



CoCiBio

Programa de cooperación para la investigación orientada a la aplicación sobre la biodiversidad y cambio climático

A National Ecosystem Services Assessment and Mapping for the status and future development of ecosystem services and biodiversity – a fast track study in Ecuador (ECU-MAES)

The challenge

Ecuador is rich in terrestrial ecosystems with a very high level of endemism and biodiversity (Olson & Dinerstein 2002). However, high rates of deforestation and fragmentation were reported for the last 30 years (Cuenca et al. 2016, Mena 2008, Sierra & Stallings 1998). Ecosystem degradation and fragmentation is associated with a substantial and largely irreversible loss of many ecosystem services, increased vulnerability against natural disasters and the exacerbation of poverty for those communities relying directly on provisioning services (Duraiappah & Naeem 2005). Awareness about this critical trend is resulting in a collective focus on empirical studies on biodiversity and biological conservation in the country (Cadilhac et al. 2017, Cuenca & Echeverria 2017). From nature conservation point of view, one of the most remarkable achievements in Ecuador might be the establishment of an official identification, classification and delineation of the nationwide ecosystems (MAE 2015), based on an initiative framework for the ecosystem classification by Sierra et al. (1999) and Josse et al. (2003). This baseline information has not been fully exploited to generate a monitoring system of national level of ecosystem services changes.

Despite the fact that studies on ecosystem fragmentation for ecosystem conservation planning are abundant and have received much attention in the tropics, very few studies showed the relationship between the capacity to provide ecosystem services, human land use and the degree of forest degradation and fragmentation and the related biodiversity losses.

Our approach

There is a need to analyse the relationship between the degree of forest ecosystem fragmentation, ecosystem services provision and human land use at ecosystem level to better design conservation strategies integrated into land use planning and management in Ecuador.

The goal is to conduct a joint mapping and assessment of the capacities of ecosystems that provide regulating, provisioning and cultural ecosystem services as a fast track study to initiate ecosystem services assessments on national level and to deepening joint research activities on biodiversity and ecosystem services losses, their impacts and consequences for Ecuador.

In Ecu-MAES, we will select representative forest ecosystems from the main biomes (Amazon area, Andean and Coastal area) and identify respective indicators. Complementarily to available quantitative information, we will conduct a workshop series with experts, scientists and local knowledge holders to fill knowledge gaps. The modelling software GISCAME will be used for an interactive mapping and assessment of ecosystem services and for developing land use / land cover change scenarios.

In order to strengthen the research cooperation between Ecuador and Germany, strategic coordination meetings, a study mission to representative forest ecosystems in Ecuador, mutual visits of guest lecturers, master theses, conference presentations, scientific publications and a joint summer school in Ecuador will be conducted. The results of the joint research activities can later serve as input for the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES).

Intended Impact

The primary output of the study will be an overview on (mainly forest) ecosystem capacities to provide ecosystem services to people and how the ecosystem services change in different scenarios.

The first level outreach is visual and written material to inform and make people aware of the high value of biodiversity and ecosystem services. The second level is through scientific publications.



CoCiBio

Programa de cooperación para la investigación orientada a la aplicación sobre la biodiversidad y cambio climático

Potential beneficiaries of the project, especially of the summer school, are master students, doctoral students and Post-Docs. In the summer school, results of the project will be presented but also students' capacities in methods and techniques will be strengthened. The high-level excursion will benefit mainly professors and Post-Docs in order to expand the professional scientific network and to develop new project proposals. Digitally available outputs, e.g., a national forest ecosystem service capacity map, will inform national environmental authorities and national research institutions. The fast track study could form the basis for the second planned IPBES assessment. Therefore, also the broader scientific community and political representatives could be interested.

implementing partner in Ecuador is the Ecuadorian Ministry of the Environment MAE with its National Institute of Biodiversity (INABIO).

