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Biodiversity data standards, infrastructures and interoperability for GEO BON - the GBIF contribution

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Outline

- GBIF informatics architecture & network
- Use of standards to enable interoperability
- Uses of GBIF mediated data
- GBIF and GEO BON



GBIF network / architecture



About GBIF

The mission of the Global Biodiversity Information Facility (GBIF) is to facilitate **free and open access to biodiversity data** worldwide via the Internet to underpin **scientific research, conservation** and **sustainable development**.

GBIF can support several GEOSS Societal Benefit Areas



Components of data sharing

1. The ***data*** – the ‘content’ of the system;
2. The ***system*** – infrastructure, tools and services (‘pipes & plumbing’) to allow data to flow – enables data publishing, discovery, access
3. The ***people*** – users, data publishers, legislators, enablers, communities of practice, etc

All three are necessary, none is sufficient of itself....



Key Data Sharing Challenges

- Data management;
- Data documentation (metadata);
- Data discovery (catalogues);
- Data access (web services, use tracking);
- Data exchange standards and protocols;
- Data types – what is needed?
- Data quality – fitness-for-use?
- Data volumes – how much is enough?
- Data security - open access vs sensitive data;
- Benefits/incentives for data sharing?
- Data ownership, IPR;
- Data attribution (authorship, recognition)



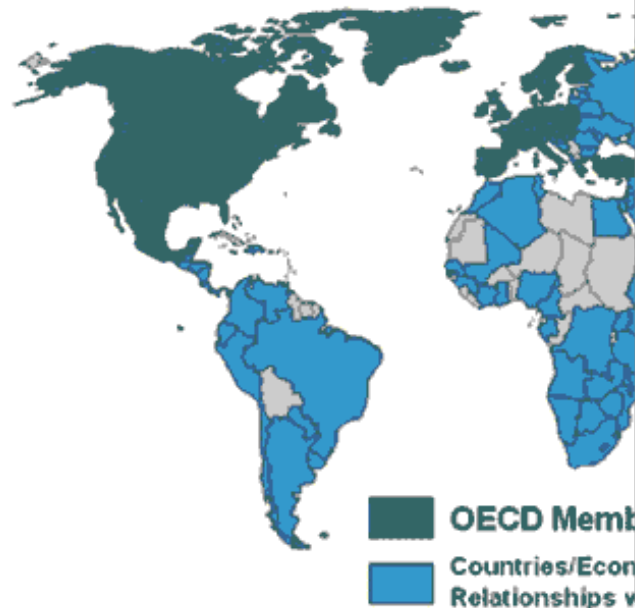
The OECD origin...



ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

OECD Global Science Forum recommendation (1999):

“Establish and support a distributed system of interlinked and interoperable modules (databases, software and networking tools, search engines, analytical algorithms, etc.) that together will form a **Global Biodiversity Information Facility (GBIF)**”



“This facility will enable users to navigate and put to use vast quantities of biodiversity information, thereby:

- advancing *scientific research...*
- serving *the economic...*
- providing *a basis from which our knowledge of the natural world can grow rapidly...*”

The GBIF Data Portal: a gate to biodiversity information

Background

The GBIF Data Portal has provided discovery and access to the content shared through GBIF since its launch in 2009. Resource accessible through the portal is primarily species data such as specimens in museums, observations in culture strains.

Issues

The primary critiques received of the portal relate to content and the time lag between data being added to the network, and becoming visible on the portal. OT identified for improvement were the backbone taxonomy organization of the content, which had become disorderly rapidly in number; and the geographic and temporal distribution of records (see maps in left column).

Solutions – improvements to the portal in 2011
During 2011, GBIF has developed new processing workflows to include the following:

- reduced processing time for data from 3–4 days to enabling more frequent rollovers (publication cycle therefore shorter delay between entering data on a portal);
- a complete regeneration of the taxonomic backbone up-to-date taxonomic catalogues;
- enhancements of the registry (see poster on GBIF support better modelling of the GBIF network structure and interactions. This paves the way for better data at data owners and service providers; and
- extended data interpretation routines and plausibility e.g. in the areas of geolocation, date interpretation depth, etc. (for illustration of some results, see next column).

The solutions were developed to run on the Hadoop efficient parallel processing environment enabling it to grow with future data volumes.

Components and Interactions

Integrated Publishing Toolkit (IPT)
Whenever anybody installs an IPT instance in their institution, they can register it to the GBIF Network. Any resources being hosted by that IPT instance can be published as well. This is possible because the IPT interacts directly with the GBIF Registry's Web Service API.

Harvesting and Indexing Toolkit (HIT)
The HIT is the tool responsible for harvesting and indexing biodiversity data from access points throughout the GBIF network. It has a dependency on the Registry's Web Service API, used to discover all available access points.

Other GBIF participant systems
There are a number of external GBIF participant systems making use of the Registry's Web Service API for their own purposes. The API documentation is simple and clear, so it is quite straightforward to make use of the API with minimal technical knowledge.

Refactoring to improve
The GBIF Registry's codebase has been improving through time to meet the needs expressed by the GBIF community. Currently all the code is open for anybody to make use of and hopefully improve. It is an ongoing development, as requirements are always being added.

The GBIF Registry: improving discovery and access

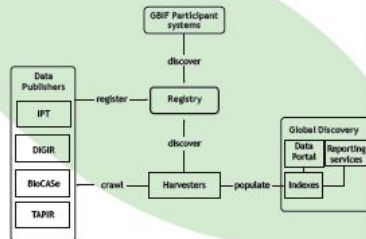
One of the major challenges for existing biodiversity informatics infrastructure is to enable users to improve substantially their ability to discover and access relevant biodiversity information and data resources.

The GBIF Registry

The GBIF Registry is a critical component of the GBIF network. Its main purpose is to hold the information about the entities that constitute the whole GBIF network, in order to enable discovery of this information. The GBIF Registry exposes a Web Service Application Programming Interface (API) to allow third party tools (e.g. harvesters) to discover and access biodiversity data. This API also offers the possibility to publish/update/delete resources on the network, using the proper authorization credentials.

Monitoring the GBIF Network

As the status of the network is ever-changing, the GBIF Registry needs to be able to detect these changes and take appropriate action (e.g. new contact info for a resource). A newly-developed monitoring service keeps track of 1) the availability (online/offline status) of the access points throughout the network, 2) changes in number of records shared throughout time and 3) changes in metadata information. This service runs periodically to keep the Registry's information as up to date as possible.



The Registry as a component of the GBIF network

Building a distributed metadata system for the GBIF network

The metadata system supports open exchange protocols. In particular, it supports the Open Archives Initiative for Metadata Harvesting (OAI-PMH), offering the possibility of integration with other catalogue systems, e.g. Metacat² and GenetecNetwork. The GBIF portal, in turn, can forward the aggregated metadata from its network to other clearinghouses such as the EuroGEOS broker³ thereby facilitating discovery of biodiversity resources on complementary networks. Work is currently in progress to support those GBIF Participants wishing to connect their national metadata catalogues to the GBIF network.

Large, distributed networks such as GBIF's bring together many publishers and consumers of data. To guide consumers in discovering data that is appropriate for their needs and fit for use, all datasets when published should be accompanied by metadata, in a standard format, that describe critical aspects of the data such as sampling procedures and methods, data quality, provenance, ownership, data format, access and intellectual property rights. Once generated, metadata are typically stored in online catalogues (databases) that can be browsed and searched.

Metadata are a central component in an expanding GBIF network, and it is essential that information about biodiversity datasets is well organized.

To meet this need better, GBIF is implementing a metadata system for its network that provides unified access to all participating metadata catalogues¹. The principal components of the system are i) a central metadata catalogue holding copies of all metadata published on the network, ii) one or more participating external metadata catalogues and iii) a set of protocols and data exchange standards to allow flow of metadata in the network. These components and the technologies chosen for their implementation, are described in Figs. 1 and 2.



Figure 1. The GBIF metadata network

datasets are available and, critically, to evaluate the appropriateness of such datasets for particular purposes.

The central metadata catalogue is being integrated in the improved GBIF data portal (Fig. 3), which allows a user to search for resources across the three main data types available (occurrences, checklists, metadata). Encouraging the publication of high quality, complete metadata via the distributed catalogue system will enable potential end users to discover easily which datasets are available and, critically, to evaluate the appropriateness of such datasets for particular purposes.

GBIF
www.gbif.org

GBIF
www.gbif.org

...free and open access to biodiversity data

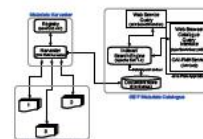


Figure 2. The system architecture includes three main functional components: a set of online accessible metadata catalogues, a metadata harvester, and the GBIF central metadata catalogue. Software choices for implementation are as indicated



Figure 3. GBIF data portal: integration of metadata

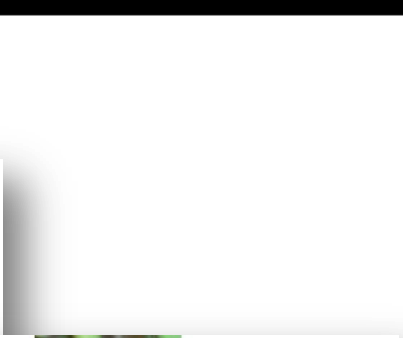
About GBIF
The Global Biodiversity Information Facility (GBIF) was established by governments in 2001 to encourage free and open access to biodiversity data. Via the Internet. Through a global network of national and thematic nodes, and a Secretariat based in Copenhagen, Denmark, GBIF promotes and facilitates the mobilization, access, discovery and use of information about the occurrence of organisms over time and across the planet.

Vision - A world in which biodiversity information is freely and universally available for science, society, and a sustainable future.

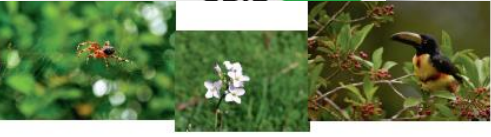
Mission - To be the foremost global resource for biodiversity information, and engineer smart solutions for environmental and human well-being.



<http://www.gbif.org/communications/resources/posters/>



IPT: facilitating biodiversity



The IPT installed by Suéfi (<http://www.gbif.org/country/SUEFI>) already holds 27 datasets describing the biodiversity of the country



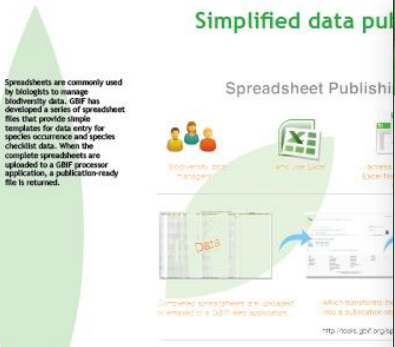
The Canadian organization Canadianys has customized the IPT to match the style of its existing website (<http://data.canadainsys.net/ipc/>)

Overview
The GBIF Integrated Publishing Tool developed to facilitate efficient biodiversity data publishing on the Internet. The IPT can manage three occurrence data, (i) taxonomic checklist metadata. Through it, users are able to upload existing files in delimited formats, and access centralized controlled vocabularies following the international standards (DWC-A) and the Ecological Modeler

After considerable community feedback and revision in early 2011. The new version is more efficient and more productive of Data Papers (see section) which represent a tangible incentive for publishing.

IPT Uptake
Since the release of IPT v. 2, 27 ins with GBIF, connecting a total of 10 260,000 checklist records to the network approximately 25 per cent of the network this year.

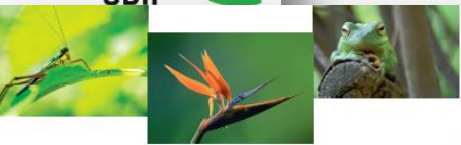
The uptake and deployment of the IPT helped and training experts. Site. Many of the group members at Workshop on the GBIF IPT, held in experts are now actively supporting and training others on its use world



The Darwin Core Archive Assistant is a service that allows database managers to produce a publication-ready data file without installing any local tools. They can describe their data files, and the service will produce the required data descriptor file that forms part of the data exchange standard format. This file is identified with the biodiversity data files for distribution through the GBIF network.



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The Data Paper: an incentive for metadata publishing

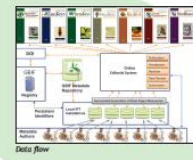
The lack of incentives for data publishers is one of the key impediments to free and open access to biodiversity data. The Data Paper has been conceived as one possible mechanism to offer scholarly recognition for the effort and investment involved in authoring rich metadata, and publishing them as a citable academic paper.

A Data Paper is a searchable metadata document describing a particular online accessible dataset, or a group of datasets, and published in accordance to the standard academic practices. Its purposes are:

- to provide a citable journal publication that brings scholarly credit to data publishers;
- to describe the data in a structured human-readable form; and
- to bring the existence of the data to the attention of the scientific community.

