Bioversity International

From information systems to monitoring systems

Elizabeth Arnaud
And the Information/Informatics team


Geissmann-
Evangelium
Vol. 3
Geissmann

1. Reports and Inventories baseline data

Country Report

- Field observations, surveys, metrics sent to National Focal Points
- National Focal Points to Global Registries, catalogues
- Statistics, predictive models

FAO – World Information Sharing Mechanism

WISM-GPA

:: WORLD INFORMATION SHARING MECHANISM
on the IMPLEMENTATION of the GLOBAL PLAN of ACTION
for the CONSERVATION and SUSTAINABLE USE of PGRFA ::

Welcome to ***WISM*-GPA**, the world information sharing mechanism on the implementation of the ***Global Plan of Action* (GPA) *for plant genetic resources for food and agriculture*** (PGRFA).

***WISM*-GPA** provides access to **National Mechanisms' portals and databases on conservation and sustainable use of PGRFA**, established by 64 countries worldwide with the participation and contribution of more than 1,000 public institutions, non-governmental and private organizations, including farmers' associations, from the PGRFA world community that, day by day, conserve, monitor, multiply, improve, exchange and make available these resources essential to our and our planet's life. More information on ***WISM*-GPA** and its contents...

To access a National Mechanism's portal click on the corresponding flag above. To perform an advanced text search on one country database, please select a country from the pull down list below. If no country is selected, the search will be performed on all countries databases. To search on two or more countries just click on the Submit button below and in the advanced search page that follows select the countries (click on the country names while pressing the *Ctrl* key). By choosing one of the **26 languages** in the pull down list below, the interface and part of the available data will be displayed in the selected language.

For any query or feedback please write to WIEWS.

To the advanced text search page:

Country ------ all countries -----

Language English

Submit

Customized text search:

Organizations		**Language**	English	Search		
Contact persons		**Language**	English	Search		
Projects		**Crop**	------- all crops -------	**Language**	English	Search
Publications		**Crop**	------- all crops -------	**Language**	English	Search
Cultivars		**Crop**	------- all crops -------	**Language**	English	Search

