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Biodiversity Data Management for Decision-Making. Information from Centers for Biodiversity of Documentation and Registration In Ecuador

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Summary

The Ministry of Environment, Water and Ecological Transition of Ecuador develops initiatives devoted to strengthening decision-making based on biodiversity data from various national stakeholders. In the initial phase, the information held by the Centers for Biodiversity Documentation and Registration is upraised. These centers are categorized in Herbaria, Natural History Museums and Mycotheque. With few exceptions, not only do data management face institutional limitations that may affect data quality, but it is uncommon to share data on biodiversity management with researchers, academia or organizations so that these entities can reuse the information in the production of new biological knowledge that could mainly strengthen the management of the country's natural heritage.

In this regard, the National Environmental Authority promotes initiatives to dynamize data sets and establish spaces to promote visibility of Centers for Biodiversity Documentation and Registration, empower data exchange and create synergies to improve the quality of biodiversity information.

Key-words: biodiversity data, herbarium, museum, natural history collection, Centers of Biodiversity Documentation and Registration.

Introduction

Within the framework of the Regional Project to manage, monitor and control of wild fauna and flora species threatened by trade - Bioamazon Project, the Ministry of Environment, Water and Ecological Transition promotes initiatives to strengthen data and information management of the country's natural heritage.

Access constraints or the absence of biodiversity data at various management scales interfere with decision-making and environmental policy development; in this sense, in the initial phase of the proposal for data management and exchange, the potential of the information collected in Natural History Museums and Herbaria is evaluated for its importance and as a reference for biodiversity at various scales, from local to national.

Stakeholders

The Ministry of Environment, Water and Ecological Transition, through the *Sistema de Información de Biodiversidad del Ecuador SiB-Ec* (Biodiversity Information System) and the *Catálogo Nacional de Objetos Biológicos CNOB* (National Catalog of Biological Objects), seeks to foster data and information exchange on biodiversity in a broad group of partners ranging from professionals to organizations that generate, process, safeguard or disseminate biodiversity data and/or information.

In Ecuador, 52 Centers for Biodiversity Documentation and Registration of the category Herbarium (flora), Museum of Natural History (flora and fauna) and Mycotheca (fungi) are registered. These are located in 13 of the country's 24 provinces and are distributed in the area of influence of the Amazonian biomes, Chocó, Seco Tropical and Montanos.

Information survey

Surveys were applied to learn about the characteristics of the documentation centers. These were answered by delegates and by the personnel working with the biological collections housed in the institutions.

Herbaria

Herbaria are located in 12 provinces, linked (Figure 1) mainly to universities; the highest concentration is found in the province of Pichincha where Quito, the capital of the country, is situated.

Ecuador's flora wealth is estimated at 17,748 native species (Neill 2012); national herbaria guard 880,079 specimens with associated data corresponding to temporal, spatial, taxonomic, and environmental coverage, among others.

