CONDESAN: Promoting Long-Term Monitoring at Different Scales to Support Natural Resource Governance in the Andean Countries

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CONDESAN
Consortium for the Sustainable Development of the Andean Ecoregion

Effective governance of natural resources requires robust information about a diverse set of social and ecological dynamics. CONDESAN (the Consorcio para el Desarrollo Sostenible de la Ecorregión Andina) is making progress in the Andean region to generate, manage, and mobilize knowledge about key social, economic, and environmental processes and to make them available to actors who most need it for decision-making. The approaches integrate tools at multiple scales, emphasizing the diverse nature of the drivers and impacts of environmental change and promoting long-term monitoring within collaborative networks. True integration of social and environmental observation platforms is still a challenge, but current progress and future initiatives will allow CONDESAN to generate sound alternatives for the Andes.

Making progress in regional mountain observatories

Understanding change in social-ecological systems requires diachronic approaches. The Andean region shares with other mountain areas complex interactions between resource use decisions, the resulting landscape patterns, and the effects on the structure and functioning of ecosystems. However, the lack of long-term data on the linkages between driving processes—both social and environmental—and patterns is an important challenge for the sustainable governance of natural resources. Therefore, efforts to promote integrated monitoring are necessary to strengthen sustainable development in this mountainous region. Long-term observations can contribute to characterizing the relative importance of different processes of environmental change and their impacts on livelihoods and ecosystems. Furthermore, integrated monitoring systems can enhance informed decision-making at different scales in contexts of high uncertainty.

Since its creation in 1993, CONDESAN has promoted collaborative efforts to support the generation of high-quality information about social and environmental systems in the Andes. More recently, CONDESAN has promoted regional networks to study the effects of climate change on vulnerable plant communities on mountaintops (the GLORIA Andes network [Global Observation Research Initiative in Alpine Environments]), the effects of land use regimes on water provision and regulation services at the micro-basin level (the iMHEA network [Monitoring of Andean Ecosystems or Iniciativa Regional de Monitoreo Hidrológico de Ecosistemas Andinos]), and the links between biodiversity, ecosystems processes, and carbon dynamics in Andean forest ecosystems (the Andean Forests network). This approach is focused on filling persisting knowledge gaps for Andean ecosystems by synthesizing region-wide perspectives on the impacts of global environmental change on ecosystem dynamics, and by supporting long-term monitoring efforts.

Facing the challenges of relevance and scale

CONDESAN is committed to realizing the transformative potential that robust information has to support more inclusive and effective decision-making in social-ecological systems at national, subnational, and local scales. With specific research questions and standardized methodologies, regional monitoring networks are well equipped to generate comparable information to support synthesis at national to continental scales. As scale shifts from regional to local, decision-making requires robust science that is relevant to the needs and context of the target resource use systems. To answer to these needs, CONDESAN is working on 2 interrelated fronts. The first is the integration of territorial approaches to support environmental governance. The second is the development and validation of integrated social and environmental monitoring tools.

Territorial approaches to environmental governance offer the advantage of allowing the explicit treatment of goals and relations among actors making decisions within and between scales. In a recent initiative, CONDESAN implemented a project aimed at strengthening environmental governance to support land use planning in the Ecuadorian province of Napo (see project details at http://otnapo.condesan.org/otnapo_siappt/index.html). The project promoted institutional arrangements and implemented applied research to generate key data for land use planning. Emphasis was placed on integrating monitoring at multiple scales, including measuring forest structure and composition at the plot level, mapping land use and land cover change patterns, and integrating spatially explicit landscape management goals and

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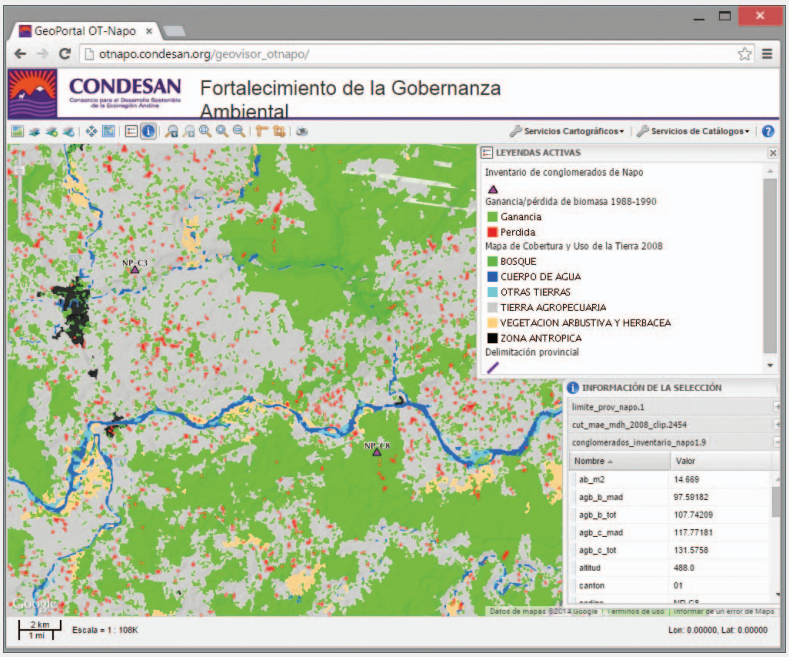
FIGURE 1 Example of an online platform that integrates spatially explicit biological, land use, and socioeconomic information at different scales. The platform was implemented to support land use planning and decision-making in Napo, Ecuador. (Platform development by Ivar Ledezma; figure composition by CONDESAN)



