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Biodiversity and Governance

Fabio Attorre

*Biodiversity and Development Symposium,
Eduardo Mondlane University Maputo, 27 September 2018*

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Biodiversity under threat

- Loss, degradation and fragmentation of natural habitats
- Overexploitation of biological resources
- Pollution, in particular the buildup of nutrients such as nitrogen and phosphorus in the environment
- Impacts of invasive alien species on ecosystems and the services they provide to people
- Climate change and acidification of the oceans, associated with the buildup of greenhouse gases in the atmosphere.



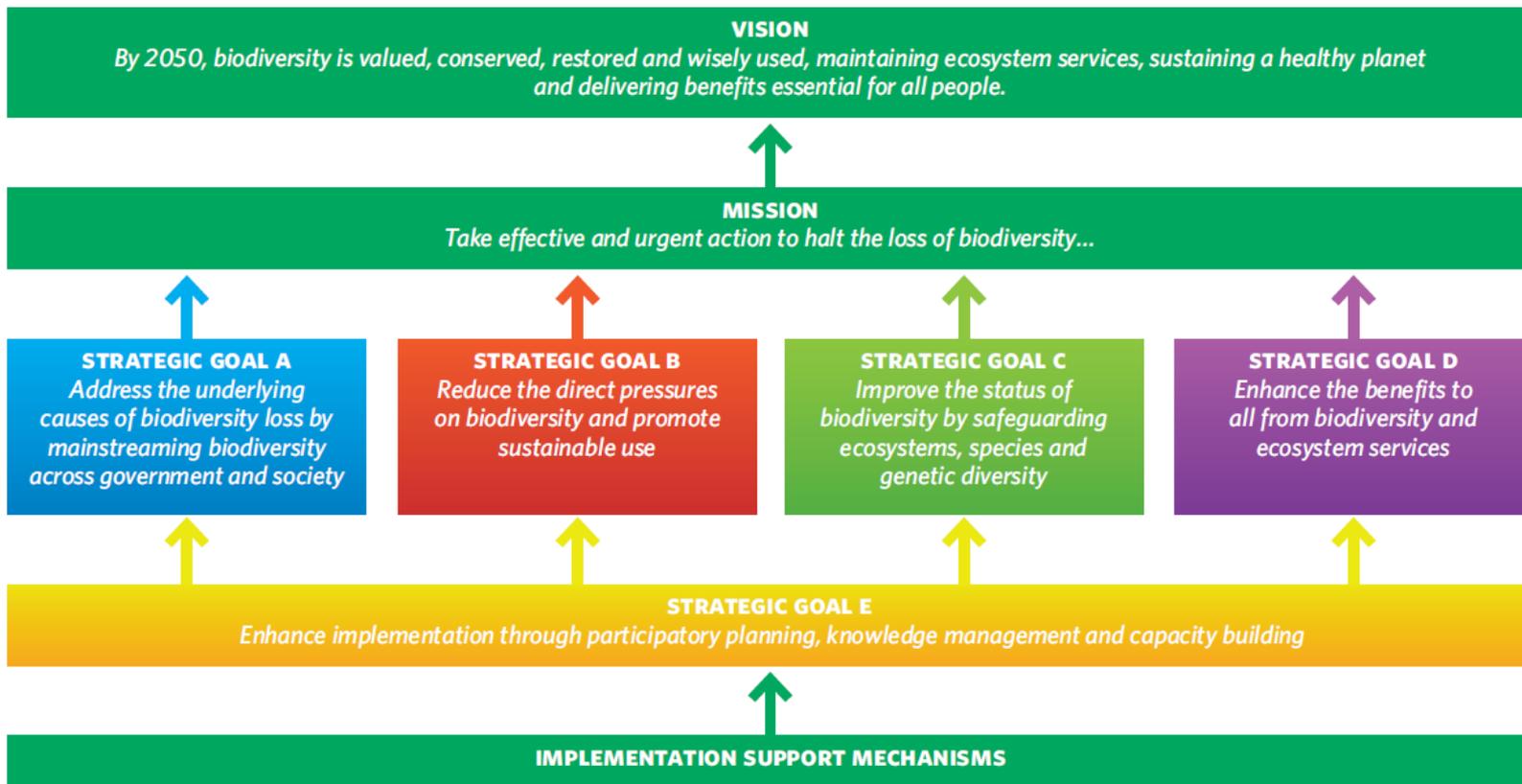
How to act

1 Strategic Plan for Biodiversity Conservation 2011-2020

5 Strategic Goals

20 Aichi targets

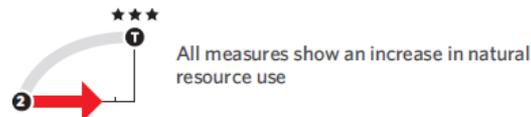
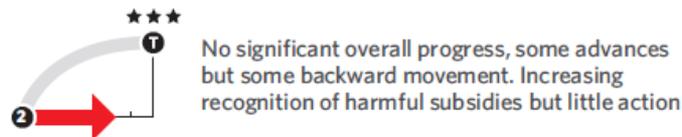
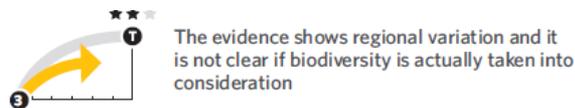
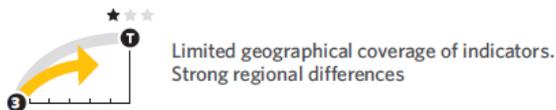
55 Indicators



Strategic Goal A

Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society

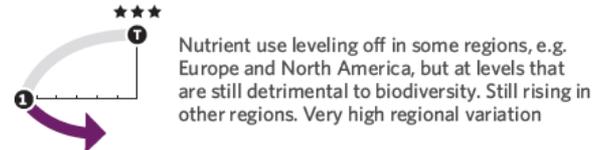
- 1 – Awareness among people
- 2 – Biodiversity mainstreamed in planning, reporting and accounting
- 3 – Harmful incentives and subsidies by governments
- 4 – Sustainable production and consumption



Strategic Goal B

Reduce the direct pressures on biodiversity and promote sustainable use

- 5 – Ecosystem fragmentation and degradation
- 6 – Unsustainable use of species, e.g. overfishing
- 7 – Unsustainable uses in agriculture, aquaculture and forestry
- 8 – Pollutants
- 9 – Alien species prevention, control and eradication
