ICT, Social Networks and the Brazilian Biodiversity Infrastructure

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Codata Conference 2010

Biocomplexity: data and information

Biosphere – The world we live in

Ecosystem – The set of communities of all domains of life that interact with one another and the abiotic environment to form a unit

Community – Interacting populations of organisms

Population – All individuals of a species or phylotype within a community

Organism – A single individual

Organ system– a specialized functional system of an organism

Organ – a set of tissues that function as a unit

Tissue A set of interacting cells

Cell – the functional unit of all living organisms

Organelle a specialized subunit within a cell

Molecule – biochemical constituents of cells

Source: Committee on A New Biology for the 21st Century

Data, information & knowledge

To predict and control the activities of biological systems we need data and information on:

- about each component
- about how components work together as systems

Complexity of biodiversity data

Requirements:

- Assemble virtual collaborations at different scales
- Integration (data, information, people …)
- Advanced communication and informatics infrastructure

Information is the fundamental currency of the new biology

http://splink.cria.org.br

Key elements

Biological collections in Brazil

- A small number of “large” collections
- A large number of small key collections

Informatics profile

- Human resources: lack of expertise in informatics
- Equipments and installations (not adequate)
- Connectivity (normally slow or unstable)

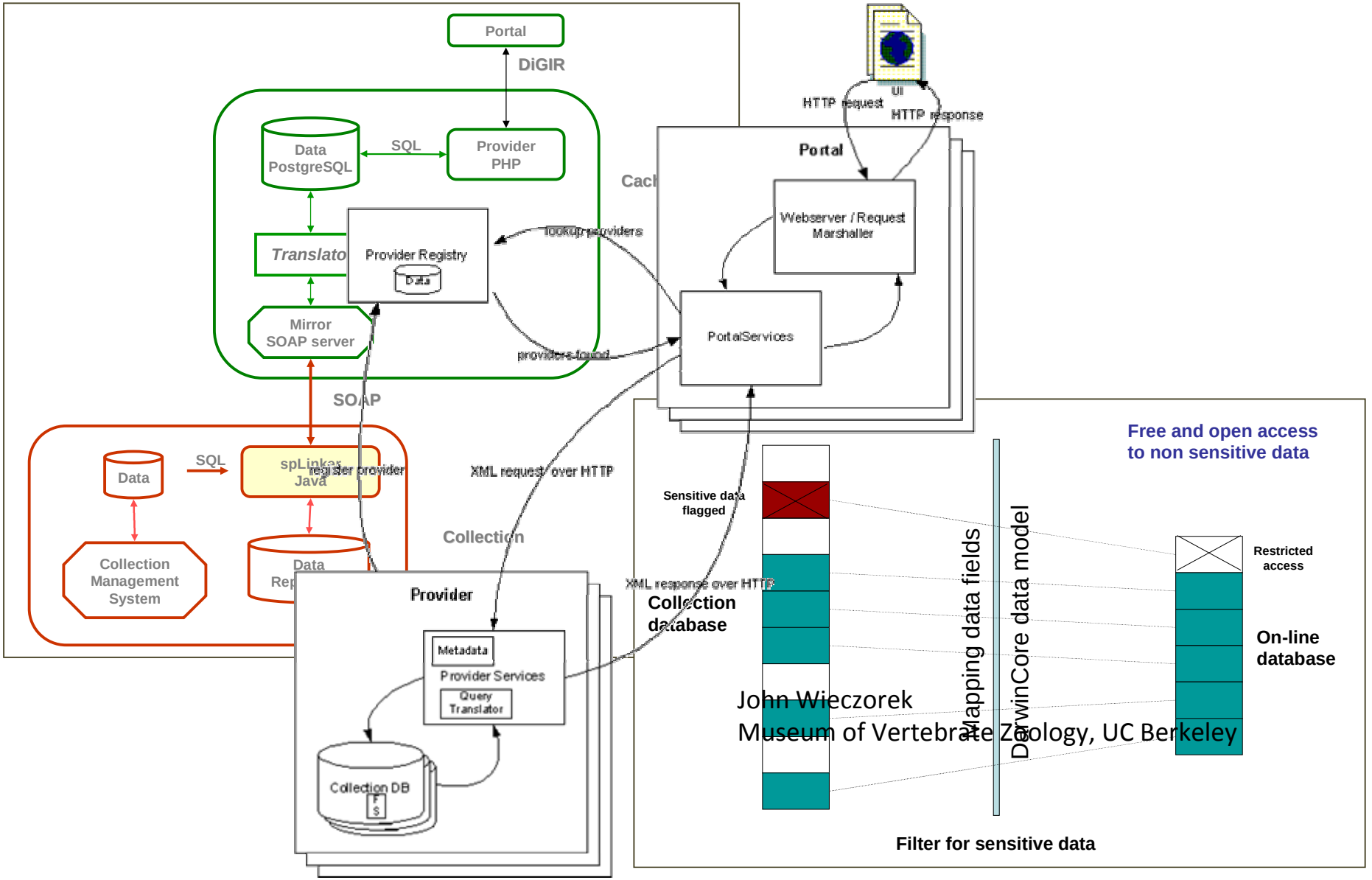
Challenges

- Integration of primary data from all *taxa*, from distributed collections, using different software in diverse environments
- Integrating data from collections with low and/or unstable internet connectivity, using basic hardware and lack of computer experts
- Data providers with full control over the data served to the network

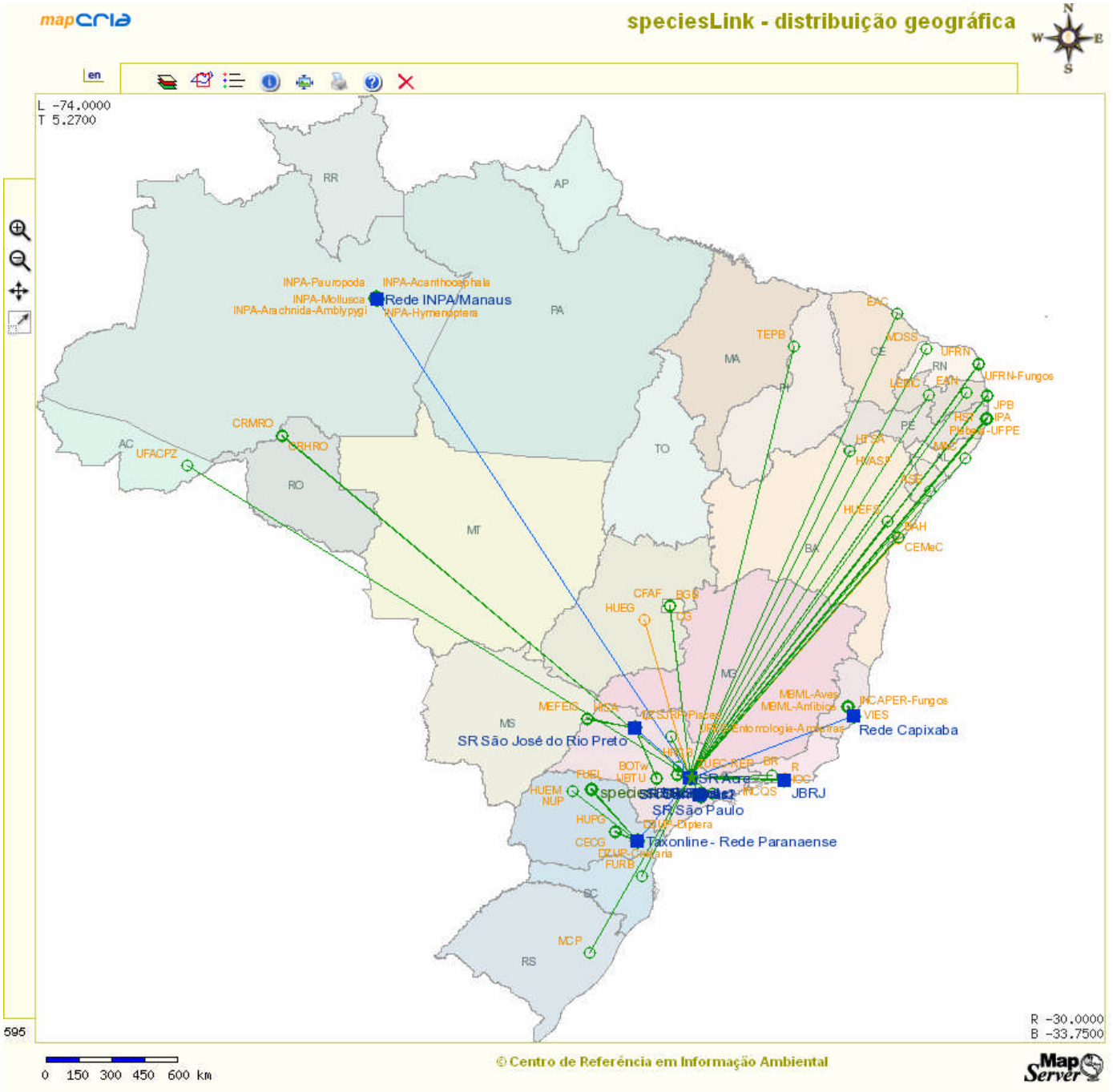
Development parameters - architecture

- Maintenance of collection's routine
  - Practically any software is accepted (Excel, Access, Specify, Biota, Brahms, PostgreSQL, MySQL, …)
- Data provider with full control over the data
  - What is sensitive data, what is open and free
  - Digitization strategy, data cleaning strategy
- Data providers fully acknowledged
- Connectivity problems addressed
- Network interoperable with international initiatives