indicators in land use planning processes (Figure 1). An important approach used in the project was promoting monitoring as a collective action challenge, in which different actors need to agree over roles in the generation, management, and synthesis of information to improve the effectiveness of ecosystem governance.

Complementarily, there is a need to develop integrated social and environmental monitoring tools that can foster more robust resource management decisions. The challenges to effective integration of approaches from different disciplines to characterize and monitor complex social-ecological systems arise from incentives to narrow specialization in academic fields, epistemological differences, and difficulty of coordinating interdisciplinary teams, among others. CONDESAN has moved forward in the direction of integrated monitoring by using a reference framework centered on how local livelihood objectives and access to resources influence land use decisions. Important elements of this framework are the links between the institutional context, individual and collective resource use decisions, and the effects on the provision of ecosystem goods and services linked to biodiversity, carbon, and water. CONDESAN has developed a series of monitoring protocols that include topics such as land use and land cover change, biodiversity, and livelihoods. These protocols have been validated in different study sites as a first step toward characterizing change in social-ecological systems through key indicators, and a first version of an online platform to share these indicators has been implemented (http://geoi-bol.com/geovisores/geovisor_cima/).

Future work

A critical issue for future efforts is the need for better articulation between monitoring systems and decision-making processes. This is important as the availability of good quality information does not immediately translate into better decision-making. Thus, major barriers of knowledge, language, goals, and legitimacy need to be addressed in order to make information useful for different stakeholders. CONDESAN will continue working to generate knowledge that is relevant at different scales, targets specific management goals, and is legitimate for a broad set of stakeholders in land use planning exercises. Therefore, monitoring systems also need to be aligned to local, national, or regional objectives and adopt proper participation mechanisms.

In these efforts for better integration of knowledge and decision-making, CONDESAN will continue improving integrated monitoring tools in sites in the Andean region in 2 new projects. The first is the EcoAndes project, funded by the Global Environmental Facility (GEF), which will be implemented in 5 sites in the Andes of Ecuador and Peru. This project is focused on the implementation of sustainable land management activities (eg ecosystem restoration and conservation) coupled with monitoring activities at site and landscape levels to validate their impact on carbon and biodiversity ecosystem services. An additional goal is to strengthen the environmental governance systems in the intervention sites by addressing knowledge gaps and generating spatially explicit decision-support tools.

The second initiative is the Andean Forest Program, funded by the Swiss Agency for Development and Cooperation (SDC), which will be implemented in collaboration with HELVETAS Swiss Intercooperation. The program will promote conservation and restoration of high-elevation forest ecosystems in the Andean arc. The emphasis will be on implementing and monitoring sustainable land-use practices that have the potential to consolidate synergies between adaptation to and mitigation of climate change and make visible the importance of Andean forests in the provision of local, regional, and global ecosystem

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goods and services. Together with initiatives at other scales, CONDESAN will continue to make efforts to generate and synthesize knowledge within collaborative networks in the Andes.

FURTHER READING

Peralvo M, Cuesta F. 2014. Conversión de ecosistemas altoandinos: vínculos entre patrones y procesos a múltiples escalas. *In:* Cuesta F, Sevink J, Llambí LD, De Bievre B, Posner J, editors. *Avances en investigación para la conservación de los páramos andinos.* Quito, Ecuador: Consorcio para el Desarrollo Sostenible de la Ecorregión Andina (CONDESAN), pp 325–351.

Protocol series for integrated monitoring: www.condesan.org/portal/novedades/protocolos-de-monitoreo-para-entender-las-dinamicas-de-los-ecosistemas-andinos

Regional monitoring networks:
www.condesan.org/gloria/
www.condesan.org/redbosques/
http://imhea.condesan.org/

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