



The Centre for the Synthesis and Analysis of Biodiversity

Eric Garnier



*ALCUE NET meeting,
CESAB (Aix-en-Provence), 27 November 2014*



Welcome to Aix-en-Provence





What is CESAB?

- A core programme of FRB launched in 2010 to promote *scientific synthesis* activities on biodiversity

A definition of scientific synthesis

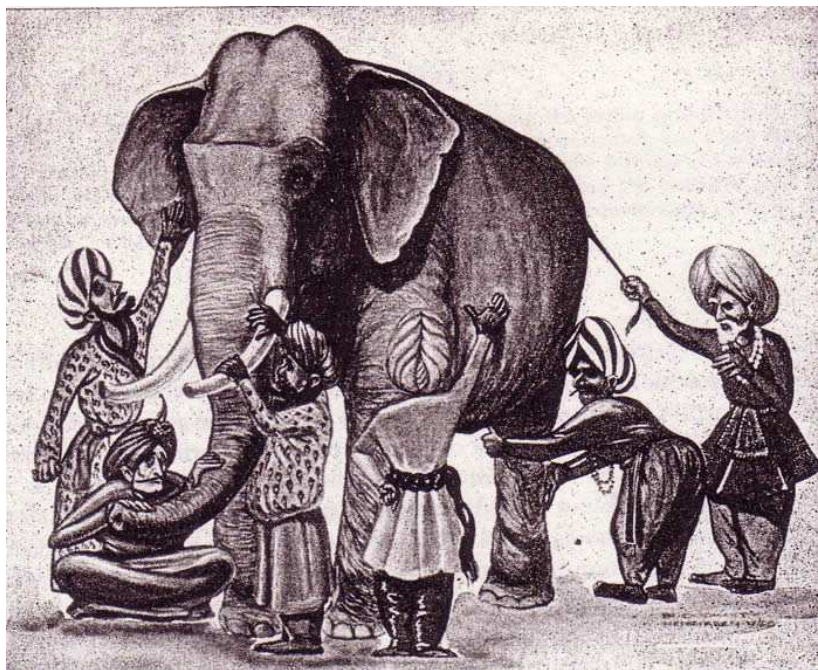
Scientific synthesis refers to the integration of diverse research in order to increase the generality and applicability of the results of that scientific research

Synthesis occurs both within and across disciplines and professional sectors and is therefore not captured entirely by the term *interdisciplinary research*

Hampton & Parker (2011)
BioScience 61: 900



A parable for scientific synthesis





What is CESAB?

- **A core programme of FRB launched in 2010 to promote *scientific synthesis* activities on biodiversity**
- **The concept:**
 - Sharing of previously collected data (*i.e.* collection of new primary data not funded by CESAB) and ideas to advance research fronts on biodiversity
 - A place, and « timeless time » for biodiversity research: « slow science »
- **Implementation:**
 - A dedicated centre (staff and premises)
 - Regular call for proposals



CESAB is also a centre !

The CESAB team



Eric Garnier
Director



Claire Salomon
Associate-director



Bruno Fady
Scientific officer



Magali Grana
Administrative
assistant

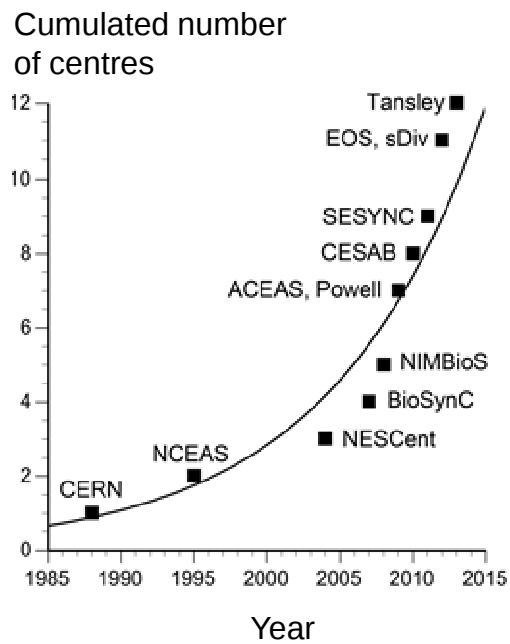


Baptiste Laporte
IT/Data bases





CESAB amongst synthesis centres for life sciences in the world





1) Synthesis activities of the working groups

2) Data management activities of the CESAB team





Scientific synthesis: a question driven approach to advance knowledge on biodiversity