Unique features of Data Papers include: (a) low technology and infrastructural overheads; (b) close links or interconnections between data publishing and scholarly publishing cycles; (c) an automated, push-button conversion tool exporting metadata to a manuscript and (d) minimal core metadata elements to reduce time required for authoring a metadata document.

Data Papers for biodiversity will use the GBIF Metadata Profile (GMP) to author the metadata document. The GBIF Integrated Publishing Toolset (IPT) contains a user-friendly interface that makes authoring metadata easy.



A list of IPT installations supporting authoring of the Data Paper is accessible at <http://tools.gbif.org/data-paper-authoring/>. Guidelines for authors and reviewers of the Data Paper are accessible at http://www.pensoft.net/_FILES/Pensoft_Data_Publishing_Policies_and_Guidelines.pdf.

The Data Paper prototype was developed in collaboration with Pensoft Publishers (<http://www.pensoft.net/index.php>)

Data publishers will be credited through (a) registering authorship in a scholarly publication, (b) indexing and citation of Data Papers similar to research papers, (c) tracing usage and citations of published data, and (d) providing a persistent description of the published data resource over time.



Taxonomic name finder

Full-text documents represent a vast corpus of knowledge about species and are increasingly being made available online. Keyword search tools exist for identifying potentially useful information when a species name is known, but extracting a list of species to build an index from a document has been primarily a manual process.

The TaxonTagger process



The TaxonTagger is a name-finding web service offered by GBIF. It offers standardized input and output formats that allow scientific name extraction to be embedded within project workflows. For example, TaxonTagger (see diagram) is a web application, that uses the service. A document is loaded and all scientific names are highlighted and extracted. This list can be passed to other GBIF name services, for example to provide a complete and up-to-date taxonomic classification for all found species names.

Species	Author	Year	Page	Volume	Issue	Page	Volume	Issue	Page
...

The same species return the same taxonomic classification and provides the correct name when the name found in the source document represents an invalid name.



...free and open access to biodiversity data



<http://www.gbif.org/communications/resources/posters/>



Nodes capacity building and collaboration

Collaboration between participants is vital for GBIF to global community. Several approaches are in place to support such collaboration.

Regional nodes meetings
In 2011, three independently financed regional nodes were organized in Africa (South Africa), Europe (France America (Uruguay)). The focus of this regional approach identify regional priorities and targets in relation to GB programme. The aim is also to strengthen cooperation participant nodes.

Mentoring programme
The mentoring programme build partnerships between nodes to transfer experiences and expertise. Since 2011 the mentoring programme has supported 15 projects, in countries, funded by small grants.

Capacity Enhancement Programme for Developing Countries (CEPDEC)
The establishment of national biodiversity information developing countries, to enable science and decision-making aim of GBIF's capacity enhancement projects. The current are:

1. support to TanBIF in Tanzania, financed by the Danish government; and
2. support to 22 SEP countries in Africa and Southeast, financed by the French government, and coordinates Institut de Recherche pour le Développement in cot with the project Sud Expert Plantes et GBIF.

GBIF encourages governments and organizations to support projects.

- SEP Countries**
- GBIF Participants**
- Benin
 - Burkina Faso
 - Cameroon
 - Central African Republic*
 - Guinea
 - Madagascar
 - Mauritania*
 - Republic of Congo*
 - Togo*
- Non GBIF Participants**
- Burundi
 - Cambodia
 - Chad
 - Comoros
 - Democratic Republic of Congo
 - Gabon
 - Ivory Coast
 - Laos
 - Mali
 - Niger
 - Senegal
 - Rwanda
 - Vietnam

SEP-CEPDEC: facilitating access to biodiversity data for science

CEPDEC

The Capacity Enhancement Programme for Developing Countries (CEPDEC) is a GBIF-developed initiative for capacity building in developing countries. Its main objective is to enhance the community, science, policy and society through improved management of, biodiversity data in developing countries move towards a sustainable future.

Sud Expert Plantes (SEP) is an initiative of the Ministry of Foreign Affairs to support the developing countries in Western and Central Indian Ocean and Southeast Asia to acquire, preserve and sustainably use their associated genetic resources. Twenty-two currently participate in SEP.

SEP-CEPDEC
Established in 2006, and operating principle of the UN Millennium Development Goals collaboration programme between the Institut de Développement (IRD) and the GBIF Secretariat. It aims to:

- establish a GBIF national node in the 5 already GBIF members;
- train national partners and stakeholder biodiversity informatics;
- mobilize national biodiversity data, and
- support formulation of national and in biodiversity.

Activities and achievements
The first phase of SEP-CEPDEC has led to important results:

- four countries joining GBIF;
- strengthening of national, regional, and for SEP countries;
- eleven national stakeholder meetings, regional training workshops with delegations from different countries; and organizations;
- training of more than 200 people in biodiversity standards;
- development of national action plans for biodiversity mobilization, and establishment of national biodiversity information facilities, in 15 countries;
- raising visibility of GBIF Participant nodes.



The GBIF Online Resource Centre Your biodiversity informatics library

The Online Resource Centre is a single and user-friendly access point to documents, files, tools and links relevant for GBIF and the wider biodiversity informatics community.

The Online Resource Centre, launched at the Governing Board meeting in Argentina in October 2011, can be accessed at www.gbif.org/orc.

This version allows extended functionality with support for diverse resource types and a wide thematic scope, different access levels and multi-language support to accommodate the widest diversity of users.

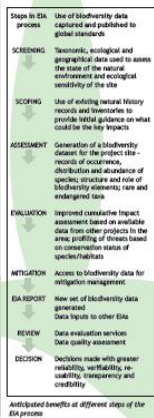


www.gbif.org/orc

Want to contribute?
The GBIF Community Site, community.gbif.org, enables participants to get involved in the future development of the GBIF Online Resource Centre.
Join today and be part of the team!

A genuinely interactive facility
The GBIF Online Resource Centre is not yet another file repository: it has been designed as a web 2.0 tool where contributions from the community play a central role.

You can rate and share your opinions about the resources available, direct others to your recent discoveries, or share them through Twitter, Facebook and other social platforms. You are encouraged to submit new resources to be shared through the Online Resource Centre.



Mobilizing primary biodiversity data associated with EIAs

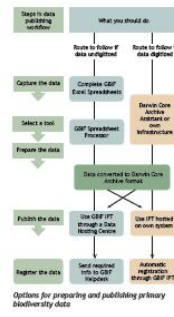
All Environmental Impact Assessments (EIA) generate biodiversity records. However, these data are seldom published.

Partnership with IAA
The principles of *in situ* and *ex situ* conservation advocated in Articles 8, 9 and 14 of the Convention on Biological Diversity (CBD) provide a strong case for promoting biodiversity-inclusive impact assessment. In 2008, GBIF and the International Association for Impact Assessment (IAIA) initiated a project to develop protocols, processes, and tools for publishing biodiversity data generated during EIAs.

- Benefits to EIA practitioners:**
- Accessible biodiversity data to assess the state of biodiversity prior to, during and after the impact assessment studies
 - Improved reliability, verifiability, credibility and transparency of the EIA's
 - Increased visibility through free and open access to EIA biodiversity data
 - Practitioners gain recognition by publishing Data Papers in academic journals

- Available products**
- Suite of data capture and publishing tools and services such as GBIF Excel templates, GBIF Spreadsheet Processor, GBIF Integrated Publishing Toolkit (IPT)
 - GBIF-IAIA Best Practice Guide
 - Improving EIA practice: Best Practice Guide for publishing primary biodiversity data, accessible at http://links.gbif.org/eia_biodiversity_data_publishing_guide_en_v1 (complete version)
 - Publishing EIA-Related Primary Biodiversity Data: GBIF-IAIA Best Practice Guide, accessible at http://www.iaia.org/publicdocuments/special-publications/sp7_web.pdf (summary guide)

Pilot projects
The South African National Biodiversity Institute (SANBI), and the Wildlife Institute of India (WII) were commissioned to develop a prototype of the EIA biodiversity data publishing framework, including (a) a web-based EIA primary biodiversity data publishing facility, (b) a suite of tools, standards and services for capture, management and publishing of EIA-related biodiversity data, (c) best practice guides for EIA practitioners and (d) solutions addressing legal, social, cultural and political issues.



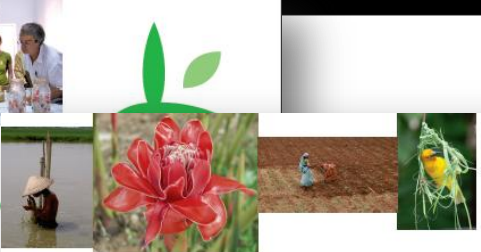
Options for preparing and publishing primary biodiversity data

About GBIF
The Global Biodiversity Information Facility (GBIF) was established by governments in 2001 to encourage free and open access to biodiversity data. At the Internet, through a global network of national and thematic nodes, and a Secretariat based in Copenhagen, Denmark, GBIF promotes and facilitates the mobilization, access, discovery and use of information about the occurrence of organisms over time and across the planet.

Vision - To be the foremost global resource for biodiversity information, and register smart solutions for environmental and human well-being.
www.gbif.org
2011-2015
United Nations Decade on Biodiversity

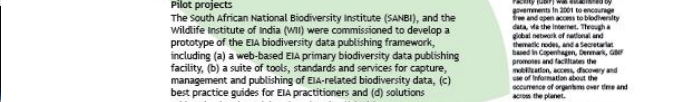
Comprehensive capacity building programme

<http://www.gbif.org/communications/resources/posters/>



Year	Member SEP Participant Nodes	Non GBIF Participant Nodes
2011	Senegal (Senegal) Cote d'Ivoire (Ivory Coast) Niger (Niger) Togo (Togo) Benin (Benin) Mali (Mali) Guinea (Guinea) Cameroon (Cameroon)	Senegal (Senegal) Cote d'Ivoire (Ivory Coast) Niger (Niger) Togo (Togo) Benin (Benin) Mali (Mali) Guinea (Guinea) Cameroon (Cameroon)
2012	Cote d'Ivoire (Ivory Coast) Senegal (Senegal) Mali (Mali) Guinea (Guinea) Cameroon (Cameroon)	Senegal (Senegal) Cote d'Ivoire (Ivory Coast) Niger (Niger) Togo (Togo) Benin (Benin) Mali (Mali) Guinea (Guinea) Cameroon (Cameroon)
2013	Senegal (Senegal) Cote d'Ivoire (Ivory Coast) Niger (Niger) Togo (Togo) Benin (Benin) Mali (Mali) Guinea (Guinea) Cameroon (Cameroon)	Senegal (Senegal) Cote d'Ivoire (Ivory Coast) Niger (Niger) Togo (Togo) Benin (Benin) Mali (Mali) Guinea (Guinea) Cameroon (Cameroon)
2014	Senegal (Senegal) Cote d'Ivoire (Ivory Coast) Niger (Niger) Togo (Togo) Benin (Benin) Mali (Mali) Guinea (Guinea) Cameroon (Cameroon)	Senegal (Senegal) Cote d'Ivoire (Ivory Coast) Niger (Niger) Togo (Togo) Benin (Benin) Mali (Mali) Guinea (Guinea) Cameroon (Cameroon)

Mentoring programmes since 2004



Mobilising new sources of biodiversity data

August 2011
Special Publication Series No. 7

IAIA

Publishing EIA-Related Primary Biodiversity Data

PURPOSE
The overall purpose of this guide is to enable EIA practitioners, consultants and other interested and affected parties to discover, capture, manage and publish to common standards, the primary biodiversity data generated during environmental impact assessment processes.

It represents a summarized version of a more comprehensive guide (ISBN: 87-92929-35) that can be accessed at http://links.gbif.org/ea_biodiversity_data_publishing_guide_en_v1

ABOUT GBIF
The Global Biodiversity Information Facility (GBIF) was established by countries as a global mega-science initiative to address one of the great challenges of the 21st century – harnessing knowledge of the Earth's biological diversity. GBIF's mission is to be the foremost global resource for biodiversity information, and to engender smart solutions for environmental and human well-being. To achieve this mission, GBIF encourages a wide variety of biodiversity data holders, generators and users across the globe to discover and publish (make discoverable) data through the GBIF network. For more information, visit <http://www.gbif.org>

HOW TO CITE THIS PUBLICATION
Cadman, M., Chavan, V., King, N., Willoughby, S., Rajvanshi, A., Mathur, V., Roberts, R., and Hirsch, T. (2011). Publishing EIA-Related Primary Biodiversity Data: GBIF-IAIA Best Practice Guide. IAIA Special Publication Series No. 7. August 2011. Pp. 6. Accessible at <http://www.iaia.org/publications/>

COLLABORATORS
This best practice guide is an outcome of the GBIF led collaboration of the following institutions:
Global Biodiversity Information Facility
South African National Biodiversity Institute
Wildlife Institute of India
International Association for Impact Assessment

INTERNATIONAL ASSOCIATION for IMPACT ASSESSMENT
• Headquarters
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Fargo, ND 58103-3705 USA
Phone + 1.701.297.9908
Fax + 1.701.297.7917
info@iaia.org
www.iaia.org

Publishing EIA-Related Primary Biodiversity Data: GBIF-IAIA Best Practice Guide

International Best Practice Principles

"PUBLISHING" BIODIVERSITY DATA MAY BE DEFINED AS BIODIVERSITY DATASETS PUBLICLY ACCESSIBLE IN A STANDARDIZED FORMAT, VIA AN ONLINE ACCESS POINT (TYPICALLY A WEBSITE OR A URL). THIS ACCESS POINT IS RECORDED IN A REGISTERED BIODIVERSITY INFORMATION FACILITY (GBIF). BIODIVERSITY DATA CAN ALSO BE DISCOVERED AND ACCESSED VIA THE GBIF NETWORK ([HTTP://DATA.GBIF.ORG](http://data.gbif.org)).