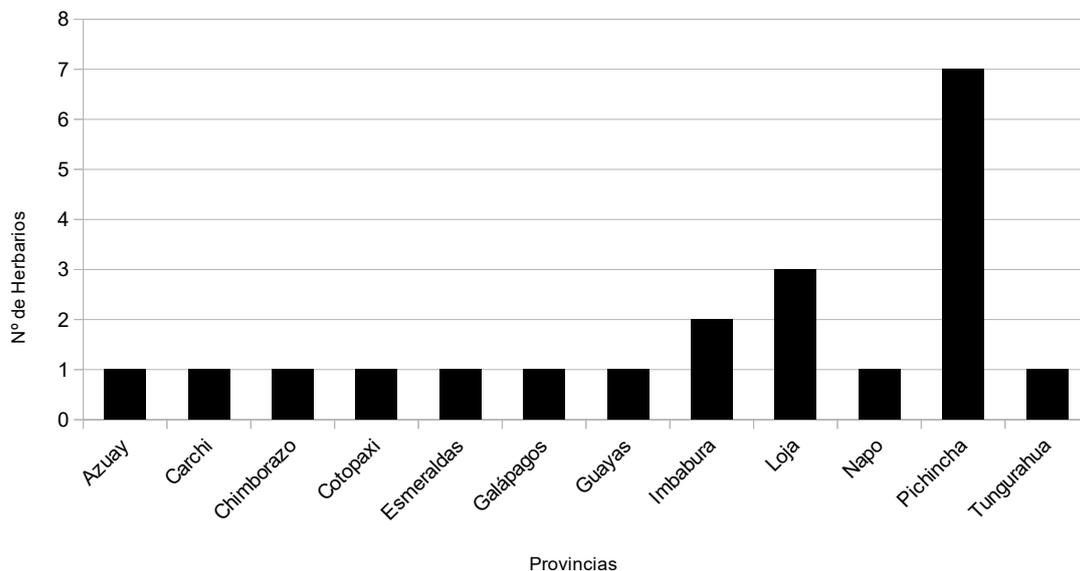


Figure 1. Herbaria by province

Natural History Museums

Natural History Museums contain specimens of invertebrates, birds, reptiles, amphibians, fish and mammals that can be classified into two types: for exhibition and for research purposes.

In Ecuador it is estimated the number of vertebrate species at 2,794 (Mestanza-Ramón et al. 2020). The Natural History Museums are located in 10 provinces (Figure 2) and house 10,501,737 specimens. The dominant group is that of invertebrates.

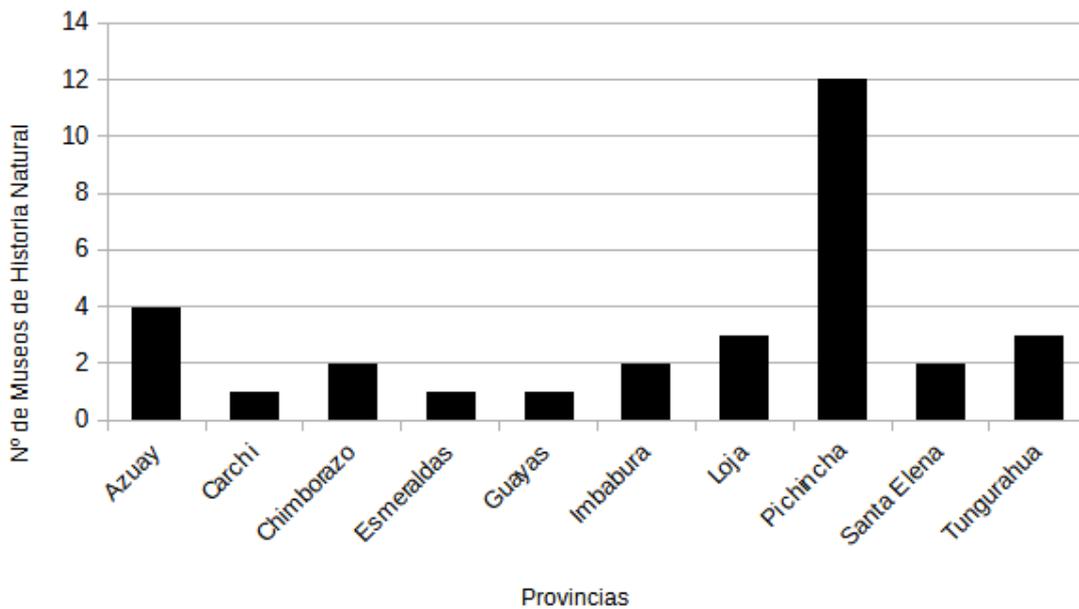


Figure 2. Natural History Museums by province

Mycothèques

Micothèques contain specimens of fungi that are associated with botanical collections. The three collections are located in Pichincha province, two of which are linked to universities and one to the National Institute of Biodiversity. The collections contain 19,492 specimens.

Once the collections are grouped by institution and by artificial biological group, it is observed that fungi and auxiliary collections are represented in 14% of the Museums and Herbariums (9% and 5%), and the Flora and Fauna groups share 86% representativeness (Figure 3).

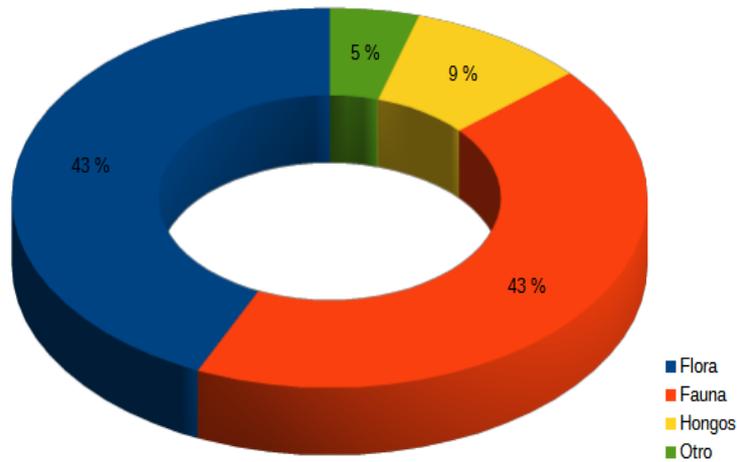


Figure 3. Representation of biological groups in the Centers for Biodiversity Documentation and Registration

The national spatial coverage of the biological collections reaches 49% of the Museums and Herbaria; the regional scale owns 28% and 11% of the institutions have a more local theme at the provincial level, and in equal percentage specimens from other countries are represented (Figure 4).

