

Dr. Miguel E. Equihua Zamora

-Brief Curriculum Vitae-

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I am currently involved in two lines of research: the ecology of natural communities, and the mathematical abstraction and comprehension of ecological processes. I have a substantial understanding of Mexican vegetation and flora. I am an expert on the processing of numerical modeling applications to ecology environmental processes, natural resources dynamics and biodiversity conservation (including their relationships to provisioning benefits to society). Also, geographical information systems.

I have a first degree in biology. Studied concurrently a bit of a first degree in mathematics. Later I took on a full diploma in Applied Statistics. I hold an MSc in Biological Computation from the University of York, UK, and a DPhil. in Ecology from the same University. I hold a recognition as National Researcher, at the Mexican National System of Researchers (SNI III). Currently, I am a full-time senior researcher at the Institute of Ecology (Inecol) in Xalapa, Veracruz. I have published 67 articles in both national and international indexed journals. I have authored eleven books and several chapters. I was involved in about 70 studies on the environmental assessment of all kinds of projects for the institution in charge of the production and distribution of electric power in Mexico (The National Commission on Electricity, CFE). I am also interested in divulgation on scientific subjects, so I have published 50 diffusion articles and have been involved in radio and TV presentations.

I have been lecturing to first-degree and postgraduate students for over 25 years on subjects like ecology, basic statistics, advanced statistics, numerical biology, mathematics for biologists, and system dynamics modeling. I coordinated and delivered “Module IV. Why ecology?” on a virtual Diploma (June 4, 2020), organized to develop didactic skills in Experimental Sciences for high school teachers. It was organized by ILCE (The Latin American Institute of Educational

Communication). Also, I and O. Pérez-Maqueo have the Module “Mathematical Modeling and Conservation” (<https://ncep.amnh.org/index.php/Detail/objects/176>) for Network of Conservation Educators and Practitioners (NCEP). Center for Biodiversity and Conservation. I was a member for several years of the editorial board of the prestigious Mexican journal *Acta Botanica Mexicana*, and have acted as a peer referee for both national and international journals. I was the General Director of the Institute of Ecology (Inecol) from 2004 to 2009.

I was involved in a pioneer study on the threats to the sustainability of all the ecosystems of Mexico, with an emphasis on two of the major environmental issues in the country: habitat loss and water quality. I was part of the Mexican delegation to The Commission for Environmental Cooperation (CEC) that produced **Ecological Regions of North America: Toward a Common Perspective**, # 04 in Top Publications (<http://www.cec.org/files/documents/publications/1701-ecological-regions-north-america-toward-common-perspective-en.pdf>). Where we proposed a system of ecoregions that depict recognizable North America’s ecological units in a hierarchical abstraction. It provided the first consensual geographical grasp among the three countries involved, in the subcontinent ecological complexity at the ecosystem level.

I was involved in the preparation of the *National Extension and Condition Accounts for the System of Environmental Economic Accounting on Ecosystem Accounting*. It was a product commissioned by a pilot project, of which Mexico was part, on the new stage of the UN environmental accounting (SEEA-EA). The Project was *Natural Capital Accounting and Valuation of Ecosystem Services* (NCAVES), and it was funded by the European Community via a Partnership Instrument. It was jointly implemented by the United Nations Statistics Division (UNSD), and the United Nations Environment Program (specifically the TEEB office), in collaboration with the secretariat of the Convention on Biological Diversity (CBD). I am currently involved in the UN-SEEA-EA Working Group on Forest Accounting. In collaboration with co-authors of the Mexican NCAVES pilot, I was involved in a training course for country members through CEPAL.

Over the year I have been involved with the Mexican IPBES team headed by Conabio (the national council on documenting national biodiversity and its use). This collaboration has

involved discussing the outcomes from IPBES, the preparation of national positioning statements and the revision of reports. I would like to refer to the **IPBES Regional Assessment Report on Biodiversity and Ecosystem Services for the Americas**, in which I was involved as expert reviewer. I performed, with the support of the Mexican team, an exploratory analysis using *computational text-mining techniques*, for the first time ever to my understanding. The results were very interesting and prompted important discussions to improve the report.

With several other authors, I contributed to the preparation of the action program on climate change for the State of Veracruz, Mexico. The first of its kind made at the state level in the country, which became a basis for the development of many others. This study was developed with the support of the Veracruz Government, the National Institute of Ecology (a federal-level institution in Mexico), and the British Council, through the Global Opportunities Fund of the United Kingdom. I was involved in the authorship of the chapter "Climate Change and Biodiversity in Veracruz" for Conabio. Interested in mainstreaming the environmental agenda, I was also involved as a co-author of a short document titled "Climate Change and Change of Government", intended to attract the political sector to the climate change agenda at the time of the election for a new governor for the state of Veracruz.

I have been an advisor on the board of various international commissions, including the North American Working Group for the development of regional environmental indicators (involving governmental agencies from Canada, the United States, and Mexico). I was the National Coordinator of the Mexican Network of Long-Term Ecological Research (MEX-LTER). I oversaw organizing, on behalf of the Mexican Council on Science and Technology (Conacyt), the international meeting "Climate Change and Environmental Change: Global Human Challenges", within the framework of the UN Climate Change Convention. It was held in Cancun, Quintana Roo concurrent to the COP-16 (December 2010). As a result of this meeting, a national collaboration agreement was signed between Conacyt and TERI (directed at the time by IPCC president Dr. Rajendra K. Pachauri from India). The agreement was intended to promote scientific and technological cooperation for sustainability.