Network architecture



John Wieczorek
Museum of Vertebrate Zoology, UC Berkeley


mapcria
speciesLink - distribuição geográfica
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MT
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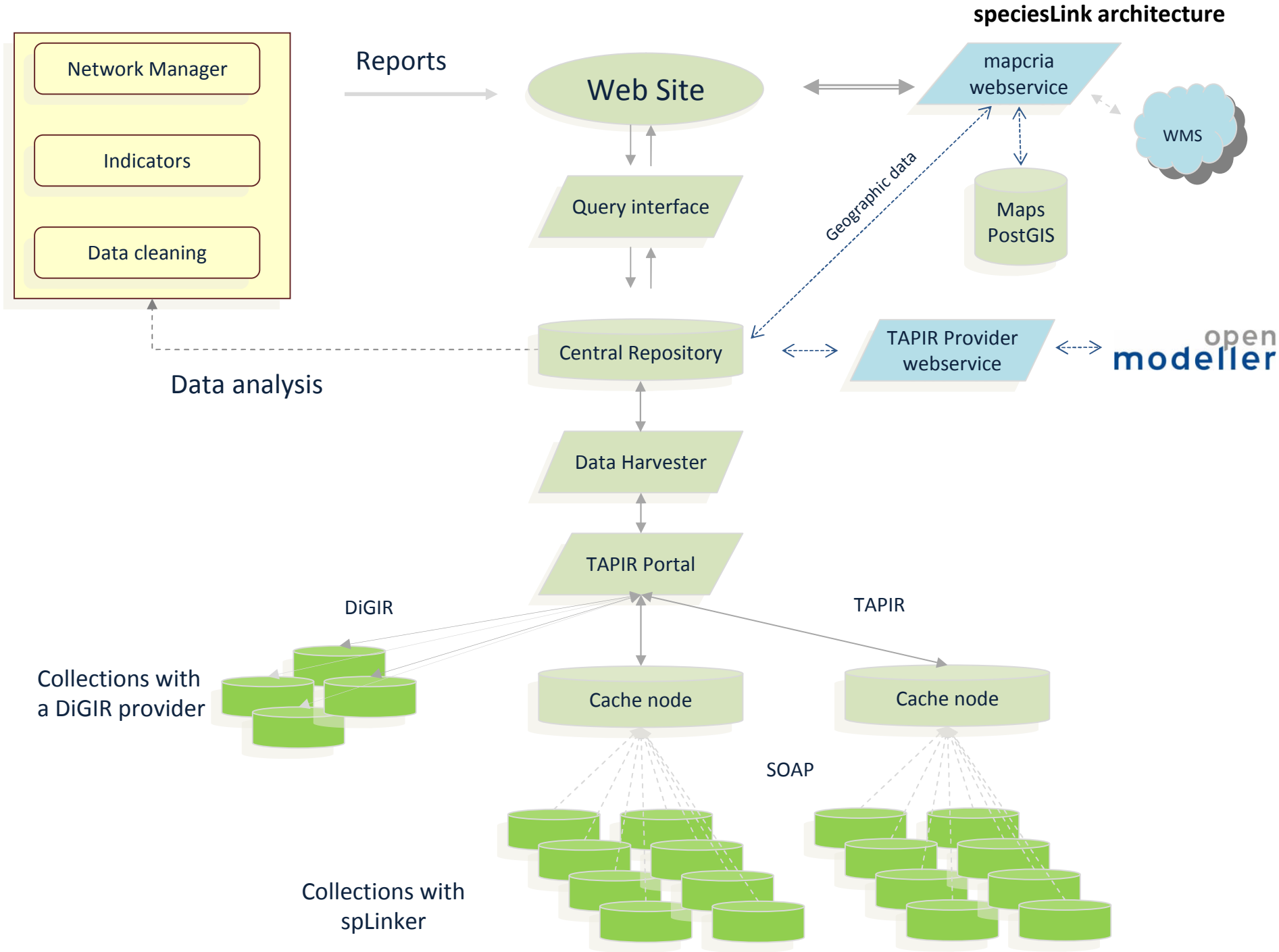
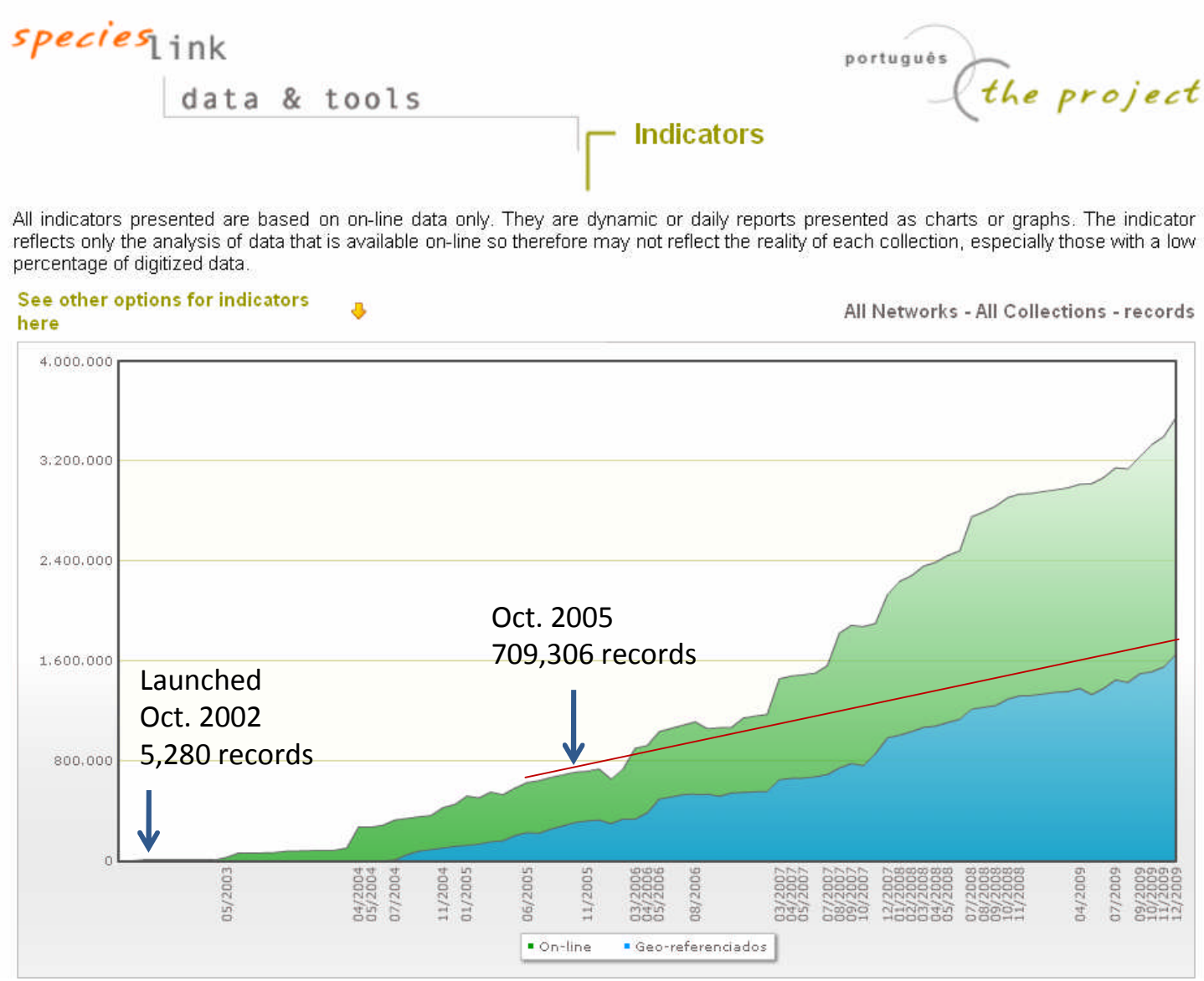
AC
MS
MG
ES
RJ
SP
PR
SC
RS
INPA-Pauropoda
INPA-Acanthocephala
INPA-Mollusca
INPA-Arachnida-Amblypygi
Rede INPA/Manaus
INPA-Hymenoptera
CRMRO
CRHRO
UFACPZ
TEPB
EAC
MOSS
UFRN
UFRN-Fungos
UFPB
JPB
IPA
Herbário-UFPE
HUEFS
BAH
CEMeC
CFAF
BGS
HUEG
MEFEIS
MBML-Aves
MBML-Anfíbios
INCAPER-Fungos
VIES
Rede Capixaba
SR São José do Rio Preto
SR Acre
JBRJ
SR São Paulo
HUEM
NUP
HUPG
CECG
Taxonline - Rede Paranaense
FURB
MCP
R -30.0000
B -33.7500
595
0 150 300 450 600 km
© Centro de Referência em Informação Ambiental
MapServer


speciesLink architecture
Network Manager
Indicators
Data cleaning
Reports
Web Site
mapcria webservice
WMS
Query interface
Geographic data
Maps PostGIS
Central Repository
TAPIR Provider webservice
open modeller
Data analysis
Data Harvester
TAPIR Portal
DiGIR
TAPIR
Collections with a DiGIR provider
Cache node
Cache node
SOAP
Collections with spLinker

The development of the speciesLink network



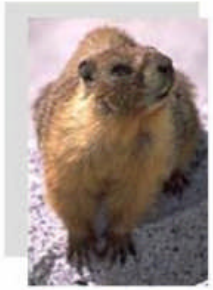
3.8 million

speciesLink

português

the project

data & tools



search

Query the collections databases using the search engine

tools

data cleaning

This tool was developed to facilitate the detection of possible errors and to help collections in the process of standardizing data. (only portuguese version available)

geoLoc

Geo reference your data based on locality descriptions.

infoXY

Get locality information using geographic coordinates.

spOutlier

Detect outliers in latitude, longitude and altitude using techniques modified from Chapman, 1999.

speciesMapper

Plot geo referenced points on a map.

converter

Convert different types of representations of geographic coordinates and datum's.

subprojects

networkManager

Manager of the metadata of each participating collection of the speciesLink network.

indicators

Dynamic or daily reports are submitted in the form of maps and charts.

openModeller

Open source spatial distribution modelling tool used to predict species distribution.

spLinker

Application that enables biological collections to mirror their data in regional servers integrated to the speciesLink network.

speciesBase

Collection management system developed in Microsoft® Access using Darwin Core 2 data elements.

plant collectors in Brazil

This database aims at offering a standard list of collectors' names which we believe important to taxonomic studies and herbaria digitization projects.

email

Discussion List
Centro de Referência em Informação Ambiental
Fundação de Amparo à Pesquisa do Estado de São Paulo

Data Cleaning Tools

- **Detects *"possible errors"***

- **Flags "*suspect records*" to facilitate the work of data providers and users**

- **Records are not modified by CRIA**

- **Main features include:**

  - Checking names using phonetic comparisons: names of the network, the Catalogue of Life (CoL), and selected authority files
  - checking dates indicating earliest collection date and latest update
  - checking geographic data inconsistencies: country/state/municipality versus geographic coordinates

speciesLink

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data & tools

data cleaning

Select a collection NYBG_BR

collection: **NYBG_BR**

total number of records on-line	241281
- without coordinates	142083
- georeferenced	99198
- access to georeferenced data denied	0
- in the sea	1995
repeated records	
catalog number	30
all fields	2
collector's name and number	30348
last update	
of the collection	11-09-2009
of data cleaning	24-09-2009

geographic distribution of the specimens

collection profile
data cleaning statistics
geographic coordinates analysis

taxonomic data	
inventory	scientific name - collector - types
family	not found
genus	244 suspect records
species	484 suspect records
subspecies	not found
author	4194 suspect records
duplicate	1271 suspect records

locality data	
inventory	country - state - municipality
name of the country/state	419 suspect records
outlier	not found
long/lat outside the world limit	not found
equal long/lat	not found
long or lat equal to zero	33 suspect records
long/lat in the sea (Brazil)	71 suspect records
municipality name (Brazil)	21305 suspect records
coordinate unit analysis (Brazil)	459 suspect records

date collected	
collect before 1767	15 suspect records
last update previous to date collected	1 suspect records

suggestions for blank fields	
long/lat (Brazil)	84090 suggestions
country/state name	52 suggestions
municipality name (Brazil)	22360 suggestions

email

Data cleaning reports for each collection based on online data

collection: NYBG_BR	
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- in the sea	1995
repeated records	
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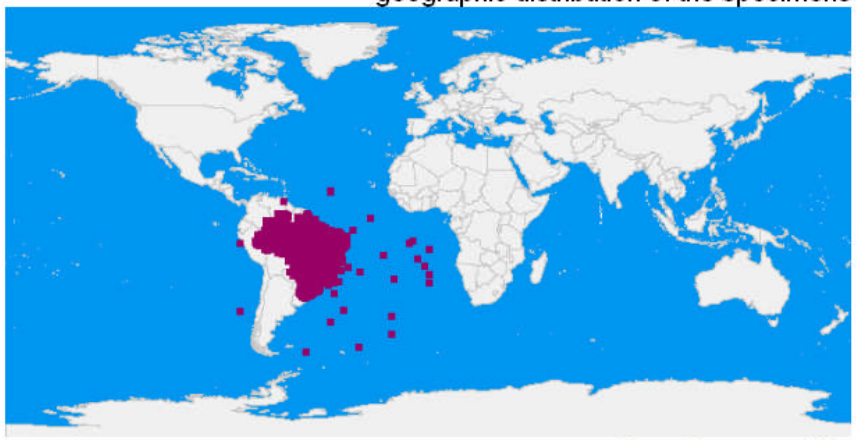

collection profile
data cleaning statistics
geographic coordinates analysis

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municipality name (Brazil)	22360 suggestions

speciesLink

data & tools

data cleaning

NAMES

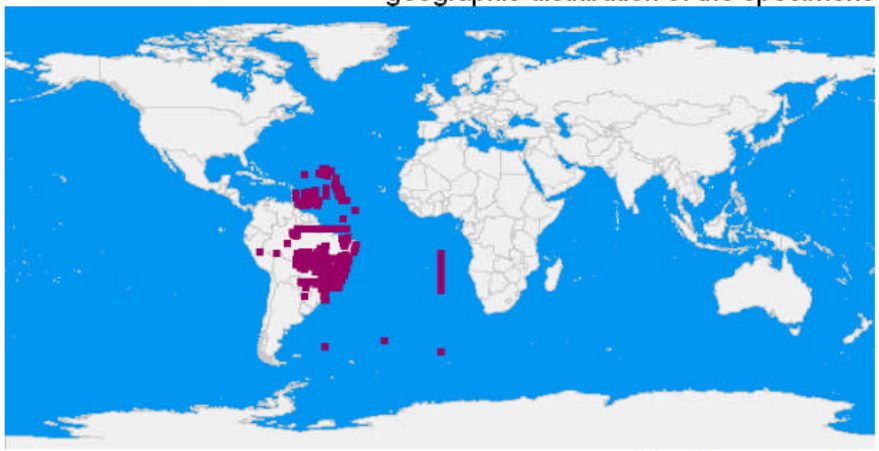
collection: **NYBG_BR**
Suspect genus names
List of records that have the same family name with a phonetic variation of the genus