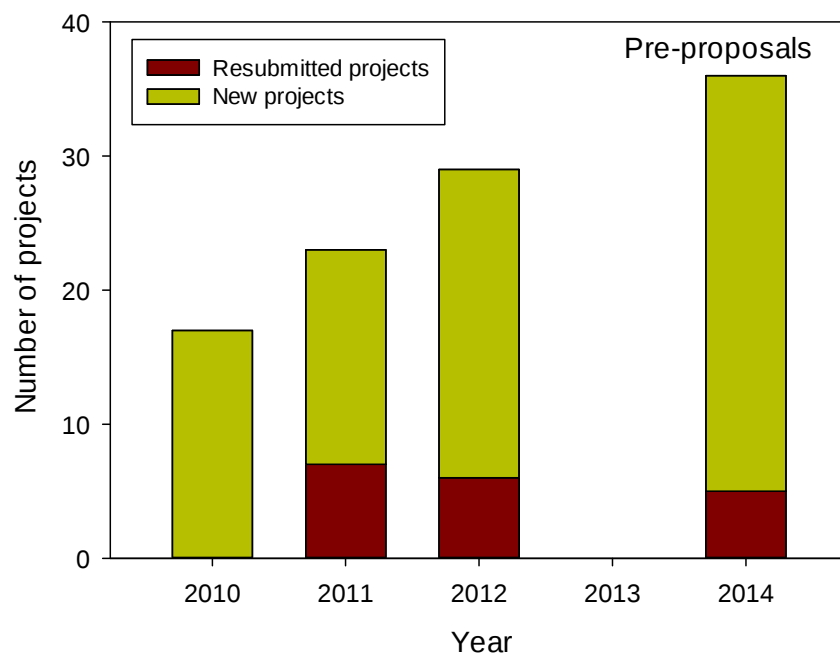
- What are the different facets of biodiversity and how to quantify them?

Non thematic call

- What is the role of biodiversity for the functioning of ecosystems and the services they deliver to human societies?
- How to preserve biodiversity efficiently?



