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BIODIVERSITY INFORMATION SYSTEM OF THE NATIONAL PARKS ADMINISTRATION OF ARGENTINA

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INTRODUCTION

The Biodiversity Information System (BIS) of the National Parks Administration of Argentina (NPA) was launched in 2002, with the support of the Global Environmental Fund (GEF) through the Biodiversity Conservation Project in Argentina. The BIS consists of a set of thematic databases and Geographic Information System (GIS) set to support management decisions, and to provide information to the general public on the national protected areas of Argentina. Currently, the BIS-NPA program collects, stores, organizes, and makes available through its website data derived from technical, scientific, and management activities in the national protected areas system.

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1. HISTORY AND BACKGROUND

Argentina subscribed to the Biological Diversity Convention (United Nations 1992) by National Law # 24,375, which states in Article 7d: "the need to maintain and organize data derived from monitoring and identification of Earth´s biodiversity components." To contribute to the fulfilment of this goal, the NPA developed the Biodiversity Conservation Project for Argentina, funded by the Global Environmental Fund (GEF). The project overall objective was "to ensure the conservation of biodiversity of global importance," and: "(a) to enlarge and diversify the NPA System, specifically, to include inadequately protected eco-regions of the country of global importance, and (b) to propose sustainable management alternatives by: strengthening the institution through investment; improving mechanisms for public consultation and participation; and improving the management of biodiversity information." To meet the latter challenge, the NPA created the BIS "to provide national and international agencies with immediate access to relevant biodiversity information for decision-making on the conservation and sustainable use of biodiversity." Since the NPA is a government agency which mission is to ensure biodiversity conservation in national protected areas, the creation of the BIS-NPA had the purpose to collect, classify, and publish biological information relevant for the conservation of biodiversity in national protected areas that might potentially cover areas outside national protection in the country. The initial programming system was based on experience that Patagonia Regional Delegation had gained since 1980 designing regional data management systems; i.e., the Conservation Data Bank (BDC-DRP) and the Plan Inventory, SIRAT, etc.

The BIS-NPA has one node in the PNA Conservation Agency (DNCAP) in Buenos Aires, and at each of the four Regional Delegations (i.e., Northwest in Salta, Northeast in Iguazú, Central in Córdoba, and Patagonia in Bariloche). Also a web server was installed to manage databases, and a website created (www.sib.gov.ar) to provide easy public access to data and restricted access to PNA staff. In 2007, the external funds ended therefore, for the project continuation the NPA institutionalized the system. Finally in 2008, the BIS-NPA was redesigned to enhance its functionality, appearance, and accessibility. Among the major changes were that the server was updated, the operating system and programming languages were changed, a new website was designed, and the content manager and database administrator were enabled to upload data online.

2. SYSTEM FEATURES AND FUNCTIONALITY

2.1. Organization

The BIS-NPA operates regionally, i.e., the web manager allows uploading data from any Internet terminal at its regional nodes. Each node is composed of at least two people: a database or data-entry operator, and a geographic information system

operator. The scheme is completed by a General Coordinator that articulates work among nodes, and with an Informatics Coordination which is composed of two programmers for software maintenance, updating, and integration of new tools and databases.

2.2. SIB-APN Technical Features

The BIS-NPA operates with free software, to ensure a safe and steady basic structure: CentOS Linux OS, Apache Web server, map server and display Pmapper MapServer, programmed databases in MySQL, POSGRE and PHP. For general programming, the BIS-NPA has two main components: 1) a **development environment** or content manager with restricted access that allows online updating of public information and of confidential data, and 2) a **production environment** or portal, which allows free, simple, and public access to data browsing.

2.3. Biodiversity Information

There are two main biodiversity information data sources for the BIS-NPA: Bibliographic Data: species records with published date and locations in scientific journals, outreach publications, internal and external reports, thesis, etc. Observational Data: presence and/or abundance records of species obtained systematically or occasionally recorded by collaborators, park rangers and/or technicians within Protected Areas. Also data from herbarium or other biological collections. Species Factsheets: taxonomy, descriptions, conservation status, images, sounds, distribution maps, etc. Protected Areas Factsheets: conservation category, administration data, area, images, maps, geographic covers, lists of special value species, ecoregions, etc.

