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iabin

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IABIN Chair Note

Dear IABIN Friends, Council, and Focal Points:

On behalf of IABIN, I would again like to inform you all that, following the decision taken at the VI Council Meeting in the Dominican Republic, and months of effort on behalf of the Organization of American States (OAS), World Bank and others, the GEF has granted a one year extension to the IABIN project, allowing project activities to continue through June 2011. This extension will allow IABIN´s Thematic Networks (TNs) and data content grantees to finalize their data creation activities, and permit more complete integration of IABIN's infrastructure. The IABIN Council, IEC and TNs will also have more time to prioritize future projects for IABIN and build support in the region for these efforts. With this recently approved extension, IABIN´s Coordinating Institutions, which are leading IABIN's TNs, submitted to the OAS their respective work and procurement plans for 2010-2011.

I am also pleased to announce that in order to reach common consensus, the drafting Project Identification Form of IABIN-GEF Second Phase has been delivered to IEC Council Members and IABIN Coordinating Institutions for review, discussion, and inclusion of priorities at national and regional level. Implementing a successful second phase of IABIN will be a long-term endeavor and please do not hesitate to contact me with any ideas or suggestions as we undertake this effort.

IABIN has tentatively awarded Data Content Building Grants for the IABIN Catalog to the following countries and institutions: Argentina: IABIN Invasives Information Network; Brazil: Horus Institute, Universidad de Sao Paulo; Colombia: International Center for Tropical Agriculture (CIAT), Instituto de Investigación de Recursos Biológicos Alexander von Humboldt (IAvH), Corporación Selva Húmeda, Instituto Amazónico de Investigaciones Científicas (SINCHI); Costa Rica: Instituto Nacional de Biodiversidad (INBio), Organización para Estudios Tropicales (OET); Panama: Fundación Ciudad del Saber, Smithsonian Tropical Research Institute (STRI); Guatemala: Consejo Nacional de Áreas Protegidas (CONAP). The proposals approved by IABIN evaluators seek the creation and documentation of metadata, web services or related informatics activities promoting the integration of IABIN content and standards. This series of grants represents the final large segment of planned activities under Component 2 of the current IABIN project. Through these projects, the IABIN Catalog intends to improve integration, accessibility, interoperability and access to IABIN content from the IABIN Thematic Networks, and promote inclusion of additional data not currently available to IABIN.

I would also like to acknowledge and thank the institutions, focal points, and countries for completing the surveys regarding our next IABIN 2010 Performance Review in the international biodiversity year. We received a considerable amount of surveys that strive to analyze and understand how we respond to our users and the achievements and challenges on IABIN and biodiversity informatics in member countries.

In broader biological and hemispheric news, the Secretariat of the Convention on Wetlands better known as (RAMSAR) and the Department of Sustainable Development (DSD) from the General Secretariat of the Organization of American States (GS/OAS) entered into a Memorandum of Cooperation (MOC) committing the two organizations to pursue joint activities that would advance their mutual interests. Joint activities to be undertaken under the MOC include: sharing data, knowledge and information relevant to biodiversity conservation of wetlands and sustainable management within the Americas; and the development and execution of joint projects related to RAMSAR Strategic Plan and the DSD mandates, such as the proposed UNEP implemented, DSD executed, GEF funded project, titled "Valuation of Ecosystem Services," which is part of the RAMSAR Regional Strategy for the Conservation and Sustainable Use of High Andean Wetlands. The two Parties have agreed to make the MOC a "living agreement". To learn more

http://www.iabin.net/es/Descargar-documento/847 - Press-Release-RAMSAR-and-the-GS/OAS-sign-Memorandum-of-Cooperation.html

Finally, let me introduce the first release of <IABIN_MIND/> Milestones on Interoperability Newsletter and Dashboard. This planned quarterly newsletter aims to document IABIN interoperability and IT advancements, best practices, and lessons learned on biodiversity informatics about data and metadata content requirements, web-based toolkits for decision support models, access considerations, syntax and semantic specifications. We have solicited key contributions from experts, such as: Arturo Restrepo-Aristizabal, Michael Browne (GISIN), Steve Schill (TNC); the CIAT Team led by Andy Jarvis in Colombia, and Denny Grossman (DataBasin). We hope to continue working with such contributors in the future, and providing a venue for all IABIN participants to share their work and scholarship.

