

Ecotoxicology in Mountain Ecosystems: Insights from the SETAC Europe 35th Annual Meeting in Vienna

J. SOLÁR

*Institute of High Mountain Biology, Žilina University,
Tatranská Javorina 7, SK-059 56, Slovak Republic;
e-mail: solar@uniza.sk*

Abstract. The 35th Annual Meeting of SETAC Europe, held in Vienna from 11–15 May 2025, convened over 2,000 scientists and professionals from around the world to discuss pressing global challenges in environmental toxicology, chemistry, and risk assessment. Under the theme “One Environment. One Health. Sustainable Societies,” the conference addressed a wide range of interconnected topics—spanning molecular responses to pollutants, ecosystem-scale stress responses, regulatory frameworks, and environmental policy. Notably, special emphasis was placed on the growing vulnerability of mountain and remote areas, the influence of climate change on contaminant behavior, and advances in environmental monitoring. The meeting provided a vital platform for interdisciplinary collaboration and knowledge exchange, showcasing innovative methodologies, comparative studies, and integrated approaches for tackling complex environmental issues.

Key words: SETAC, conference, ecotoxicology, mountains

Conference Overview

Hosted at the Austria Center Vienna, the SETAC Europe 35th Annual Meeting was a dynamic event featuring diverse contributions from academia, government agencies, industry, and NGOs. Reflecting the multidisciplinary nature of environmental sciences, the conference was structured into eight thematic tracks: 1. Environmental and Human Toxicology: From Molecules to Organisms, From Omics to In Vivo; 2. Ecotoxicology Becomes Stress Ecology: From Populations to Ecosystems and Landscapes; 3. Environmental Chemistry and Exposure Assessment: Analysis, Monitoring, Fate and Modeling; 4. Ecological and Human Health Risk Assessment of Chemicals, Mixtures and Stressors and Risk Mitigation Strategies; 5. Life Cycle Assessment and Footprinting; 6. Environmental Policy, Risk Management, and Science Communication; 7. Moving

Beyond – Cross-Cutting Themes, Emerging and Transdisciplinary Topics; 8. Special Sessions. Each track addressed current research trends, regulatory needs, and future priorities in environmental science, emphasizing the integration of mechanistic toxicology, large-scale monitoring, chemical risk mitigation, and sustainable policy implementation.

Spotlight on Mountain Ecosystems

A key focus of the conference was the special session titled “Ecotoxicology and Environmental Chemistry in Mountain and Remote Areas: Challenges, Impacts, and Future Directions,” held under Track 2 – Ecotoxicology Becomes Stress Ecology. Chaired by Paolo Pastorino (IZSPLV – Experimental Zooprophyllactic Institute of Piedmont, Liguria and Valle d’Aosta) and Damia Barceló (University of Almeria), the session emphasized the increasing environmental pressures faced by high-elevation and remote ecosystems.

Mountain and remote areas, often regarded as pristine, are increasingly impacted by global environmental change. This session explored the unique challenges associated with pollutant transport, deposition, and effects in such fragile ecosystems, which serve as sensitive indicators of global environmental health. Understanding environmental chemistry and ecotoxicology in these regions is essential for anticipating the long-term consequences of human activity and climate change.

Session Objectives:

- To present advanced research on the sources, fate, and effects of chemical pollutants in mountain and remote environments.
- To evaluate the ecological and human health impacts of contaminants in these vulnerable ecosystems.
- To share innovations in sampling and monitoring methodologies suited for hard-to-reach areas.
- To foster interdisciplinary dialogue and collaboration across research institutions and policy frameworks.

Main Topics Addressed:

- Long-range atmospheric transport of pollutants to remote and high-altitude regions.
- Chemical deposition and accumulation in alpine and polar ecosystems.
- Ecotoxicological impacts of POPs, trace elements, and emerging contaminants.
- Climate change effects on contaminant mobil-

ity and bioavailability.

- Novel tools and methods for contaminant analysis in remote environments.

- Comparative case studies from the Alps, Carpathians, Pyrenees, Apennines, Arctic, and Antarctic regions.

This session was particularly relevant for researchers, environmental scientists, ecologists, policymakers, and students interested in the protection and conservation of sensitive mountain and remote ecosystems. It also provided valuable insights for those working at the intersection of climate change, global pollution dynamics, and ecosystem health.

The session aimed to identify critical knowledge gaps, stimulate new collaborative initiatives, and develop recommendations for future research priorities and environmental policies in these vulnerable regions.

As part of this special session, our research group of Institute of High Mountain Biology contributed four poster presentations:

1. Comparison of Pollution in High Mountain Aquatic Ecosystems – Glacial Tarns and Alpine Stream and Effects of Flash Flood Using Alpine

Bullhead as an Indicator (Martin Janiga, Marián Janiga, Zuzana Kompišová Ballová).

2. Indication of Environmental Pollution by Mercury and Other Elements Using Equivalent Alpine Mammals from the Western Carpathians and the Zhonggar Alatau (Zuzana Kompišová Ballová, Lenka Zábojníková, Martina Haas, Marián Janiga).

3. Impact of Flash Floods on Physicochemical Dynamics in Alpine Streams: Insights from Long-Term Monitoring in the Tatra Mountains (Jaroslav Solár, Tatiana Pitoňáková)

4. Seasonal Dynamics and Biota's Role in Elemental Transfer in the Javorinka Mountain Stream Ecosystem (Martina Haas, Patrik Pánik).

The SETAC Europe 2025 Annual Meeting reinforced the importance of interdisciplinary collaboration and region-specific research to understand and mitigate environmental risks. In particular, mountain and remote ecosystems were highlighted as sensitive and valuable sentinels of global environmental change. Contributions from this special session underscored the urgent need for continued monitoring, innovative methodologies, and transnational cooperation to protect these fragile ecosystems in the face of ongoing climate and pollution pressures.