Title: The names in red are not included in the dictionaries available, those in green are.

family	genus	species	subspecies	records	speciesLink	status CoL	catalog number
[Rhamnaceae]	[Zyziphus]	[joazeiro]	[]	0	1		
[Rhamnaceae]	[Zyzyphus]	[joazeiro]	[]	0	3		
[Rhamnaceae]	[Ziziphus]	[joazeiro]	[]	30 see	331		
[Rhamnaceae]	[Zizyphus]	[joazeiro]	[]	1 see	24		1034302
[Rubiaceae]	[Emmeorhiza]	[umbelata]	[]	0	1		
[Rubiaceae]	[Emmeorrhiza]	[umbellatta]	[]	0	2		
[Rubiaceae]	[Emmeorriza]	[umbellata]	[]	0	1		
[Rubiaceae]	[Emmeorrhiza]	[umbellata]	[]	92 see	109		
[Rubiaceae]	[Emmeorhiza]	[umbellata]	[]	17 see	477	accepted name	
[Euphorbiaceae]	[]	[hieronyma]	[]	0	1		
[Euphorbiaceae]	[Hieronyma]	[]	[]	5 see	38		1064903 1064904 1064905 1064906 1064907
[Euphorbiaceae]	[Hyeronima]	[]	[]	3 see	24		195423 40920 896135

collection: ESA	
total number of records on-line	94179
- without coordinates	77149
- georeferenced	17030
- access to georeferenced data denied	643
- in the sea	2177
repeated records	
catalog number	1273
all fields	42
collector's name and number	3394
last update	
of the collection	08-11-2007
of data cleaning	07-04-2008

geographic distribution of the specimens



collection profile
data cleaning statistics
geographic coordinates analysis

taxonomic data	
inventory	scientific name - collector - types
family	3 suspect records
genus	1389 suspect records
species	2769 suspect records
subspecies	not found
author	41477 suspect records
duplicate	1348 suspect records

locality data	
inventory	country - state - municipality
name of the country/state	3 suspect records
outlier	1110 suspect records
long/lat outside the world limit	3 suspect records
equal long/lat	not found
long or lat equal to zero	1498 suspect records
long/lat in the sea (Brazil)	1738 suspect records
municipality name (Brazil)	6128 suspect records
coordinate unit analysis (Brazil)	2770 suspect records

date collected	
collect before 1930	220 suspect records
last update previous to date collected	not found

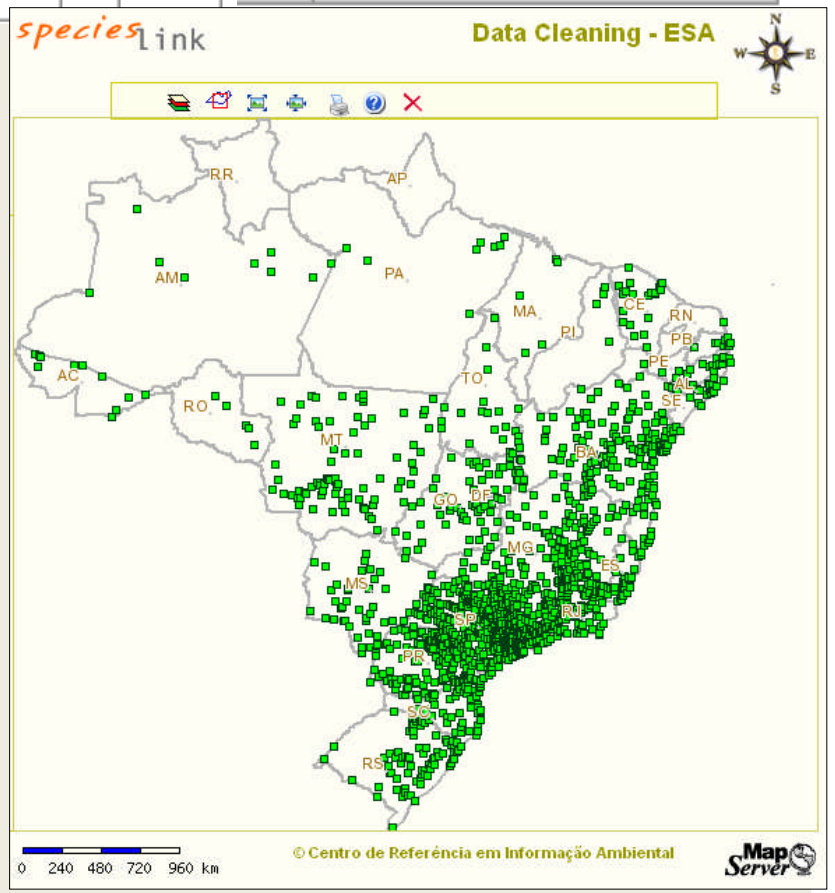
suggestions for blank fields	
long/lat (Brazil)	67066 suggestions
country/state name	2 suggestions
municipality name (Brazil)	36 suggestions

Automatic Georeferencing

collection: ESA	
total number of records on-line	71977
- without coordinates	53891

Suggestions for blank fields:	
long/lat (Brazil)	49697 suggestions
	83 suggestions
	162 suggestions

country	stateprovince	county	locality	longitude_sug	latitude_sug	datum	map	ocor_col
Brasil		Arcos		-45.5394	-20.2819	SAD69		1
Brasil		Arcos	Água Limpa - Calciolândia	-45.5394	-20.2819			
Brasil		Colina		-48.54	-20.71			
Brasil		Iguape		-47.55	-24.7			
Brasil		Itatiaia		-44.5633	-22.4961			
Brasil		Jaboticatubas		-43.745	-19.5136			
Brasil		Pariquera-açú		-47.88	-24.71			
Brasil		Pirangi		-48.65	-21.09			
Brasil		Santa Adélia		-48.8	-21.24			
Brasil		Santa Cruz da Conceição		-47.45	-22.14			
Brasil		São Paulo		-46.63	-23.54			



Centralized query

- Classification system to select data providers
- Data outputs: files (html, xml, Excel), mapCRIA, Google Maps
- Data filters: type specimen, georeferencing at source or automatic, inconsistent records
- Results: presented per collection, integrated with red lists, show geographic inconsistencies, smart links to CRIA's name server and GBIF

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data & tools

Centralized Search

Advanced search | Simple inventory | Advanced inventory

Use the options below to select the collections to be searched

Uncheck all

Collection type

Plants and Macrosco

All

Collection location

All

Net

All

Data source

Voucher

- [x] ASE - Herbário da Universidade Federal de Sergipe
- [x] BCTw - Xiloteca Calvino Mainieri
- [x] BOTU - Herbário "Irina Delanova Gemtchújnicov"
- [x] BOTw - Xiloteca "Profa. Dra. Maria Aparecida Mourão Brasil"
- [x] CPMA - Coleção de plantas medicinais e aromáticas
- [x] EAC - Herbário Prisco Bezerra
- [x] EAN - Herbário Jaime Coelho de Moraes
- [x] ESA - Herbário da Escola Superior de Agricultura Luiz de Queiroz
- [x] FUEL - Herbário da Universidade Estadual de Londrina
- [x] FURB - Herbário Dr. Roberto Miguel Klein
- [x] HISA - Herbário de Ilha Solteira

Search

Higher taxonomy

Scientific name: campomanesia phaea

Collector

Catalog Number

Query

Locality

County

State

Country

Filters (data subsets) - about

- [ ] Type specimen
- [ ] Georeferenced at source
- [ ] Automatic georeferencing (municipality level)
- [ ] Select "suspect" records
- [ ] Select "not suspect" records

Result

Result

Source	Records	Georeferenced records		Content	Format		
		At source	Automatic				
ESA	4	2	2	All	html	see	
FUEL	1	0	1	Locality	excel	see	
HUMC	1	1	0	Summary	xml	see	
IAC	5	5	0	All	html	see	
IPA	1	0	1	All	html	see	
JBRJ_RB	6	6	0	All	html	see	
MBM	6	0	6	All	html	see	
MBML-Herbario	2	2	0	All	html	see	
MOBOT_BR	5	1	0	All	html	see	
NYBG_BR	5	1	3	All	html	see	
SP	22	2	18	All	html	see	
SPSF	8	1	7	All	html	see	
UEC	3	2	0	All	html	see	
UPCB	1	0	1	All	html	see	
Total	**70**	**23**	**39**	All	html	see	

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Centralized Search

ESA - Herbário da Escola Superior de Agricultura Luiz de Queiroz
Escola Superior de Agricultura Luiz de Queiroz, ESALQ
How to cite e Use conditions

spLink	Institution	Collection	Catalog number	Scientific name	Basis of record	Kingdom	Phylum	Class	Ord
sp	ESALQ	ESA	75352	Campomanesia phaea	S	Plantae	Magnoliophyta	-	-
sp	ESALQ	ESA	17676	Campomanesia phaea	S	Plantae	Magnoliophyta	-	-
sp	ESALQ	ESA	13138	Campomanesia phaea	S	Plantae	Magnoliophyta	-	-
sp	ESALQ	ESA	68271	Campomanesia phaea	S	Plantae	Magnoliophyta	-	-

FUEL - Herbário da Universidade Estadual de Londrina
Universidade Estadual de Londrina, UEL
How to cite e Use conditions

spLink	Institution	Collection	Catalog number	Scientific name	Basis of record	Kingdom	Phylum	Class	Order	Fam
sp	UEL	FUEL	39902	Campomanesia phaea	S	-	-	-	-	Myrta

HUMC - Herbário Mogiense
Universidade de Mogi das Cruzes, UMC
How to cite e Use conditions

spLink	Institution	Collection	Catalog number	Scientific name	Basis of record	Kingdom	Phylum	Class	Order	F
sp	UMC	HUMC	-	Campomanesia phaea	-	-	-	-	-	M

Scientific Name Search

Genus: *Campomanesia* | Species: *phaea* | subspecies: | in: All | search

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Terms of use

HELP SAVE SPECIES NOW!

Help | Dictionaries | **Resources at CRIA** | External Resources

Flora brasiliensis | **speciesLink**

speciesLink

***species*Link** is a distributed information system that integrates primary data from biological collections of the State of São Paulo, Parana's network Taxonline, the SICol network, Rio de Janeiro Botanical Garden Herbarium and observation data from the Biota/Fapesp program, and some collections outside of Brazil. The development was funded by Fapesp (Process 2001/02175-5).

