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INITIATIVE

Frameworks to improve our understanding of the distribution of global soil biodiversity

Philippe Lemanceau, Kelly Ramirez, Diana Wall

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WEEK** | LOSING
GROUND
?

Soils and their biodiversity deliver many ecosystem services

Soil ecosystem services

Food & biomass production



A. Richer de Forges (CA 45)



Infosol (INRA Orléans)



Habitat, gene pool



Infosol (INRA Orléans)



J. Moulin (CA 36)

Storing, filtering & transformation



A. Richer de Forges (CA 45)

Source of raw materials



J. Moulin (CA 36)

Physical & cultural environment for mankind



C. Schwartz (ISAL)

Courtesy of Antonio Bispo, ADEME



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Living soils

- Huge quantity of organisms

- Fauna: 1-5 T/ha
- Fungi: 3.5 T/ha
- Bacteria: 1.5 T/ha



F. Ippolito

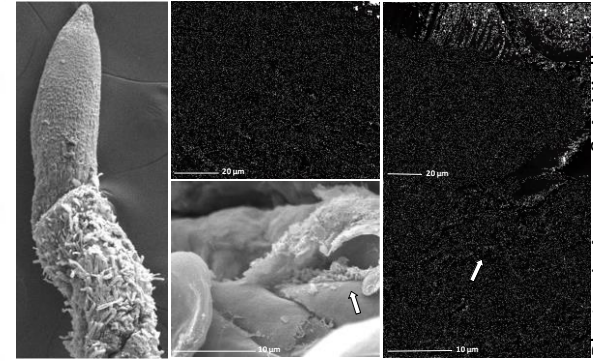
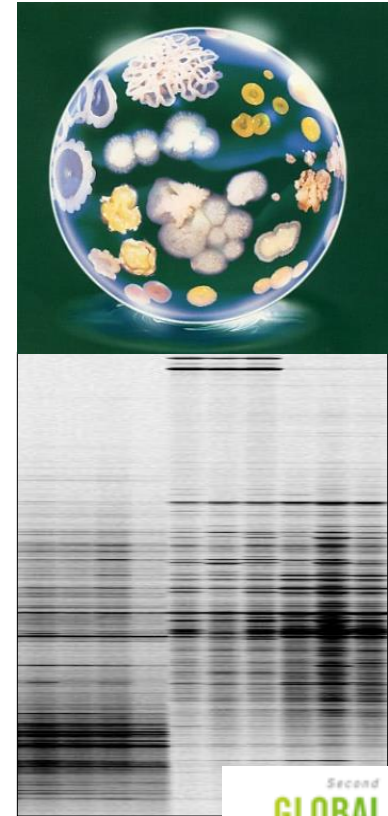


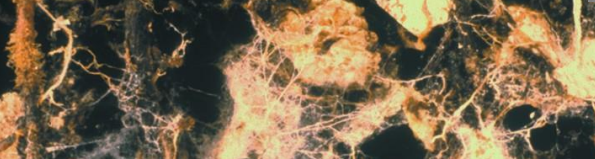
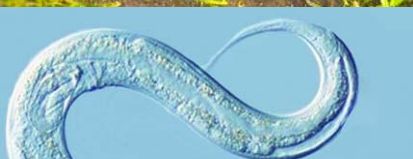
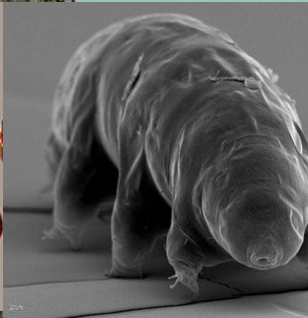
Photo : L. Avoscan & A. Viollet

- Fantastic diversity ...but so little explored...