Introduction

The issue

Primary biodiversity data is defined as "digital text or multimedia data about the occurrence of an organism." Knowledge about the identity and distribution of organisms forms the backbone of our understanding of the biological world and is essential for monitoring the state of natural ecosystems, for developing sound environmental policies, and making ecologically sustainable development decisions. **Assessment (EIA)** provides opportunities for integrating biodiversity information into decision-making, but, for a variety of reasons, biodiversity has not always been given adequate consideration in EIAs (Rajvanshi et al., 2007).

Ideally, **biodiversity-inclusive** EIA, which is promoted by the Convention on Biological Diversity, should: (a) use biodiversity information to determine the biological value of a site, and (b) generate new biodiversity records about the site. For these reasons, EIA practitioners need access to verifiable biodiversity data in a usable form and that can be accessed using standardized protocols. Such a mechanism has been no easy-to-use mechanism for discovering and accessing data for use in EIA, or for publishing the biodiversity data that EIA generators produce.

This means that EIA-related biodiversity data is, generally, unavailable for use in EIAs, or for informing research programmes, environmental planning, and policy-making. This compromises the quality of the EIA, reduces the transparency and accountability of the process, and ultimately, the confidence that can be placed in decisions based on EIA results.

The solution

Through the **Global Biodiversity Information Facility (GBIF)**, digital biodiversity data is being made freely and openly available via the Internet for scientists and the general public. GBIF provides a suite of standards and data formats that can be employed to discover and publish primary biodiversity data. The **Best Practice Guide** describes the tools, standards and infrastructure that are available and explains when and how they should be used. It represents a summary of a more comprehensive guide (ISBN: 87-92929-35) that can be accessed at http://links.gbif.org/ea_biodiversity_data_publishing_guide_en_v1. Sources of additional assistance are listed in the **Appendix**.

Improving EIA practice: Best Practice Guide for publishing primary biodiversity data Version 1.0

IAIA



GBIF
www.gbif.org

Improving EIA practice: Best Practice Guide for publishing primary biodiversity data

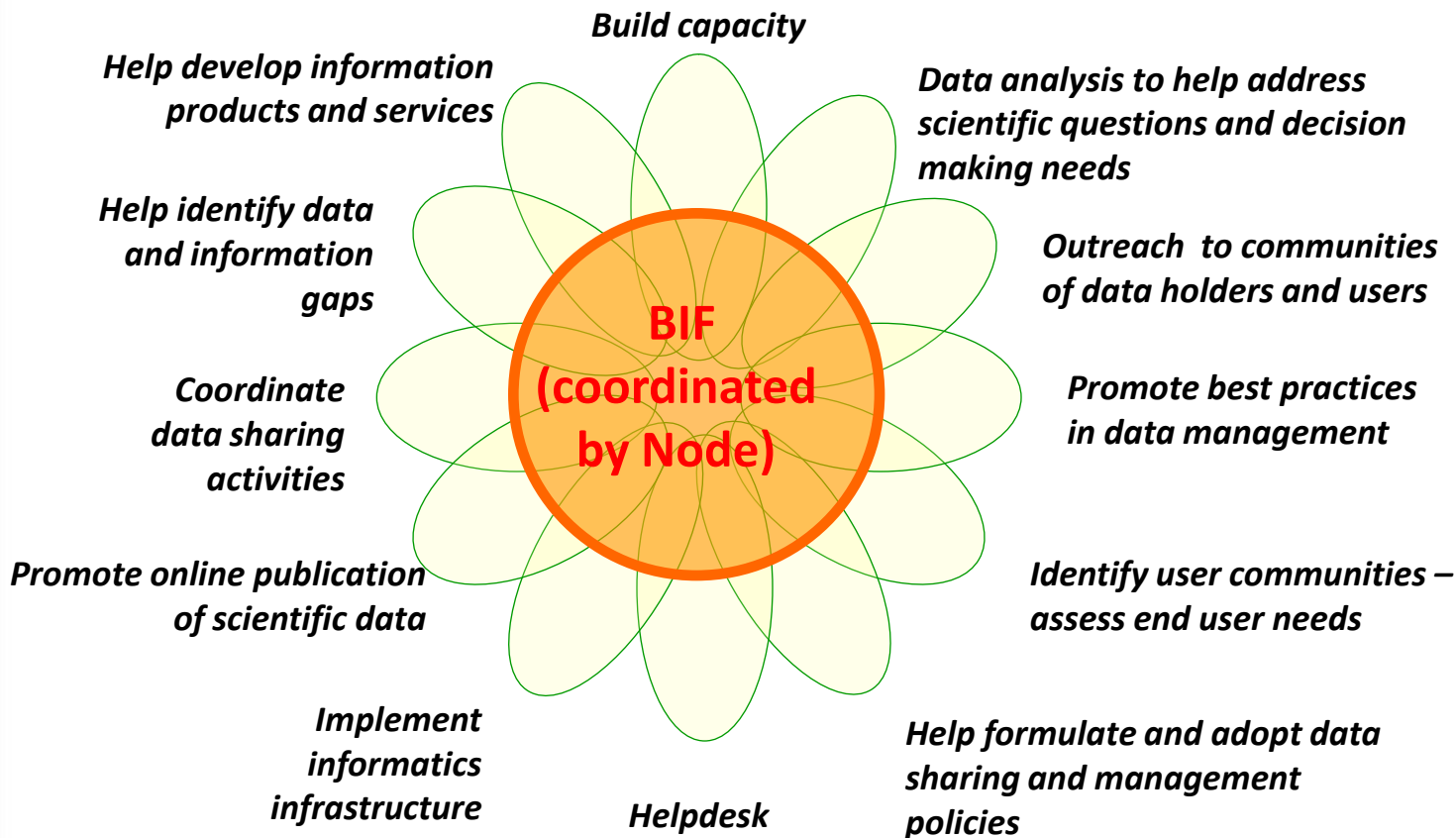
Version 1.0



August 2011



BIFs established by a country or organisation to serve multiple needs – env, agric, health, forestry, climate change, etc....



A global infrastructure for data exchange/sharing via a single portal



GLOBAL BIODIVERSITY INFORMATION FACILITY

SPECIES COUNTRIES DATASETS OCCURRENCES SETTINGS ABOUT

```
<?xml version="1.0" encoding="UTF-8"
  response="xml" https://rs.tdug.org/t
  <header>
    <source accesspoint="http://145.18.162
    software name="TapirLink" version="0.2(re
```

... free and open access to biodiversity data

Welcome to the GBIF Data Portal

Access millions of data records shared via the GBIF network. To learn how to use this site, please see [About](#). To tune this site for smaller displays, see [Settings](#). Version 1.2.5 - [click here](#) to see what is new!

Explore Countries

Find data on the species recorded in a particular country.

Countries

Information on the species recorded in each country, including records shared by providers from throughout the GBIF network.

See data for: [Denmark](#)

Explore Datasets

Find data from a data provider, dataset or data network.

Datasets

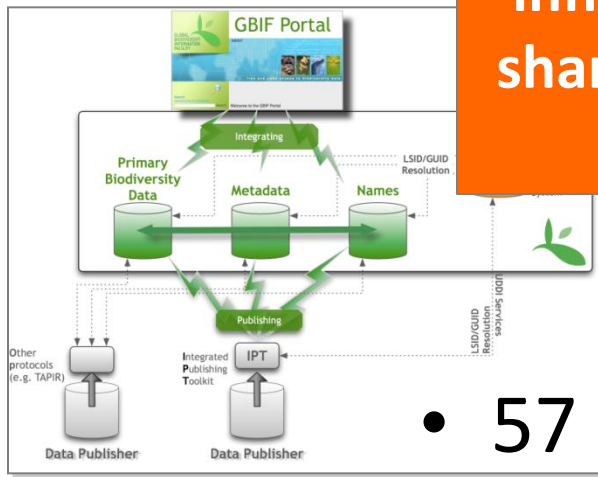
Information on the data providers, datasets and data networks that share data through GBIF, including summary information on 8634 datasets from 299 data providers.

Latest dataset added:

(Table 1) Distribution of planktonic foraminifera from samples spanning the Cretaceous-Tertiary boundary at ODP Site 207-1259

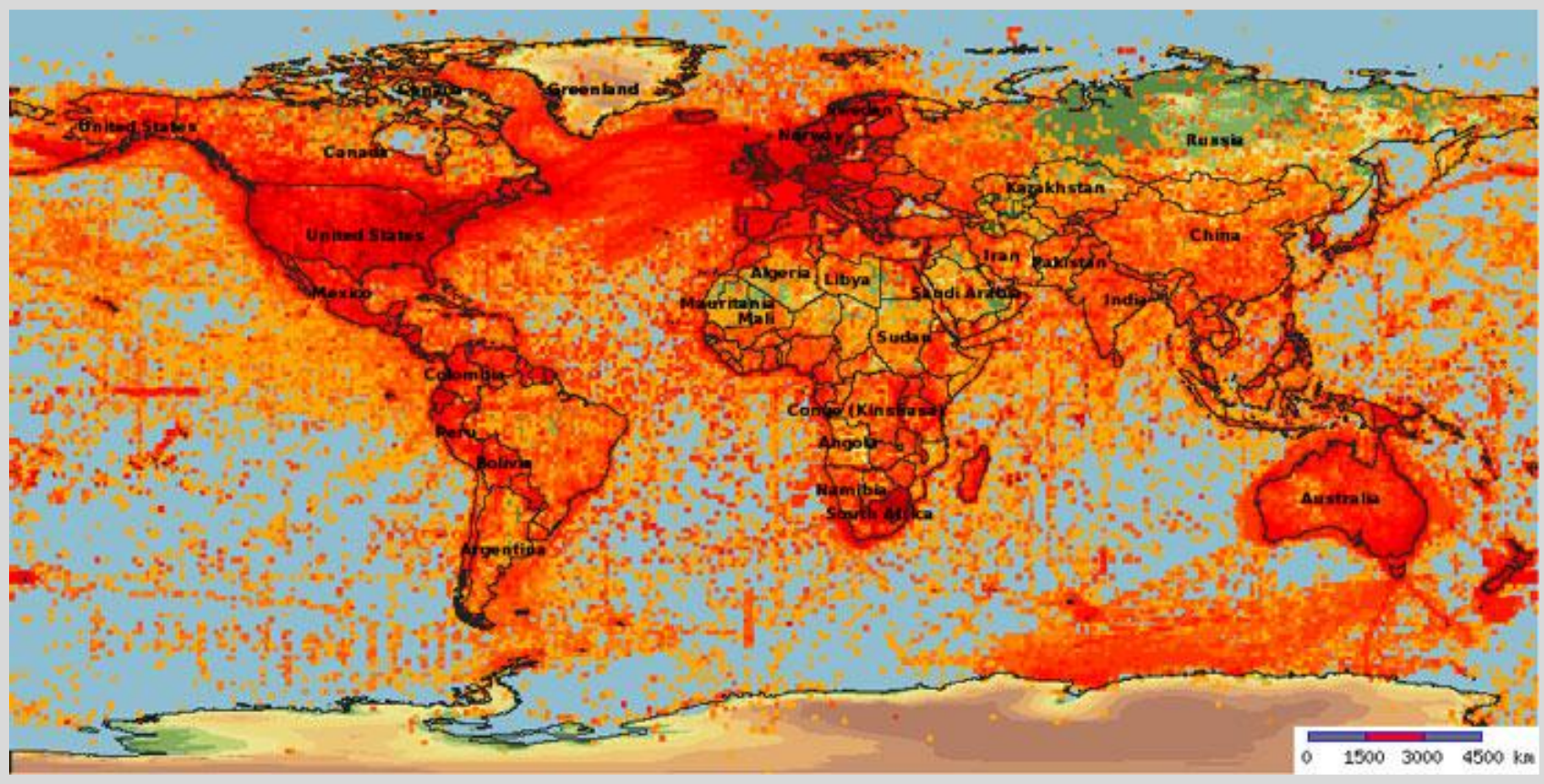
Layout & design © GBIF. Data providers retain all rights to data. Contact us

A distributed global infrastructure for the sharing of biodiversity data



- 57 countries
- 45 organisations

Current GBIF-Network Data Coverage



Nov 2011: **>312 million occurrence records** from **>10,000 datasets** from **>300 publishers** and spanning a wide range of geospatial, temporal and taxonomic coverages.

