core influence on the international academic stage.

The Council and Editorial Board both successfully concluded the work in an orderly manner, charting a clear blueprint for WASWAC future development and galvanizing momentum for progress. Each of these achievements owes much to the foresight and strategic guidance of our Council members, the dedicated mentorship and intellectual support of our Advisory Board, and the diligent efforts and passionate contributions of all our members. Equally vital has been the steadfast support of our global partners, the extensive participation of international academic colleagues, and the enduring companionship of friends from all sectors who care about and advance the cause of soil and water conservation.

A new year heralds a new journey. May we continue to uphold the WASWAC principles, joining hands with every colleague and friend in the global soil and water conservation community. Together, with shared purpose and steadfast dedication, we shall forge new glories on the path of ecological conservation and sustainable development.

Wishing you a happy new year filled with blessings and gentle joys!

Best regards,

Prof. NING Duihu
The President of WASWAC

How Soil Erosion Impacts Earth's Ecosystems

It begins almost imperceptibly. A whisper of wind lifts a few grains of soil from a bare patch of land. A sudden downpour sends muddy rivulets racing downhill, dragging precious earth with them. Over time, these small, invisible losses build into a disaster. Hills once rich with vegetation turn barren. Rivers run brown. Crops fail. Species vanish. Entire ecosystems unravel, not in a single dramatic moment, but slowly—steadily—as the ground itself begins to give way.

This is the story of soil erosion: a quiet catastrophe that rarely makes headlines but underlies some of the most urgent environmental crises of our time. It is the gradual wearing away of Earth's life-sustaining skin, and it's happening everywhere—from the windy grasslands of the Sahel to the fertile plains of the American Midwest. Soil erosion doesn't just affect farmers or foresters—it strikes at the heart of ecosystems, threatening biodiversity, water security, food production, and climate stability.

The Ripple Effect: How Erosion Disrupts Ecosystems

The effects of soil erosion extend far beyond the land it strips bare. When soil erodes, ecosystems begin to collapse from the ground up. Take forests, for example. Trees and understory plants rely on rich soil to grow. When erosion removes the topsoil, nutrients vanish. Roots struggle to anchor, young saplings fail to thrive, and the forest thins. As plant life recedes, so too do the animals that depend on it—birds, mammals, insects. The web of life begins to fray.

In grasslands, where root systems often stretch deep into the soil, erosion can decimate native species. Fast-growing invasive plants may take over, further weakening the ecosystem. In agricultural zones, the loss of soil fertility means lower crop yields, increased dependency on chemical inputs, and greater susceptibility to drought and disease.

Aquatic ecosystems suffer too. When eroded soil is carried into rivers and lakes, it clouds the water, reducing light penetration and choking aquatic plants. Sediment smothers fish eggs, clogs the gills of aquatic animals, and carries with it a cocktail of pollutants—pesticides, fertilizers, heavy metals—that poison life downstream. Coral reefs, some of the most biodiverse ecosystems on Earth, are dy-

ing in part due to sedimentation caused by upstream erosion.

In this way, soil erosion acts like a slow-moving avalanche—starting high on the land and rolling downward, destroying everything in its path.

Hope Beneath the Surface: Restoring the Earth's Skin

The good news is that soil erosion is not irreversible. With the right practices, damaged land can be healed. Around the world, farmers, scientists, indigenous communities, and conservationists are working together to rebuild soil, restore ecosystems, and safeguard the future.

One of the most powerful tools is reforestation. Trees act as natural armor for the land. Their roots bind the soil, their canopies soften the impact of rain, and their leaf litter nourishes the earth. Reforestation projects in countries like China, India, and Ethiopia have already helped reclaim millions of acres of degraded land.

Sustainable agriculture is another key solution. Practices like cover cropping, no-till farming, agroforestry, and crop rotation protect the soil and enhance its health. Instead of stripping the land bare, these methods work with nature—mimicking the complexity of natural ecosystems.

Terracing and contour plowing help slow water flow on slopes. Grassed waterways, hedgerows, and buffer strips reduce runoff and trap sediment. Even simple measures—like reducing grazing pressure or planting native grasses—can make a profound difference.