- Until recently: only access to culturable microorganisms
- Methodological progresses
 - ⇒ possibility to extract DNA from soils
 - ⇒ $10^4 - 10^6$ bacterial genotypes / g sol



Living soils



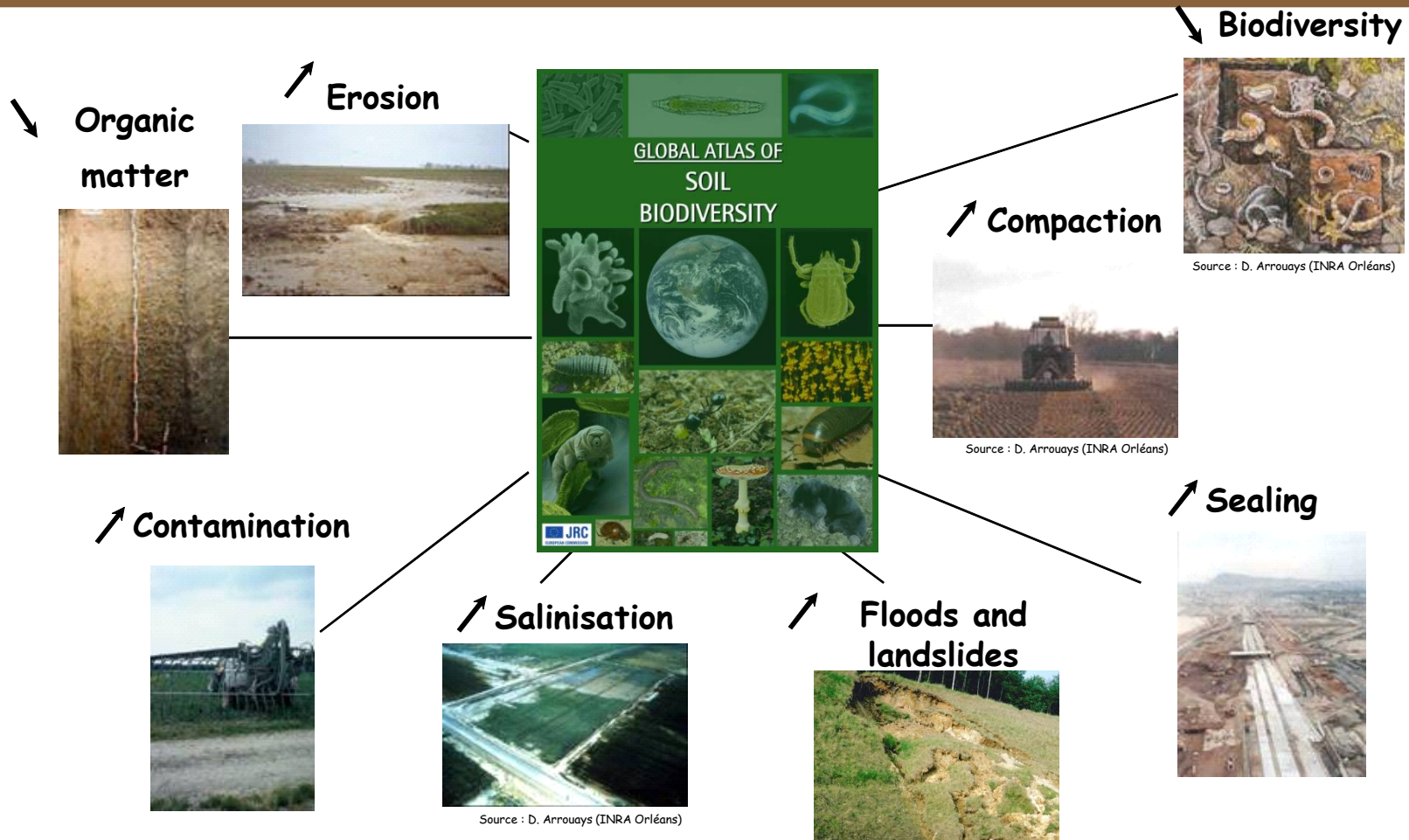
Courtesy of Wim van der Putten



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Soils and biodiversity are submitted to major threats



Adapted from Dominique Arrouays, InfoSol

- **Erosion:** 12% of Europe's total land area subject to water erosion
- **Contamination:** 3.5 million sites within the EU could be contaminated
- **Decrease of organic matter:** About 45% of European soils have low organic matter content
- **Soil sealing:** 1990-2000: 1,000 km² of soil lost per year in the EU