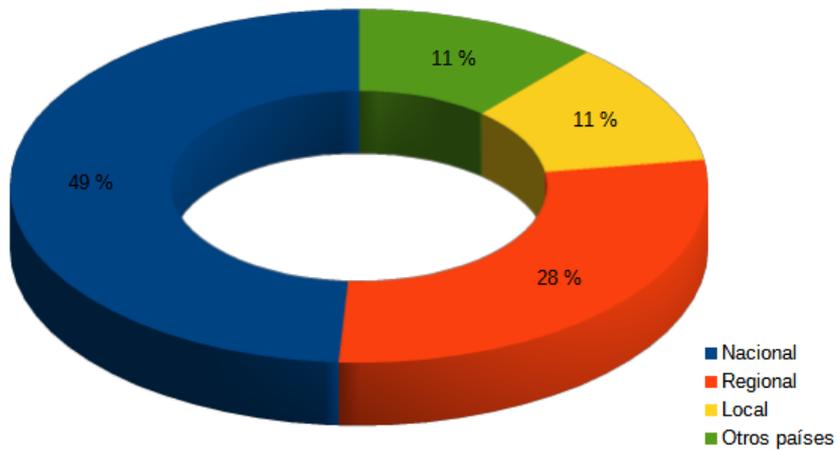


Figure 4. Proportion of the origin of the biological collections of Herbaria and Museums

With regard to institutional capacities, it is noted that the 42 documentation centers that provided information through the survey have limitations in terms of the management of geographical data and databases (Figure 5).

The other 18% of the institutions responded that they have between 80 to 100% of their information digitalized.

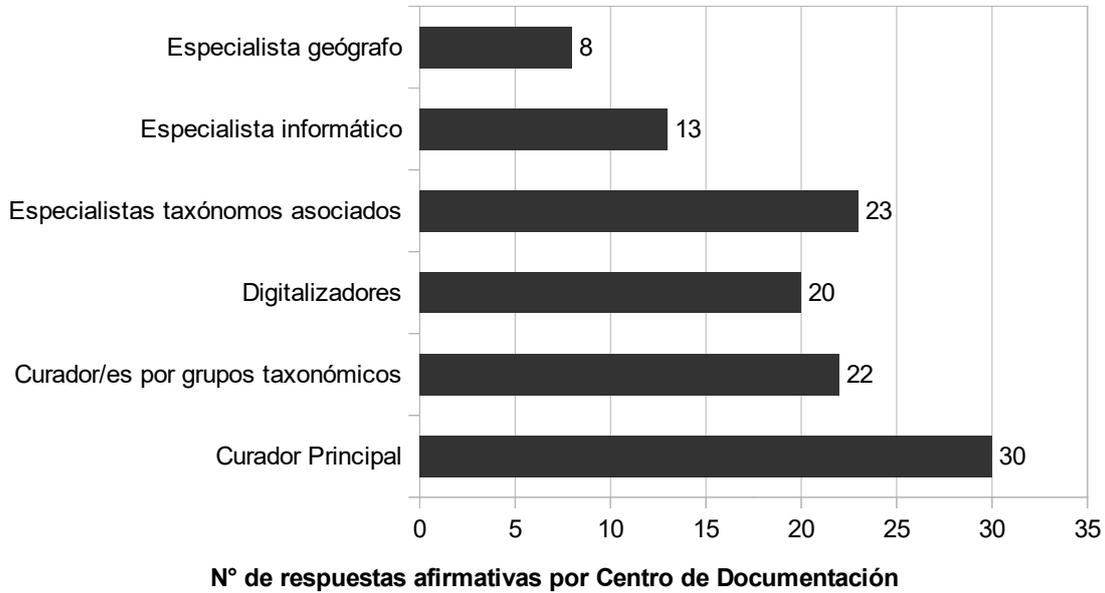


Figure 5: Technical personnel reported by 42 Centers for Biodiversity Documentation and Registration

Information management includes text files to databases designed for biological collections, and the spreadsheets are the most commonly used resource for the digitization process (Figure 6).