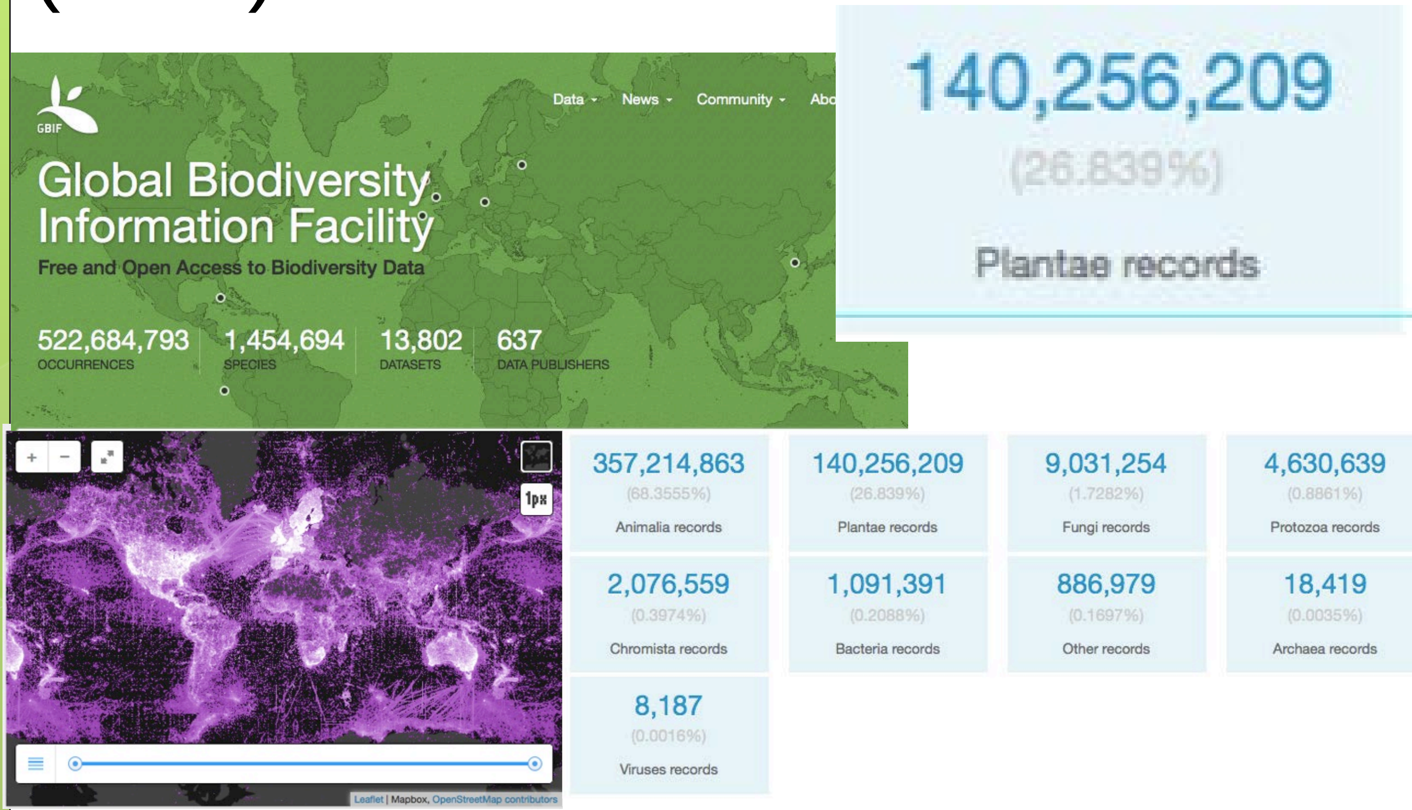
Version 4.01

Food and Agriculture Organization of the United Nations

with the collaboration of Bioversity International

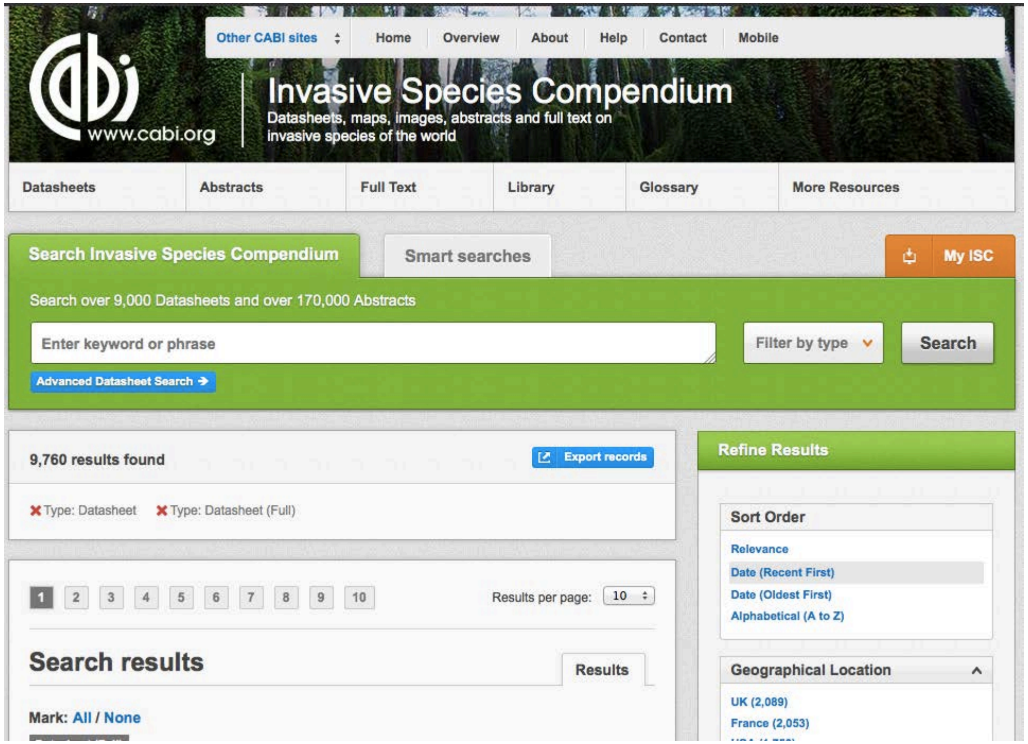
Bioversity International

Global Biodiversity Information Facility (GBIF)

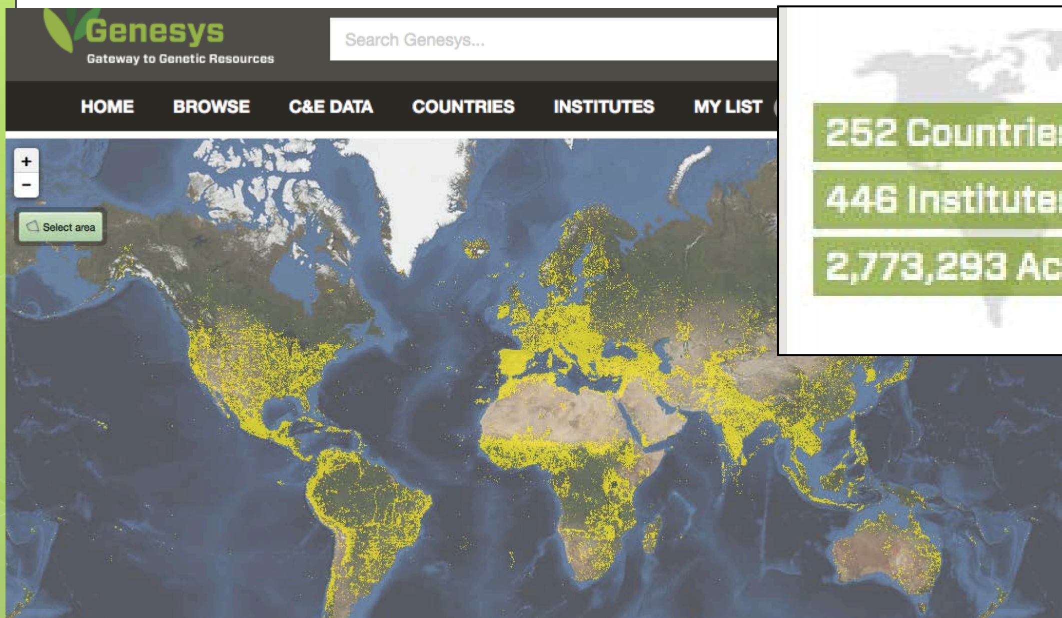


Observations and Specimen
GBIF Nodes in Countries to build inventories with GBIF tools