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European initiative - EcoFINDERS

In 2010, European Commission considered that for establishing Soil Thematic strategy, further knowledge was required on soil biodiversity, and functions, ecosystem services supported by this diversity

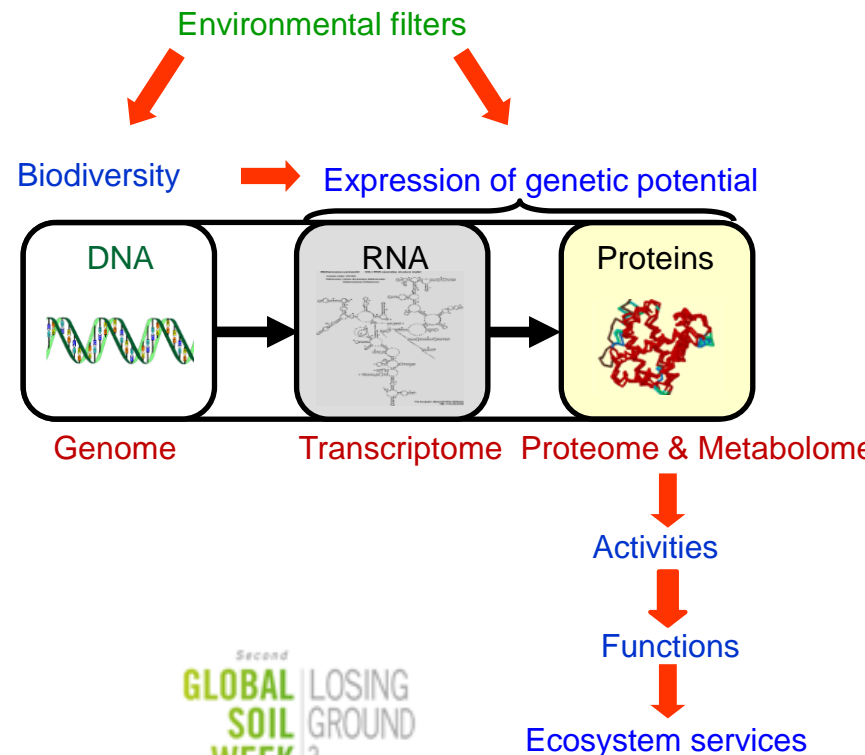
EcoFINDERS



- launched in 2011

- aims at:

- ✓ Developing standardized methods for the characterization of soil biodiversity
- ✓ Identifying of policy-relevant and cost-effective bioindicators for biological diversity
- ✓ Deciphering relations between soil biodiversity, activities, functions and ecosystem services
- ✓ Assessing the impact of environmental filters on soil biodiversity and relations biodiversity-activities



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Ecosystem services

Europe initiative - EcoFINDERS - Transect

Characterization of biodiversity across Europe

Aims at assessing:

- ✓ Range of variations of biodiversity and bioindicators across Europe
- ↪ Normal Operating Range according to soil types, to climatic zones and to land uses

Strategy:

- ✓ Analyses from 80 sites representative of
 - EU soil physico-chemical properties (Joint Research Council maps)
 - land-use (LUCAS – landcover survey)