Universal open access...



24 Google Calendar | Data sharing with cou x | data.gbif.org/countries/datasharing?view=concise&host=all&country=all

... free and open access to biodiversity data
GLOBAL BIODIVERSITY INFORMATION FACILITY

search species/country/dataset
 Search Start new search

HOME SPECIES COUNTRIES DATASETS OCCURRENCES SETTINGS ABOUT

26 countries + intl. networks share data on Japan.

Iran, Islamic Republic Of
 Iraq
 Ireland
 Isle Of Man
 Israel
 Italy
 Jamaica
Japan
 Jersey
 Jordan
 Kazakhstan
 Kenya
 Kiribati
 Korea, Democratic Peoples Republic Of
 Korea, Republic Of
 Kuwait
 Kyrgyzstan
 Lao Peoples Democratic Republic
 Latvia
 Lebanon

Change view: Summary Host: All Country: Japan

Change view: Summary Host: All Country: Japan

[Download as tab file](#)

HOST	AD	AR	AT	AU	BE	BJ	CA	CH	CM	CO	CR	DE	DK	EE	ES	FI	FR	GB	GN	IE	IL	IN	IS	JP	KR	LU	MG	MR	MX	NI	NL	NO
JP	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Japan shares data on 198 countries.

Achieving interoperability

- Simplified data standards
 - Darwin Core Archives
- Improved data publication processes
 - Integrated Publishing Toolkit (IPT)
 - Spreadsheet-based publishing
- Improved integration
 - New taxonomic resources
 - Improved data processing

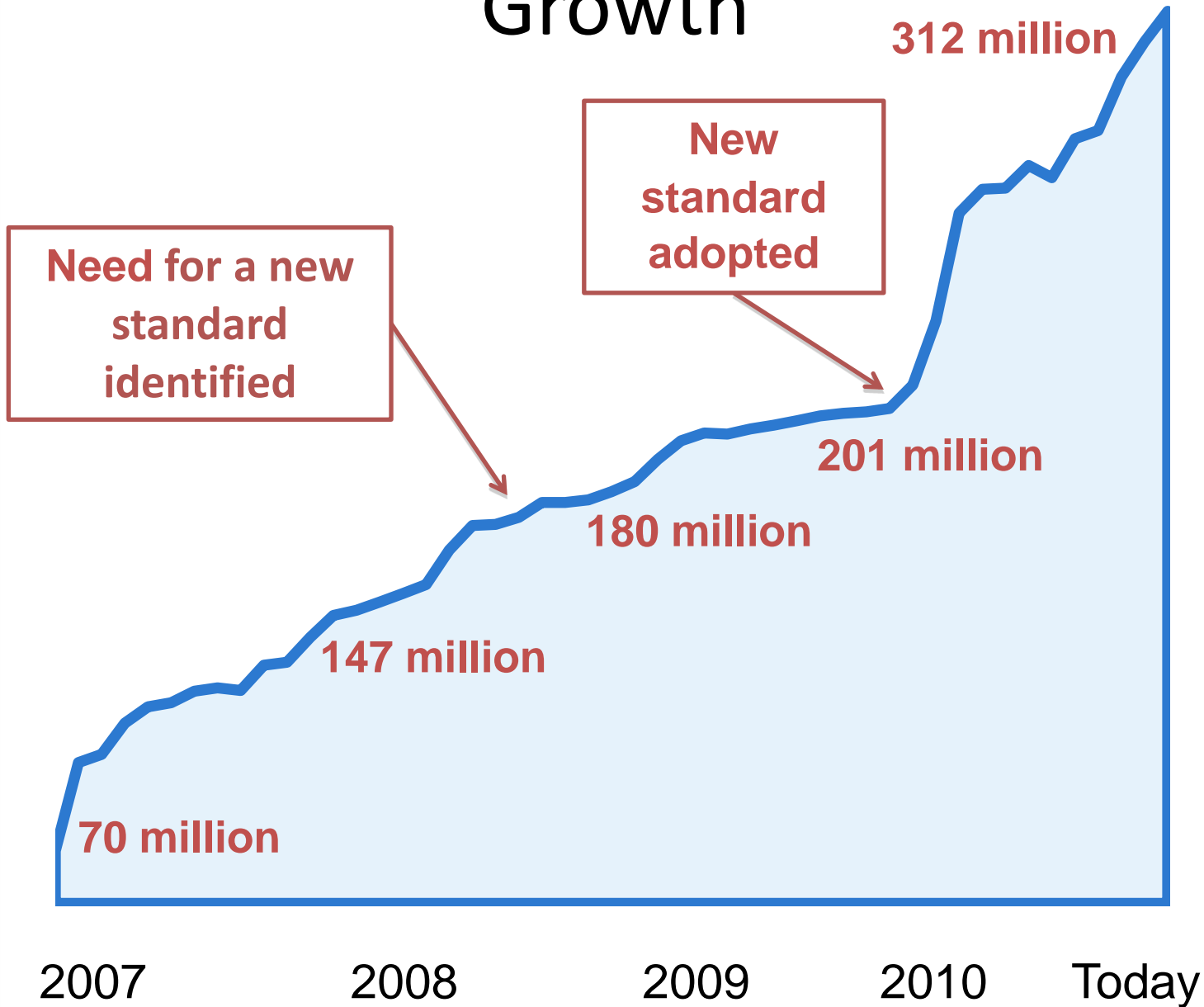


Darwin Core Archives (DwC-A)



**A text-based solution to
publishing biodiversity data**

Growth



Promotion of Publishing Standards

<http://www.gbif.org/orc/>



> 2500 downloads English/French/Spanish

Taxonomic catalogues

GBIF taxonomic backbone is based on many authoritative catalogues:

- Catalogue of Life 2011
- Fauna Europaea
- The National Center for Biotechnology Information (NCBI)
- The Integrated Taxonomic Information System (ITIS)
- **... and 40+ others**



Enabling authoritative taxonomic data to be published through GBIF



> 50 new checklists

Taxonomic

A screenshot of a checklist titled "Neuropterida Species of the World: A Catalogue of the Species-Group Names of the Extant and Fossil Neuropterida (Insecta: Neuroptera, Megaloptera and Raphidioptera) of the World". It includes the author's name, John O. Corwell, and a brief abstract.

A screenshot of a checklist titled "fauna" with a blue header and a central image of a butterfly. It lists various species and includes a "NEWS" section.

A screenshot of a checklist titled "Hierarchy of Taiwanese Species" showing a hierarchical tree structure of taxonomic groups like Kingdom, Phylum, Class, Order, Family, Genus, and Species.

A screenshot of the "Canadensys" website, featuring a search bar and a list of plant species names like Carex, Crataegus, and Salix.

A screenshot of the "Allerter.dk" website, showing a grid of small images of various insects and a list of species names.

A screenshot of the "The IUCN Red List of Threatened Species" website, featuring a red header and a large image of a gazelle.

A screenshot of a "GLOBAL COMPOSITE CHECKLIST" page with a yellow header and a list of species names.

A screenshot of a checklist titled "Invasive species in Belgium" with a red header and a table listing species names, their status, and other details.

A screenshot of a checklist titled "muséum" with a green header and a list of species names.

A screenshot of the "FADA" website, showing a search bar and a list of species names.

Regional

Thematic




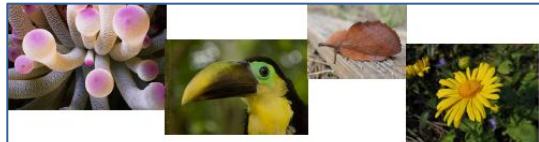
Metadata

Essential for **discovery** and **access** to data.

The GBIF metadata profile is based on **Ecological Metadata Language**.

OAI-PMH for interoperability across distributed metadata catalogues <http://metadata.gbif.org>

Output of **ISO19139** to share with EuroGEOSS broker



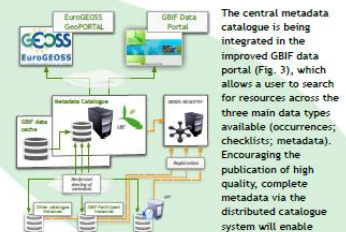
Building a distributed metadata system for the GBIF network

The metadata system supports open exchange protocols; in particular, the Open Archives Initiative for Metadata Harvesting (OAI-PMH), and therefore offers the possibility of integration with other catalogue systems that support OAI-PMH, e.g., Metacat² and GeoNetwork⁴. The GBIF portal, in turn, can forward the aggregated metadata from its network to other clearinghouses such as the EuroGEOSS broker⁵ thereby facilitating discovery of biodiversity resources on complementary networks. Work is currently in progress to support those GBIF Participants wishing to connect their national metadata catalogues to the GBIF network.

Large, distributed networks such as GBIF's bring together many publishers and consumers of data. To guide consumers in discovering data that is appropriate for their needs and fit for use, all datasets when published should be accompanied by metadata, in a standard format, that describe critical aspects of the data such as sampling procedures and methods, data quality, provenance, ownership, data format, access, and intellectual property rights. Once generated, metadata are typically stored in online catalogues (databases) that can be browsed and searched.

Metadata are a central component in an expanding GBIF network, and it is essential that information about biodiversity datasets in well organized.

To meet this need better, GBIF is implementing a metadata system for its network that provides unified access to all participating metadata catalogues¹. The principal components of the system are i) a central metadata catalogue holding copies of all metadata published on the network, ii) one or more participating external metadata catalogues, iii) a set of protocols and data exchange standards to allow flow of metadata in the network. These components and the technologies chosen for their implementation are described in Figs. 1 and 2.



The central metadata catalogue is being integrated in the improved GBIF data portal (Fig. 3), which allows a user to search for resources across the three main data types available (occurrences; checklists; metadata). Encouraging the publication of high quality, complete metadata via the distributed catalogue system will enable potential end users to easily discover which datasets are available, and, critically, to evaluate the appropriateness of such datasets for particular purposes.




Figure 1. The GBIF metadata network

Figure 2. The system architecture includes three main functional components: a set of online accessible metadata catalogues, a metadata harvester, and the GBIF central metadata catalogue. Software choices for implementation are as indicated.

Figure 3. GBIF data portal: Integration of metadata


About GBIF

The Global Biodiversity Information Facility (GBIF) was established by governments in 2001 to encourage free and open access to biodiversity data, via the Internet. Through a global network of national and thematic nodes, and a Secretariat based in Copenhagen, Denmark, GBIF promotes and facilitates the mobilization, access, discovery and use of information about the occurrence of organisms over time and across the planet.

Vision - A world in which biodiversity information is freely and universally available for science, society, and a sustainable future.

Mission - To be the foremost global resource for biodiversity information, and engender smart solutions for environmental and human well-being.

www.gbif.org



New data types



A roadmap developed by Q1 2013

1.3. Scope
GBIF will

- genomic data
- ecological data

- complement, not duplicate work
- GBIF as top-level gateway to discovery, access



organisms. The currency of this knowledge will not be phenotypic data, but primarily genomic biodiversity data, with identifiers linked to animals, plants, microbes, and ecosystems.