Urban areas, too, have a role to play. Green roofs, permeable pavements, and restored wetlands help reduce surface runoff and protect urban soils. Cities can be reimagined not as concrete wastelands, but as part of a living, breathing Earth.

News Source

https://www.sciencenewstoday.org/how-soil-erosion-impacts-earths-ecosystems

Putting a Stop to Shifting Sands

Typical plants used in the effort to stop deserts from spreading and to improve people's livelihoods: rose (left), apricot (upper right) and cistanche (lower right).

With the planting of the final rose seedling in the Xinjiang Uygur autonomous region's Hotan prefecture on Nov 28 last year, the final link in a 3,046-kilometer chain was put in place, creating a green belt completely encircling 340,000 square km of China's Taklimakan Desert.

What is now the world's longest ecological safety barrier around a desert stretches for a length that roughly equals the straight-line distance from Shanghai to Urumqi.

The natural conditions in Hotan are well-suited to growing roses, with the history of their cultivation spanning over 2,000 years.

Initially, local people planted roses in their courtyards to make jam and tea. These varieties have excellent drought and salt-alkali resistance. As the needs of sand prevention grew alongside industrial development, roses became large-scale crops that prevented wind erosion, served as economic crops, and supported industrial development.

Roses have extensive lateral root systems that branch and sprout extremely quickly. A single plant can form a 2 to 3 meter wide flower ridge within the same number of years. The dense foliage of clustered roses effectively reduces wind speed, fixing sand dunes and preventing soil erosion. The local varieties are recognized worldwide for their high oil yield and superior fragrance profile, producing world-class quality rose products.

All 27 villages in Yutian have planted windbreak forests and drought-resistant plants on

their outskirts, completing biological sand control over more than 30,000 hectares.

Since 2020, sandy weather days per year in Yutian have decreased from 179 to 128, and sandstorm days from 24 to 7.5. By planting tamarisk, saxaul, roses, red dates and other species with both ecological and economic benefits, the project has benefited 8,900 households, 25,000 people and created stable employment for over 2,900 workers.

With ecological restoration as the foundation and industrial benefits as the driving force, this systematic strategy not only protects villages and farmland but also combines desertification control with livelihoods through "ecological industrialization". The approach has formed specialty industry chains for roses and red dates, achieving a positive cycle between ecological governance and economic development.

The Yellow River "ji-shaped bend" region serves as both a major source area and pathway for sandstorms affecting Beijing, Tianjin and eastern regions, and is the main sediment

Farmers plant Job's tears, a herb used in traditional Chinese medicine, at a desert industrial base in Yutian, Xinjiang Uygur autonomous region, in April.

source for the Yellow River's middle and lower reaches. This region forms an important component of the Three-North program as it features mountains, waterways, forests, fields, lakes, grasslands and deserts.

This area encompasses three major deserts — Kubuqi, Ulan Buh and Tengger — along with the Mu Us sandy land and over 10,000 sq km of loess plateau hilly and gully regions.

The Yellow River flows through this area, forming the shape of the Chinese character ji. The region faces unique ecological challenges, with both rivers and deserts, and particularly severe soil erosion problems.

For different areas in the Yellow River's various reaches, with their distinct landforms, natural endowments and territorial functions, local authorities have implemented areaspecific approaches. In the upper reaches, which feature hilly and gully terrain called "kongdui", they adopt a model of "planting trees on mountaintops, returning farmland to grass on slopes, building terraced fields on hillsides, and constructing dams in gully bottoms for land accretion".

In treating the Yellow River's downstream alluvial plains, salt-tolerant tamarisks take root first near water sources. At sand dune foundations, drought-resistant willows anchor shifting sands, while on dune tops, desert willows are woven into flexible grids to "shape" the dunes.

Viewing mountains, waterways, forests, fields, lakes, grasslands and deserts as a life community represents China's latest concept for comprehensive, all-regional and full-process systematic ecological governance.