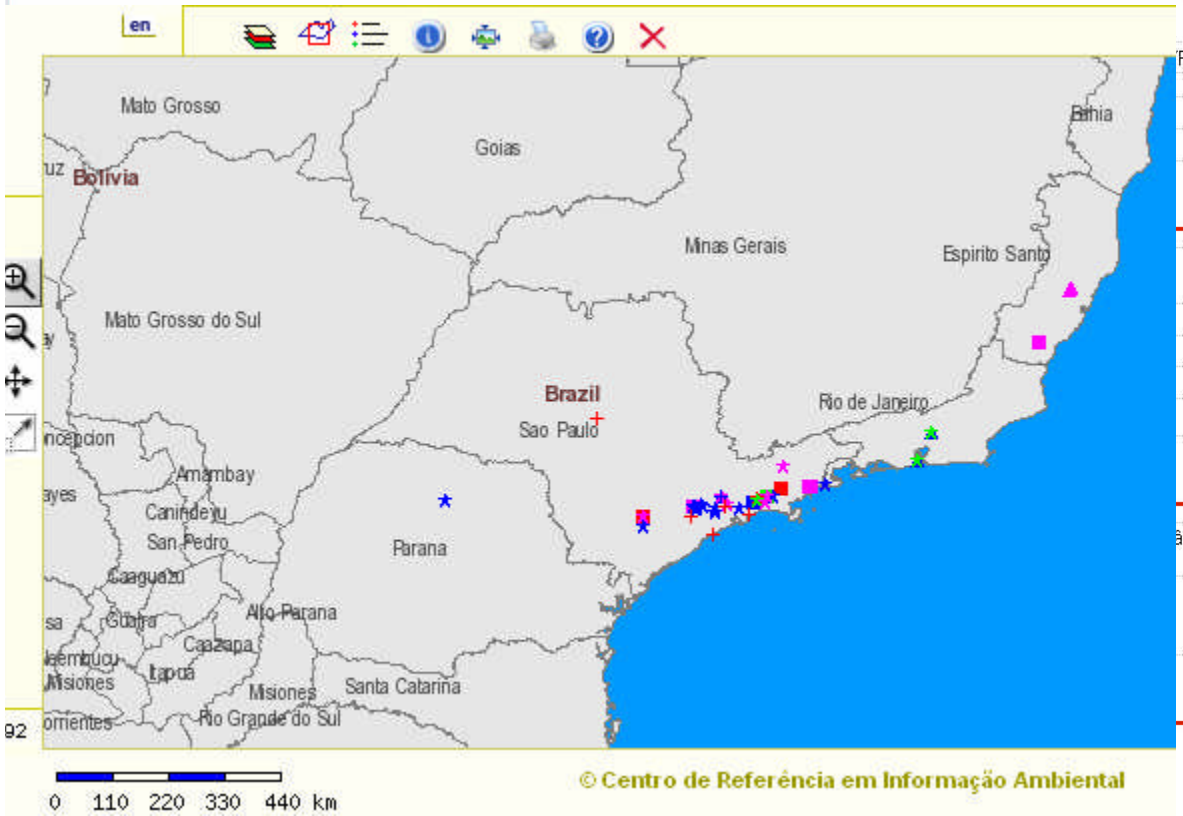
Centro de Referência em Informação Ambiental, CRIA

See matches

speciesLink

RTACEAE

View Printer Friendly

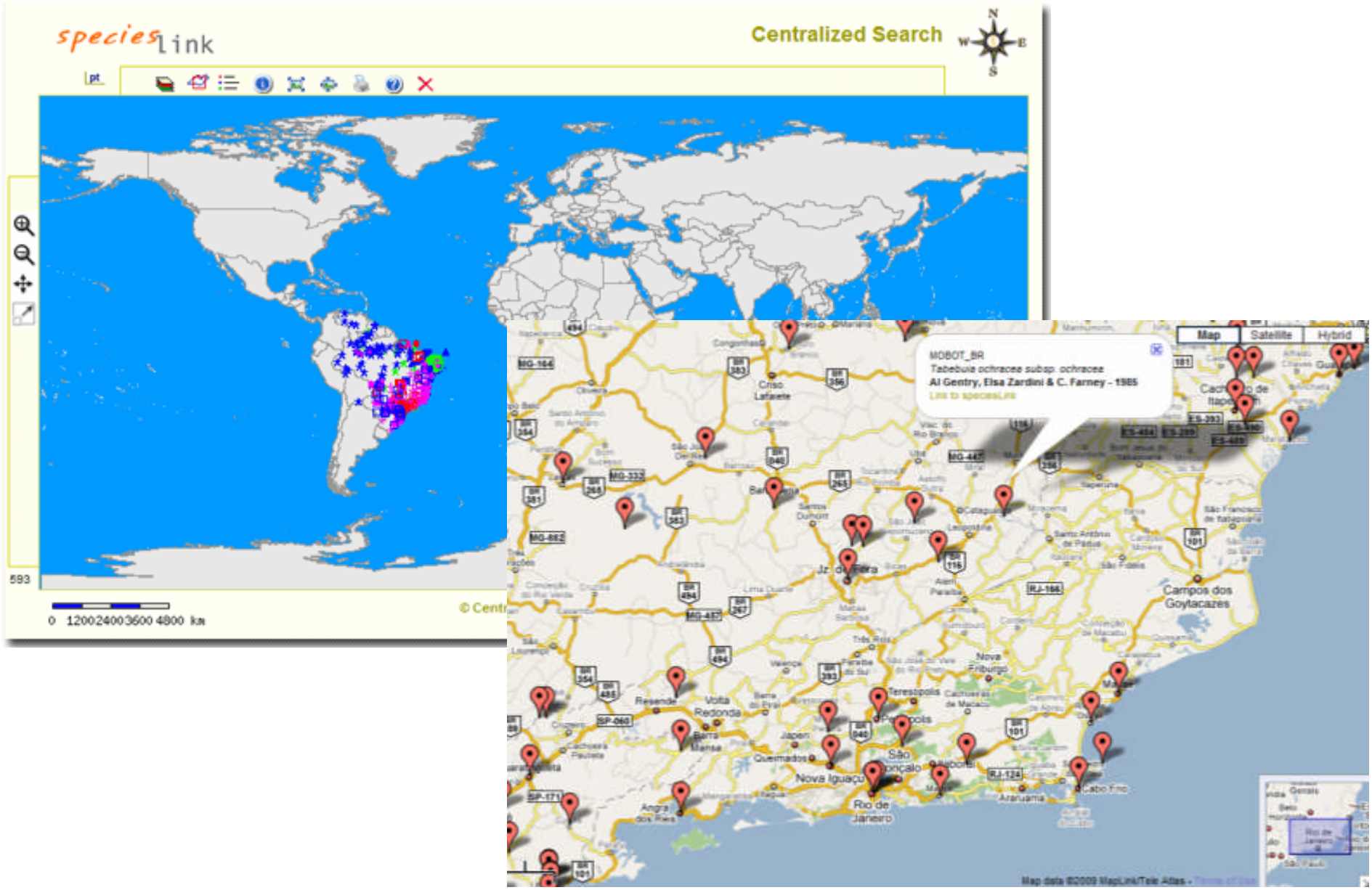


Centralized query: Tabebuia

Result

Source	Records	Georeferenced records At source	Automatic	Content	Format		
ASE	33	2	27	All	html	see	
BOTU	4	4	0	All	html	see	
CPMA	10	8	2	All	html	see	
EAC	12	2	10	All	html	see	
ESA	192	12	172	All	html	see	
FUEL	39	2	32	All	html	see	
FURB	11	7	4	All	html	see	
HISA	5	4	1	All	html	see	
HRCB	11	0	11	All	html	see	
HST	79	6	54	All	html	see	
HUMC	24	12	12	All	html	see	
HUPG	6	0	6	All	html	see	
IAC	57	51	0	All	html	see	
INPA-Herbario	295	46	100	All	html	see	
IPA	17	0	13	All	html	see	
JBRJ_RB	747	747	0	All	html	see	
JPB	117	17	91	All	html	see	
MAC	47	18	27	All	html	see	
MBM	294	0	214	All	html	see	
MBML-Herbario	52	43	7	All	html	see	
MOSS	22	0	20	All	html	see	
SP	41	2	37	All	html	see	
SPSF	133	6	119	All	html	see	
UEC	60	19	39	All	html	see	
UFRN	13	0	13	All	html	see	
UPCB	59	2	53	All	html	see	
VIES	31	0	29	All	html	see	
Total	**2411**	**1010**	**1093**	All	html	see	

Centralized query – maps



Centralized query – retrieved record

speciesLink

english

dados e ferramentas

Busca Centralizada

MOBOT_BR - **Missouri Botanical Garden - Brazilian records**
Missouri Botanical Garden, MOBOT
Como citar e Condições de uso

Instituição	MOBOT
Coleção	MOBOT_BR
Catálogo	483917
Nome científico	Tabebuia ochracea subsp. ochracea
Forma de registro	S
Reino	-
Filo	-
Classe	-
Ordem	-
Família	Bignoniaceae
Gênero	Tabebuia
Espécies	ochracea
Subespécie	subsp. ochracea
Autor do nome científico	-
Identificado por	-
Ano de identificação	-
Mês de identificação	-
Dia de identificação	-
Tipo nomenclatural	-
Número do coletor	-
Número do campo	-
Coletor	Al Gentry, Elsa Zardini & C. Farney
Ano da coleta	1985
Mês da coleta	01
Dia da coleta	18
Horário	-
Continente ou oceano	America
País	Brazil
Estado	Minas Gerais
Município	-
Localidade	34 km NW of Leopoldina on road to Muriaé, dry deforested hillsides in Paraiba Valley.
Longitude	-42.45
Latitude	-21.42

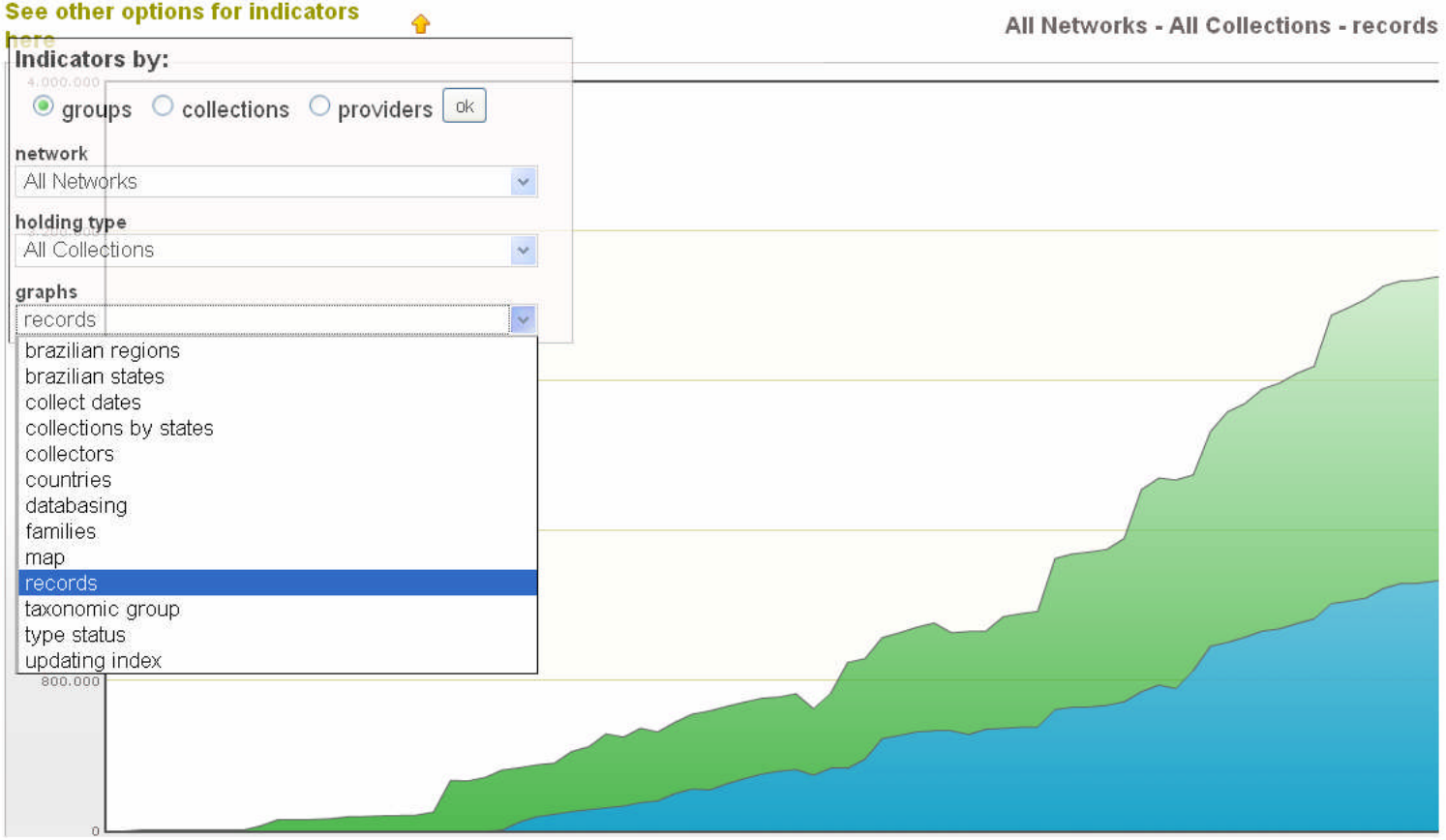
Indicators

- ❑ “On the fly” indicators based on online data
- ❑ Dynamic daily reports presented as charts or graphs
- ❑ Only reflects the analysis of data that is available online and may not reflect the reality of each collection or group of collections, especially those with a low percentage of digitized data
- ❑ With the growth of the network (more collections and more digital data) the indicators will support the identification of information gaps (geographic and taxonomic)