CABI Invasive Species Compendium



Genesys

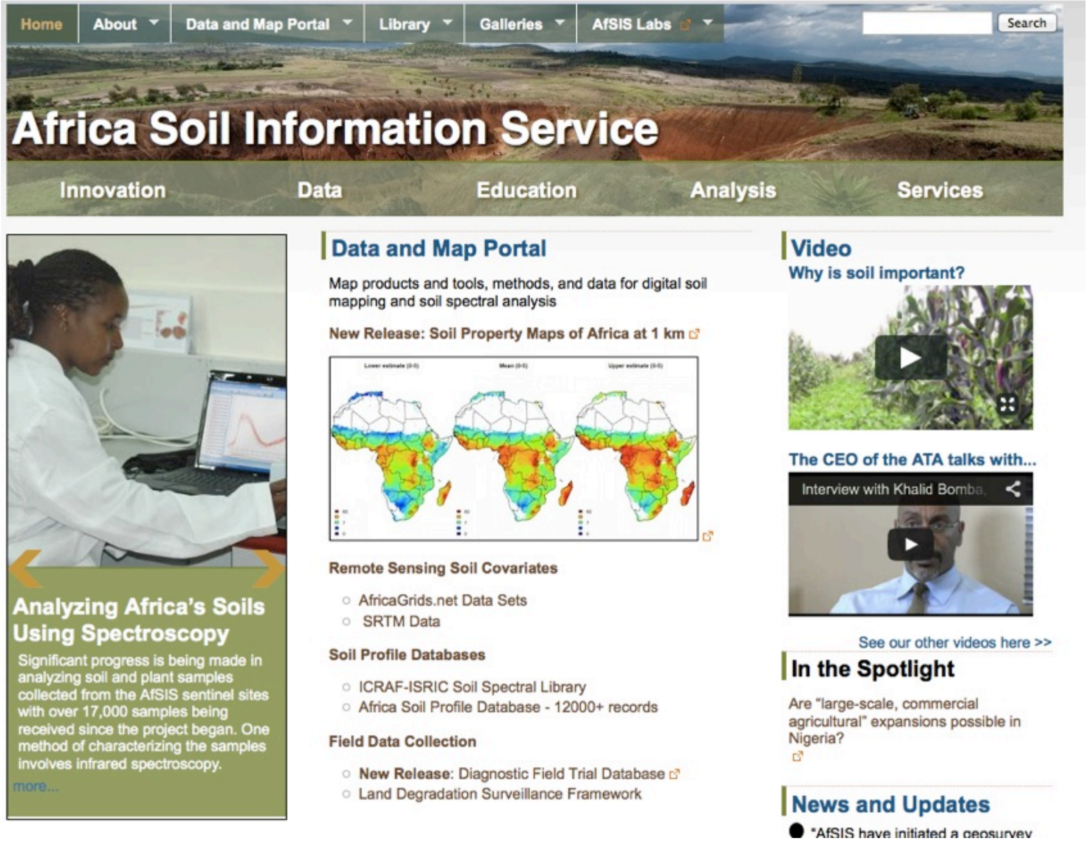


Passport data of accession = specimen

The site where the sample was collected is georeferenced = observations

Reports from Genebanks and international catalogues

Afsys – African soil Atlas



Integrating data sets

- Extract data
- Develop metadata and annotate data sets
- Open data standards to link sources of information

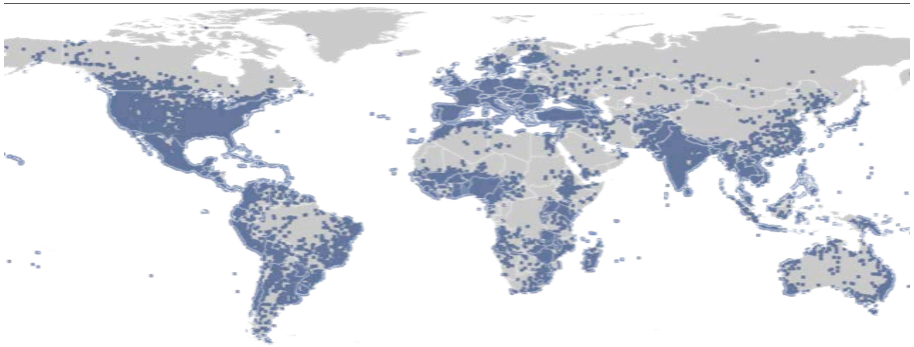
- Are these global catalogues useful for monitoring ? At which stage?
- Acurate enough for monitoring objectives?
- How can they be used to provide scientific evidence on ABD status, trends and Management?

Atlases

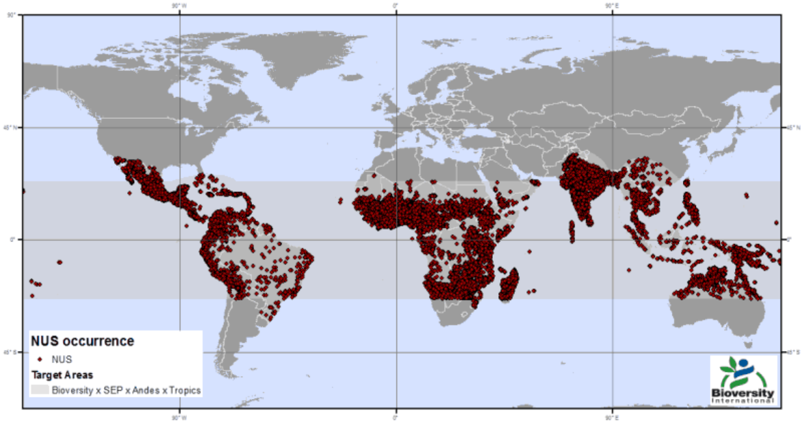
Data analysis & Geospatial vizualization

- Preparing data for use and adding value
- curation of data:
  - georectification
  - Cleaning taxonomy using reference checklists
  - Annotating, describing
- Resources, collaboration
  Baseline data