I represented Mexico in the *Scientific Research Network on Climate Change* of at the time emerging Pacific Alliance, created by the joint presidential declaration produced among Colombia, Chile, Mexico, and Peru. On behalf of the Pacific Alliance, I Organized the International Course "Data Science and Environmental Big Data", to further scientific cooperation on climate change within the Pacific Alliance. The initiative also focused on “New generation biodiversity monitoring to support adaptation and mitigation processes to climate change”. The event was supported by Mexico through the Mexican Agency for International Cooperation and Development (AMEXCID). It was held in the city of Xalapa Ver.

I was a collaborator of the ROBIN Project, a large research endeavor funded by the European Union through the 7th Framework Programme. Through this project, the Mexican team of which I was part, developed a novel approach to estimating the functional integrity of ecosystems. We proposed a data-driven concept that used Machine Learning technology to produce an “index on ecosystem integrity”. The results, in addition to its academic publication, were presented to MEPs and the interested public at the headquarters of the European Parliament in Brussels, Belgium. Later, it was presented as well at COP21 in Paris.

I was head of a large project funded by the Conacyt through the Fordecyt fund. The project was titled *Use of Big Data Based and Machine Learning in Support of Sustainable Development*, shortly named “Gamma Integrality” (**i-Gamma**). Eventually, this initiative was recognized as an exemplary project by the Global Alliance on Artificial Intelligence (GPAI). The recognition went to i-Gamma: Model of ecosystem integrity (December 18, 2020). The distinction was specifically set on the theme of Responsible Artificial Intelligence which combines the development and ethical use of artificial intelligence, as well as the search to advance toward the Sustainable Development Goals of the UN 2030 Agenda. I am currently a member of the Academic Executive Committee of the National Strategic Program on Social-Ecological Systems and Sustainability (Pronaces SSyS) which is charged with organizing and fostering the development of multi and transdisciplinary research at the National Level. In addition to traditional research, the program is also directed to develop an “implementation science agenda” for sustainability.

Some publications

- Benítez, G., Laura, Ruelas-Monjardín, L.C., Von Thaden, J., Acosta-Rosado, I., Gerardo Alvarado-Castillo, **M. Equihua***. 2023. Carbon storage in a peri-urban neotropical forest: Assessing its potential and patterns of change over half a century, *Urban Forestry & Urban Greening*, Volume 86, 128009, ISSN 1618-8667, <https://doi.org/10.1016/j.ufug.2023.128009>. FI 6.4
- Cervantes-Huerta, R., **M Equihua***, VJ Colino-Rabanal, A González-Romero, J Duran-Antonio, A González-Gallina. 2022. Controlling human activities as confounding variable in road studies. *Environmental Impact Assessment Review*. 2022/9/1, Volumen 96. Pages 106852 <https://doi.org/10.1016/j.eiar.2022> IF 6.122
- Equihua, M.**, Espinosa Aldama M, Gershenson C, López-Corona O, Munguía M, Pérez-Maqueo O, Ramírez-Carrillo E. 2020. Ecosystem antifragility: beyond integrity and resilience. *PeerJ* 8:e8533 DOI 10.7717/peerj.8533 IF 2.38
- Challenger, A., A. Cordova, E. Lazos Chavero, **M. Equihua**, and M. Maass. 2018. Opportunities and obstacles to socioecosystem based environmental policy in Mexico: expert opinion at the science-policy interface. *Ecology and Society* 23(2):31. <https://doi.org/10.5751/ES-10066-230231> IF 4.14
- Garcia-Alaniz, N., **M. Equihua**, O. Pérez-Maqueo, J. Equihua Benítez, P. Maeda, F. Pardo Urrutia, J.J. Flores Martínez, S. A.Villela Gaytán, M. Schmidt. 2017. The Mexican National Biodiversity and Ecosystem Degradation Monitoring System. *Current Opinion in Environmental Sustainability* Volumes 26–27, June 2017, Pages 62-68. <https://doi.org/10.1016/j.cosust.2017.01.001> IF 3.954

Books

- Equihua, M. y G. Benítez 1983 (1ª Edición). *Dinámica de las Comunidades Ecológicas.*, Trillas, México, D.F. 120pp. ISBN 968-24-0924-1. Varias Reimpresiones (reimp. 2004).
- Rzedowski, J. y M. Equihua, 1987. *Atlas Cultural de México: Flora.* Planeta/INAH, México, D.F. 221pp. ISBN 968-406-056-4.
- Bocco G., Equihua M., Takaki F., Vargas-Mena A. Y Victoria A. (De México), 1997., “Ecological Regions of North America: Toward a common perspective” Commission for Environmental Cooperation. 71 páginas. Primera Edición. Primer Volumen. (en inglés, francés y español). Comisión para La Cooperación Ambiental 393, rue St Jaques Ouest, bureau 200. Montreal (Québec) Canada H2 y 1N9. 63 pp. Impreso y Versión Electrónica. ISBN 2-922305-20-1 1 # 04 in Top Publications. <http://www.cec.org/publications/ecological-regions-of-north-america/>