References

- CADILHAC, L., TORRES, R., CALLES, J., VANACKER, V. & CALDERN, E. 2017. Desafíos para la investigación sobre el cambio climático en Ecuador. *Neotropical Biodiversity*.
- CUENCA, P., ARRIAGADA, R. & ECHEVERRÍA, C. 2016. How much deforestation do protected areas avoid in tropical Andean landscapes? *Environmental Science & Policy*, 56, 56-66.
- CUENCA, P. & ECHEVERRIA, C. 2017. How do protected landscapes associated with high biodiversity and population levels change? *PLoS One*, 12, e0180537.
- DURAIAPPAH, A. K. & NAEEM, S. 2005. Millennium Ecosystem Assessment, 2005.
- JOSSE, C., G. NAVARRO, P., COMER, R. EVANS, D., FABER-LANGENDOEN, et al. 2003. Ecological systems of Latin America and the Caribbean: A working classification of terrestrial systems. Arlington, Virginia.
- MAE. 2015. Mapping and Assessment of Ecosystems and their Services. JRC Science and Policy Report. Maes J, Fabrega N, Zulian G et al.
- MENA, C. F. 2008. Trajectories of Land-use and Land-cover in the Northern Ecuadorian Amazon. *Photogrammetric Engineering & Remote Sensing*, 74, 737-751.
- OLSON, D. M. & DINERSTEIN, E. 2002. The Global 200: Priority Ecoregions for Global Conservation. *Annals of the Missouri Botanical Garden*.
- SIERRA, R., CAMPOS, F. & CHAMBERLIN, J. 2002. Assessing biodiversity conservation priorities: ecosystem risk and representativeness in continental Ecuador. *Landscape and Urban Planning*, 59, 95-110.
- SIERRA, R. & STALLINGS, J. 1998. The dynamics and social organization of tropical deforestation in Northwest Ecuador, 1983-1995. *Human Ecology*, 26, 135-161.

Information

Name of the project	A National Ecosystem Services Assessment and Mapping for the status and future development of ecosystem services and biodiversity – a fast track study in Ecuador (ECU-MAES)
Part of	German-Ecuadorian Research Cooperation on Biodiversity and Climate Change – CoCiBio
Project financed by	Federal Ministry of Economic Cooperation and Development (BMZ)
Project Partners	Prof. Dr. Christine Fürst, Dr. Janina Kleemann, Ms. Hongmi Koo, Martin-Luther-University Halle-Wittenberg Prof. Dr. Pablo Cuenca, Dr. Jin Noh, Universidad Regional Amazónica
Duration	1 st October 2019 to 31 st March 2021

German-Ecuadorian Cooperation

On behalf of the Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ), the German Academic Exchange Service (DAAD) is supporting the "**German-Ecuadorian Research Co-operation Programme on Biodiversity and Climate Change**". Over a term of 18 months, the German-Ecuadorian research co-operation in the fields of biodiversity and climate change will be intensified as part of the DAAD-GIZ co-operation and the conditions for the application of the results of bilateral research projects will be improved. The central



CoCiBio

Programa de cooperación para la investigación orientada a la aplicación sobre la biodiversidad y cambio climático



Figure 1: The participants of CoCiBio close to the Antisana Volcano. Photo credits: Janina Kleemann



Figure 3: View from Mera. Water as regulating and provisioning ecosystem service. and Photo credits: Janina Kleemann



Figure 2: In the Antisana Nature Reserve. Photo credits: Janina Kleemann



Figure 4: Photo credits: Pablo Cuenca

This Factsheet has been published by

Deutscher Akademischer Austauschdienst e.V.,
legally represented by Dr. Dorothea Rüländ,
Kennedyallee 50, D-53175 Bonn
Tel: +49 228 882-0
Fax: +49 228 882-444
E-Mail: VGp31@daad.de
Internet: <https://www.daad.de>

Head office:

Bonn (Germany), registered with the Bonn District Court,
Commercial Register Court VR 2105

Editorial staff:

Janina Kleemann, Christine Fürst, Pablo Cuenca

Image credits: Janina Kleemann, Pablo Cuenca

Liability Notice:

We are not liable for the content of any websites run by third parties. This remains solely the responsibility of the third parties.

Copyright © by DAAD e.V. The content of this Factsheet is copyright-protected. All rights reserved. The full or partial reproduction of a text or images without prior permission by the DAAD is prohibited