- 10 – Multiple anthropogenic pressures on critical ecosystems, e.g. coral reefs



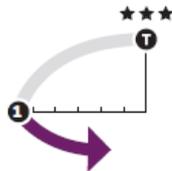
Strategic Goal C

To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity

- 11 – Number, area, connectivity of protected area
- 12 – Extinction and Conservation status of species
- 13 – Genetic diversity of domesticated plant and animals



Extrapolations show good progress and the target will be achieved if existing commitments on designating protected areas are implemented. Inland water protection has distinct issues.



Red List Index still declining, no sign overall of reduced risk of extinction across groups of species. Very large regional differences

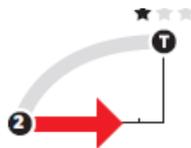


Gradual increase in the conservation of wild relatives of crop plants in *ex situ* facilities but their conservation in the wild remains largely insecure, with few protected area management plans addressing wild relatives

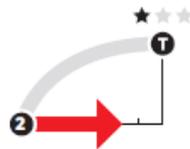
Strategic Goal D

Enhance the benefits to all from biodiversity and ecosystem services

- 14 – Ecosystems and their services degradation
- 15 – Ecosystems and their services restoration
- 16 – Nagoya protocol in force and operational



High variation across ecosystems and services. Ecosystems particularly important for services, e.g. wetlands and coral reefs, still in decline



Despite restoration and conservation efforts, there is still a net loss of forests, a major global carbon stock

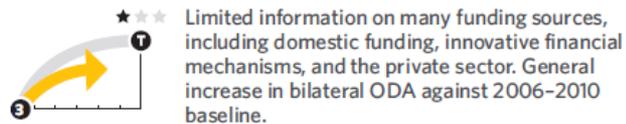
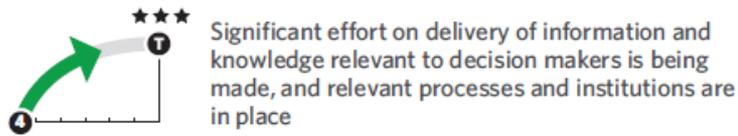
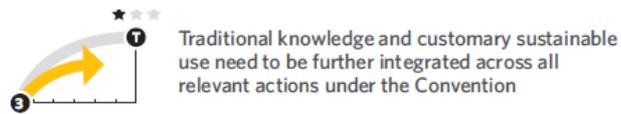
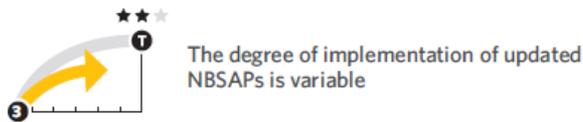