Gladys Cotter,
IABIN Chair

Metainteroperability trends to be applied over cloud computing by IABIN.

Arturo Restrepo-Aristizabal, Ecologist

The XX century brought answers to understand structural linguistics, signs, and heterogeneity of Indo-european languages by Ferdinand de Saussure. Later, the semiotics synthesis of Umberto Eco and ecosemiotics focus from Nöth & Kull, coupled with fuzzy logic linked to linguistic variables and its application into approximate reasoning, syllogistic, and computational approaches by Lofti Zadeh paved the way towards embracing ***On-line Knowledge Management*** into Semantic Web led by Tim Berners-Lee (Saussurre, 1916; Eco, 1975; Zadeh, 1987; Nöth, 1998; Kull, 1998; Berners-Lee, et al., 2001)

Knowledge management (KM) comprises a range of practices used by organizations to identify, create, represent, and distribute knowledge. KM may be viewed from each of the following perspectives: 1) ***Techno-centric*** with a focus on technology, ideally those that enhance knowledge sharing/growth. 2) ***Organizational*** how does the organization need to be designed to facilitate knowledge processes? Which organizations work best with what processes? 3) ***Ecological*** seeing the interaction of people, identity, knowledge, and environmental factors as a complex adaptive system. In addition, Nonaka´s reformulation of Polanyi´s distinction between tacit and explicit knowledge, where ***tacit is knowledge*** is what people carry on their minds and is, therefore, difficult to access. Often, people are not aware of the knowledge they possess or how it can valuable to others. Tacit knowledge is considered more valuable because it provides for people, ideas, and experiences. Effective transfer of tacit knowledge generally requires extensive personal contact and trust. ***Explicit Knowledge*** is knowledge that has been or can be articulated, codified, and stored in certain media. We can add a third type of knowledge to this list, the ***implicit knowledge***. This knowledge is hidden in a large amount of data stored in various databases but can be made explicit using some algorithmic approach. Knowledge can be further classified into procedural and declarative. Procedural knowledge is often referred to as knowing how to do something. ***Declarative knowledge*** refers to knowing that something is true or false (Berka, Rauch, & Zighed, 2009).

To readily manage biodiversity knowledge, **Meta-Interoperability (MI)** serves as the structural enterprise overlaid on distributed subsystems to become the functional framework allowing integration and harvesting. The MI is an applied solution for cross-platforms with existing or future web-based unified languages, resource descriptive frameworks - RDF, protocol connectors, standards, and XSLT script translators in order to enable and assemble both syntactic and semantic IABIN integration.

In 2006, Paul Kopp from The Centre Nationale d´Etudes Spatiales (CNES) published a pragmatic article through the Working Group on Information Systems and Services (WGISS) explaining how few technical and conceptual definitions about interoperability exists; even the concept itself cannot be found in any dictionary. Kopp introduces three complex issues related to reach out thorough interoperability among Earth IT science systems, such as: ***geographic, thematic, and technological diversity***.

In accordance to Kopp, Geography plays its role when any international program or project decides to distribute data over several repositories or provide access from spotty latitudes. Thematic diversity comes up because data is not isolated and is commonly related to some theme, pertinence, and need. This theme has an effect on the way data are organized and crosswalk classified (i.e. astronomical data produced by the observation of discrete objects -like stars- are obviously not collected in the same way as data produced by observing geographic features, which are shaped by the spatial and temporal continuity of observations). It implies that the same data may be subsumed under several distinct thematic categories, thus the quality of a data center, as perceived by its users, is directly related to the viewpoints and applications it offers. With a high rate of ICT diversity products released over short lapses of time, information and communication technology emerges as the snowball which is rolling languages, protocols, standards, and formats over the Web. Kopp also states that the way by which the different data elements are formatted to create the resulting dataset usually depends on rules enacted by the dataset designer or custodian. Thus, formats may be totally arbitrary or shaped by specific constraints or needs (Kopp, P. 2006)

Furthermore, there is a fourth issue to be defined as an assortment of idiosyncratic biodiversity IT systems by which organizations "take the lead" by developing a biodiversity informatics instance into a standard profile, and converting this into a XML schema without regionally syndicating or disseminating its development by the community of experts. It will definitely incorporate conceptual and technical details about the representation of biodiversity knowledge conceived by geographic, thematic, and technological groups; adding more complexity to the equation for integration.