A complementary requirement is to allow the integration of related ecological biodiversity data, as knowledge of the ecosystem function of biodiversity is critical to global and national policy and decision-making. This needs an increased focus on the relationships between species and the ecosystems they inhabit, and

Genomic Level Observations

RfP for position paper on genomic level observations (Q1 2011)

Genomic Standards Consortium (GSC)

<http://gensc.org>

Joint activities:

- Participate in GSC biodiversity work group
- Participate in GSC conferences (Cambridge, Bremen)
- Aligning Darwin Core and GSC MlxS
- Identifying use cases, e.g., Microbial Earth Catalog, UNITE
- GBIF convened workshop in Q1 2012

The image shows a screenshot of the GBIF website and a Nature Biotechnology article. The GBIF website header includes the logo, the text 'free and open access to biodiversity data', and the title 'GLOBAL BIODIVERSITY INFORMATION FACILITY'. Navigation tabs for 'INFORMATICS', 'PARTICIPATION', 'GOVERNANCE', and 'COMMUNICATIONS' are visible. A search bar is present. The main content area features a navigation menu on the left with categories like 'News and Events', 'Related News', 'Meetings and Events', 'Ebbe Nielsen', 'GBIF Symposia', 'Workshops', 'Opportunities', 'Resources', 'Press', 'Contact us', and 'Directory of...'. The main article title is 'GBIF position paper on genomic level observations' with a sub-headline 'Request for proposals to draft a GBIF position paper on the publishing and discovery of, and access to, primary biodiversity data in the form of genomic level observations'. Below this is a Nature Biotechnology article titled 'Minimum information about a marker gene sequence (MIMARKS) and minimum information about any (x) sequence (MlxS) specifications'. The article is categorized as a 'PERSPECTIVE' and lists authors: Pelin Yilmaz^{1,2*}, Renzo Kottmann¹, Dawn Field³, Rob Knight^{4,5}, Jack A Gilbert⁹⁻¹¹, Ilene Karsch-Mizrachi¹², Christopher Hunter¹³, Joonhong Park¹⁴, Manimozhayan Arumugam¹⁷, Mark E. Vivien Bonazzi²¹, Tim Booth³, Peer B. Emily Charlson²², Elizabeth K Costello²³, Noah Fierer²⁴, Jed A Fuhrman²⁵, Rachael Antonio Gonzalez²⁴, Jeffrey I Gordon³, Philip Hugenholtz²⁸, Janet Jansson^{23,39}, Omry Koren⁴¹, Justin Kuczynski¹⁸, Niku Ruth E Ley⁴¹, Catherine A Lozupone⁴, Wilfried Folker Meyer¹⁰, Brian Muegge³⁵, Sara Ni Lindsay K Newbold³, Anna E Oliver³, Nor Joseph Petrosino^{31,37}, Lita Proctor²¹, Elma Jacques Ravel²⁵, David A Relman^{51,52}, Sus Rohini Sinha²², Michelle I Smith³⁵, Erica Doyle V Ward¹⁹, George M Weinstock⁵⁴, Jennifer R Wortman²⁵, Tanya Yatsunenko³.

The article abstract states: 'Here we present a standard developed by the Genomic Standards Consortium (GSC) for reporting marker gene sequences—the minimum information about a marker gene sequence (MIMARKS). We also introduce a system for describing the environment from which a biological sample originates. The ‘environmental packages’ apply to any genome sequence of known origin and can be used in combination with MIMARKS and other GSC checklists. Finally, to establish a unified standard for describing sequence data and to provide a single point of entry for the scientific community to access and learn about GSC checklists, we present the minimum information about any (x) sequence (MlxS). Adoption of MlxS will enhance our ability to analyze natural genetic diversity documented by massive DNA sequencing efforts from myriad ecosystems in our ever-changing biosphere.'



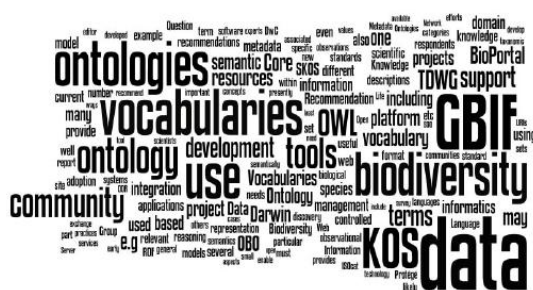
GBIF position paper on KOS



Recommendations for the Use of Knowledge Organisation Systems by GBIF

Version 1.0

Terry Catapano¹, Donald Hobern², Hilmar Lapp³, Robert A. Morris⁴, Norman Morrison⁵, Natasha Noy⁶, Mark Schildhauer⁷, David Thau⁸



February 2011

¹ Librarian, Columbia University Libraries and Vice President, Plazi
² Director, Atlas of Living Australia and TDWG Chair
³ Asst. Director for Informatics, National Evolutionary Synthesis Center (NESCent)
⁴ Convener; Professor Emeritus of Computer Science, Univ. of Massachusetts/Boston and Informatics Associate, Harvard University Herbaria
⁵ Ontologies and Data Standards Manager, Natural Environment Research Council, Environmental Bioinformatics Centre (NEBC) & The University of Manchester, UK
⁶ Senior Research Scientist, Stanford Center for Biomedical Informatics Research (BMIR), Stanford University
⁷ Director of Computing, National Center for Ecological Analysis and Synthesis (NCEAS)
⁸ Developer Advocate, Google

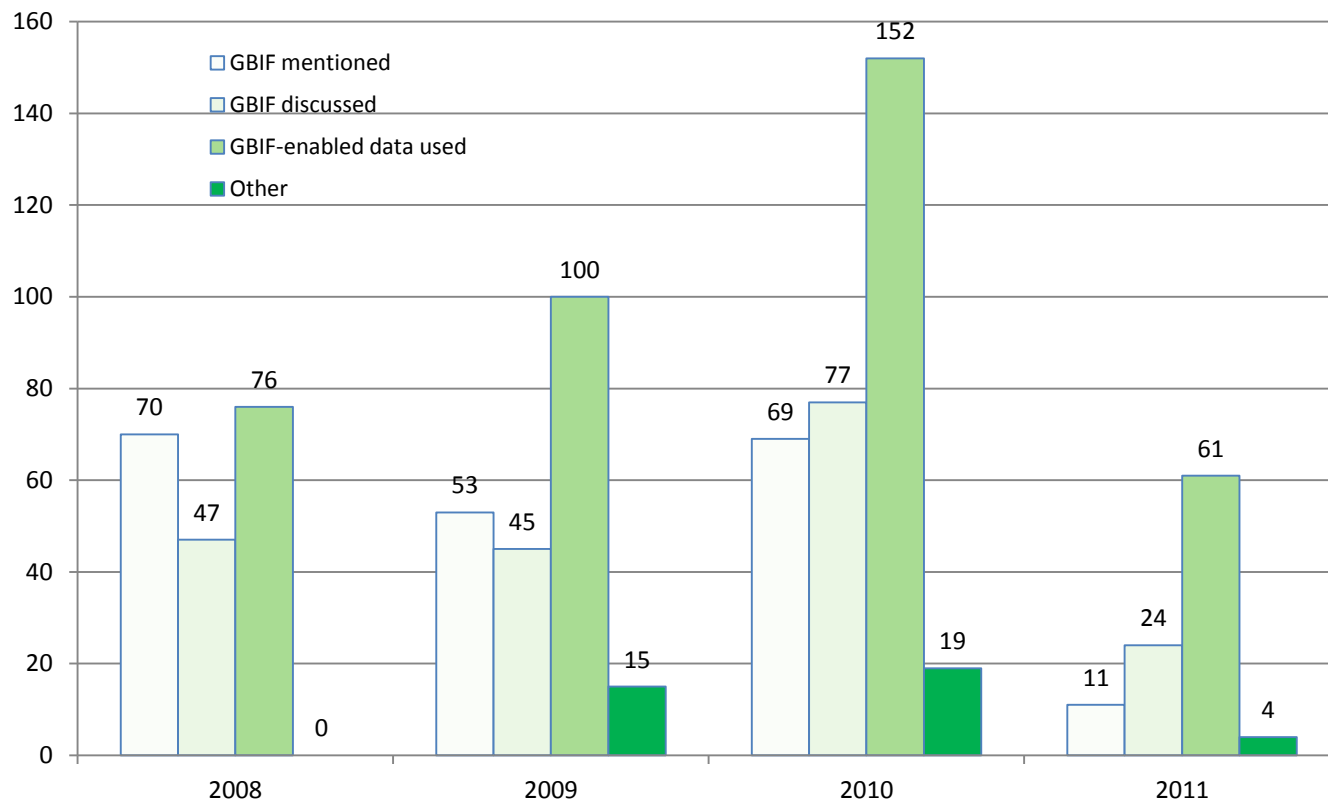
Robert A Morris
Terry Catapano
Donald Hobern
Hilmar Lapp
Norman Morrison
Natasha Noy
Mark Schildhauer
David Thau



Advancing scientific research – the use of GBIF mediated data



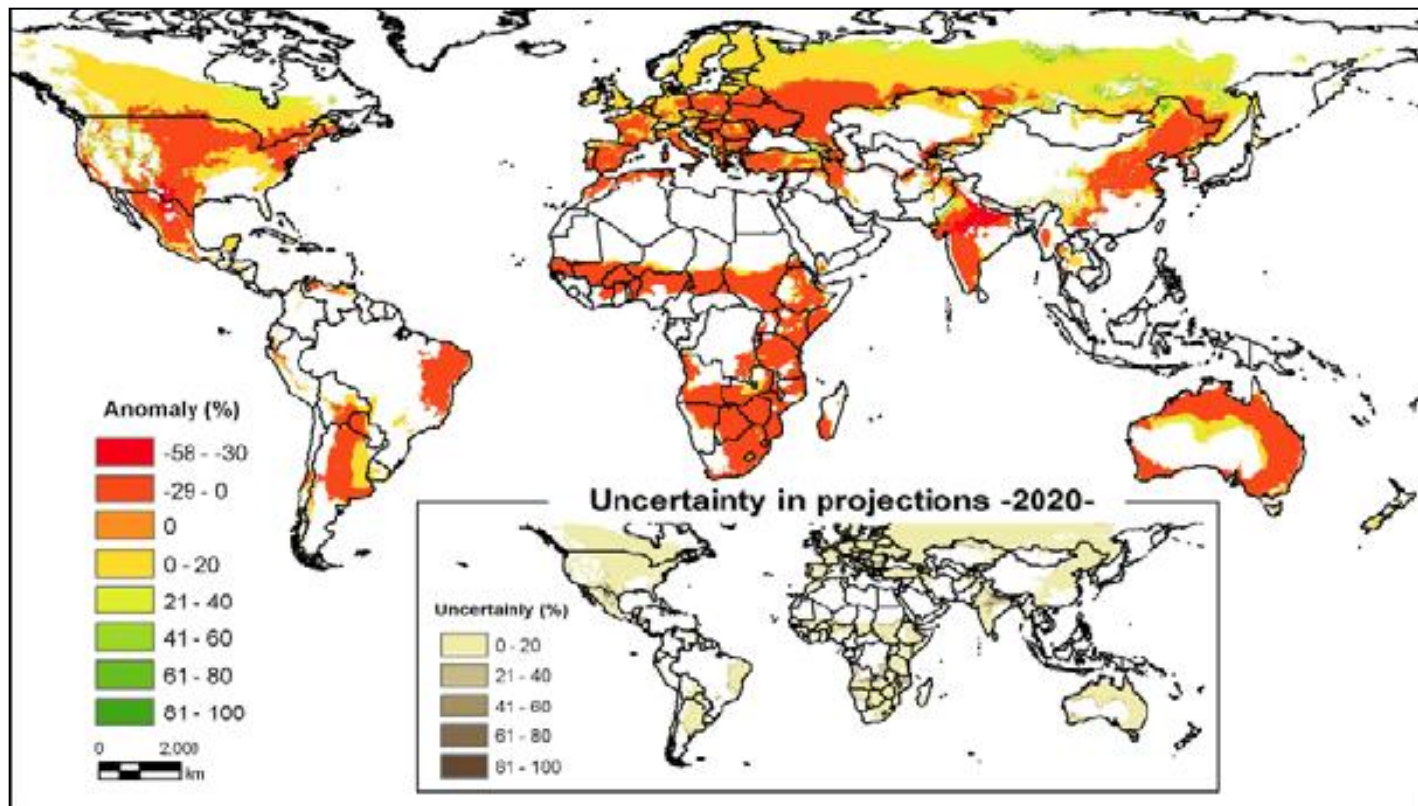
GBIF: Scientific publications



	2008	2009	2010	2011	Total
Used	76	100	152	61	389
Discussed	47	45	77	24	193
Mentioned	70	53	69	11	203
Other	0	15	19	4	38
Total	193	213	317	100	823