Given progress that has been made, it is likely that the Nagoya Protocol will be operational by 2015 in those countries that have ratified it

Strategic Goal E

Enhance implementation through participatory planning, knowledge management and capacity-building

- 17 – National biodiversity action plans
- 18 – Traditional knowledge, e.g. languages
- 19 – Data on biodiversity digitalized and shared
- 20 – Financial resources



Areas of intervention





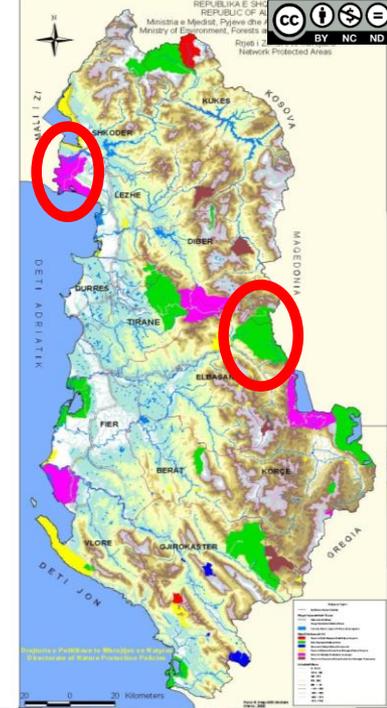
Conservation and Sustainable use



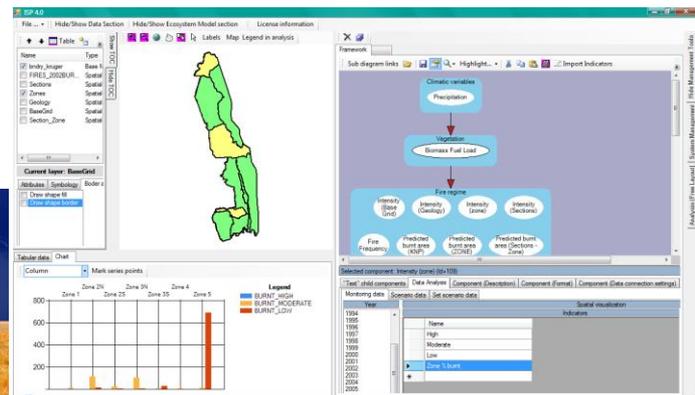
Frankincense trees
Yemen



Forest management
of Pas in Albania



Fire Management System in SA



Integration of biodiversity data in NFI of PNG

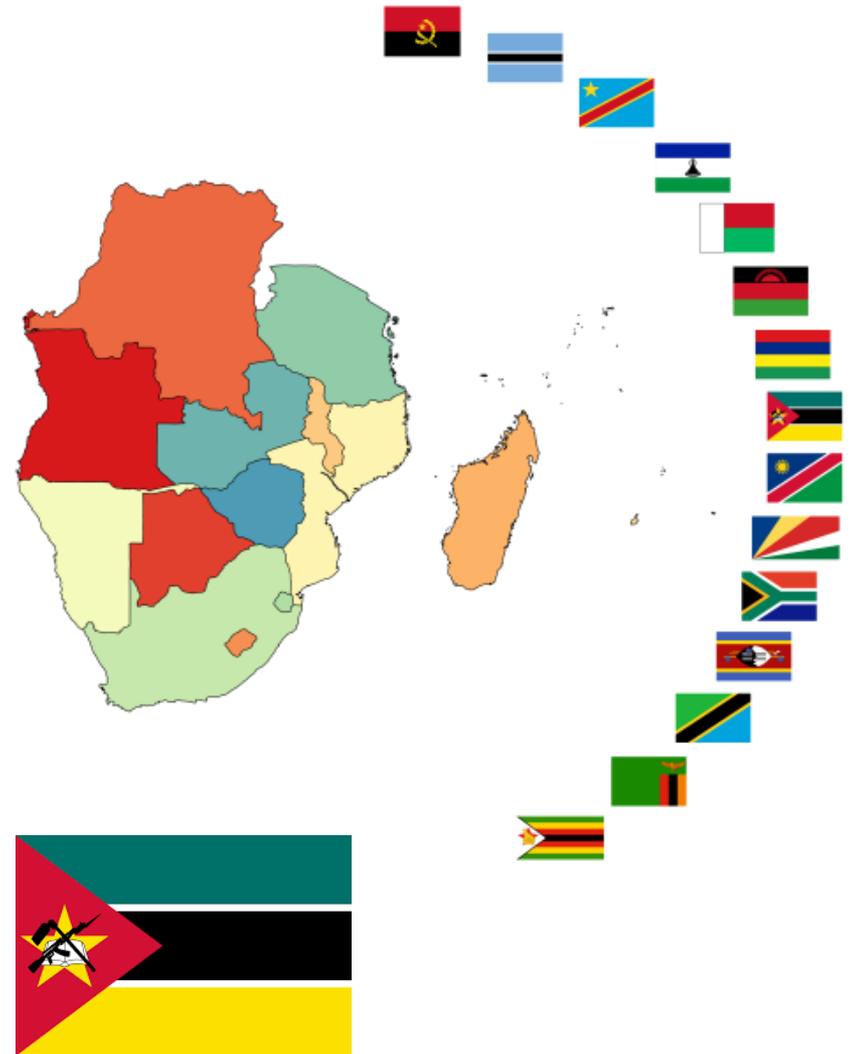


Conservation and equitable use of biological diversity in the SADC region: from geographic information system (GIS) to Spatial Systemic Decision Support System (SSDSS)