Nevertheless, this is not the first time that scientists and knowledge managers struggle to tackle heterogeneity from other fields; chiefly dealing with the questions asked to explain diversity by approaching an issue based on their systems of thought (i.e. explaining high species diversity on tropical vs. temperate ecology, today´s digital economy, and Earth science systems).

Having depicted the problem to get effective interoperability, IABIN comprehends that there are a myriad of operating systems, file extensions, formats, incompatible workflows, which are available in biodiversity repositories in the Americas, aside from having many specimens and other data holdings which still need to be digitized. Hence, IABIN as conceived as a generative and foundational network, plans to explore the future web-based <IABIN_DIAC/> (Data Integration Analysis Center) as a virtual contributed enterprise for dealing with interoperability instances in the framework of theory, conceptual design, software enhancements, cloud computing, and new applications. This will be achieved by implementing a set of existing and future elementary constructs, which would be implemented among coordinating institutions (CIs) and thematic networks (TNs) to blend subsystems into the IABIN Web Services.

Successful regional and global collaboration among IABIN Coordinating Institutions representing Specimens and Species (SSTN), Protected Areas (PATN) http://www.iabinpatn.org/ , Pollinators (PTN) http://pollinators.iabin.net/portal/ , Invasive Species (I3N), and Ecosystem (ETN) Thematic Networks are responding to the interoperability challenge with both flexible organizational structures and cutting-edge technological process. This collaboration has been based on shared process models and application of syntaxes and semantics through data exchange formats and communication protocols (See Table 1). In so doing, IABIN is responding to users' needs by enabling data and services on both access and data/metadata exchange through www.iabin.net

Table 1. Major IABIN contribution is the political overlay of 34 OAS members countries acceptance of technical protocols and standards to contribute biodiversity knowledge.

IABIN STRUCTURE	Adopted Protocol & Standard
Overall structure	Web Services
Service registry	UDDI
Interface	WSDL
Access protocols	TAPIR / DiGIR
Geospatial Web services	OGC, WMS/WFS
Data/Metadata encoding	XML
Bibliographic data	Dublin Core
Specimens collections	Darwin Core / ABCD
Species	Plinian Core
Protected areas	WDPA Core Version 1.2
Invasive Species	I3N Standard on DwC
Geospatial data and metadata	FGDC
Biological resources	CSDGM n Bioprofile

The IABIN MIND Newsletter, published quarterly, will highlight interoperability practices and ecological informatics advancements through the fusion of four domains: 1) architectures, 2) enterprise integration & harvesting, 3) modeling, and 4) ontologies. ***The architectural*** outlook is focusing on implementation frameworks for interoperability, the ***enterprise integration*** is defining interoperability requirements, the ***modeling*** is analyzing inter-organizational systems based on the union of elementary technological constructs, and the ***ontological*** realm elucidated through semantic web technology for the topics dealing with terminological, thesaurus, and controlled vocabulary problems and style-sheet conventions. These domains will identify their common points and those divergent.

Ultimately, interoperability is gaining momentum and a lot of pioneering work still needs to be done through ***Inter-American Biodiversity [Interoperable] Network*** in coping with these challenges in an integrated way. IABIN should assemble integration/harvesting and Metainteroperability over a cloud-based unified resource, thus facilitating its contributed network approach across distributed systems.

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Interoperability and the Global Invasive Species Information Network

Michael Browne[1]

The government of Mexico has just approved a major invasive species bill that prohibits the importation or release into the wild of exotic invasive species or any other wild species that can carry an exotic invasive species, and mandates the creation of a list of exotic invasive species that has to be reviewed every 3 years . The government of Mexico, and every other government that wishes to implement effective prevention strategies, need to know which exotic species are potential threats. Science-based risk assessments are used to determine the likelihood of invasion. The history of establishment, spread and invasiveness of a species in other areas is a key factor in making this determination, along with information such as habitat preferences, tolerances and resilience, behaviour, reproduction strategy and response options at different stages in the life cycle of the species (Simons & De Poorter, 2009). Invasion history is one of the best available predictors of whether a species will become invasive when introduced to a new environment (Wittenberg and Cock, 2001).