Indicators

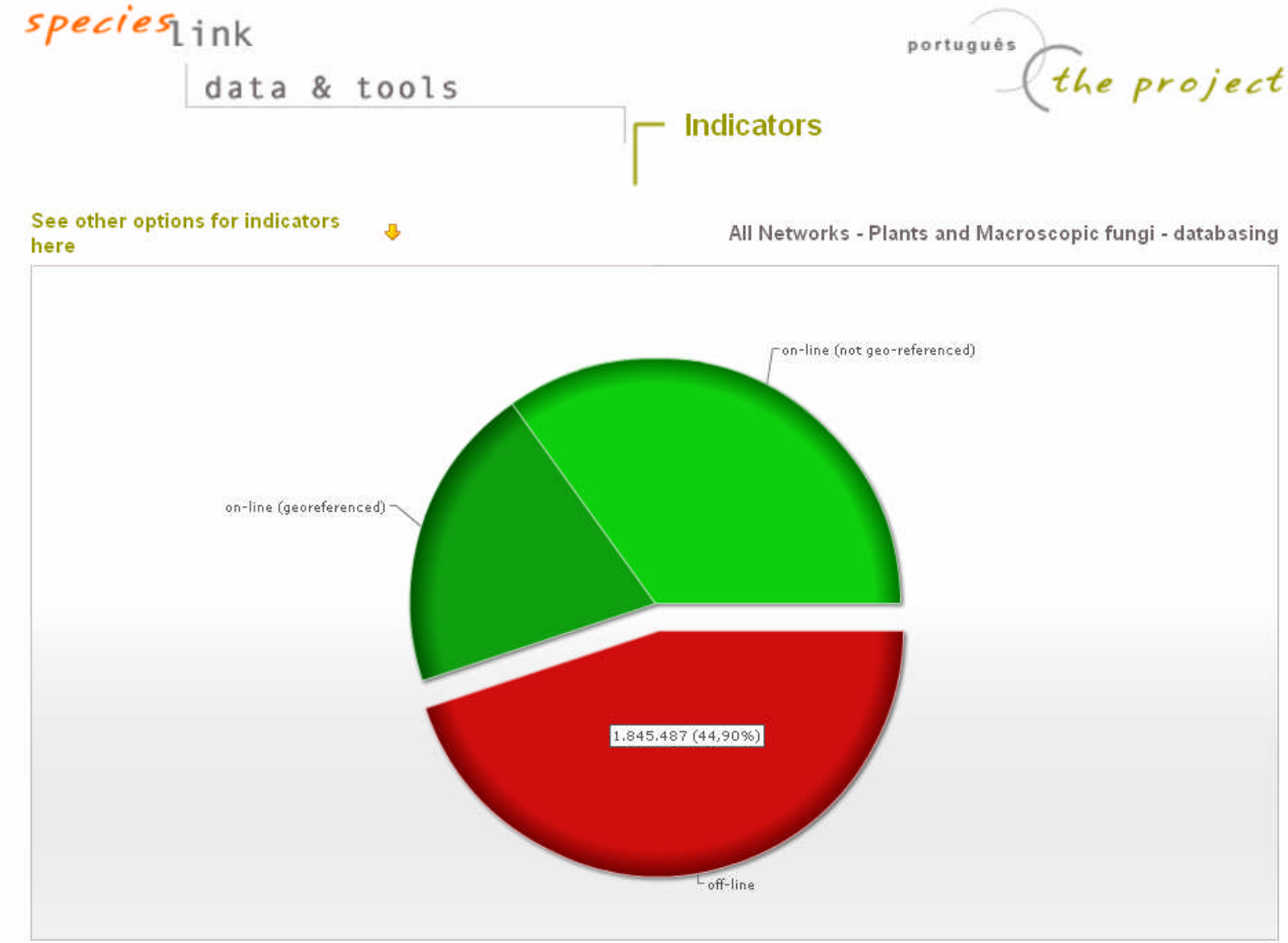
All indicators presented are based on on-line data only. They are dynamic or daily reports presented as charts or graphs. The indicator reflects only the analysis of data that is available on-line so therefore may not reflect the reality of each collection, especially those with a low percentage of digitized data.

See other options for indicators here

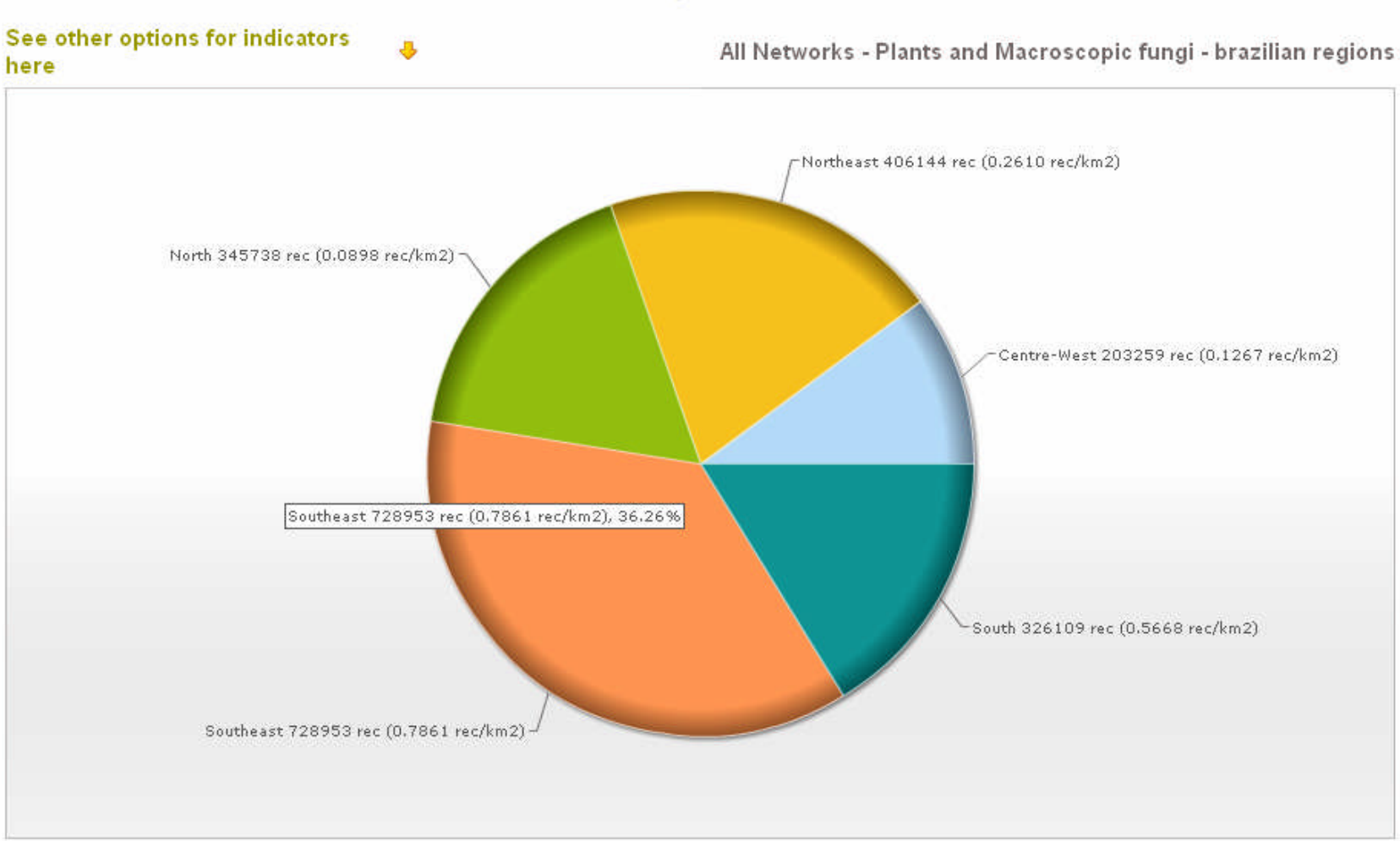


This graph reflects the movement of data (entry and removal) in the network. Monthly averages are presented for both total on-line records and total georeferenced records.