Mapping Observed Distribution



Occurences of crop wild relatives

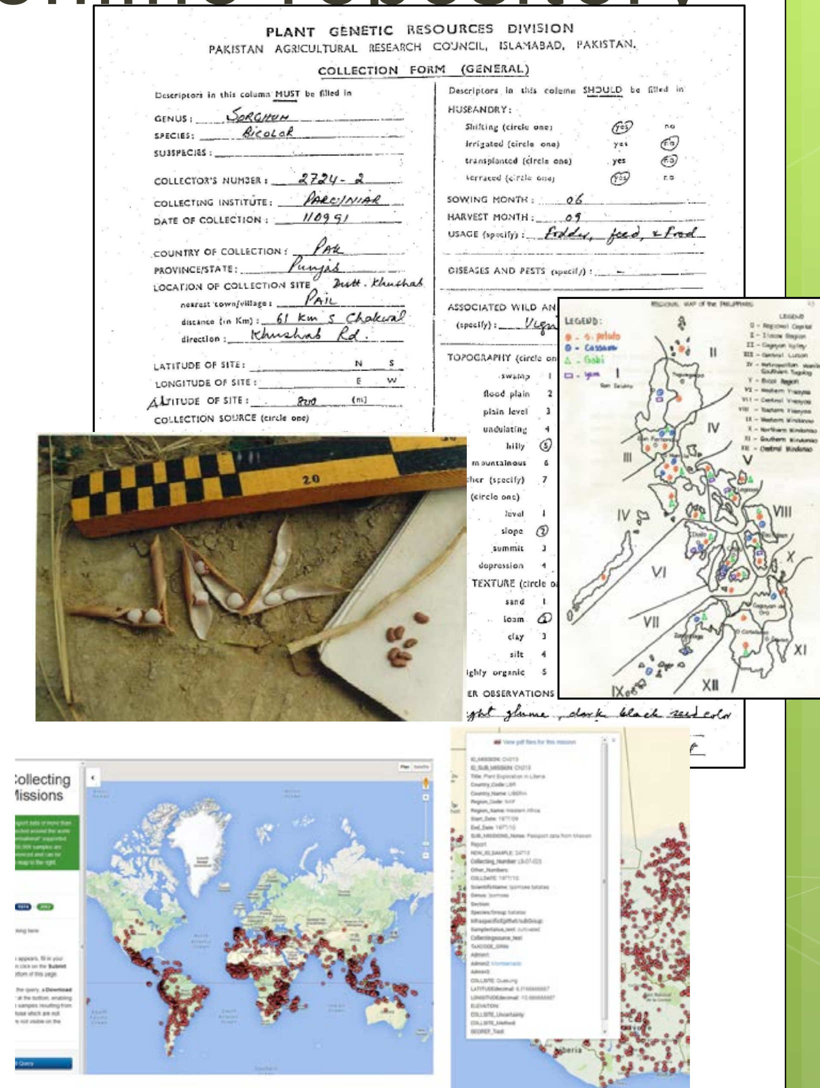


Occurrence of neglected and underutilized species

Collectors' fieldbook online repository

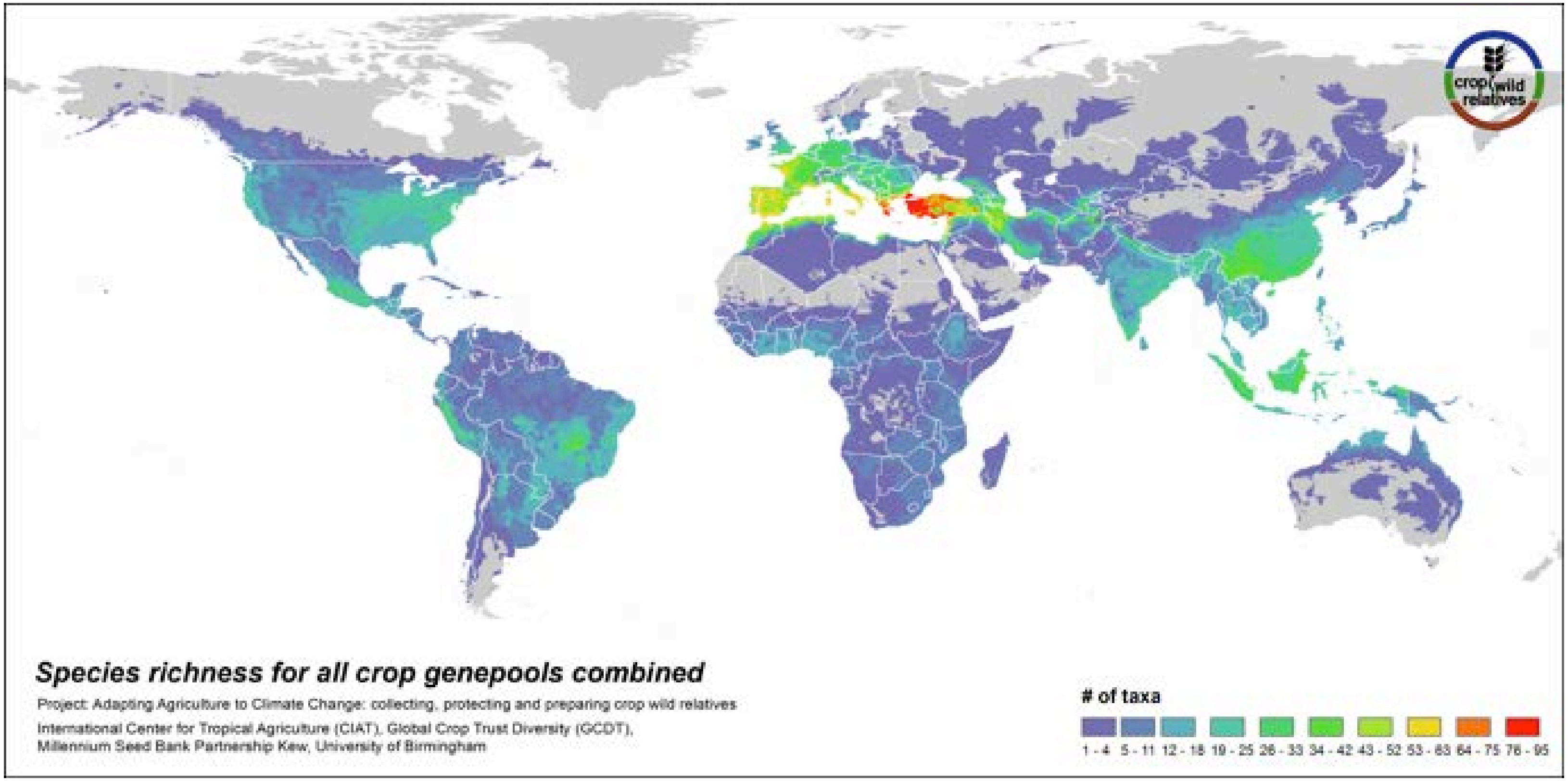
- **27,000 fieldbooks and reports scanned and stored on a repository**
- **Observations on environment, traits, cultural practices, cropping systems, etc**
- **Data Extracted and Annotated with DarwinCore Germplasm**

- over **225,000 plant samples** collected in more than 500 collecting expeditions worldwide,
- 4,300 different species



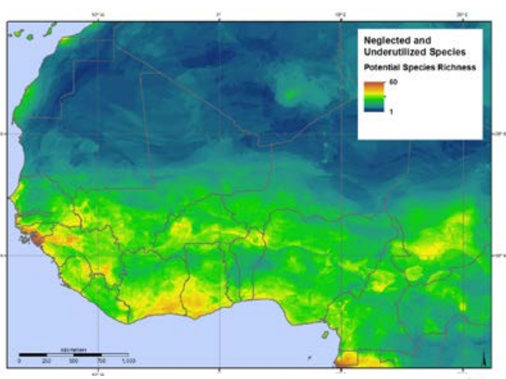
http://www.bioversityinternational.org/e-library/databases/collecting-missions/

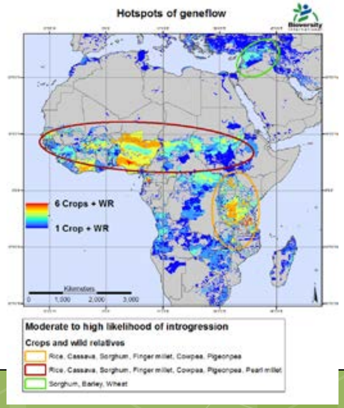
Predictive Models
for targeting sites of sampling, monitoring