Exotic invasive species can appear in areas far from their native ranges. While rich information is available about a small proportion of invasive species, the vast majority are poorly understood because our information networks are extremely limited in their global reach. Fewer than 30 (12%) of the world's countries have online invasive species information systems (Sellers et al. 2004, updated in 2010), and only 6 (11%) out of 57 countries randomly picked for survey for the 2010 global indicators of biological invasion report were considered to be 'data rich' (McGeoch et al. 2010). We need information from all parts of the world because different assemblages of invasive species occur in different places for historic and biogeographic reasons (Worner & Gevrey, 2006).

At present, there are at least 278 online invasive species databases (Sellers et al. 2004, updated in 2010), of which 157 have the United States as their host or originating country. We can expect a gradual increase in the number and the geographic coverage of invasive species databases over time, but the need for interoperability and integration of data mediated by a federated data network is already apparent.

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[2]Gaceta Parlamentaria 16/2/2010. Anexo III, de la Comisión Mexicana de Medio Ambiente y Recursos Naturales. (http://gaceta.diputados.gob.mx)
[3]Red Mundial de Información sobre Especies : www.gisin.org
[4]http://gisin.org/cwis438/websites/GISINDirectory/tech/Protocol_Home.php?WebSiteID=4

Image source : http://www.landcareresearch.co.nz/ :

Six invasive species databases are currently linked to the Global Invasive Species Information Network (GISIN) , which has been developing technology and standards to leverage the value of existing information resources for risk/impact assessments and the development of early warning systems. GISIN has deployed six data models that build on the components of Darwin Core and Dublin Core standards, but which define additional concepts that are important to invasive species science . GISIN also conducted a needs assessment survey which indicated low levels of technical capacity amongst most potential data providers, so while toolkits in the programming languages PHP and ASP are available, GISIN data providers can also post their data for upload to the cache as flattened, tab-delimited text files for easier implementation.

A parallel effort is needed to generate standardised information about invasive species in parts of the world not covered by current databases. Promoting inventory activities and providing access to a range of data capture tools ranging from standardised spreadsheets to sophisticated databases such as the Inter-American Biodiversity Information Network's (IABIN) Invasives Information Network (I3N) database, will help address taxonomic and geographic information gaps. The I3N database allows network members to collect and share standardized information on invasive species taxonomy, introduction, biology, ecology, impacts, control methods, occurrence (including geographic data), contacts, projects, and references. Inventory development has important local benefits for awareness raising, monitoring and prioritisation of management activities. In addition, inventory development typically involves close cooperation amongst key stakeholders, which leads to the development of enduring information exchange networks.

The third element of the emerging international biosecurity information infrastructure is a tool that harvests and integrates available data to produce a regularly updated and easily accessed list of known invasive species. A prototype tool that provides information support for pre-screening of proposed imports, risk assessments and prioritising management activities has already been developed. The Global Register of Invasive Species (GRIS) is currently the subject of a funding proposal to the US Environmental Protection Agency (EPA).

Interoperability between data mediated by the Global Biodiversity Information Facility (GBIF) and GISIN is also being explored. Ecological niche modelling and invasion history data can be combined to provide policy and decision-makers with a package of decision support tools including distribution maps, models of potential distributions (under present conditions and under different climate change scenarios), along with country-specific risk scores for invasive species, links to identification tools, and pathway, impact and management information.
GISIN's involvement in this effort is contributing to the development of an international biosecurity information infrastructure that will help countries identify invasive species threats and prevent their spread.

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Ecosystem Assessment and Reporting (EAR) Tool: Providing direction on conservation actions.