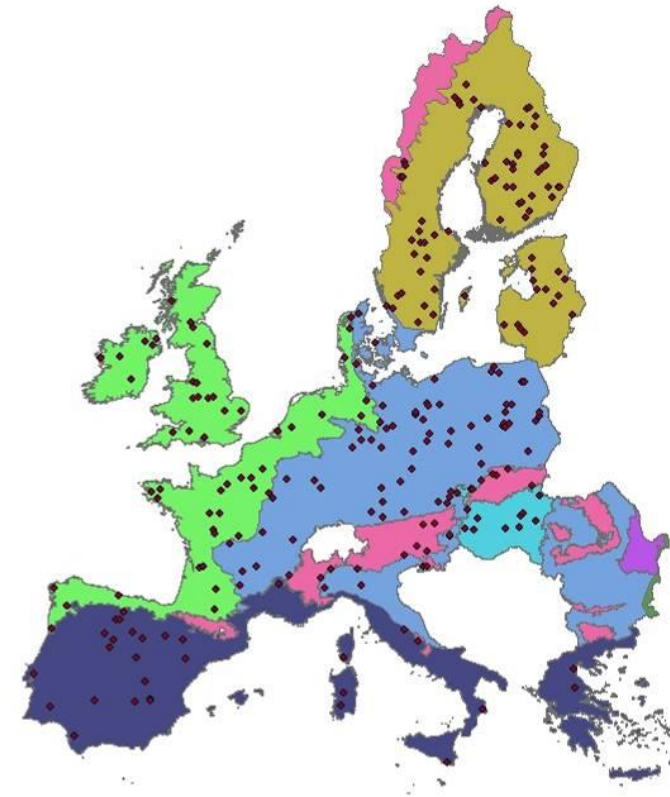
Legend

• Random_Points_2

Biogeo

Region

- ALPINE
- ATLANTIC
- BLK
- BOREAL
- CON
- MACARO
- MED
- PAN
- STEPPIC

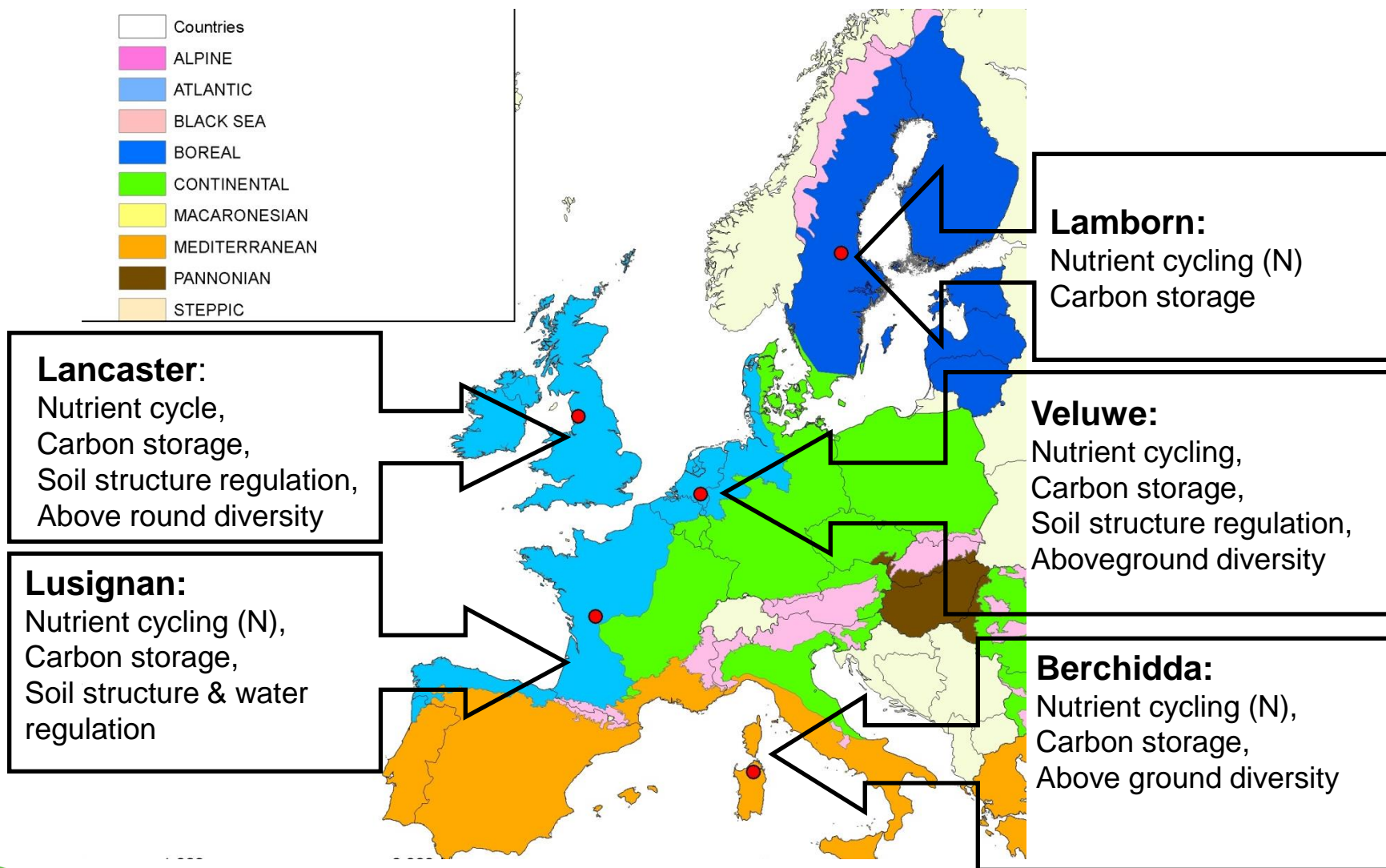


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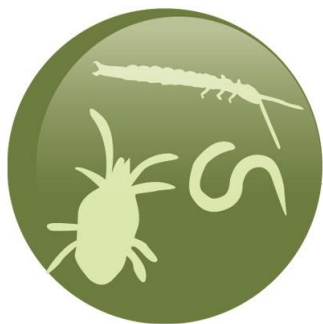
Europe initiatives – EcoFINDERS – Long Term Observatories

Connecting soil biodiversity, functions and ecosystem services