The CESAB calls for proposals





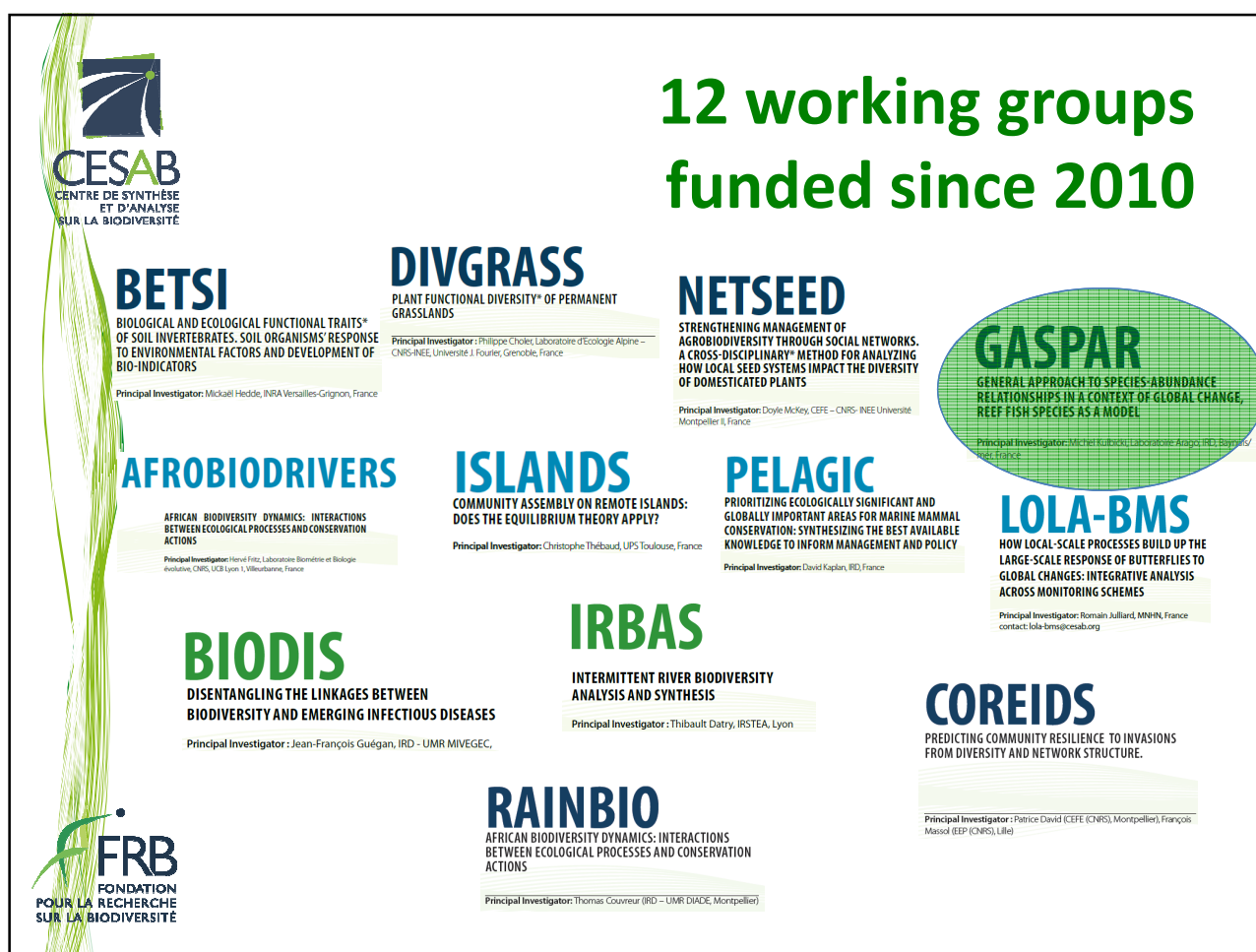
Working groups

- 3 to 4 working groups are selected by the CESAB scientific and orientation committee in response to the call: funding for a 3-year period
- The Principal Investigator must conduct his activities in a French research organization or university
- One post-doc is funded for each working group
- Groups gather 2 to 3 times *per* year in CESAB premises, for intensive working sessions which last 5 to 8 days

⇒ **timeless time...**

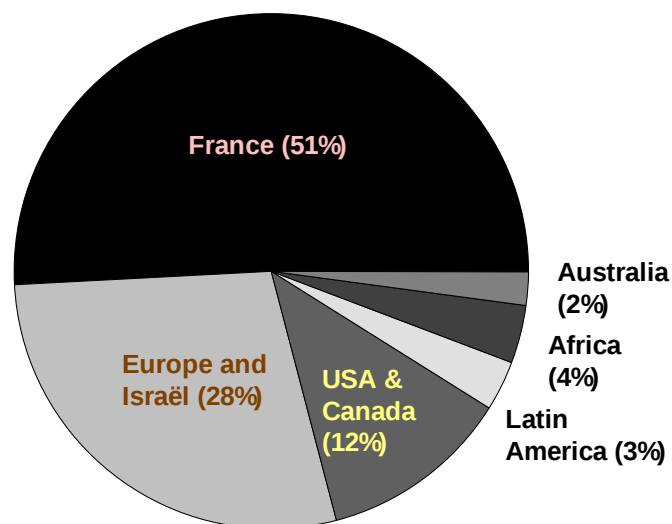
...to work collectively « face to face »







Geographic origin of participants in the 12 working groups





1) Synthesis activities of the
working groups

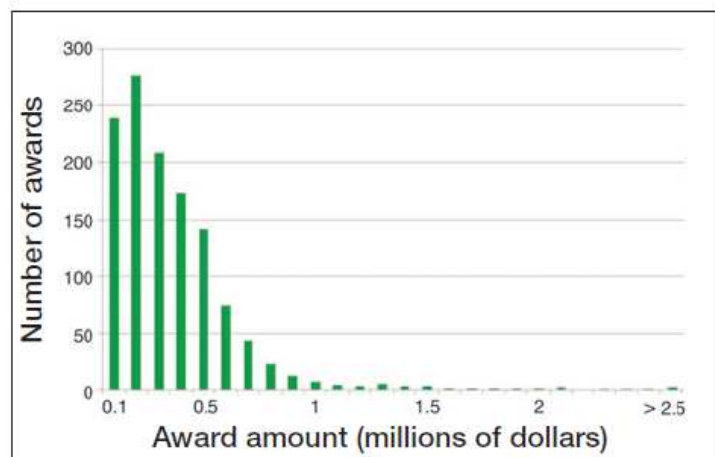
**2) Data management activities
of the CESAB team**