Steve Schiller (TNC)

Conservation decision-makers often make decisions in an atmosphere of uncertainty and, sometimes, without a complete understanding of the different factors that can affect the environment. The Inter-American Biodiversity Information Network (IABIN) recognizes the need to develop decision-support tools that synthesize biodiversity and management data, highlighting gaps in current needs, and provide reports and maps for prioritizing conservation action on the ground. The development of the Ecosystem Assessment and Reporting (EAR) tool responds directly to that need and demonstrates how data from the IABIN Ecosystems and Protected Area Thematic Networks (ETN and PATN) can be effectively integrated and used in the decision making process to guide and enhance environmental management decisions. The tool is provided in both Internet-based Server and Desktop versions, providing a "manager's dashboard" approach for querying current spatial information on ecosystem condition, socioeconomic threat to ecosystems, and protected area management status. By integrating biodiversity, socioeconomic and protected area datasets, the Ecosystem Assessment and Reporting Tool calculates eight conservation action classes for each ecosystem or species, providing a simple approach to answer questions such as "Which ecosystems are least protected?" "Of these ecosystems, where and how do we need to improve management?" and "Where are the opportunities to most efficiently reduce threats to these ecosystems?" By integrating data from the Ecosystems and Protected Area Thematic Networks that have been assigned biodiversity, threat, and management status, conservation decision-makers are able to cross-query ecosystems/species with protected area information, then report back spatial and tabular format user-defined categories on the condition and vulnerability of selected ecosystems/species. This information can then be used by conservation decision-makers to develop focused and prioritized strategies, effectively allocating resources and activities to the most appropriate places.

Future enhancements to the internet-version of the tool will permit the integration and interoperability of **WMS-WFS layers** for added functionality. While methods may vary on how to calculate an ecosystem's viability, threat status, and management needs, the design of the EAR tool provides a common framework for conservation decision makers to obtain direction on where to implement critical management actions.

The design and development of the tool was executed by The Nature Conservancy's Caribbean Science Program, working closely with the Department of Geography and Geology at the University of Southern Mississippi. Funding for the development of the tool was provided by the Global Environment Facility (GEF) Grant through the World Bank and executed by the General Secretariat of the Organization of American States (GS/OAS). To find out more, please go to http://www.eartool.org and download the Spanish and english user´s guide at http://gg.usm.edu/EAR/tutorial.htm or contact Dr. Steve Schill, Senior Scientist at The Nature Conservancy <sschill at tnc.org>