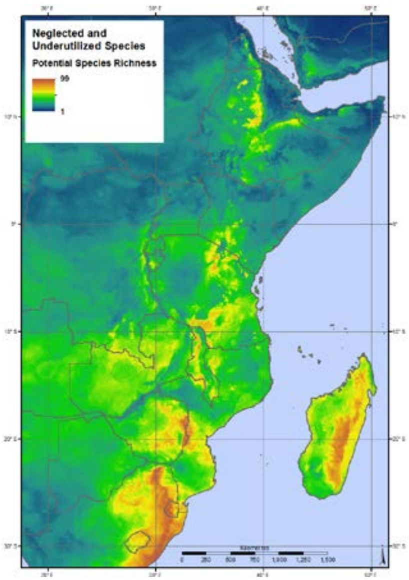

crop wild relatives
Species richness for all crop genepools combined
Project: Adapting Agriculture to Climate Change: collecting, protecting and preparing crop wild relatives
International Center for Tropical Agriculture (CIAT), Global Crop Trust Diversity (GCDT),
Millennium Seed Bank Partnership Kew, University of Birmingham
# of taxa
1 - 4
5 - 11
12 - 18
19 - 25
26 - 33
34 - 42
43 - 52
53 - 63
64 - 75
76 - 95

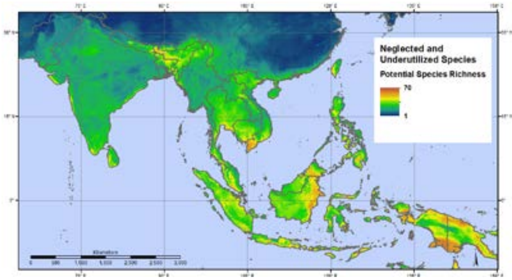
Diversity Niche Modeling

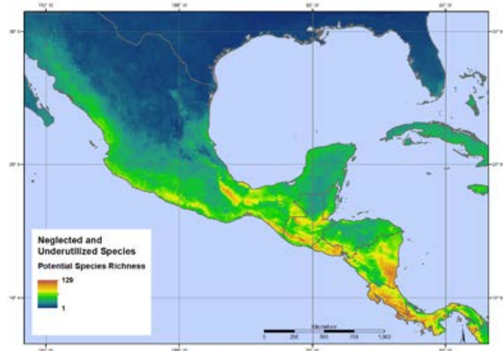
- Prediction of Distribution, Richness
- To support identification of priority areas for research, monitoring and conservation



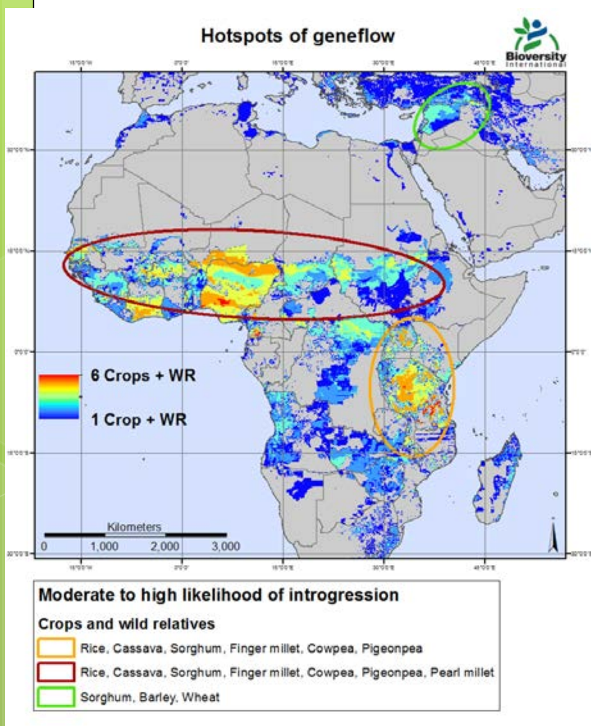


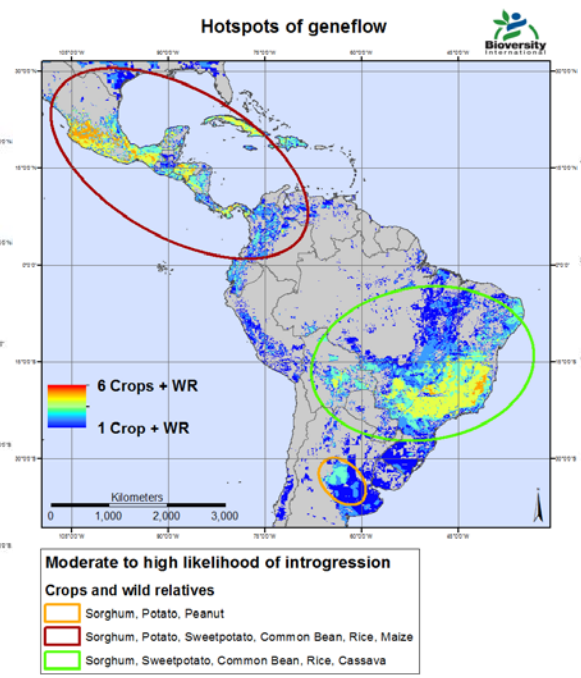


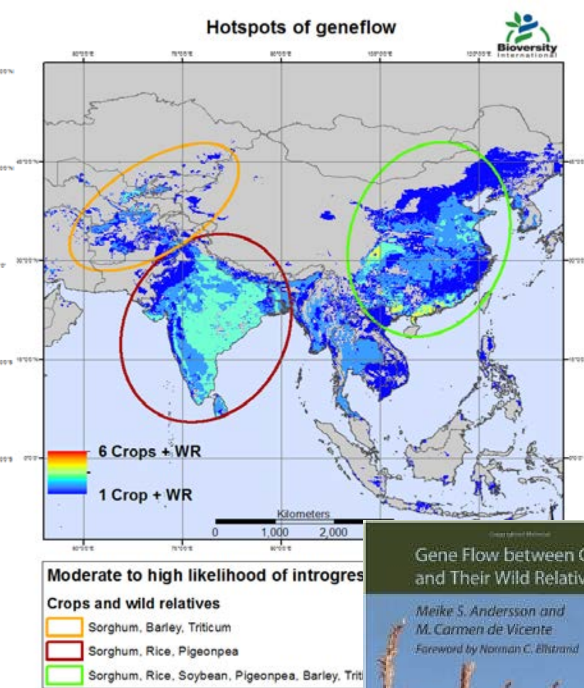




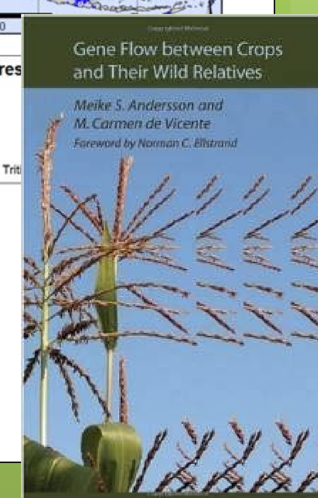
Hotspots of geneflow between 16 crops and their wild relatives