Traditional ecology produces « dark data »

- The vast majority of scientific projects in ecology are relatively small
- « Dark data »: data not easily found by potential users



Hampton *et al.* (2013) *Front Ecol Env* **11**: 156



Ecological data for synthesis activities and data intensive science

Feature	Data derived from	
	Coordinated studies	Independent studies
Format	Homogeneous	Heterogeneous
Collection and entry	Automated	Hand generated
Procedures	Standardized	Idiosyncratic
Curation	Central	Individual
Repository	Disciplinary and reference	Institutional
Maintenance	Ensured	Not ensured
Access	Open	Obscured or protected
Reuse	Immediate	Seldom
Valorization	Acknowledged for career assessment	Currently unnoticed



Heidorn (2008) *Library Trends* 57: 280



Summary of the data challenges

- **Data are dispersed:**
 - The vast majority of data in ecology is structured in small and dispersed sets of data, managed by « independent » researchers (less than 1% of the data are « freely » available)
 - The themes that have led to the collection of data might be substantially different
- **Data are heterogeneous**
 - Various sub-disciplines : *e.g.* organisms/communities/ecosystems; plants/animals/microbes
 - Lack of concertation among scientists to standardize approaches, protocols and data
 - Related fields (*e.g.* climatology, social sciences) have their own terminologies and experimental protocols
 - Syntactic heterogeneity





Challenges associated with scientific synthesis and data sharing

- **Technological: data**
- **Semantics: concepts**
- **Cultural and sociological: benefits of sharing and intellectual properties**





Possible solutions



Madin *et al.* (2008) *TREE* 23: 159



Contribution of the CESAB team: an ecoinformatics approach to improve the study of biodiversity

- Support for the structuration of data
 - syntactic heterogeneity: generic data base
 - semantic heterogeneity: development and use of standards





Semantics standards

- **Metadata:** who, what, when, where and how about every aspect of the data
(e.g. Darwin Core, EML, ISO 19115 [INSPIRE])
- **Controlled vocabularies and thesaurus:**
list of key terms and their definitions (in a domain of interest) and how these are organized and structured
- **Ontologies:**
a formal representation or classification of concepts and their relationships within a domain of interest





Contribution of the CESAB team: an ecoinformatics approach to improve the study of biodiversity

- Support for the structuration of data
 - syntactic heterogeneity: generic data base
 - semantic heterogeneity: development and use of standards
- Progressive capacity building from the work of the CESAB groups : networking (among scientific communities)
- Exchange of practices: GBIF, AnaEE-France, Ecoscope, DB network (MI of CNRS), other synthesis centres...



Toward a better **interoperability** of biodiversity data



To conclude

- Reappropriation of time... : distraction-free time and space for maximal concentration during several days
- ... through well-designed logistics:
 - practical issues (travel, conventions, housing...)
 - dedicated and adapted premises
 - communication
- Integration of a post-doctoral researcher in the working groups
- Support for the management of data: concepts and data basing





CESAB in a few figures

Figure	Item (working groups)
12	Projects funded since 2010
~ 400	Scientists and experts on site each year
24	Nationalities represented
5	Days, average duration of working sessions (~ 2 sessions/year)
30	Scientific articles published (as of 25 November 2014)
6	Seminars to present work conducted by the WGs in 2013 (for staff on Technopôle and master students)
Figure	Item (CESAB team)
2	International meetings organized by the CESAB team
2	Meetings devoted to biodiversity data management in 2014
1	Training session on meta-analysis organized
3	Groups gathering beyond those funded through the call





Thank you for your attention



ANY QUESTION ?