Indicators: online x offline records

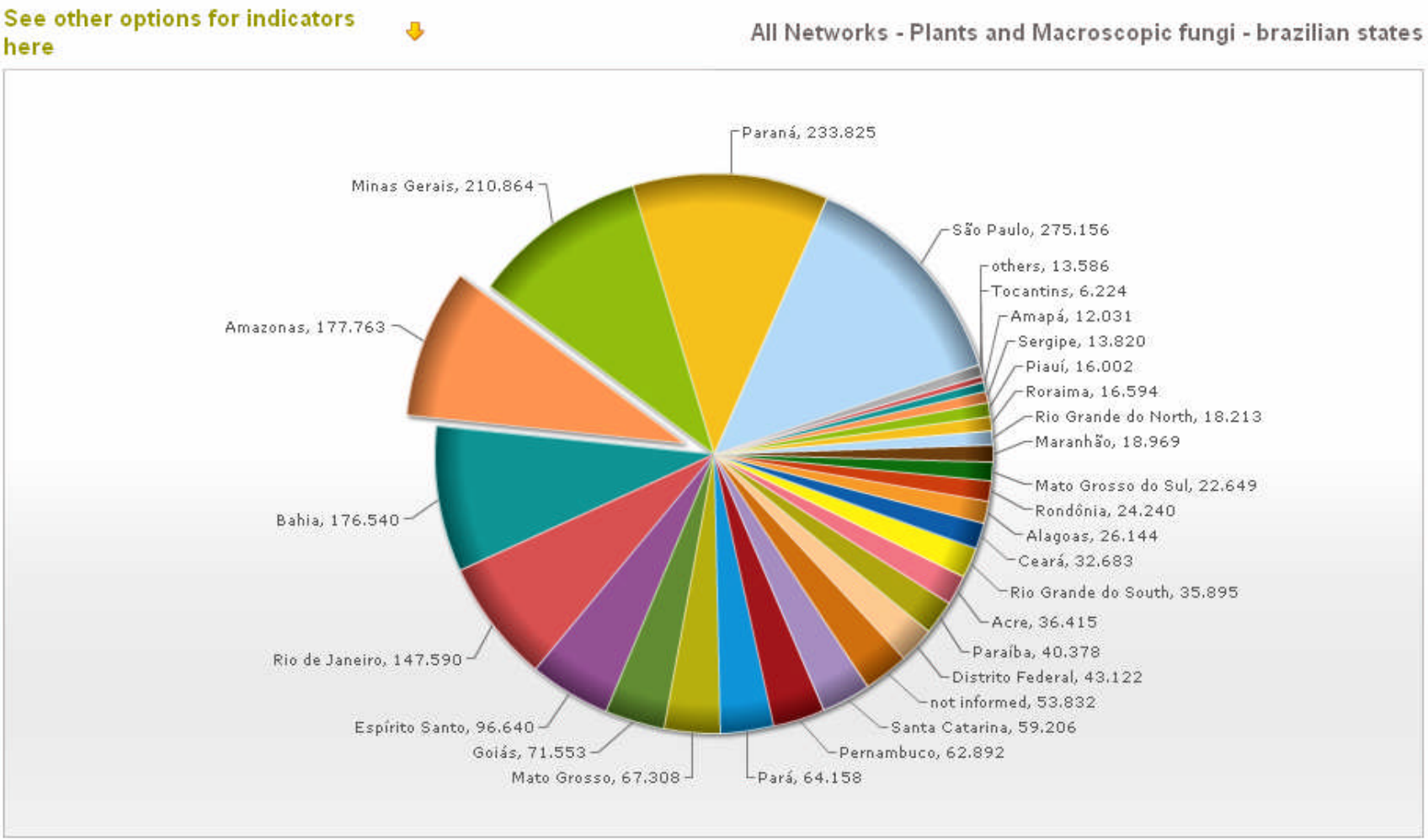


Indicators: records per region, per km2



Indicators: records per state

See other options for indicators here

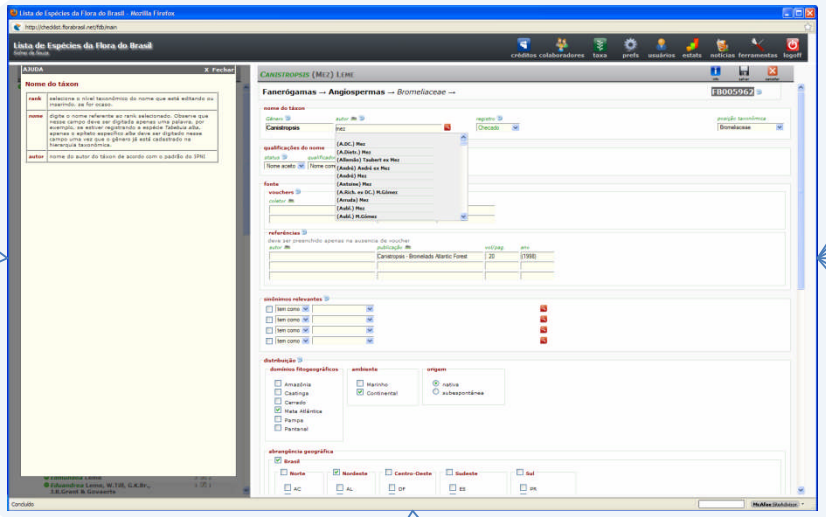


Open online system

Uploading and integrating data from available lists

Remote data input by more then 400 specialists

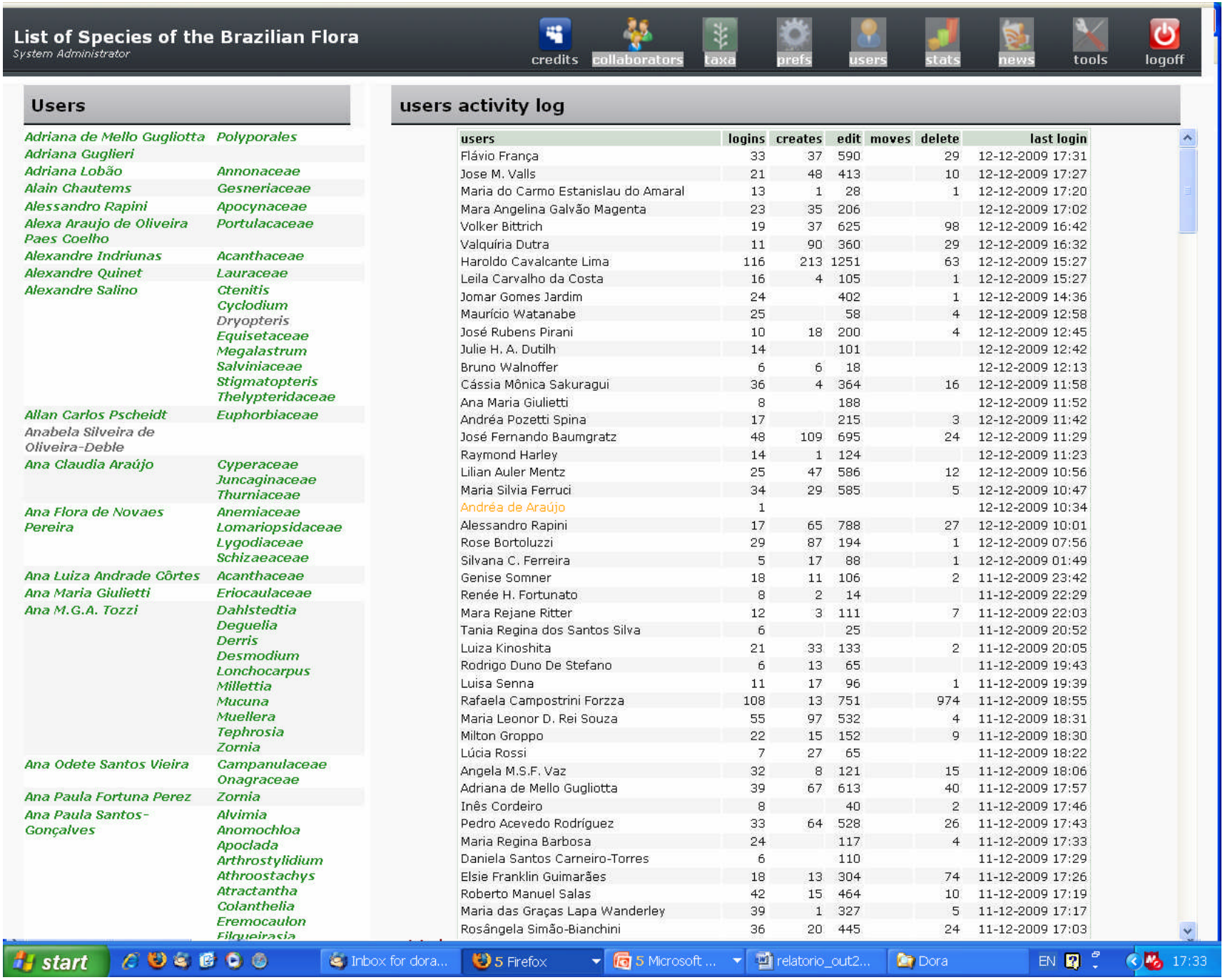
Internet

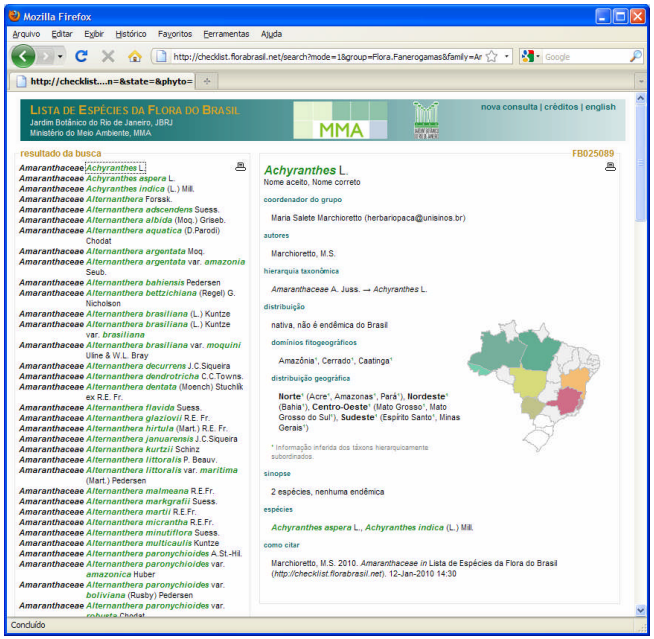


Development and support team

Coordination

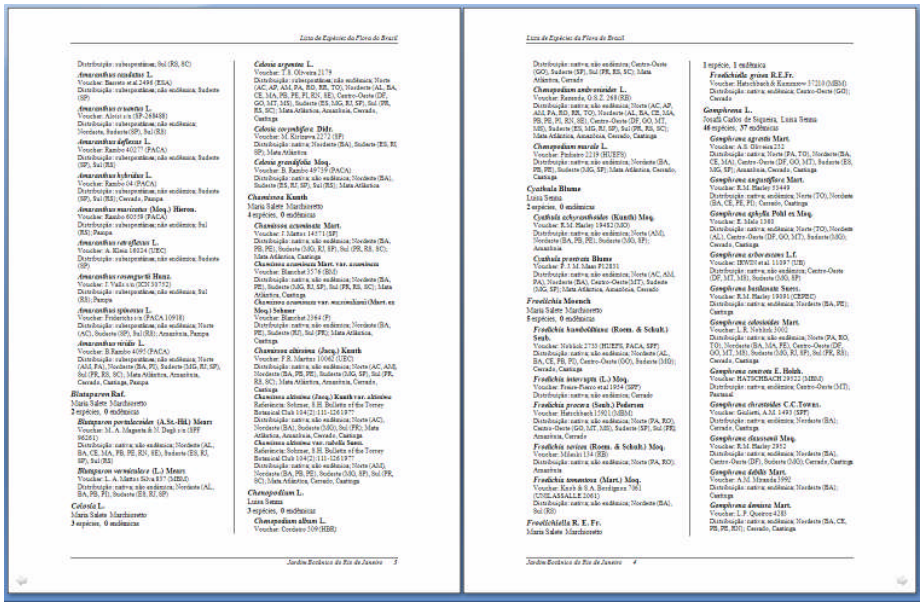
Specialists


List of Species of the Brazilian Flora
System Administrator
credits
collaborators
taxa
prefs
users
stats
news
tools
logoff
Users
Adriana de Mello Gugliotta
Polyporales
Adriana Guglieri
Adriana Lobão
Annonaceae
Alain Chautems
Gesneriaceae
Alessandro Rapini
Apocynaceae
Alexa Araujo de Oliveira Paes Coelho
Portulacaceae
Alexandre Indriunas
Acanthaceae
Alexandre Quinet
Lauraceae
Alexandre Salino
Ctenitis
Cyclodium
Dryopteris
Equisetaceae
Megalastrum
Salviniaceae
Stigmatopteris
Thelypteridaceae
Allan Carlos Pscheidt
Euphorbiaceae
Anabela Silveira de Oliveira-Deble
Ana Claudia Araújo
Cyperaceae
Juncaginaceae
Thurniaceae
Ana Flora de Novaes Pereira
Anemiaceae
Lomariopsidaceae
Lygodiaceae
Schizaeaceae
Ana Luiza Andrade Côrtes
Acanthaceae
Ana Maria Giulietti
Eriocaulaceae
Ana M.G.A. Tozzi
Dahlstedtia
Deguelia
Derris
Desmodium
Lonchocarpus
Millettia
Mucuna
Muellera
Tephrosia
Zornia
Ana Odete Santos Vieira
Campanulaceae
Onagraceae
Ana Paula Fortuna Perez
Zornia
Ana Paula Santos-Gonçalves
Alvimia
Anomochloa
Apoclada
Arthrostylidium
Athroostachys
Atractantha
Colanthelia
Eremocaulon
Filgueirasia
users activity log
users
logins
creates
edit
moves
delete
last login
Flávio França 33 37 590 29 12-12-2009 17:31
Jose M. Valls 21 48 413 10 12-12-2009 17:27
Maria do Carmo Estanislau do Amaral 13 1 28 1 12-12-2009 17:20
Mara Angelina Galvão Magenta 23 35 206 12-12-2009 17:02
Volker Bittrich 19 37 625 98 12-12-2009 16:42
Valquíria Dutra 11 90 360 29 12-12-2009 16:32
Haroldo Cavalcante Lima 116 213 1251 63 12-12-2009 15:27
Leila Carvalho da Costa 16 4 105 1 12-12-2009 15:27
Jomar Gomes Jardim 24 402 1 12-12-2009 14:36
Maurício Watanabe 25 58 4 12-12-2009 12:58
José Rubens Pirani 10 18 200 4 12-12-2009 12:45
Julie H. A. Dutilh 14 101 12-12-2009 12:42
Bruno Walnoffer 6 6 18 12-12-2009 12:13
Cássia Mônica Sakuragui 36 4 364 16 12-12-2009 11:58
Ana Maria Giulietti 8 188 12-12-2009 11:52
Andréa Pozetti Spina 17 215 3 12-12-2009 11:42
José Fernando Baumgratz 48 109 695 24 12-12-2009 11:29
Raymond Harley 14 1 124 12-12-2009 11:23
Lilian Auler Mentz 25 47 586 12 12-12-2009 10:56
Maria Silvia Ferruci 34 29 585 5 12-12-2009 10:47
Andréa de Araújo 1 12-12-2009 10:34
Alessandro Rapini 17 65 788 27 12-12-2009 10:01
Rose Bortoluzzi 29 87 194 1 12-12-2009 07:56
Silvana C. Ferreira 5 17 88 1 12-12-2009 01:49
Genise Somner 18 11 106 2 11-12-2009 23:42
Renée H. Fortunato 8 2 14 11-12-2009 22:29
Mara Rejane Ritter 12 3 111 7 11-12-2009 22:03
Tania Regina dos Santos Silva 6 25 11-12-2009 20:52
Luiza Kinoshita 21 33 133 2 11-12-2009 20:05
Rodrigo Duno De Stefano 6 13 65 11-12-2009 19:43
Luisa Senna 11 17 96 1 11-12-2009 19:39
Rafaela Campostrini Forzza 108 13 751 974 11-12-2009 18:55
Maria Leonor D. Rei Souza 55 97 532 4 11-12-2009 18:31
Milton Groppo 22 15 152 9 11-12-2009 18:30
Lúcia Rossi 7 27 65 11-12-2009 18:22
Angela M.S.F. Vaz 32 8 121 15 11-12-2009 18:06
Adriana de Mello Gugliotta 39 67 613 40 11-12-2009 17:57
Inês Cordeiro 8 40 2 11-12-2009 17:46
Pedro Acevedo Rodríguez 33 64 528 26 11-12-2009 17:43
Maria Regina Barbosa 24 117 4 11-12-2009 17:33
Daniela Santos Carneiro-Torres 6 110 11-12-2009 17:29
Elsie Franklin Guimarães 18 13 304 74 11-12-2009 17:26
Roberto Manuel Salas 42 15 464 10 11-12-2009 17:19
Maria das Graças Lapa Wanderley 39 1 327 5 11-12-2009 17:17
Rosângela Simão-Bianchini 36 20 445 24 11-12-2009 17:03
start
Inbox for dora...
5 Firefox
5 Microsoft ...
relatorio_out2...
Dora
EN
17:33