Maps by Hannes Gaisberger (Bioversity), July 2012,
with the data of Meike S. Anderson
Aderson M.S., De Vincente C. '*Gene Flow between Crops and Their Wild Relatives*' **(2009)**



Monitoring

measuring regularly what happen between 2 surveys

?

Indicators, Metrics

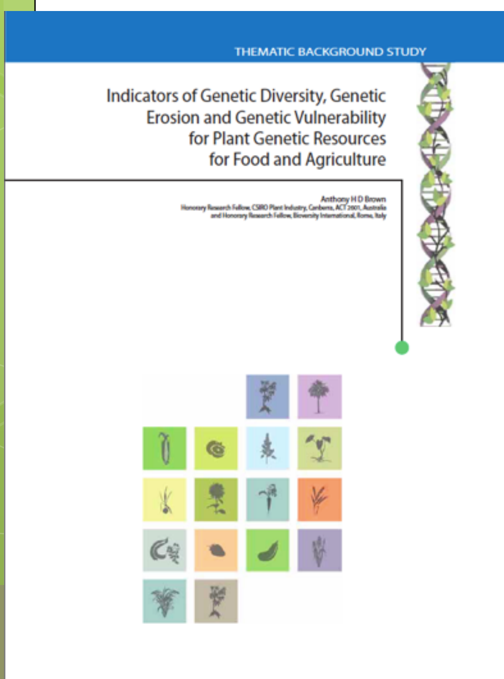
Collaborative Development of a core set of Indicators

Repeatable

Cost effective

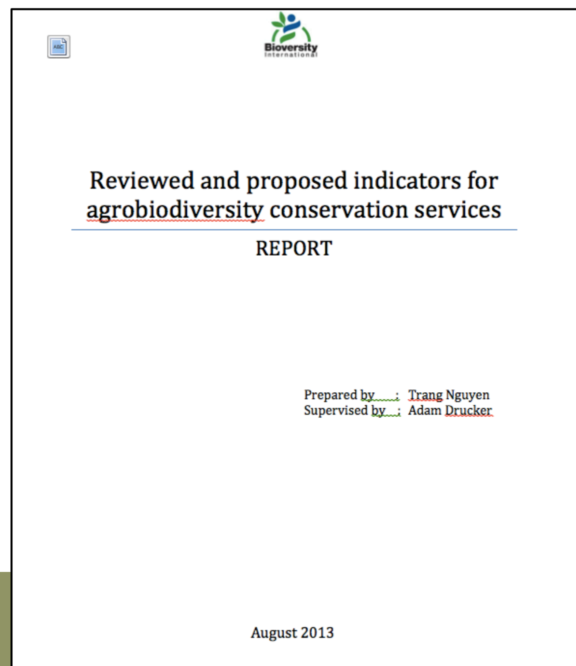
Adequate Scale

High Value for Information


THEMATIC BACKGROUND STUDY

Indicators of Genetic Diversity, Genetic Erosion and Genetic Vulnerability for Plant Genetic Resources for Food and Agriculture