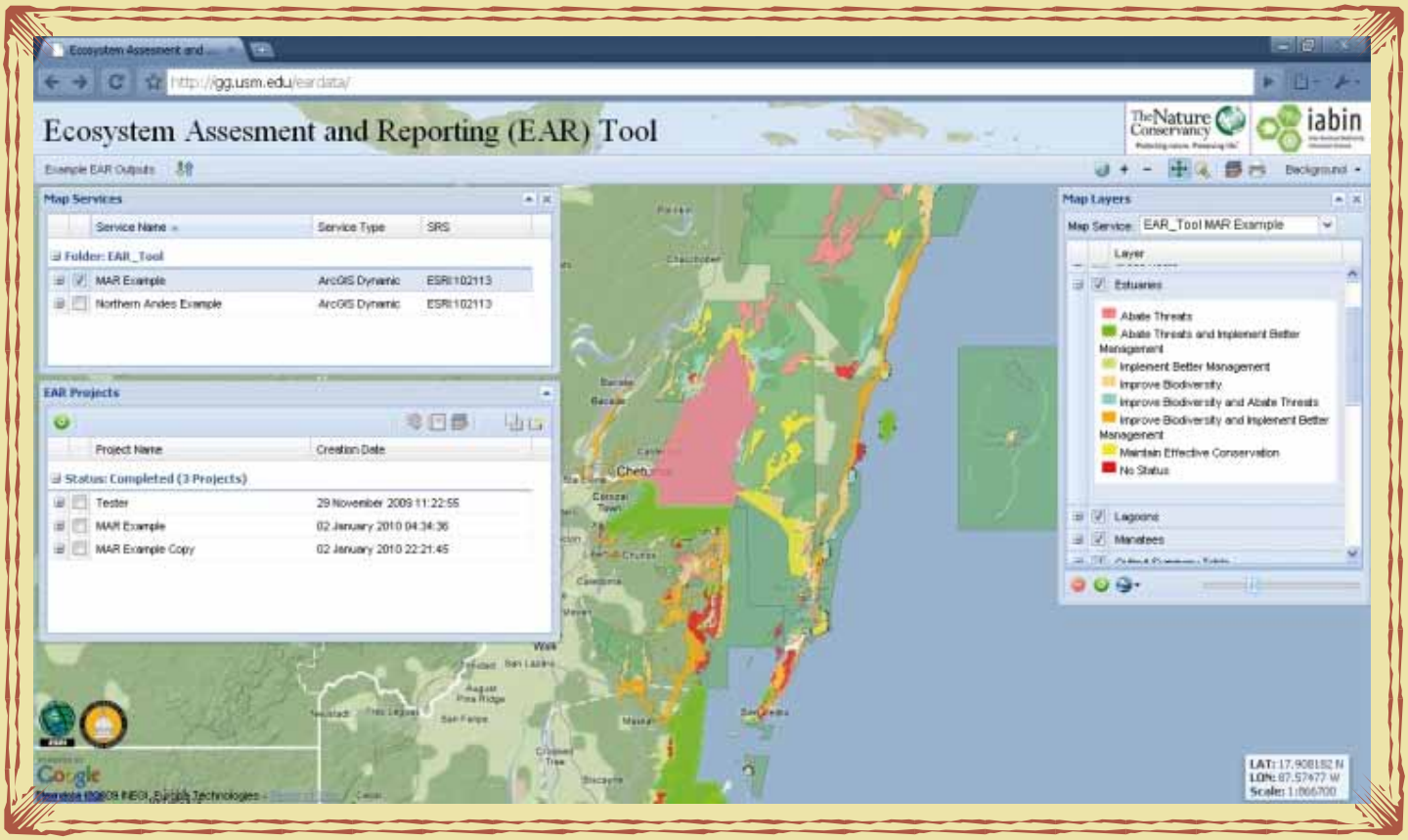

Fig. 1. *The user-interface of the internet-based Server version of the EAR tool. Users can select existing map services, or upload their files to perform the calculation of the conservation action classes. Users also have access to advanced graphing and reporting functions that cross-query ecosystems and protected areas attributes.*

Providing means for a better understanding of biodiversity: improving primary data and using it for threat assessment and in situ conservation planning in South America.

Julian Ramirez, Hector Tobon, Daniel Amariles and Louis Reymondin - International Center for Tropical Agriculture (CIAT)

Recent developments in Geographic Information Systems (GIS) and ecological niche modeling (ENM) applications have added value to data, and permit researchers to provide highly policy-relevant analyses to direct conservation interventions. Through the most recent ENM techniques, potential distributions of species can be analyzed using fairly limited or biased datasets containing primary data to determine current biodiversity hotspots (Phillips et al. 2006; Elith et al. 2006; Hijmans and Graham 2006), and likely threats from anthropogenic activities (Jarvis et al. 2009) and climate change (IPCC 2007) in order to define current and future in situ and ex situ conservation priorities (Walker et al. 2009; Bass et al. 2010)

However, one of the most relevant issues regarding the analyses and latter conclusions derived from the usage of primary biodiversity data is the reliance on its quality. Poor quality biodiversity data could lead to incorrect and biased conclusions as well as cause inefficient and/or wrong investment of the available resources and inadequate policy development.

Checking of biodiversity data quality as well as adequate use is a key issue in order to aid decision-making processes. We intend to (1) assess and improve the quality of IABIN's terrestrial holdings using automated scripts, (2) use the primary biodiversity data to develop niche models, (3) couple those results to assess the extent at which South American biodiversity is both under threat and conserved by the current Protected Areas network, and (4) implement an interface through which all results can be accessed and viewed by policy-makers.

We have automated algorithms developed in the Java programming language that allow a thorough coordinate verification process, which have been used on the GBIF (The Global Biodiversity Information Facility) database, and through which the whole database was verified for consistency of location data. Some 85% of the data was found to be correct at three different levels (Fig. 2). The same assessment will be done for all IABIN holdings in the first place.

