



REPORTING 2025 EVIDENCE



Ecuador's State Agricultural Policy embeds Alliance-co-produced soil fertility maps as a foundation for 2025–2034 national planning and climate risk management

OVERVIEW OF THE RESULTS

Between 2022 and 2025, the Alliance Bioversity–CIAT supported Ecuador's Ministry of Agriculture, Livestock and Fisheries (MAGP) in institutionalizing high-resolution digital soil mapping as a national public-good infrastructure for agricultural planning and climate risk management. Using machine learning and co-designed institutional workflows, the initiative transformed soil data into operational decision-support systems embedded in national policy, territorial planning, and soil conservation programs, strengthening evidence-based governance for sustainable agriculture and resilience.

HIGHLIGHTS

- **National soil maps institutionalized:** High-resolution 30-meter soil maps were integrated into Ecuador's Public Agricultural Information System (SIPA), its agricultural geoportal del Agro Ecuatoriano, and the national policy *Manos para el Campo 2025–2034*.
- **Advanced national soil datasets produced:** Machine learning combined 13,400+ soil profiles and 40 environmental covariates to generate detailed national soil property maps.
- **Evidence-based policy strengthened:** Alliance-MAGP maps informed Ecuador's soil degradation diagnosis, identifying 43.4% of productive land (4.1 million ha) as potentially degraded, with soil fertility alterations reducing yields losses by up to 20%.
- **Climate-risk and land-use planning improved:** Soil maps now support zoning, soil health monitoring, conservation targeting, and flood and drought adaptation planning.
- **Institutional technical capacity built:** MAGP technicians gained capacity to manage workflows, update datasets, and apply parish-level soil analytics for territorial planning.

GEOGRAPHIC SCOPE: NATIONAL



COUNTRY: Ecuador

CONTRIBUTING EXTERNAL PARTNERS:

1. Ministry of Agriculture, Livestock and Fisheries (MAGP), Ecuador
2. Fundación EcoCiencia, Ecuador

SDG TARGETS



15.3 -By 2030, combat desertification, restore degraded land and soil,

PRINCIPAL CGIAR IMPACT AREA



Impact Area 5: Environmental Health and Biodiversity

ELABORATION OF OUTCOME/IMPACT STATEMENT

Just three years after the Ecuadorian Ministry of Agriculture, Livestock and Fisheries (MAGP) released its high-resolution soil mapping, those 30-meter grid layers have become an important component of national agricultural information systems [2,3,4]. What started as co-produced maps under Alliance Bioversity-CIAT leadership have evolved into an institutionalized public good instrument that shapes how Ecuador plans, protects, and invests in its agricultural land [2,3].

Alliance scientists and partners did not stop at model development. They worked alongside MAGP and its General Coordination of National Agricultural Information (CGINA) to turn a research output into an operational service. Alliance-led machine learning for more than 13,400 soil profiles and 40 environmental covariates produced more detailed national soil property layers [2,3]. Alliance teams then co-designed workflows with MAGP technicians, embedded the technical memory into institutional systems, and supported the translation of technical evidence into the State Public Policy for the entire agricultural sector "Manos para el Campo 2025–2034" [1].

The published State Public Policy cites the Alliance Bioversity-CIAT fertility map as a primary input to its national soil degradation diagnosis—finding that 43.4% of productive land (over 4.1 million hectares) is potentially degraded and that soil fertility alterations can reduce yields by up to 20% [1]. These figures, drawn directly from Alliance-co-produced maps, now anchor the policy's evidence base for Axis 5 on environmental sustainability and climate risk management and underpin the specialized soil conservation instrument (PMPCRS) that complements it [1,5,6]. The former Minister of Agriculture, Livestock and Fisheries, Bernardo Manzano Díaz, captured the ambition behind this: "This map will contribute to diagnosing the state of soil degradation in Ecuador—mainly caused by erosion, desertification, and contamination—and will serve as an effective tool to guide strategies aimed at achieving fertile and healthy soils, minimizing the impacts of land-use change. It will also help increase productivity without causing further degradation, support smallholder farmers, ensure food security and sovereignty, and reduce poverty levels" [1].

Today, the full suite of soil layers is integrated into Ecuador's Public Agricultural Information System (SIPA) and its agricultural geoportal Geoportal del Agro Ecuatoriano [6], and their use is explicitly codified in the Manos para el Campo national policy [1]. Zoning decisions, soil conservation programs, and climate risk planning are no longer based on fragmented or coarse information; they are anchored in the digital soil infrastructure that the Alliance helped build and deliver.

Through learning-by-doing with Alliance experts, two MAGP technicians have moved from passive users to active stewards—running workflows, updating outputs, and applying parish-level analytics to territorial planning [5]. Four routine functions now depend on maps the Alliance helped institutionalize: land-use planning; monitoring soil health indicators; targeting soil-conservation and management strategies; and integrating flood and drought layers with soil fertility classes and soil organic carbon to guide preparedness and adaptation [5,6].

EVIDENCE

1. Ministry of Agriculture, Livestock and Fisheries of Ecuador. (2026). State public policy for the Ecuadorian agricultural sector 2026–2034. link [here](#)
2. Martín-López, J.M.; Jimenez, W.; Calahorrano, O.; Caicedo, Flaker, J.D.; Mayesse, Da Silva, (2023) Digital map of chemical fertility of soils of continental Ecuador, Harvard Dataverse. link [here](#)
3. Alliance Bioversity and CIAT (2022) Mapa digital de fertilidad química de los suelos del Ecuador continental. link [here](#)
4. Fundación EcoCiencia, Ministry of Agriculture and Livestock of Ecuador, Bioversity International, & International Center for Tropical Agriculture. (2022). Digital map of chemical fertility receives Esri's Map Gallery Award. Conference of Esri Ecuador Users (CUE 2022). link [here](#)
5. Martin, J. (2024) Capacitación en monitoreo espacio-temporal de la erosión hídrica usando Google Earth engine. Strategic alliance with SERVIR Amazonía to combat water erosion in the Amazon. link [here](#)
6. Ministerio de Agricultura y Ganadería del Ecuador. (2025). Spatio-temporal monitoring of water erosion in the Ecuadorian Amazon. link [here](#)

OTHER NOTABLE REFERENCES, PROMOTIONAL PRODUCTS AND COMMUNICATION MATERIALS

- Alliance of Bioversity and CIAT (2022) Restoring Soils of Continental Ecuador. (Spanish version). Blog. available [here](#)
- Ministry of Agriculture, Livestock and Fisheries of Ecuador. (2022) A map allows us to know the situation of the soils in Ecuador (Spanish version). Blog available [here](#)
- Fundación EcoCiencia (2024) MAGP training and meeh platform launch: strategic alliance with serving-amazon to combat water erosion in the Amazon. available [here](#)



*Presentation of the Digital Map of Chemical Fertility of Soils of Continental Ecuador and training workshop for Ecuadorian technicians
(Photos: Ecociencia)*

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PARTNERS' LOGOS



Produced with professional inputs from the Alliance's Performance Innovations Strategic Analysis for Impact Program & the Science Writing Service team.



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The Alliance is part of CGIAR, a global research partnership for a food-secure future.



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