Anthony H D Brown


Reviewed and proposed indicators for agrobiodiversity conservation services

REPORT

Prepared by : Trang Nguyen
Supervised by : Adam Drucker

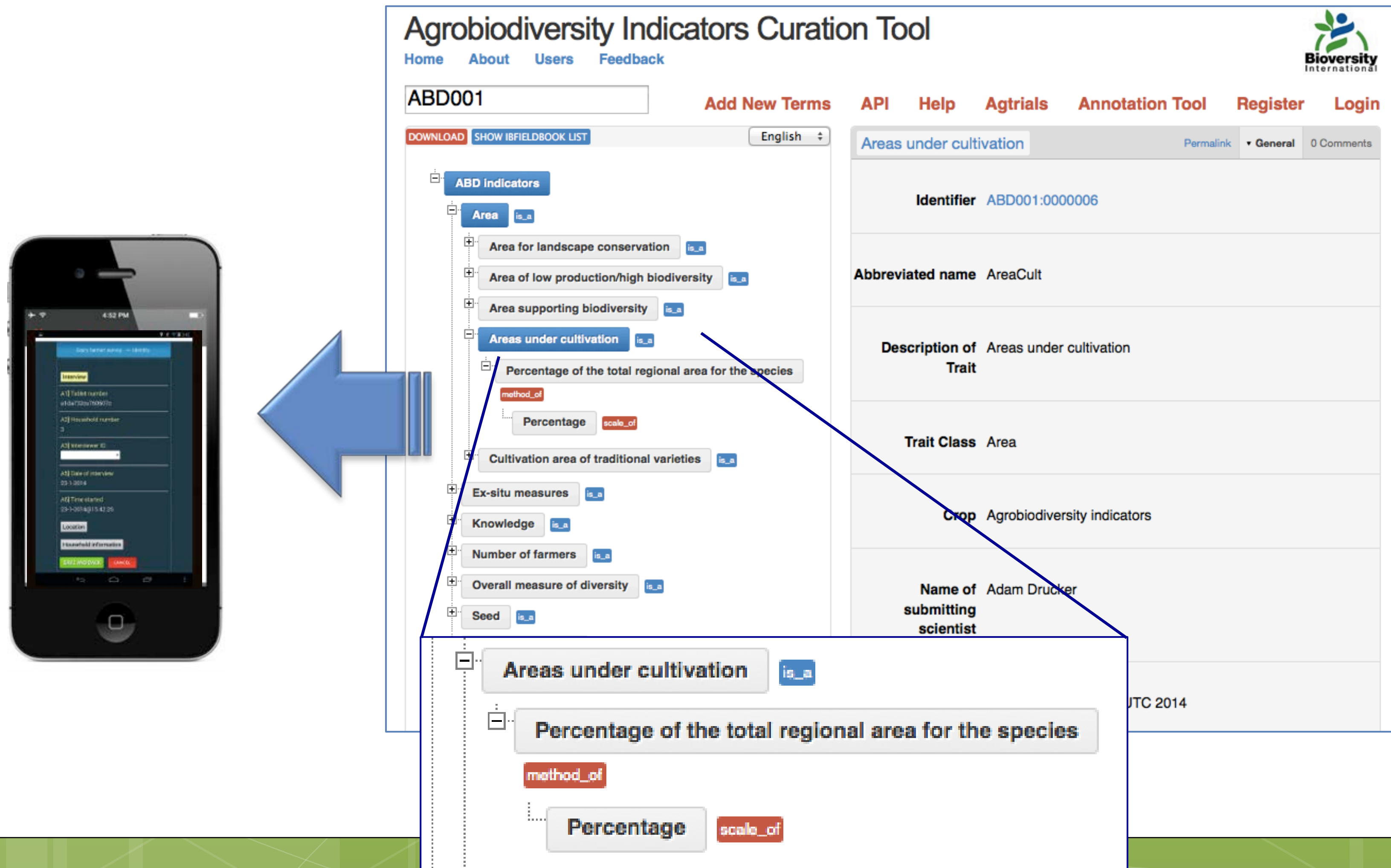
August 2013


ECOLOGY

Essential Biodiversity Variables

A global system of harmonized observations is needed to inform scientists and policy-makers.

Collect if Data
Ontologies & Fieldbook for surveys



Monitoring Cycle

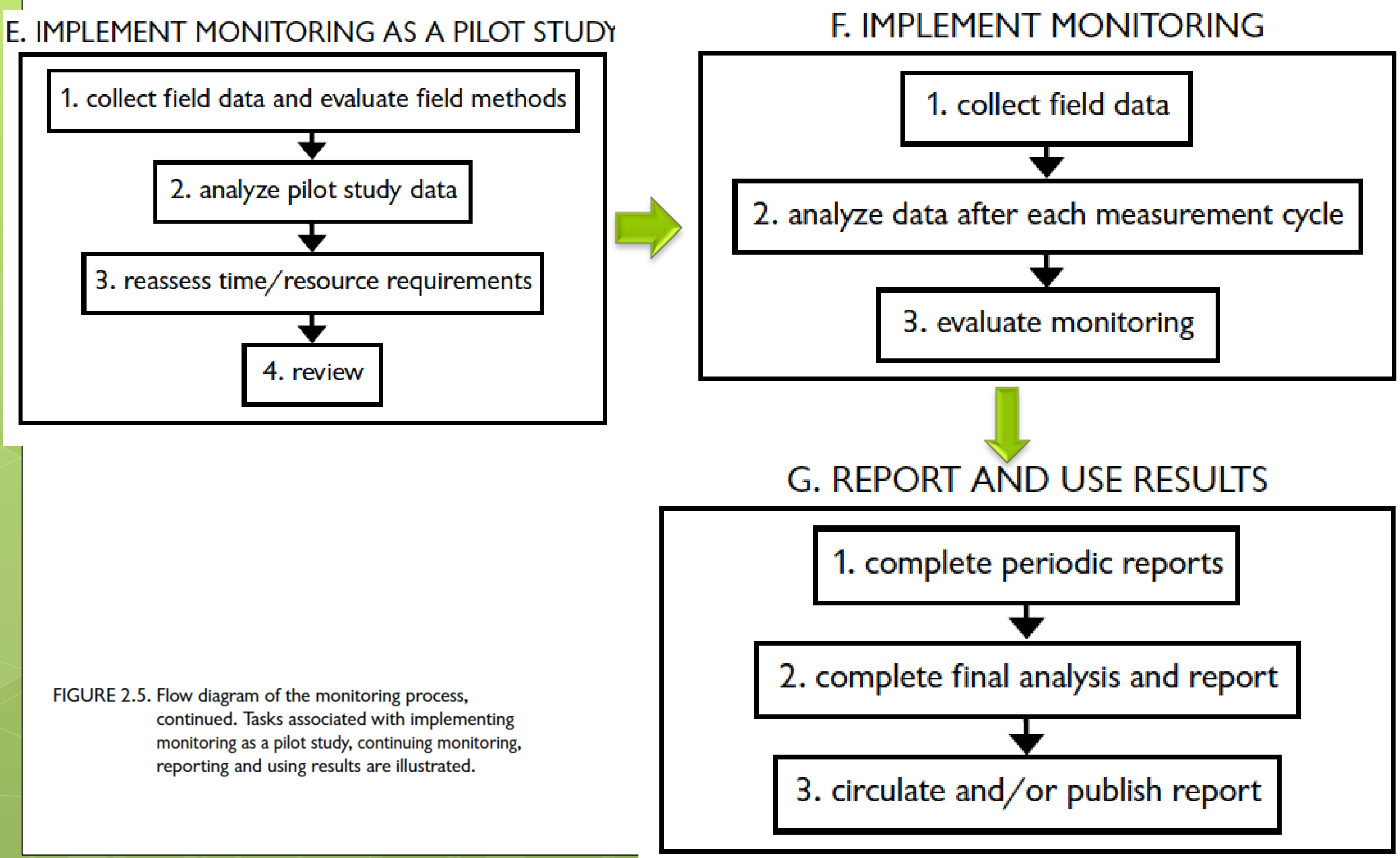


FIGURE 2.5. Flow diagram of the monitoring process, continued. Tasks associated with implementing monitoring as a pilot study, continuing monitoring, reporting and using results are illustrated.

Monitoring

- Many monitoring projects suffer one of five unfortunate fates:
  - (1) they are never completely implemented - PLANNING
  - (2) the data are collected but not analyzed - RESOURCES
  - (3) the data are analyzed but results are inconclusive – SELECTION OF INDICATORS
  - (4) the data are analyzed and are interesting, but are not presented to decision makers; - REPORTING TOOLS
  - (5) the data are analyzed and presented, but are not used for decision-making - COMMUNICATION TOOLS

The problem is rarely the collection of data. - most enjoyable parts of the monitoring !