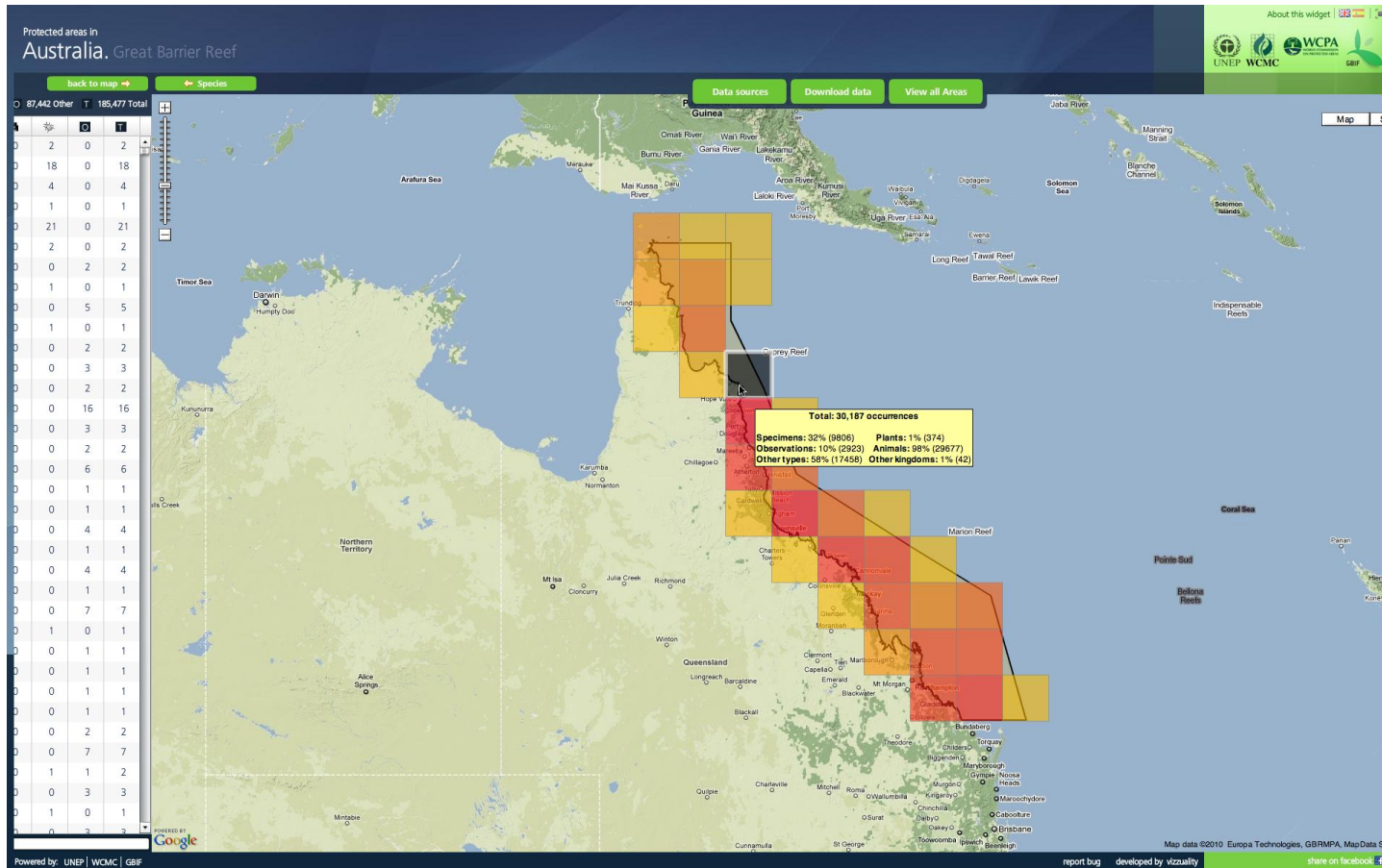


Using biodiversity data: Ecological Niche Modeling



Change in suitability for cultivating common bean across the world, from present to 2020, showing a global loss in suitability, especially in Africa.

Integration: UNEP WCMC World Database on Protected Areas



Integration: GBIF & IUCN Red List

Amphibia Anura Hylidae

Acris crepitans
(Northern Cricket Frog)

Baird, 1854

NE IDI **LC** > NT VU EN CR EW EX
LEAST CONCERN

Legend:
 Native (resident)
 Basemap Overview map

Citation: IUCN (International Union for Conservation of Nature), Conservation International & NatureServe.
Assessment date: 2004

Terms of Use

IUCN SSC Species Survival Commission RED LIST THE IUCN RED LIST OF THREATENED SPECIES





Wallace Initiative

[About us](#) | [Contacts](#) | [Help](#)

Demonstration Site

Biodiversity data: --Taxa-- --Family-- --Genus-- --Species--
 BioClimate layers: --Timelines-- --GCM-- --Emission Scenario-- --Bioclimate Variable--



Tyndall°Centre
for Climate Change Research



GLOBAL BIODIVERSITY INFORMATION FACILITY



NCCARF
National Climate Change Adaptation Research Facility



JAMES COOK UNIVERSITY
AUSTRALIA

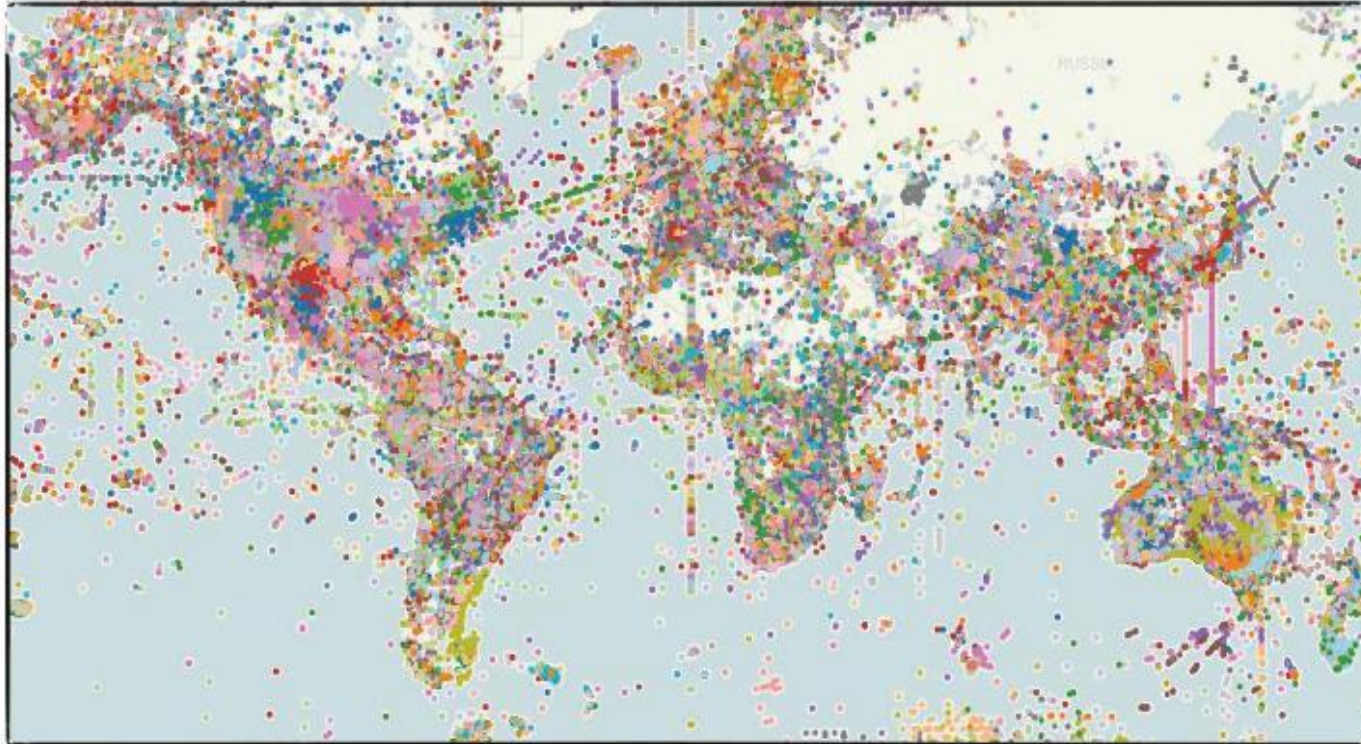
eRESEARCH Centre



<https://wwftest.hpc.jcu.edu.au/wallace/>



CBD Access & Benefit Sharing (Nagoya) Protocol



The ABS Patent Index (ABSPAT)

Paul Oldham, Stephen Hall & Oscar Forero

ESRC Centre for Economic and Social
Aspects of Genomics (Cesagen) & UNU

Image: GBIF¹ sample distribution data for species appearing in the USPTO Patent Collection



ICLEI Cities Biodiversity Centre

BiodiverCities Programme

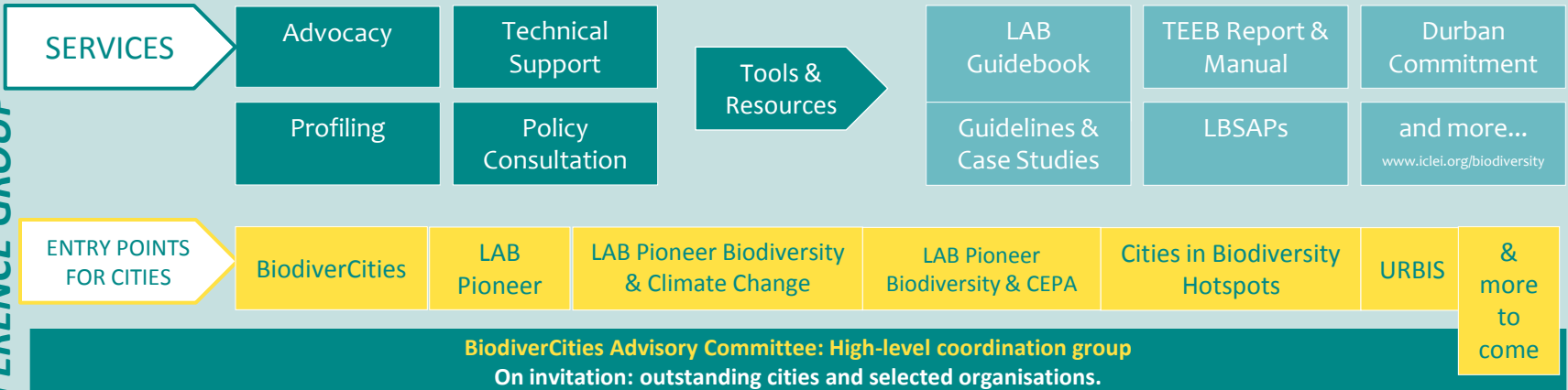
The goal of the BiodiverCities Programme is to guide, support, capacitate and motivate local governments and their partners to integrate biodiversity and ecosystem-based planning into all aspects of policy, decision making and implementation activities to result in enhanced biodiversity conservation and more sustainable local economic development.

Acknowledgement of accountability and responsibility for the health and well-being of communities and recognition of biodiversity and essential ecosystem services as the foundation of our existence are core components of the goal.