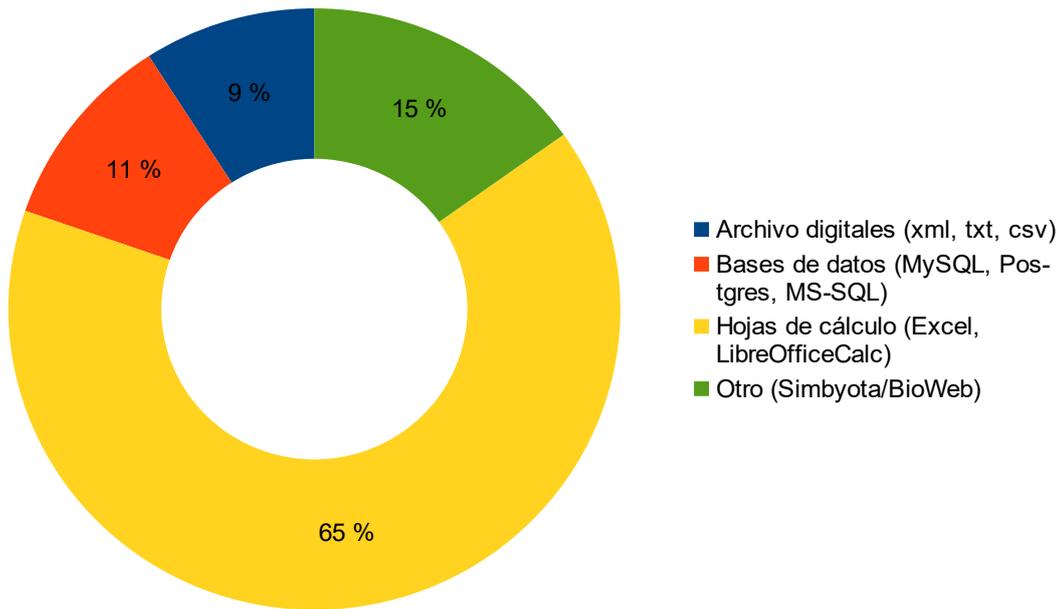


Figure 6. Information management methods in National History Museums and Herbaria

Regarding the perception of the importance of the information they manage, the institutions consider the temporal, geographic and species type information to be more relevant (Figure 7).

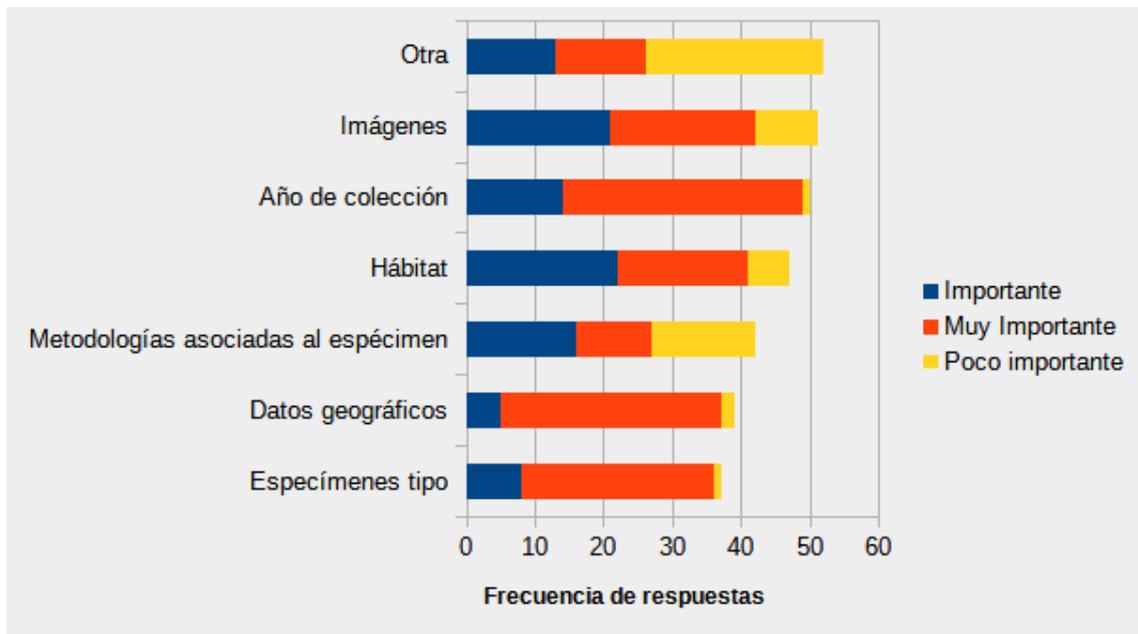


Figure 7. Primary information considered relevant by the Centers for Biodiversity Documentation and Registration