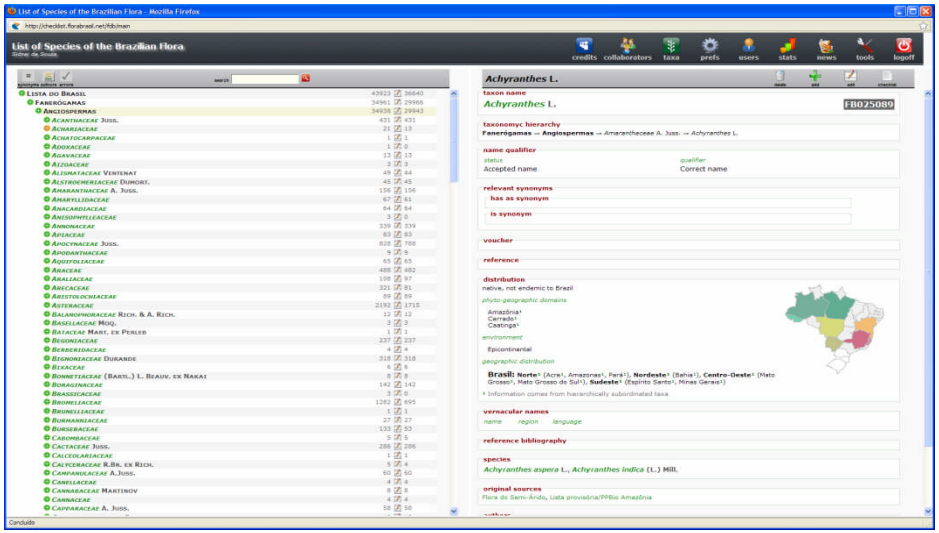


Public online output

Distribution map



Printing output



Working system for continuous update

Data Repatriation

speciesLink

data & tools

networkManager

português | the project

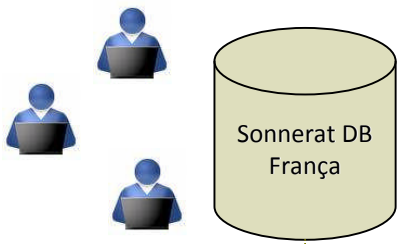
networkManager is a tool used to manage the collections of speciesLink network. In order to obtain more information on each collection, please click on the acronym. It is possible to "filter" the data by typing in keywords such as "plants" or "Ribeirão Preto" in order to view only information about plant collections or about collections locate in the Ribeirão Preto city. See the network indicators.

Click here to also see collections that are off-line

filter: international

acronym *	county	state	network	software	records **	on-line	%	georef ***	%	auto georef****	update *****
FPR Colombia	Bogotá	Cundinamarca	International	MS-Excel	47.021	47.021	100%	45.121	96%	0	13/02/2008
MOBOT BR	St. Louis	Missouri	International	DiGIR provider	177.874	177.874	100%	44.465	25%	0	22/09/2009
MVZ BR	Berkeley	California	International	DiGIR provider	5.778	5.778	100%	5.132	89%	0	17/04/2008
NMNH Botany BR	Washington	District of Columbia	International	DiGIR provider	37.662	37.662	100%	2.289	6%	4.532	17/10/2009
NYBG BR	Bronx	NY	International	MS-Access	241.281	241.281	100%	98.849	41%	83.998	11/09/2009
5 collections					**509.616**	**509.616**	**100%**	**195.856**	**38%**	**88.530**	

Date of last update: 12/12/2009 16:36



Sonnerat DB
França

XML

SH@CRIA DB
Brasil

Transcrições

Servidor de imagens eRez

Herbier Virtuel A. de Saint-Hilaire

http://hvsh.cria.org.br/exsicataViewer?barcode=P00552424&hasp

Google

herbier virtuel A. de Saint-Hilaire

P00552424

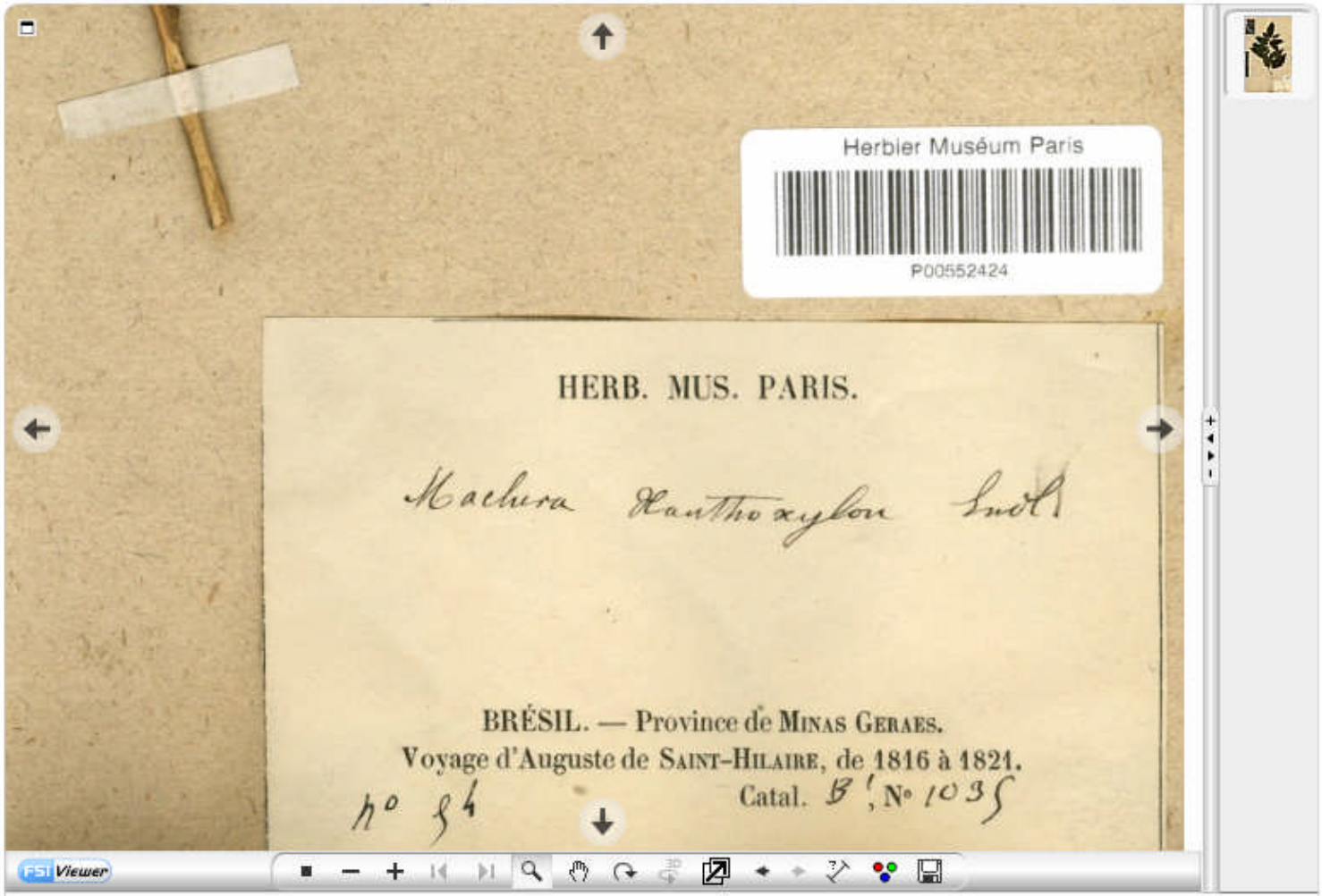
B1-1035: MORACEAE *Maclura tinctoria* (D. Don) Steud.