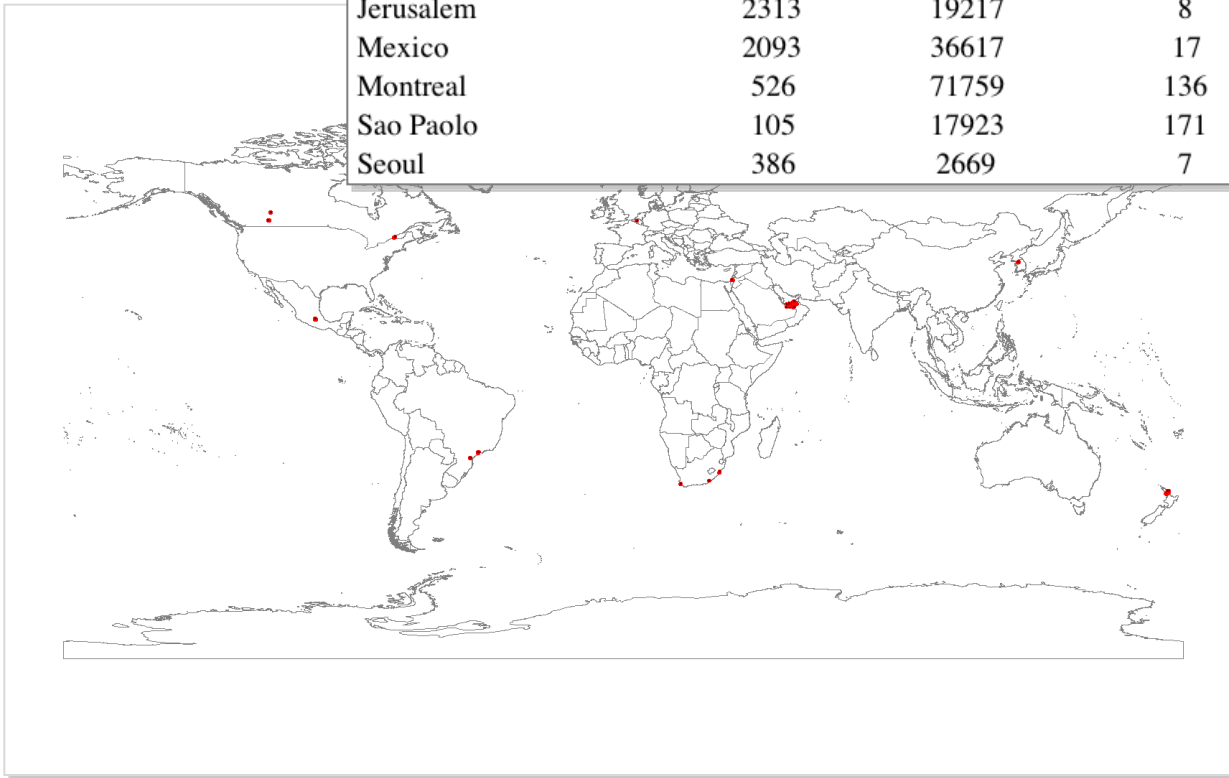
BIODIVERCITIES TECHNICAL REFERENCE GROUP

GLOBAL PARTNERSHIP

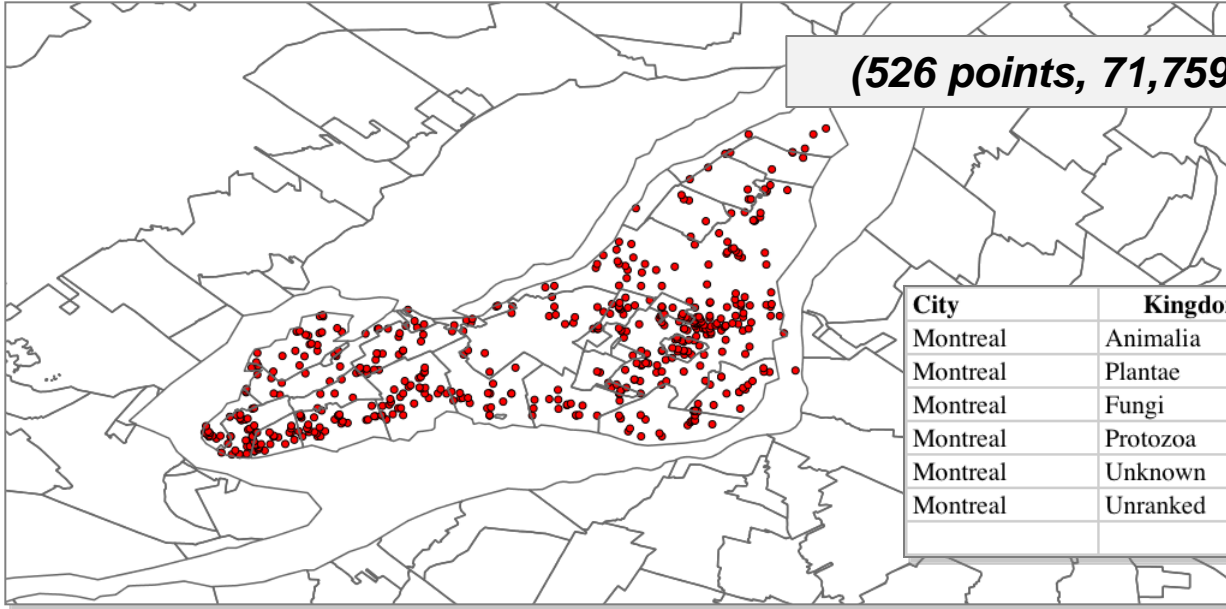


Accessing data from the GBIF network (using polygons from www.gdams.org)

City	Points	Occurrences	Ratio
Abu Dhabi	74	502	7
Auckland-Waitakere	2166	17124	8
Brussels	148	6786	46
Calgary	542	75783	140
Cape Town	43	25614	596
Curitiba	27	877	32
Durban	118	22925	194
Edmonton	444	36525	82
Jerusalem	2313	19217	8
Mexico	2093	36617	17
Montreal	526	71759	136
Sao Paolo	105	17923	171
Seoul	386	2669	7



Montreal



(526 points, 71,759 occurrences)

City	Kingdom	Occurrences	
Montreal	Animalia	71475	99.6%
Montreal	Plantae	245	0.3%
Montreal	Fungi	13	0.0%
Montreal	Protozoa	1	0.0%
Montreal	Unknown	5	0.0%
Montreal	Unranked	20	0.0%
		71759	

City	Kingdom	Phylum	Class	Order	Family	Genus	Species	Occurrences
Montreal	Animalia	Chordata	Aves	Passeriformes	Paridae	Poecile	atricapillus	5093
Montreal	Animalia	Chordata	Aves	Passeriformes	Passeridae	Passer	domesticus	4577
Montreal	Animalia	Chordata	Aves	Passeriformes	Fringillidae	Cardinalis	cardinalis	3810
Montreal	Animalia	Chordata	Aves	Passeriformes	Sturnidae	Sturnus	vulgaris	3498
Montreal	Animalia	Chordata	Aves	Passeriformes	Fringillidae	Carduelis	tristis	3485
Montreal	Animalia	Chordata	Aves	Columbiformes	Columbidae	Zenaida	macroura	3265
Montreal	Animalia	Chordata	Aves	Piciformes	Picidae	Picoides	pubescens	3072
Montreal	Animalia	Chordata	Aves	Passeriformes	Fringillidae	Carpodacus	mexicanus	2654
Montreal	Animalia	Chordata	Aves	Passeriformes	Corvidae	Corvus	brachyrhynchus	2637
Montreal	Animalia	Chordata	Aves	Columbiformes	Columbidae	Columba	livia	2310

Building national data portals



USGS science for a changing world

Biodiversity Information Serving Our Nation (BISON) BETA

Home Search About Data Providers Help

Search

by scientific name by common name

Advanced Options Show Search Details

Found 79,424,935 matches for *all species*

States Counties

Basemap Layers
BISON Layers
Climate and Weather
Agriculture & Soils
Ecosystems and Regions
National Atlas & Demographic
HUCs, Catchments,
Landcover
Protected Areas
Other

LEGEND

Midway Is.

Canada

Mexico

Atlantic Ocean

Western Sahara

- Increased geospatial granularity (national to county)
- Nationally-relevant thematic layers

GBIF and GEO BON



GBIF and GEO BON

Co-lead of WG8 on **Data Integration & Interoperability**

Key outputs:

1. Detailed Implementation Plan
2. Principles of the GEO BON Information Architecture



GEO BON Detailed Implementation Plan

Concepts to be implemented

- networks and their information resources
- data types and data content
- existing global networks
- national and regional networks
- discovery services and registries
- interoperability and information management services
- ontologies, thesauri, dictionaries, semantic mediation
- organism names and habitat classifications
- workflow of services and integration of applications
- portals, search engines, querying and harvesting
- open access issues



GEO BON Detailed Implementation Plan

Activities

- Establish a working group and coordinating unit for technical implementation
- Review existing data provider networks and establish partnerships
- Review of data processing needs of other WGs
- Design the information architecture of GEO BON
- Build the components such as portal, registry, ontologies
- Register data and services and provide helpdesk
- Outreach and capacity building



Principles of the GEO BON Information Architecture (1)

(companion document to the Detailed Implementation Plan)

- Documents the "*diversity of biodiversity networks*" and their chief characteristics;
- Highlights how GEO BON can *leverage* the work of *existing networks and initiatives*;
- Proposes approach to *informatics design* based on a Service Oriented Architecture as described in the *GEOSS Common Infrastructure*.

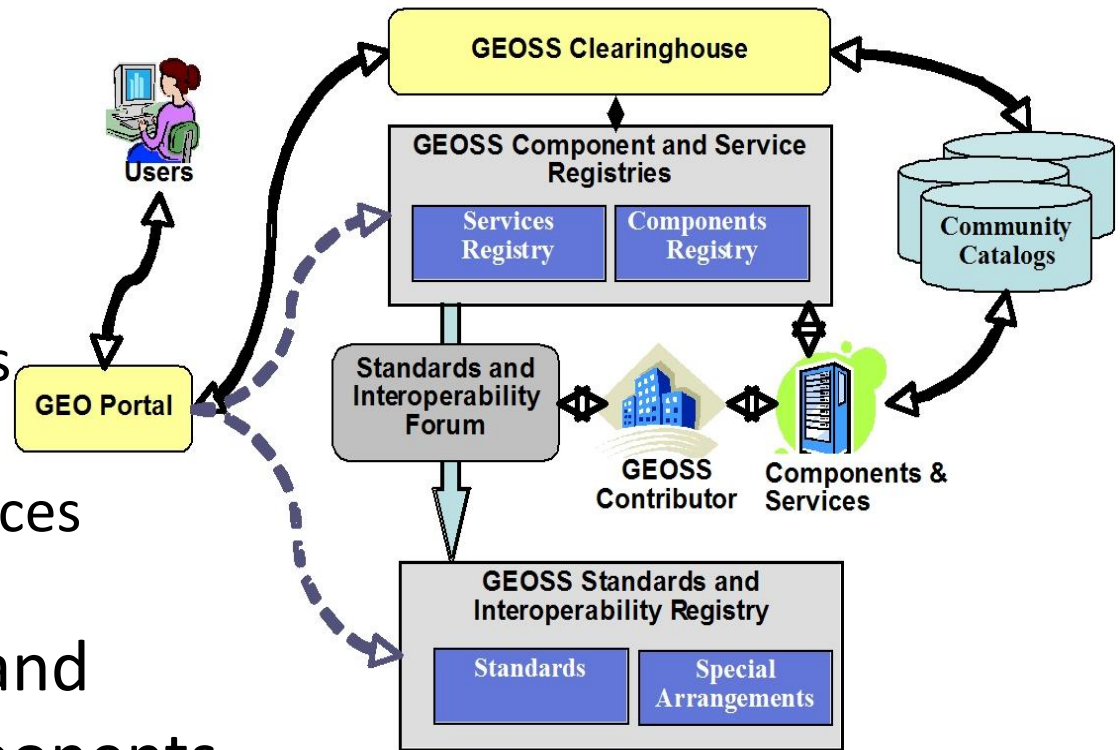


GEOSS Common Infrastructure

A Service Oriented Architecture featuring:

- loose coupling of services
- consumers discover services

Metadata catalogues and registries are key components



Interactions of GEOSS Registries, Portal and Clearinghouse

Extracted from: *GEOSS Core Architecture Implementation Report*
(http://portal.opengeospatial.org/files/?artifact_id=24315)

Principles of the GEO BON Information Architecture (2)

Covers:

- 41 existing global, regional and national networks, discovery services and registries (GBIF, ILTER, KNB, NASA GCMD, NBII);
- 20 standards (metadata, data, transfer protocols);
- Ontologies, vocabularies for semantic mediation;
- Biological names and habitat classifications;
- Workflow of services and integration of applications (climate change scenario example using GBIF data);
- Portals, search engines, querying and harvesting including GBIF Data Portal, LTER/ILTER, NBII, KNB and NASA GCMD facilities;
- Open Access Issues and GEOSS Data Sharing Principles.



GEOSS and data sharing

"The societal benefits of Earth observations cannot be achieved without data sharing"

The 10-Year Implementation Plan

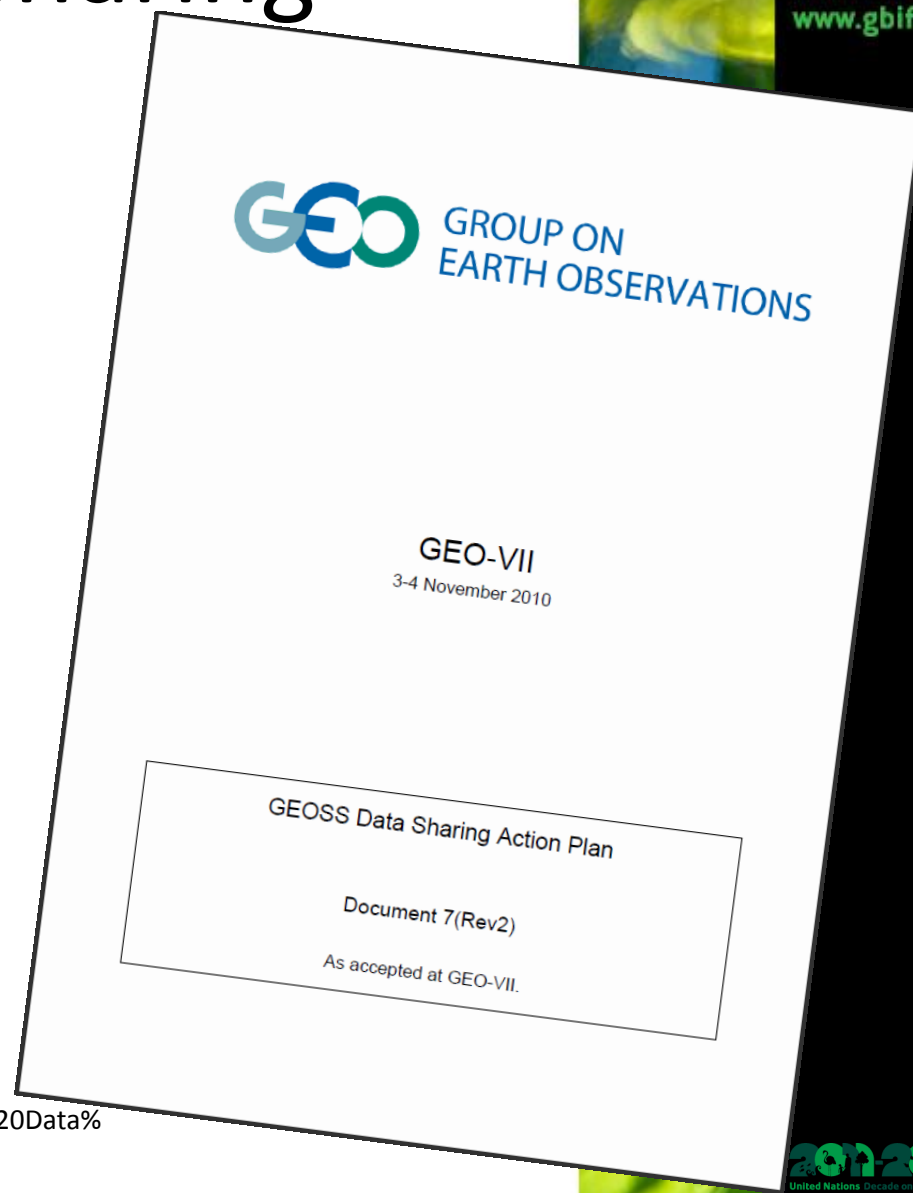
"... full and open exchange of data, metadata and products shared within GEOSS, recognizing relevant international instruments and national policies and legislation"