The Three-North program's core achievement lies in deeply integrating ecological, economic and social development goals. As it achieves the ecological objectives of preventing wind erosion, conserving soil and water, and improving climate, it will also transform "lucid waters and lush mountains" into economic assets through economic forests, understory economies and eco-tourism. This allows people to benefit from desertification control while protecting farmland, villages and transportation networks, ensuring livelihood safety and providing employment opportunities.

News Source

https://www.chinadaily.com.cn/a/202510/28/WS69001a6da310f735438b748f_1.html

The Deputy President of WASWAC Attended World Soil Day 2025 Ceremony

The official theme for 2025 is "Healthy soils for healthy cities." World Soil Day 2025 wants everyone to understand that soil inside cities is as valuable as soil on farms. Protect the soil that remains in our cities.

On December 8, 2025, the deputy president of WASWAC, Prof. Seyed Hamidreza Sadeghi attended the World Soil Day ceremony in Tehran, and gave a speech as a special guest about the importance and value of soil and the necessary MUSTs to conserve soil and water with a specific focus on urban ecosystems. The ceremony, with about 700 participants, was held in the presence of the Minister of Agricultural Jihad, deputies for the ministers, and the Secretary of the FAO Global Soil Partnership (GSP) Program, who came from Italy, and a group of Iranian managers, mayors, authorities, scientists, experts, students, and school students, and NGOs.

In December 2013, at the 68th United Nations Assembly, December 5 was officially declared as World Soil Day. It aims to attain global attention and bring the effects to light to everyone.

Nature-based Solutions to Combat Reservoir and Dam Erosion

Erosion at reservoirs is described as being a worldwide problem, especially in countries with a tropical and subtropical climate, such as Brazil. Here the problem is intensified by uneven rainfall which is typically concentrated over a few months of the year, along with the presence of soils with well-developed and deep profiles.

Regardless of their size, erosion can take place on the banks of reservoirs, with sedimentation accumulating on the bottom. Impacts on the banks are caused by wave action and the oscillation of operating levels, which occur over a daily to annual time scale. And as Rita dos Santos Sousa et al explain in their research published in Ecological Engineering, the impact of regular waves on reservoir embankments can result in:

1. Soil entrainment: soil material is eroded, transported and deposited at the base of the slope, creating a relatively flat area known as an abrasion and sedimentation platform, with a very steep slope or escarpment.
2. Rapid deterioration of the protective vegetation on the slopes. The vegetation must therefore be monitored frequently and maintained if necessary.

Taking into account both technical and environmental factors, these techniques mostly

use living materials (seeds, plants, plant parts, etc.) that can be combined with inert materials.

In their study, the authors investigated four different types of soil and water bioengineering measures to stabilise and control erosion processes on the banks of hydroelectric reservoirs. The study area focused on the reservoir of the Ita hydroelectric power plant on the Uruguay River in southern Brazil.

The proposed nature-based solutions aim to cover and protect the banks with native rheophyte plant species that were naturally present on the banks of the Uruguay River before the power plant was built. Techniques designed for the upper slope included coconut bioretention, wooden bank pile wall and enveloped soil – all of which proved effective in stabilising and protecting the base of reservoir's water level. While techniques designed for the lower slope included live siltation, square planting, wooden palisades and coconut bioretention. These acted as living physical barriers against the action of waves, dissipating their kinetic energy.

Even after a short time of data collection, and the focus of what has been called a very empirical approach, the authors say their results show that such natural engineering techniques offer innovative and technically feasible solutions for rehabilitation projects in the vicinity of hydroelectric dams, and can be used independently or in addition to conventional engineering techniques. They go on to add their use offers additional ecological, economic, environmental and aesthetic benefits in addition to the intended technical effects.

Admitting that these effects will change over time due to the evolution of plants, the authors conclude it is essential to have a longer period of data, of vegetation, erosion and load, to have more secured results and develop numerical models to optimise such bioengineering efforts against these specific erosion processes.