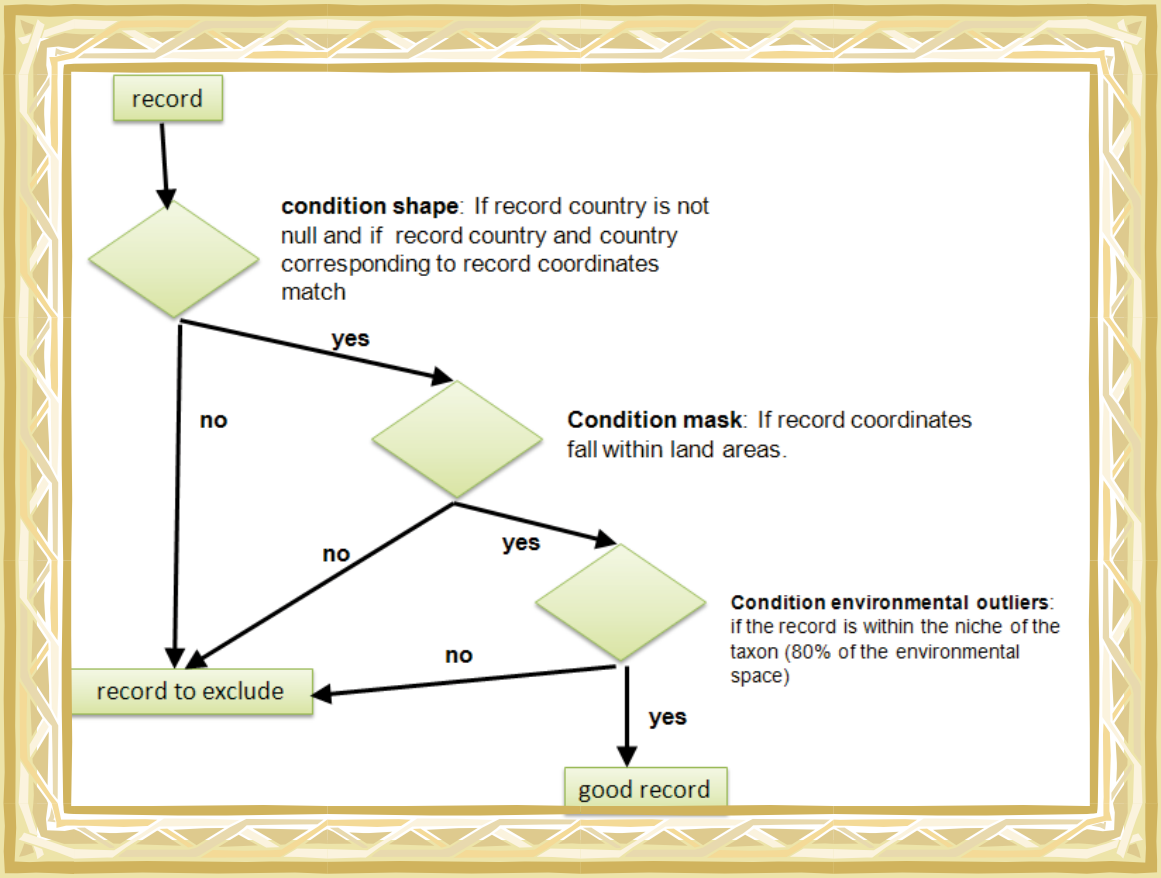

Figure 2 Flow chart of the coordinate verification process

We acknowledge the importance of the relationship between biodiversity and socio-economy, and the reliance of human beings on biodiversity and high quality ecosystem services. We, therefore, consider it fundamental to assess the level at which biodiversity is threatened and conserved across the globe, and particularly (given IABIN's focus) in Latin America, where the presence of significant biodiversity 'hotspots' (e.g. Brazilian Atlantic Forest, Ecuador's Yasuní National Park, the Guyana Shield, the Amazon forest, among others) make conservation strategies critical towards the near and long term future.

Strong methodologies to assess the impacts of anthropogenic activities will be developed and at least one peer reviewed publication will be pursued using the results of the modeling and cross-checking of coordinates. For further information, please contact Andy Jarvis, leader of the Decision and Policy Analysis program at CIAT (a.jarvis@cgiar.org).