MEASURING & MONITORING Plant Populations - Caryl L. Elzinga , Daniel W. Salzer , John W.Willoughby - U.S. Department of the Interior, Bureau of Land Management, Nature conservancy

Table 7.1 Areas Where New Methodologies and Technologies are Expected to Benefit NFIs

Methodology or technology	Main phases of a national forest inventory				
	Planning	Implementation	Data quality and data management	Analysis (including modeling)	Reporting
Remote sensing		X		X	X
Satellite navigation systems		X		X	
Measurement devices		X			
Mobile information and communication		X	X		
Software and algorithms			X	X	X
Sampling options	X		X		

Source: Kleinn 2002.

Getting more data, larger scale

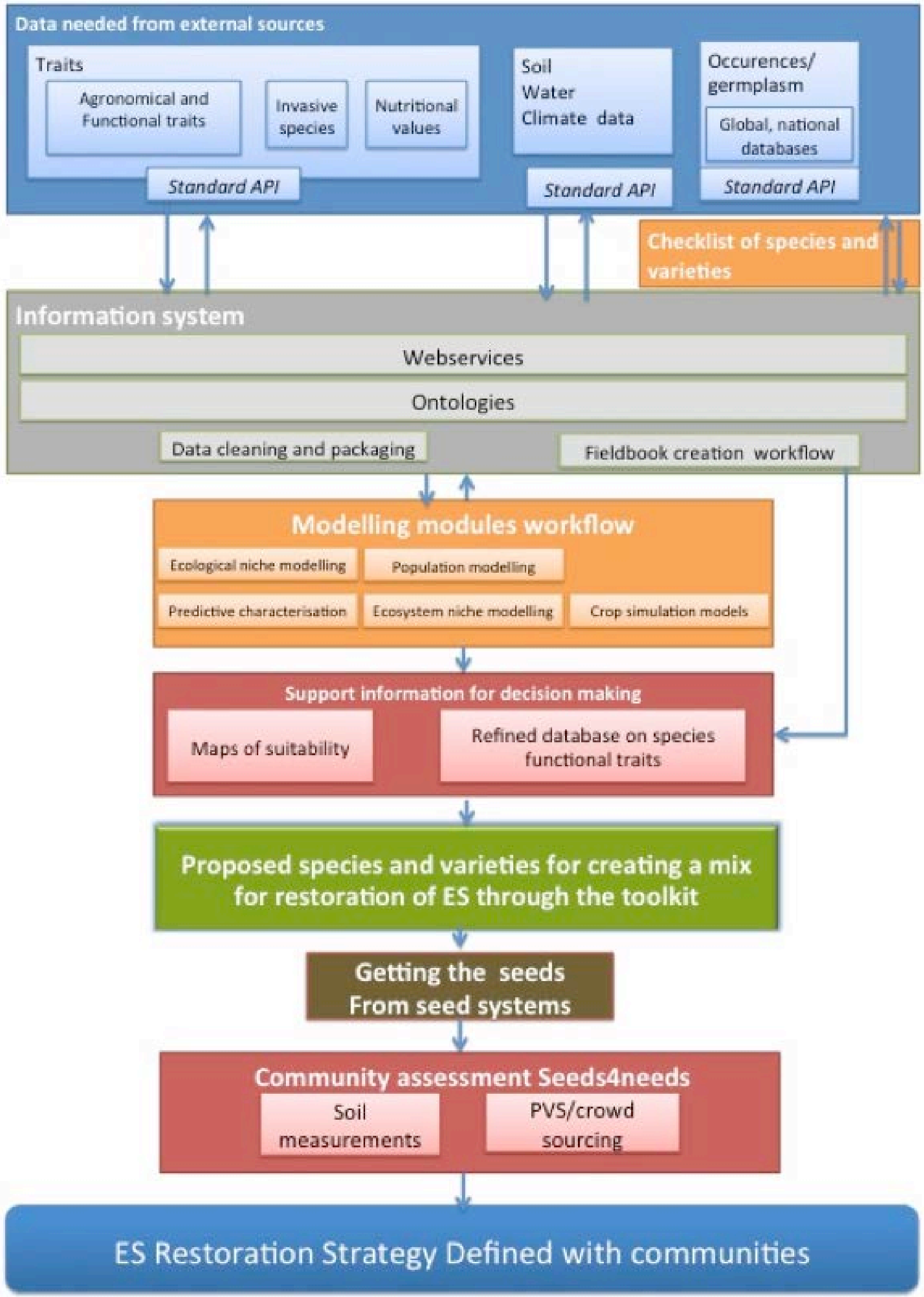
Local Surveys, Network of field surveys/sampling

Community SeedBanks, Crowd Sourcing

Remote sensing technics enables to get large amount of data at a high frequency: phenotyping, climate, maps, land cover, soil quality, etc

Data Collect

- What technology could be used to get useful, reliable data for ABD monitoring?
- What technology for what objective and scale?
- How to analyze large amount of data ?


Data needed from external sources
Traits
Agronomical and Functional traits
Invasive species
Nutritional values
Standard API
Soil
Water
Climate data
Standard API
Occurences/ germplasm
Global, national databases
Standard API
Checklist of species and varieties
Information system
Webservices
Ontologies
Data cleaning and packaging
Fieldbook creation workflow
Modelling modules workflow
Ecological niche modelling
Population modelling
Predictive characterisation
Ecosystem niche modelling
Crop simulation models
Support information for decision making
Maps of suitability
Refined database on species functional traits
Proposed species and varieties for creating a mix for restoration of ES through the toolkit
Getting the seeds From seed systems
Community assessment Seeds4needs
Soil measurements
PVS/crowd sourcing
ES Restoration Strategy Defined with communities

Monitoring with ICT tools

- Integrating management processes and appropriate computer-based tools can greatly enhance the effectiveness of gathering and storing data
- Models and analytical processes producing useful information.
- These tools also require great care and planning in their development
- Start-up costs include hardware and software acquisition, staff training, and data entry, data curation

Data Fitness for Use

- Bring enough data on Agrobiodiversity, **of comparable scale and granularity**
- Confirm the Diversity managed in the field: **Genetic identification**
- Identify gaps, find **proxys** and **interpolate data**
- Develop **metadata** and **controlled vocabularies** for describing data sets (taxon, traits, etc)
- Multilingual and multidisciplinary knowledge