Article Source

https://www.waterpowermagazine.com/analysis/nature-based-solutions-to-combat-reservoir-and-dam-erosion/

Integrating RUSLE, AHP, GIS, and Cloud-based Geospatial Analysis for Soil Erosion Assessment Under Mediterranean Conditions

Soil erosion is a major environmental challenge in Mediterranean regions, where climatic variability, steep slopes, and human activities accelerate land degradation. In the north-central region of Algeria, the Mitidja Plain faces increasing erosion pressure, threatening biodiversity, agricultural productivity, and -term soil sustainability. This study aims to assess soil erosion risk by integrating the Revised Universal Soil Loss Equation (RUSLE), the Analytical Hierarchy Process (AHP), and Geographic Information System (GIS) techniques within a Cloud-Based Geospatial (CBG) framework using the Google Earth Engine (GEE) platform. High-resolution datasets on rainfall, topography, soil properties, and land cover were processed in GEE to derive five RUSLE factors: rainfall runoff erosivity (RE), soil erodibility (KS), slope length steepness (LS), cropping management (CM), and management practices (PC). The analysis revealed that 41% of the Mitidja Plain is at severe erosion risk, with an average soil loss of 88.72 t ha^{-1} yr^{-1} and a maximum of 161.13 t ha^{-1} yr^{-1}. Erosion hotspots correspond to areas where slopes exceed 22°, vegetation cover is sparse, and rainfall intensity is high. The AHP -weighted integration achieved strong predictive accuracy (AUC = 0.87), identifying slope characteristics as the most influential factor (weight = 0.292). Forested areas reduced erosion risk in 30% of the region, while unprotected mountainous zones covering 22% of the study area require urgent intervention. These findings demonstrate the effectiveness of CBG -enhanced modeling for mapping priority conservation areas. Recommendations include terracing, check dams, vegetation restoration, and adaptive agricultural practices to reduce soil loss, particularly in agricultural lands with moderate to high vulnerability (48% of the plain). The methodology provides a replicable framework for other Mediterranean regions facing similar erosion pressures, offering robust spatial data to guide soil management and conservation planning.

