Swimming in a stream of information

The quantity of satellite imagery available, and the data it provides on biodiversity, is so substantial that new avenues of research are opening up, requiring specialists from the fields of biodiversity, remote sensor technology and artificial intelligence to work together. This proliferation of new knowledge represents a major opportunity for the global South, where biodiversity has been less thoroughly inventoried.

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Vegetation survey, Cameroon.

Since the 1970s, researchers have been monitoring biodiversity by analysing satellite images. The continuous diversification and multiplication of signals and sensors over the intervening years has opened up vast new possibilities in terms of detecting species, habitats and natural or man-made variation in natural environments. But this technical progress also poses a certain number of new challenges. The exponential flow of information and the growing power of artificial intelligence means that two formerly separate scientific disciplines now need to coexist: data analysis and data interpretation.

The risk we now face is that the never-ending flow of data, the complexity of the processes and the problems inherent to data access, management and storage will overshadow the issue itself: how can we better understand the dynamics shaping landscapes and vegetation? The priority now must be to restructure research efforts to allow for a lasting dialogue and collaboration to emerge between biodiversity and data processing specialists.

As they all seek to answer the same questions, these specialists must bring to bear the expertise of their respective disciplines, while adapting their methodologies to produce knowledge which is precise, pertinent and attuned to the demands of sustainable development. New methods of data analysis are already giving rise to new ways of approaching and understanding the plant kingdom.

In fields which require the analysis of complex processes such as deforestation, carbon storage capacities and the dynamics reshaping

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> ··· New collaborations are needed between researchers in the fields of data processing, life sciences and the humanities in order to capitalise on this mass of data and develop a biodiversity mapping system which is innovative, robust and tailored to users' needs ···

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Betsiboka Estuary, Madagascar. Image Sentinel 2, MSI sensor.

agricultural and agro-forestry landscapes, new approaches are beginning to take shape: systematic cross-comparison of data from multiple sensors (optical, lidar and radar), each of which offers insight into a specific facet of the complex overall picture; establishing rigorous processes for generalisation, allowing information gathered in the field to be scaled up for mapping on a regional or even continental scale: this approach makes it possible to identify individual species (palm trees, for example) within different forest formations, while also studying the dynamics at play in major forests on a global scale.

In the long term, the goal is to set up automated observation systems capable of measuring the impact of climate change and nature conservation policies, with reference to societal pressures.

BIODIVERSITY
IN THE GLOBAL SOUTH

Research
for a sustainable world

New tools for studying biodiversity

Swimming in a stream of information

Anne-Elisabeth Laques, landscape geographer, UMR Espace-Dev
Stéphanie Carrière, ethno-ecologist, UMR Gred
Danielle Mitja, ecologist, UMR Espace-Dev
Pierre Couteron, ecologist, UMR Amap
Éric Delaitre, specialist in the use of remote sensors for terrestrial analysis, UMR Espace-Dev

Artificial intelligence to the rescue for biodiversity

Morgan Mangeas, mathematician specialising in artificial intelligence, UMR Entropie
Corina Iovan, specialist in remote sensing and artificial intelligence, UMR Entropie
Laurent Vigliola, marine biologist, UMR Entropie

The Nagoya protocol, reconciling ambition with effective action

Jean-Louis Pham, plant geneticist, Nagoya scientific advisor, UMR Diade

Listening to the environment

Amandine Gasc, eco-acoustician, UMR IMBE

A botanist in my smartphone

Jean-François Molino, ecologist, UMR Amap

Using genetics to identify the adaptative capacities of coral

Véronique Berteaux-Lecellier, geneticist, UMR Entropie
Gaël Lecellier, geneticist, UMR Entropie
Oliver Selmoni, geographer, UMR Entropie and EPFL
Stéphane Joost, geographer, EPFL

Protecting biodiversity

Converting waste water into fertiliser for leafier cities

Didier Orange, eco-hydrologist, UMR Eco&Sols

Of dams and fish

Pablo Tedesco, biologist, specialist in aquatic ecology, UMR EDB

Cataloguing the French Guiana forest

Raphaël Pélissier, ecologist, UMR Amap

Birds and tourists as research topics

Martin Thibault, ecologist and population biologist, UMR Entropie
Philippe Borsa, population geneticist, UMR Entropie
Catherine Sabinot, ethnoecologist and anthropologist, UMR Espace-Dev
Éric Vidal, ecologist and population biologist, UMR Entropie

Making sure that regulation rhymes with appropriation

Catherine Sabinot, ethnoecologist and anthropologist, UMR Espace-Dev
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The proportion of birds

Philippe Cury, marine ecologist, UMR Marbec

Biodiversity and health

Nature's abundance protects us against pandemics
Benjamin Roche, biologist, specialist in the ecology of pathogenic agents and health threats, UMR Ummisco and Mivegec

At the cutting edge of ethnopharmacology
Geneviève Bourdy, ethnopharmacologist, UMR Pharma-Dev
Christian Moretti, eethnopharmacologist, UMR EIO, retraité

Tracking infectious diseases
Oleg Mediannikov, microbiologist, expert in infectious diseases, UMR Mephi

Controlling the inevitable
Laurent Granjon, biologist, UMR CBGP

Biodiversity to feed the world

Trees, the backbone of agriculture
Geneviève Michon, ethnobotanist, UMR Gred

Moving towards sustainable aquaculture
Marc Legendre, fish physiologist, UMR Isem

Adaptive fishing in Peru
Arnaud Bertrand, marine ecologist, UMR Marbec

Pastures and humans drip-fed by glaciers
Olivier Dangles, ecologist, UMR Cefe

Custodians of agricultural diversity
Serge Hamon, plant breeder, UMR Diade
Yves Vigouroux, population genomicist, UMR Diade

Rice as a common good
Alain Ghesquières, geneticist, UMR Diade

The potential of the world beneath our feet
Alain Brauman, soil ecologist, UMR Eco&Sols
Éric Blanchart, soil ecologist, UMR Eco&Sols

Mangroves, a new Eldorado?
Marie-Christine Cormier-Salem, geographer, UMR Paloc

Plant symbiosis
Éric Giraud, microbiologist, UMR LSTM

The Hidden Agriculture of the Amazon Forest
Laure Emperaire, ethnobotanist, UMR Paloc