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GLOBAL SOIL BIODIVERSITY INITIATIVE

- Launched in September 2011
- Open to all
- Goal: Develop a coherent platform for promoting the translation of expert knowledge on soil biodiversity
- For environmental policy and sustainable land management
- For the protection and enhancement of ecosystem services.



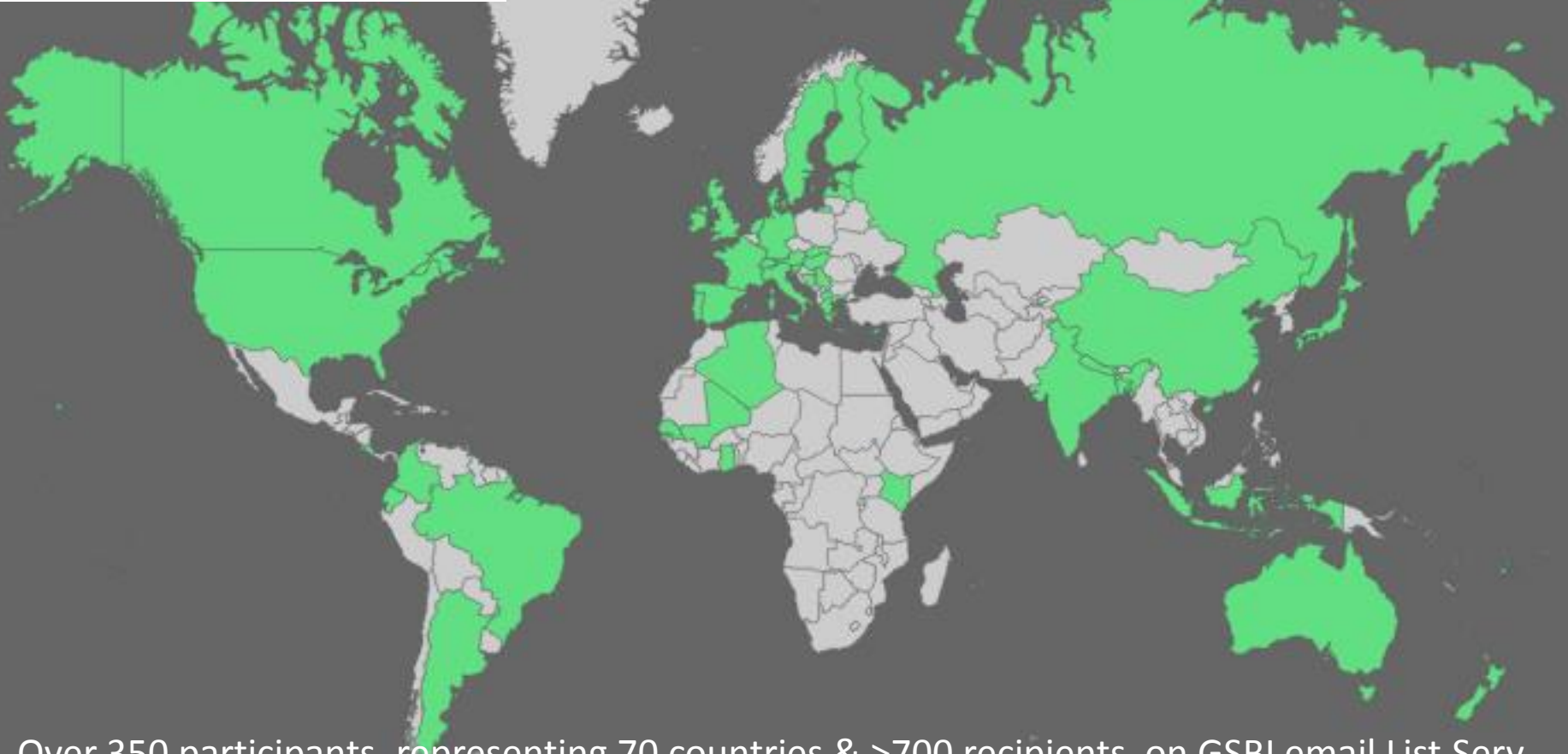
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Global initiative - GSBI