GEOSS and data sharing

GBIF is one of the case studies in the **GEOSS Data Sharing and Action Plan** promoting full and open sharing of data.

http://www.earthobservations.org/documents/geo_vii/07_GEOSS%20Data%20Sharing%20Action%20Plan%20Rev2.pdf



GEOSS Component Details

Component Basic Information

Component Id:	urn:uuid:54374b70-25e6-4071-a530-b137bdcb130b
Name:	Global Biodiversity Information Facility Data Portal
Abbreviation:	GBIF Data Portal
Description:	<p>GBIF is an international organisation that is working to make the world's biodiversity data freely accessible. The GBIF data portal is a service that provides access to millions of data records that are being shared via the GBIF network. These data are generally made available through the GBIF network.</p> <p>by tw Sp inf Na sci on</p>
GEO Member or Participating Organisation :	No
Responsible Organisation:	Gk
URL to Component Information:	ht

Associated GEOSS Services for GEOSS Component: Global Biodiversity Information Facility Data Portal

Component Contact Information

Contact Name:	Éa
Contact Email:	eo

Component Category

websitesDocuments

Societal Benefit Areas

Agriculture
Biodiversity
Climate
Ecosystems
Health
Water

Associated Services

1. Global Biodiversity Information Facility Network Web Service	Details
2. Global Biodiversity Information Facility Provider Web Service	Details
3. Global Biodiversity Information Facility Occurrence Web Service	Details
4. Global Biodiversity Information Facility Density Web Service	Details
5. Global Biodiversity Information Facility Taxon Web Service	Details
6. Global Biodiversity Information Facility Resource Web Service	Details



EuroGEOSS Broker

GBIF provides services for the EuroGEOSS broker

	CSW	WMS	WFS	Others
Forest	-	4 services (38 datasets)	-	-
Biodiversity	-	-	1 service	1 GBIF-service
Drought	2 services (102 datasets)	6 services (161 datasets)	3 services (40 datasets)	1 WFS-G
Generic	2 services	-	-	-

- Web Map Service
- Web Feature Service
- ~~CSW~~ -> OAI-PMH

CSW - « Catalogue Service for the Web »

Service used to request metadata catalogues of datasets and services.

WMS - « Web Map Service »

Service used to download geospatial information in a raster format. WMS are mainly view services.

WFS - « Web Feature Service »

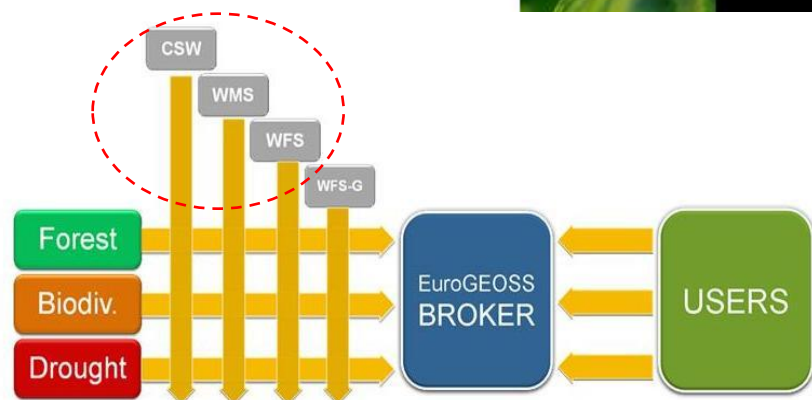
Service delivering raw geospatial data (under GML). WFS are mainly downloading services.

WFS-G

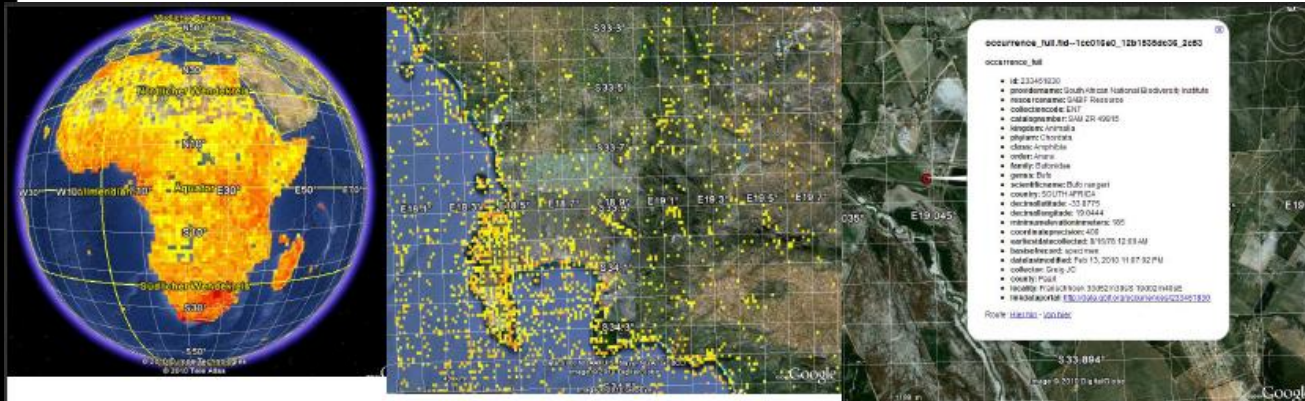
WFS used to deliver gazetteer service (producing Bounding Box from toponyms).

GBIF

Specific query interface connected to the GBIF (Global Biodiversity Information Facility) metadata catalogue.



Source: <http://www.eurogeoss.eu/broker/default.aspx>



GBIF OGC services visualised in Google Earth. The rightmost image shows the record details with a clickable link to the GBIF data portal.
 GBIF WMS African Biota - <http://ogc.gbif.org/wms?service=WMS&version=1.1.1&request=GetCapabilities>
 GBIF WFS African Biota - <http://ogc.gbif.org/wfs?service=WFS&version=1.1.0&request=GetCapabilities>

OGC Web Services for GBIF-Mediated Occurrence Data

One of the goals of the EU-funded EuroGEOSS¹ project is to develop the infrastructure for a “biodiversity operational capacity” as a European contribution to the Group on Earth Observations Biodiversity Observation Network (GEO BON)². One outcome of EuroGEOSS will be the Digital Observatory for Protected Areas (DOPA)³, an information system for assessing the state and pressure of protected areas in order “to support proper prioritisation for decision making and fund allocation processes”. As a contribution to the DOPA, GBIF developed a number of OGC⁴ web services facilitating geospatial access to GBIF-mediated African biodiversity data.

The Open Geospatial Consortium (OGC) is a non-profit, international, voluntary consensus standards



GBIF
www.gbif.org

...free and open access
 to biodiversity data

GBIF Contacts

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Information Systems Architect,
 Tim Robertson, trobertson@gbif.org

Senior Programme Officer, Inventory,
 Discovery, Access (IDA),
 Éamon Ó Tuama, eotuama@gbif.org

DOPA

Digital Observatory for Protected Areas



- Home
- Overview
- Projects
- Web Services
- Publications & Resources
- News & Events
- Who Are We?

 Search

USER LOGIN

Username: *

Password: *

Log in

Request new password

RECENT CHANGES

Web Services & Clients

(9 weeks 6 days ago)

Who are we?

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Projects

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The Digital Observatory for Protected Areas

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An introduction to the DOPA

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News & Events

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The Digital Observatory for Protected Areas

The Digital Observatory for Protected Areas (DOPA) has been created as a component of the GEO-BON observation network by the Joint Research Centre in collaboration with other international organizations including the Global Biodiversity Information Facility (GBIF), the UNEP-World Conservation Monitoring Centre (WCMC), Birdlife International and the Royal Society for the Protection of Birds (RSPB). DOPA is conceived as a set of distributed databases combined with open, interoperable web services (Figure 1) to provide a large variety of end-users including park managers, decision-makers and researchers with means to assess, monitor and forecast the state and pressure of protected areas at the global scale.

DOPA is also a contribution to the Group on Earth Observations Biodiversity Observation Network (GEO BON), the biodiversity arm of the Global Earth Observation System of Systems (GEOSS).

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**GBIF
and
IPBES:**

Leveraging a
decade of
investment in
biodiversity data
sharing

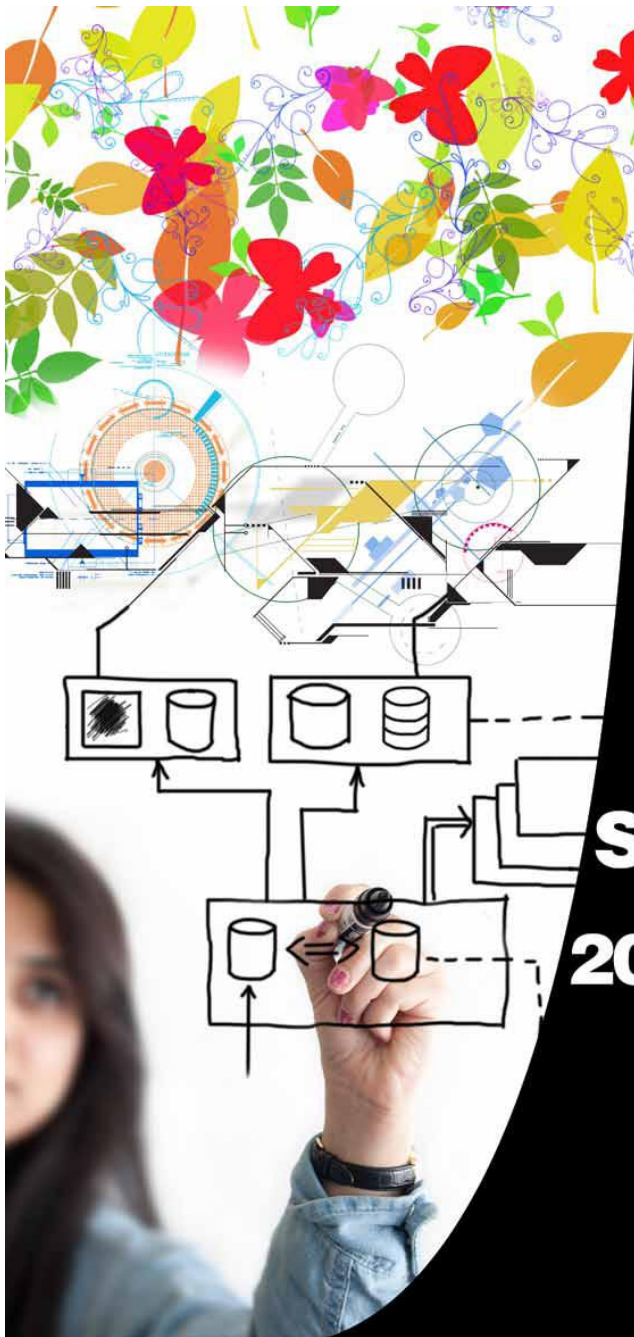
WWW.GBIF.ORG



Key messages

- Highly complex, non-trivial challenges – people, data, infrastructure;
- 10 years experience to date, and much already accomplished, allowing GEO BON to ‘jump start’ on GBIF;
- Based on partnerships, common purpose and ‘public good’ philosophy;
- GBIF mediated data easily deployed for GEOSS, e.g., Architecture Implementation Pilot studies, DOPA, EuroGEOSS broker.
- Watch this space!!!





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GBIF Strategic Plan 2012-2016

Seizing
the
Future

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