

EMERGING ENVIRONMENTAL TRANSDISCIPLINARY SCIENCES, ROOTS AND CHALLENGES

Although enough scientific evidence on global climatic changes was placed on the table decades ago, it is nowadays undeniable that human societies are facing unprecedented environmental hazards (EH). So far, these EH have caused dramatic social, economic and environmental local and regional consequences; nonetheless it is predictable that EH consequences will shortly have global impacts, jeopardizing survival of mankind. Conventional scientific knowledge, therefore, has proved to be insufficient to trigger collaborative actions towards slowing down the present anthropogenic environmental crises. This is a call for reviewing disciplinary fields and reframing them accordingly to the new global dilemmas.

Traditional disciplinary fields are currently being contested in defining their study subject, their methods, and their outreach. Environmental Hazards is far beyond than just natural hazards as traditionally approached by geosciences; One Health embraces much more than conventional medicine; Political Ecology thrives from traditional geography into power-base understanding of contested regions. Without disregarding the relevance of traditional disciplinary fields, human societies are demanding outbreaks in knowledge generation to fasten the capabilities of man-made for positive environmental actions.

Landscape science (LS) is an interdisciplinary field, rooted in the origins of Earth Sciences in the XIX century, that seeks to understand place-based interactions between socio-ecological patterns and processes. Over the years, it has evolved significantly, embracing integrative frameworks and complementary tools (e.g. Remote Sensing) and methods (e.g., Geographic Information Systems) that have enriched our understanding and speed to produce spatially explicit socioecological models. In the present XXI century, sustainable sciences (SS) have been coined as emerging integrative and interdisciplinary framework. SS are grounded in a problem driven pathway where natural, social and humanities disciplinary fields are merged in addition to traditional wisdom and knowledge. Within the scope of SS, LS have

been barely integrated nor understood as complementary to move Sustainable and Landscape (S&L) sciences into a much-needed transdisciplinary framework (TF). The TF fosters a holistic dimension and is grounded in recognizing the interconnectedness of place-based ecological and socio-cultural-political components. The TF emphasizes the importance of engaging stakeholders, rightholders, landholders, policymakers, and scholars from different fields in collaborative efforts for melting wisdom, knowledge, and action.

A key aspect of S&L sciences and TF lies in recognizing the complementary nature of these three approaches. Organizational levels of nature (e.g., species-habitats-ecosystems), multi-scale geographic levels (e.g., local regional, global) and participatory roles of multi-stakeholders (e.g., farmers, urban communities, scholars, policy makers) possess the challenge of the emerging Environmental Transdisciplinary Sciences. The outreach of ETS is not meant to be uniquely assessed by impact factors of journals publishing the outcomes, nor by the number of citations of peers for a specific article; rather, based upon scientific evidence, it is aimed at providing short- and long-term meaningful collective action to solve local and regional environmental problems.

On the verge of the continuous and exacerbated rhythm of global geopolitical set up, it is urgent that Higher Education Institutions ought to be reinventing themselves for providing educational opportunities for new generation of students who will be the decision makers of the next generation. Environmental Transdisciplinary Sciences is one example where defying scholars may redefine the epistemic perception of science and include uncertainty, complexity, commitment, and engagement into learning for solving current Environmental Hazards. Else we will all wait the witness the process of the step backward of humanity.

ALEJANDRO VELÁZQUEZ
Universidad Nacional Autónoma de México, México