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Over 350 participants, representing 70 countries & >700 recipients on GSBI email List Serv



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Global initiative – GSBI – JRC - Atlas



GLOBAL ATLAS OF SOIL BIODIVERSITY



Global Soil Biodiversity Assessment Workshop
Colorado State University
Fort Collins, CO
February 2013

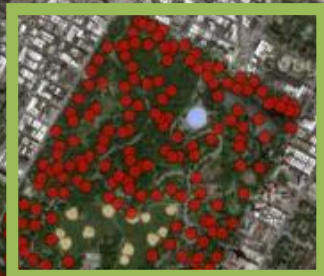


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Central Park, New York City

Sample Location



- 600 Samples
- Across 3.41² KM
- All Soil Biodiversity (bacteria, archaea and eukarya)



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GSBI – EcoFINDERS - Conference

THE FIRST GLOBAL
SOIL BIODIVERSITY CONFERENCE
Assessing soil biodiversity and its role for ecosystem services

GLOBAL SOIL BIODIVERSITY INITIATIVE
Palais des Congrès, Dijon, France
2-5 DECEMBER 2014



The Global Soil Biodiversity Initiative and EcoFINDERS are pleased to announce:

THE FIRST GLOBAL SOIL BIODIVERSITY CONFERENCE

Assessing soil biodiversity and its role for ecosystem services

Conference chair:

Dr. Diana H. Wall, Colorado State University and Scientific Chair of the GSBI.

Confirmed Keynote Speakers include:

Dr. Noah Fierer, University of Colorado, Boulder, USA

Dr. Laurent Philippot, INRA, Dijon, FR

Dr. Kate Scow, University of California, Davis, USA

Dr. Wim van der Putten, Netherlands Institute of Ecology, Wageningen, NL

Dr. David Wardle, Swedish University of Agricultural Sciences, Umea, SE

Dr. Junling Zhang, China Agricultural University Beijing, CH

Read more about this conference on <http://colloque.inra.fr/gsbi1>



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Professor Fatima Maria de Souza Moreira
Federal Univesrity of Lavras
Minas Gerais, Brazil



Professor Diana Wall
School of Global
Environmental Sustainability
Colorado State University
Fort Collins, CO, USA



Professor Richard Bardgett
The University of Manchester
Manchester, UK



SCHOOL OF GLOBAL
ENVIRONMENTAL
SUSTAINABILITY



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Wageningen, The Netherlands



Fred Ayuke, PhD
University of Nairobi
Nairobi, Kenya



Dr. Luca Montanarella
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Joint Research Centre
Ispra, Italy



Professor Nobuhiro Kaneko
Yokohama National University
Japan



Professor Johan Six
Institute of Agricultural
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Jack Faber
Alterra Wageningen UR
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Bryan Griffiths
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Elodie Tan
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Paris



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