SECOSUD II

Italian Cooperation - AID 9695

An **Italian Cooperation Project** implemented by **two universities** and providing institutional support for biodiversity conservation through provisioning of systemic tools and capacity building, particularly focused on **Mozambique**



DIPARTIMENTO
DI BIOLOGIA AMBIENTALE



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Project Components

Transboundary Protected Area Management



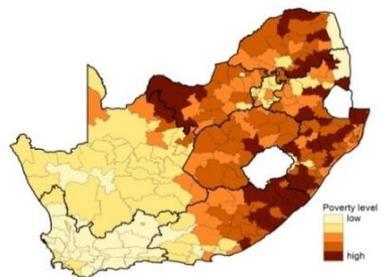
Biodiversity Network of Mozambique



ABS



South African Natural Resources Management Program

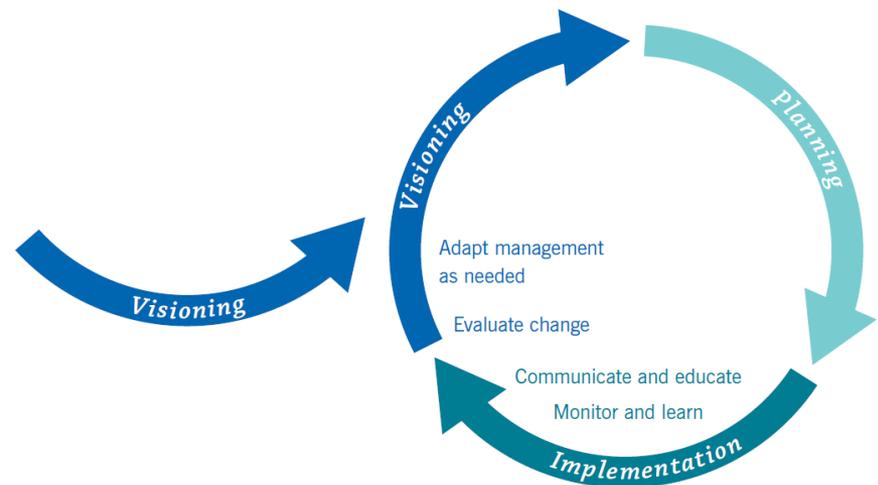


Land Degradation Neutrality



Ecosystem Based Management

“The ecosystem approach is a strategy for the integrated management of land, water and living resources that provides sustainable delivery of ecosystem services in an equitable way.” (UNEP).