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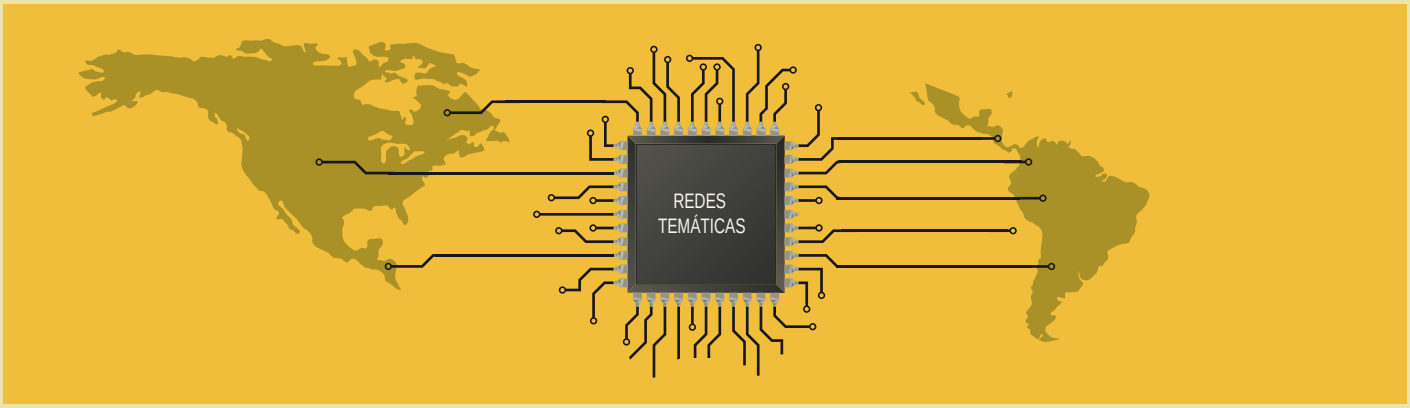
The IABIN Data Integration and Analysis Center <IABIN DIAC/>: : *A Pilot Application for the Integration, Visualization, Sharing and Analysis of IABIN Thematic Network Data*

Dennis Grossman

The Conservation Biology Institute (CBI) is poised to kick off a new IABIN Component 3 project to advance the development of value-added tools for decision-making. For this project, CBI will develop the IABIN DIAC on the new Data Basin platform. This web based application will enable the integration, visualization, sharing and analysis of IABIN Thematic Network (TN) data. The IABIN DIAC will also facilitate the integration of IABIN TN data into current environmental, economic, and social decision-making processes.

Data Basin is being constructed on a foundation of ArcGIS Online and traditional ESRI GIS mapping technology. CBI conservation scientists and programmers have worked closely with ESRI to build this new web-based tool http://www.databasin.org/ . Technically, Data Basin is pushing the envelope of allowing users to: (1) combine their spatial datasets with others; (2) create and customize their own maps; and (3) gain access to specific analytical tools. Socially, Data Basin provides a contributed platform for: (1) sharing datasets, maps, and projects; (2) user-defined security; (3) user-defined groups; (4) a simple ratings system from datasets and maps; and (5) direct links to experts.



The IABIN DIAC will allow scientists, decision-makers, and civil society easy access to IABIN TN datasets, integration and analytical tools, and information about the IABIN network and subject experts. Individuals and organizations will be able to explore and download TN datasets, upload their own data, and produce customized visualizations that can be shared with others. The IABIN DIAC will magnify the value of existing IABIN TN investments by empowering people to apply this information to scientific, educational, and planning objectives.

This IABIN DIAC project will start with a standards and interoperability evaluation of the existing datasets that have been adopted and are being managed by the five Thematic Networks. This evaluation will result in a report that outlines the current status of the datasets, and what will be required to improve interoperability between the Network data and with other important contextual datasets. The IABIN DIAC will then access the interoperable spatial datasets available in two ways. Shapefiles and raster files will be uploaded and stored as part of ArcGIS Online as layer packages while being converted to a map service hosted on the Amazon cloud. It is worth to mention that Intellectual Property Rights will be cited on both source and data provider´s origin. The IABIN DIAC will also allow users to access and incorporate datasets where compatible map services are provided by the five Thematic Networks.

Value added maps can also be created within the IABIN DIAC system through the integration of interoperable IABIN TN datasets and other datasets accessible through the Data Basin system. These maps can be saved, published, and shared with designated working groups. All datasets and maps require full metadata for inclusion into the system. Datasets can also be downloaded to a user's desktop GIS system. Users can use the provided mapping and analytical tools within the IABIN DIAC, or download individual files as layer packages to their own desktop for additional analysis and styling.

For more information, please contact Dr. Dennis Grossman (denny at consbio.org).