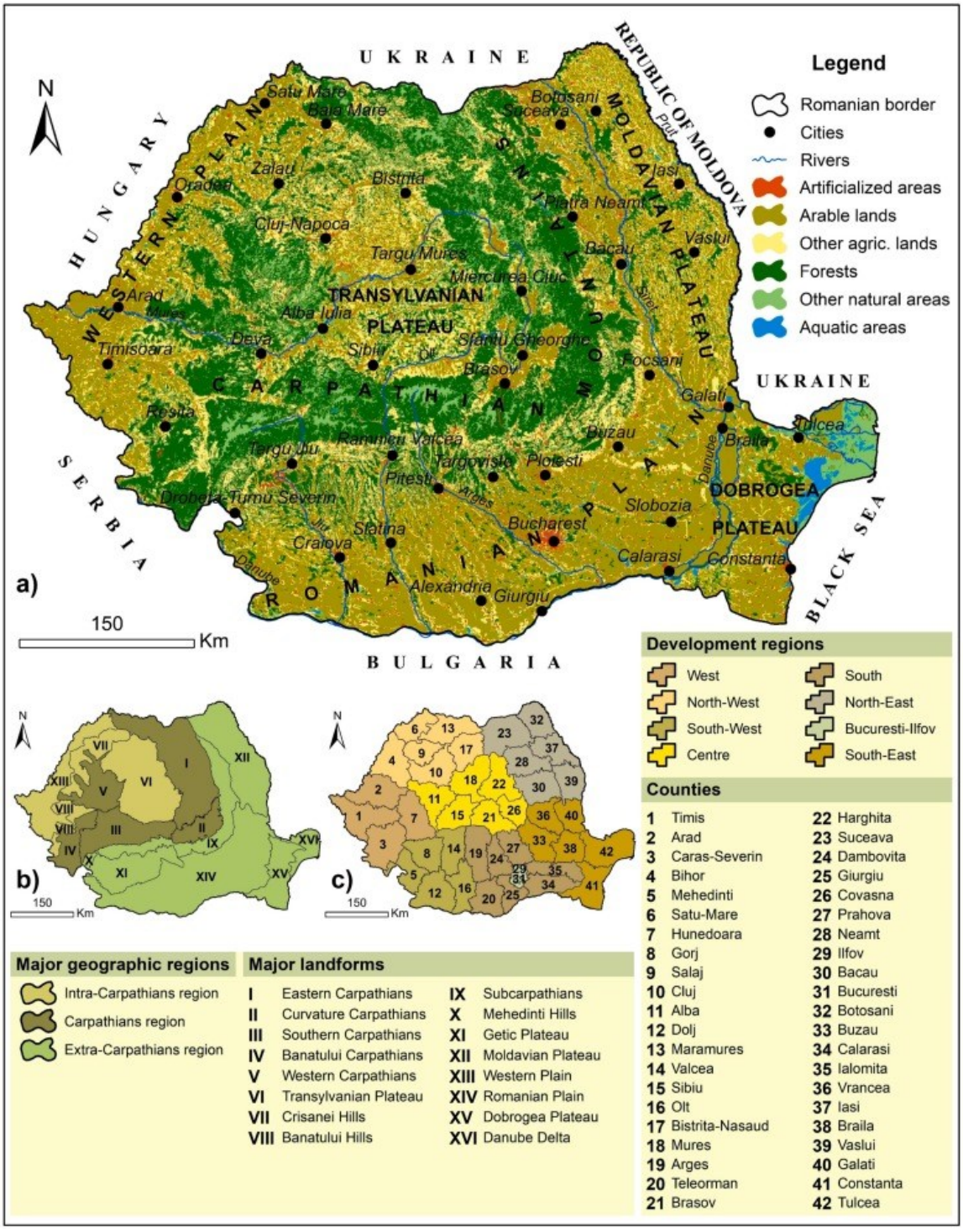
Article Source

https://www.nature.com/articles/s41598-025-22503-3

A Complex Spatial Inventory of Land Degradation and Desertification in Romania

Land degradation is a complicated environmental issue that involves multiple operating and interacting degradative processes, which have so far remained uninvestigated in Romania. This study explores the multidimensional nature of land degradation in Romania, by processing, mapping and examining 12 degradation processes (water erosion, wind erosion, tillage erosion, soil organic carbon loss, soil salinization, soil acidification, soil compaction, soil nutrient imbalances, soil pollution via heavy metals, vegetation degradation, groundwater decline and aridity) occurring throughout the agricultural environments of this country. By using multiple geospatial datasets, analyzed individually and combined into a Land Multi-degradation Index, a complex spatial pattern of land degradation and desertification was revealed across the country. Essentially, the results indicated between 1 and 40 % of Romania's agricultural area impacted by critical levels of singular processes, highlighting the degradative pathways of soil compaction (40 %), aridity (24 %), tillage erosion (22 %), soil nutrient imbalances (22 %) and water erosion (20 %) as the greatest threats to agricultural landscapes countrywide. Also, the findings on the co-occurring processes highlighted that over 4 % (~5800 km2) of agricultural lands in Romania are cumulatively affected by high and very high degradation (and desertification) conditions, detected based on the synergistic action of 4 and ≥5 drivers of degradation. The detailed cartographic and statistical results of this study represent the first comprehensive inventory of land degradation and desertification processes, in terms of typology, extent, spatial interaction and intensity of land degradative pathways, and can constitute a valuable informational support for land degradation-related policies in Romania.

This study is focused on the agricultural lands of Romania, which are crucial for agro-ecological productivity and food security, but generally recognized as highly exposed to land multi-degradation. The nationwide agricultural environments are also crucial in terms of socio-economic stability, considering that Romania's agricultural sector accounts for 20–25 % of national employment, despite its relatively small direct share (~5 %) in the gross



domestic product (GDP). However, agriculture supports many agro-industrial activities that finally increase its overall contribution to the country's GDP.

Article Source

https://www.sciencedirect.com/science/article/pii/S1470160X25006016

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Variability in rill morphometry, surface runoff and erosion with soil conservation techniques (application of polyacrylamide and rice husk biochar and hydromulching) in deforested hillslopes under simulated rainfall

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