The institutions consider the information related to scientific production to be sensitive, and it is available to be shared, together with data on threatened and sensitive species (Figure 8).

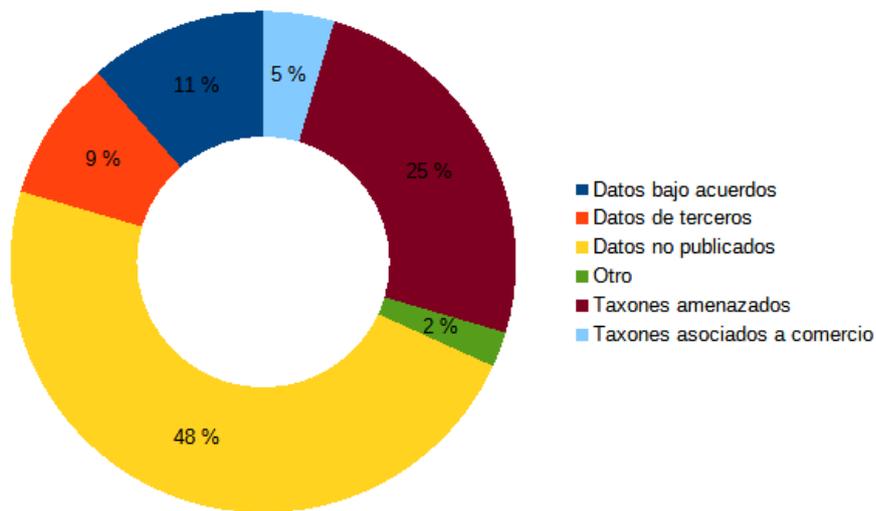


Figure 8. Information considered sensitive

Information management methods from the Centers of Biodiversity Documentation and Registration

Within the framework of capacity building in Biodiversity Documentation and Registration Centers, cycles of meetings were arranged to discuss the importance of improving the quality of institutional data and fostering the spirit of sharing them to generate new knowledge on natural heritage and guide the management of natural resources at various levels.

In this sense, a legal body is created to provide guidelines for the management of data and information on biodiversity through the CNOB catalog, so this information is available with different levels of access and can be used for the benefit of conservation, sustainable use of biodiversity, decision-making and generation of public policies.

Forty-two percent of the Centers for Biodiversity Documentation and Registration participate in the first phase and, tentatively, share 38,176 data with the Environmental Authority; these data follow a quality control process and are expected to be reused by the national scientific community.

Table 1: Records per type of Center of Biodiversity Documentation and Registration

TYPE OF CENTER OF BIODIVERSITY DOCUMENTATION AND REGISTRATION	N.º DE RECORDS
Herbarium	25.814
Botanical Garden	300
Natural History Museum	12.062

Conclusions

The Centers for Biodiversity Documentation and Registration expressed interest in learning about the National Environmental Authority's initiative and the guidelines for biodiversity data management set out in the National Catalog of Biological Objects.

The country's biological collections house data of greatest amount of diversity and have a national scope. However, there are institutional limitations that were exposed during the discussions. Attention was drawn to the limited number of staff available and the limited time they can devote to improving the quality of the data in the collections, as well as to enhance the use of data in the generation of new knowledge; they identified important aspects such as the need to make visible the work carried out by institutions, and the need to generate spaces for capacity building and synergy between them.

In the Centers for Biodiversity Documentation and Registration it is reasonable that doubts arise when considering sharing data, especially due to the use and non-recognition of copyright; it is for this reason that unpublished data are considered sensitive, and data on threatened species, for example, are then prioritized.

The first call has 42% of the Centers for Biodiversity Documentation and Registration that have welcomed the proposed standardization and will continue to improve the quality of data to be shared, initially, with the Ministry of Environment, Water and Ecological Transition and, in the medium term, with the national scientific community.

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