Herbier Virtuel A. de Saint-Hilaire

http://hvsh.cria.org.br/exsicataViewer?barcode=P00552424&hasp

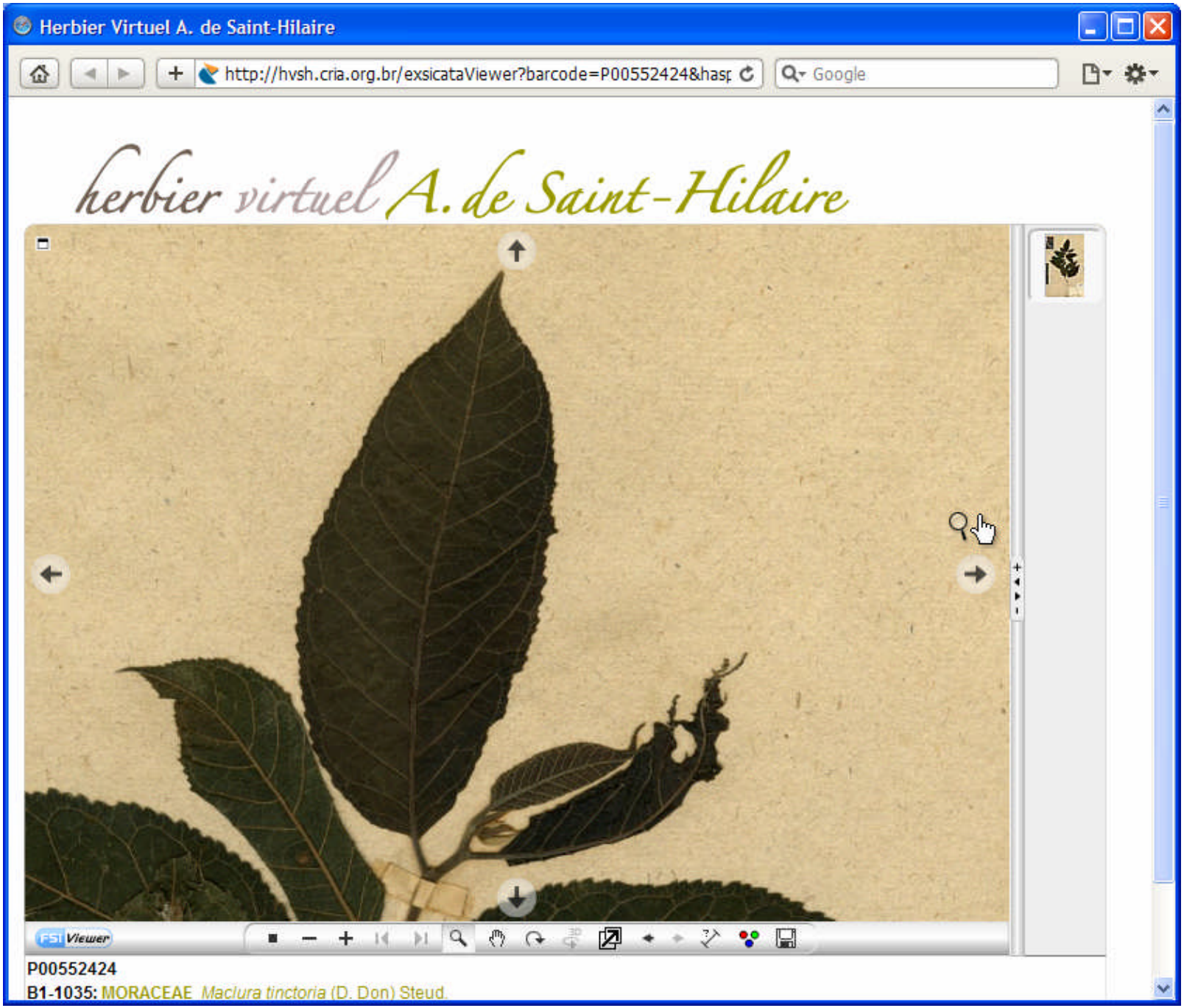
Google

herbier virtuel A. de Saint-Hilaire



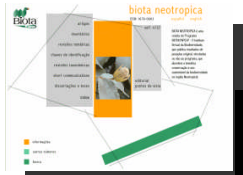
P00552424

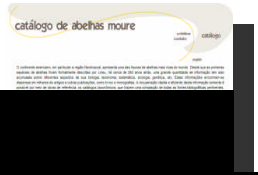
B1-1035: MORACEAE *Maclura tinctoria* (D. Don) Steud.

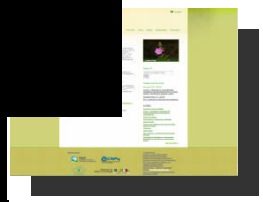

Herbier Virtuel A. de Saint-Hilaire
http://hvsh.cria.org.br/exsicataViewer?barcode=P00552424&hasp
Google
herbier virtuel A. de Saint-Hilaire
FSI Viewer
P00552424
B1-1035: MORACEAE Maclura tinctoria (D. Don) Steud.

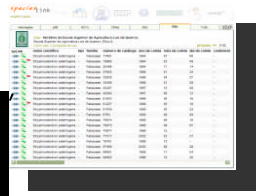

Herbier Virtuel A. de Saint-Hilaire
http://hvsh.cria.org.br/exsicataViewer?barcode=P00552424&haspages
Google
herbier virtuel A. de Saint-Hilaire
4.7 cm, 87.0 °
FSI Viewer
P00552424
B1-1035: MORACEAE Maclura tinctoria (D. Don) Steud.

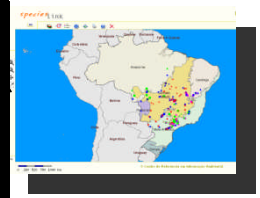
Sistema CRIA de informação

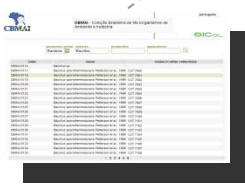












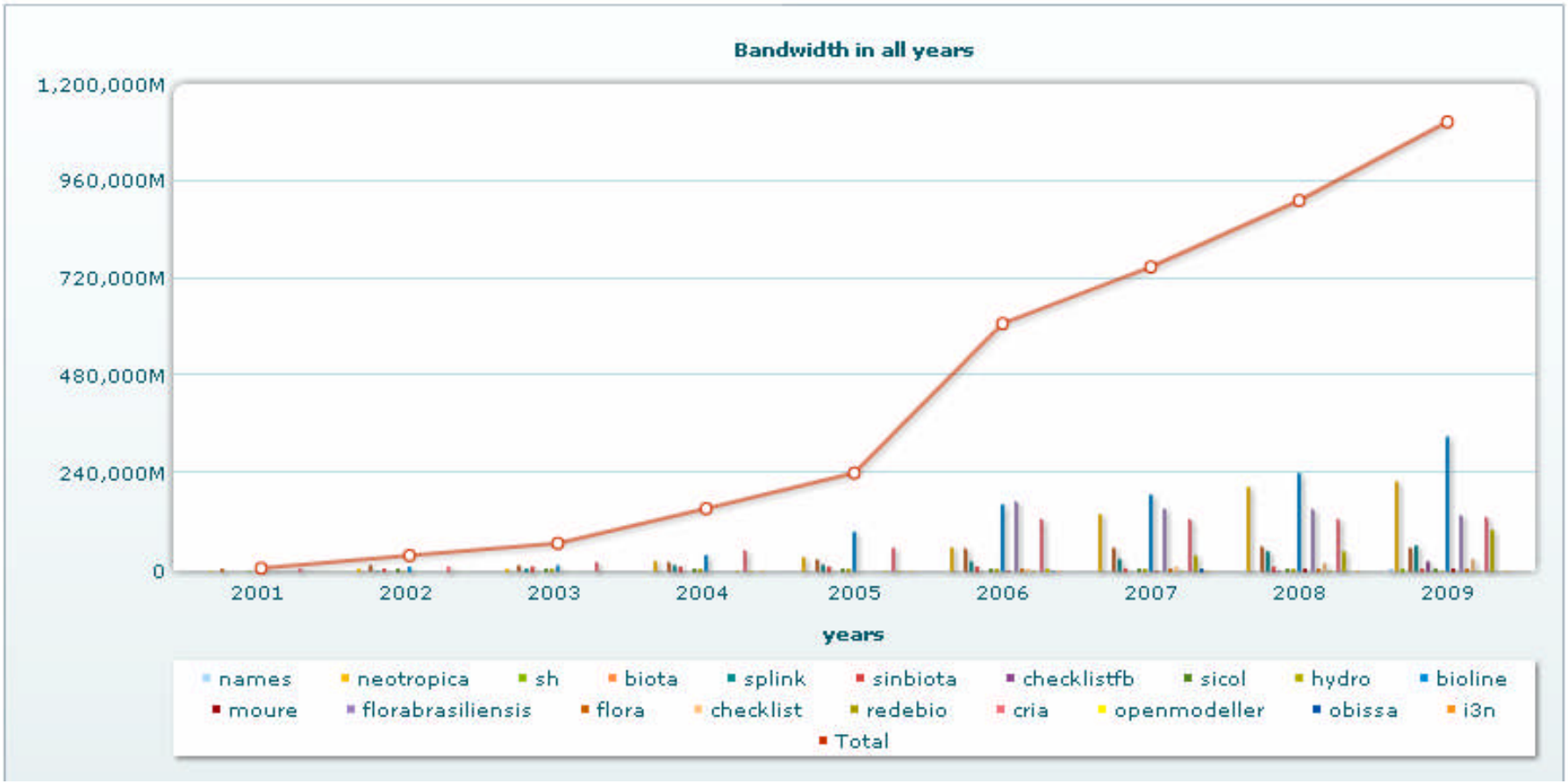
Parcerias

Financiadores e patrocinadores

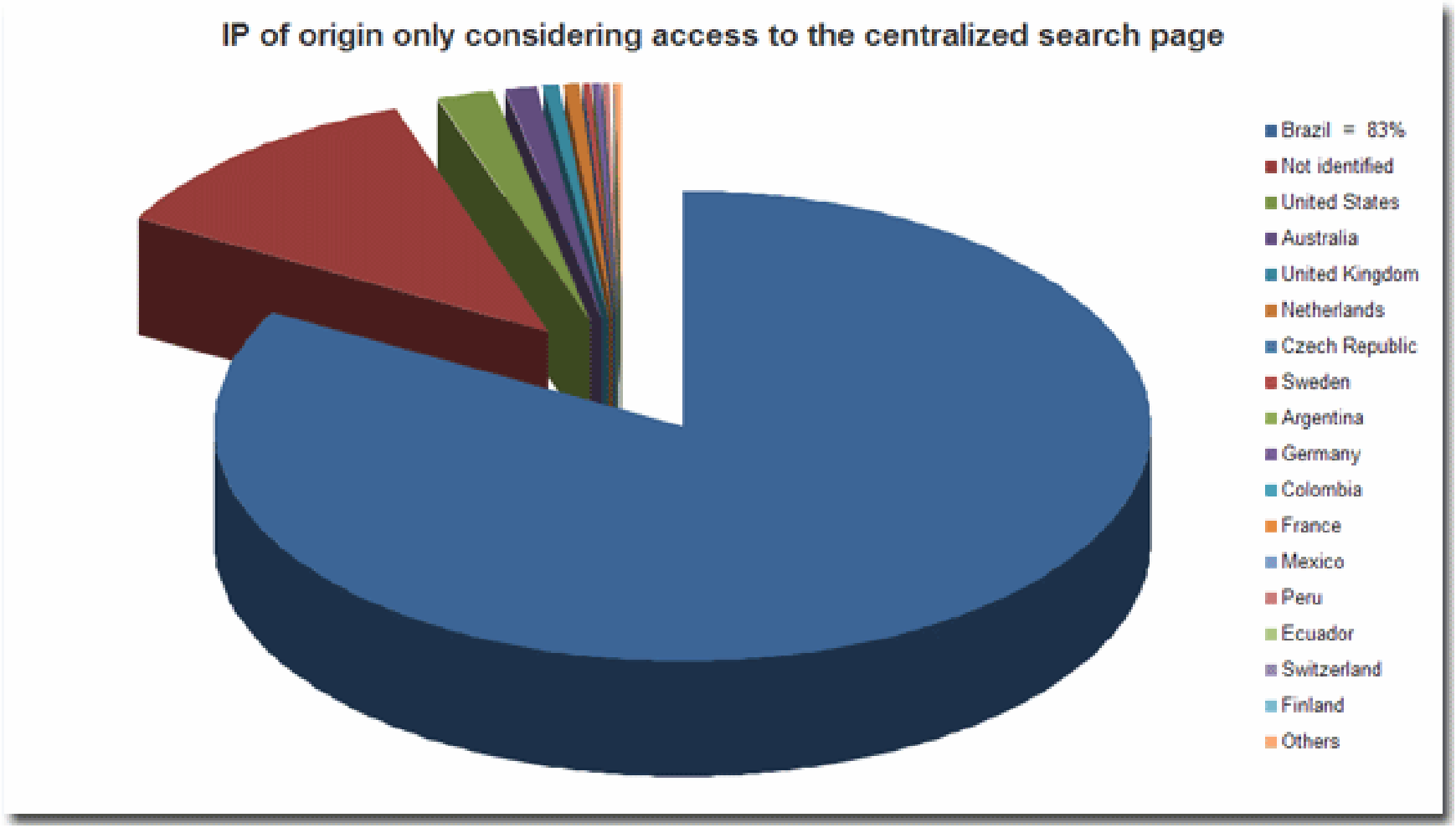
Parceiros internacionais

Parceiros nacionais

Usage is increasing !



Usage: mainly Brazil



Lessons learned

- ❑ **Adoption of internationally agreed standards and protocols is key**
- ❑ **Support unlocking and sharing of data (make it simple and easy !)**
- ❑ **Enable data providers to have full control of their data determining what can be openly shared and what is sensitive**
- ❑ **Full credit and acknowledgement to the data providers at all levels !**
- ❑ **Data providers must see the benefit to participate in the network**
- ❑ **Data flagging and data cleaning tools are key to support the identification of data inconsistencies**
- ❑ **Stable and long term funding is necessary to ensure development and the persistency of open and free data networks (persistent repositories are critical; funding mechanisms need to be improved !)**

Centro de Referência em Informação Ambiental

http://www.cria.org.br

Vanderlei Canhos
vcanhos@cria.org.br