Research Projects: general description, researchers responsible, reports, and administrative information of permits issued to conduct research in national protected areas. Cultural Resources: description of cultural valued sites and objects found in national protected areas, their management and preservation. Documents of interest: collection of files of general interest, including those the public frequently requests. Census of activities, housing and education of National Parks inhabitants.

Due to the dynamic nature of the new website, data are updated automatically as they are entered by the Content Manager. To access the data there is a Taxonomic Browser, and three main search engines (i.e., Protected Areas, Species, and Bibliography), and a fourth one recently included; i.e., an Advanced Search of Biological Records that allows the query of georeferenced locations of species in the system. Also, at the website main panel news related to Protected Areas and Biodiversity are displayed, recommended species datasheets are shown and the location of National Protected Areas on Google Map provides an alternative access to the Protected Areas datasheets. Additionally, on the main panel there is access links to the new applications and tools, institutional information, and links to related sites.

Among the BIS-NPA public applications and tools the following can be mentioned: Read documents of interest. Search on the Advanced Biological Records. Species surveys by protected area and information source. The Database of Scientific Research in National Protected Areas. Interactive mapping and downloading shape files. Data on Collections and surveys. Animal sounds.

2.4. Geographic information system

The BIS-NPA has published at its web site a number of thematic maps of national protected areas in Argentina, and interactive maps and tools for downloading geographic coverages. GIS-based mapping and biodiversity data allowed the production of thematic maps (i.e., habitat, infrastructure, roads, topography, etc.) and contributed to multi-scale spatial analysis and information to support decision making at NPA.

2.5. The BIS-NPA TODAY: strengths, weaknesses, and challenges

One of the main strengths that ensured the construction of the BIS-NPA was a significant external funding for its development, which initially allowed almost no limitations in terms of human resources and equipment. Furthermore, the continuous supply of information by NPA staff and others, such as, technicians, scientists, and naturalists. Additionally, the staff of programmers that continually develop new tools and databases and biodiversity experts that have allowed the maintenance, updating, and sustained growth of the system. Finally, the interaction with international (e.g., GBIF) and national (SNDB) systems has allowed to exchange data, tools, and resources. However, this latter aspect should be further strengthened.

The main weaknesses identified that impair the full operation of BIS-NPA are the lack of training or internet access by users, and the additional costs that the inclusion of new technologies and programming tools require .

The system recorded about 600,000 visits last year. Although no detailed characterization of users outside NPA has been made, we are also receiving a wide variety of queries via mail and in person, which can be grouped as follows: Requests of more detailed information by students of different educational levels. Queries and suggestions by the scientific and technical community, governmental and nongovernmental, for management plans, projects and/or for geographic coverage exchanging. Contributions and inquiries by naturalists and the general public, providing information and photographs, project collaborators, etc.

Therefore, the information services provided by the BIS-NPA has facilitated not only external linkages with other institutions and the general public, but internally it has contributed to the system´s growth with information input and demand. Recently, new databases of several topics have been included; such as species survey records, museum collections, research permits, people census, cultural resources, exotic species, etc. While primarily focused on national protected areas, the BIS-NPA

scope is extending to protected areas of other jurisdictions (e.g., provincial, municipal, and private).

After 10 years of operation, the BIS-NPA has been able to: Make available over 140,000 species references, mainly for national protected areas, from about 3,800 research and technical reports. Organize 16,590 occasional sightings of NPA "special-value" vertebrate species and 334,077 records from various collections and surveys.

Post around 300 Factsheets of protected areas, resources and species, with text, pictures, and sounds produced by NPA staff, researchers, and observers. Make available relevant documents in pdf format. Post cartography of national protected areas, including thematic maps, geographic shapefiles, interactive maps, and spatial analysis. Develop new databases of restricted access with complementary issues related to biodiversity: Research in national protected areas. National Registry of Cultural Resources. Census of national parks residents - Norpatagonia 2008. Monthly survey and monitoring of species in an area.

Currently, the goal of the BIS-NPA is to increase the use of the system as a tool that can provide information for decision-making and management of NPA. At the same, trying to catch up with the evolving concepts of conservation, the BIS-NPA has to become an information system providing updated biodiversity data, and on other sources of information to allow a holistic, integrative, and ecosystem vision for the planning and management of protected areas. Beyond rescuing, saving, organizing, and making available the data, the greatest challenge of the BIS-NPA is to analyze the data and generate information products required by the NPA agency and other users, thus strengthening internal and external bonds for biodiversity conservation.

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