Ecosystem Approach

Step A

Determining the **main stakeholders**, defining the **ecosystem area** and developing the **relationship between them**

Step B

Characterizing the **structure and functions of the ecosystem** and setting in place **mechanism to manage and monitor it**

Step C

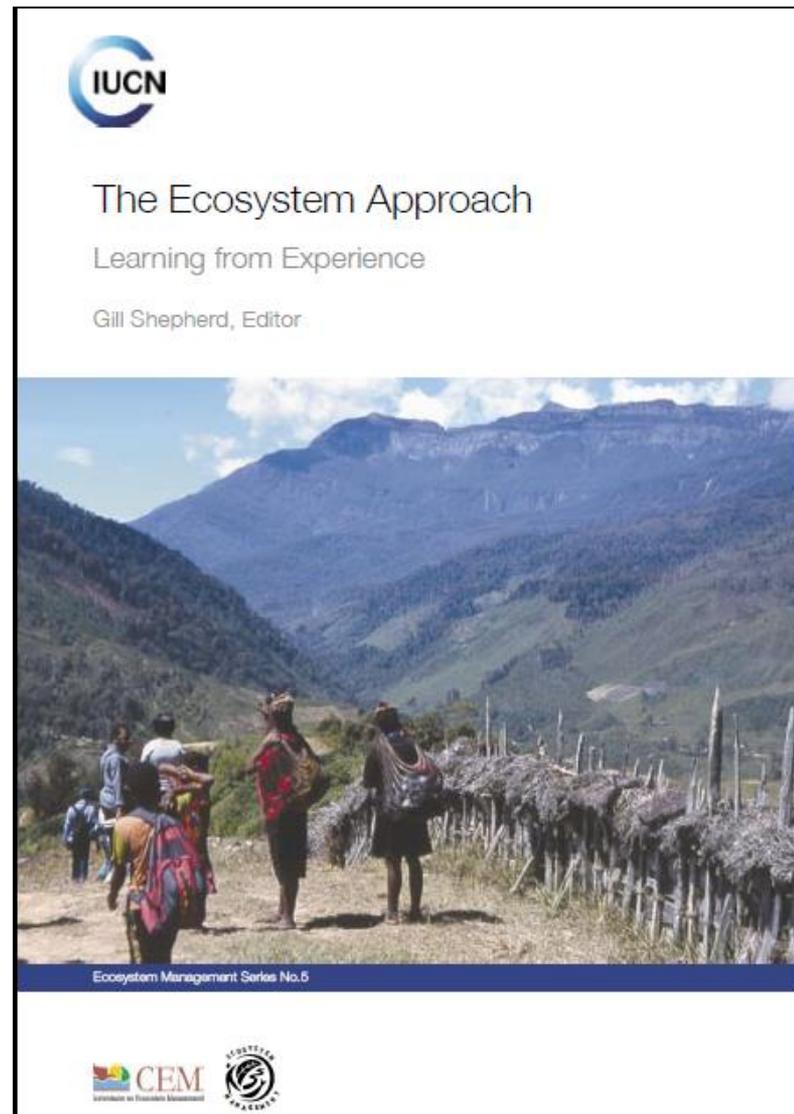
Identifying the important **economic issues** that will **affect the ecosystem** and its **inhabitants**

Step D

Determining the **likely impact** of the ecosystem on **adjacent ecosystems**

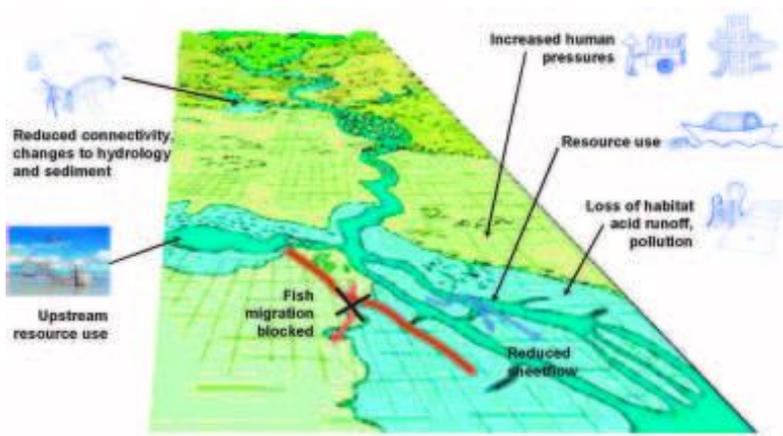
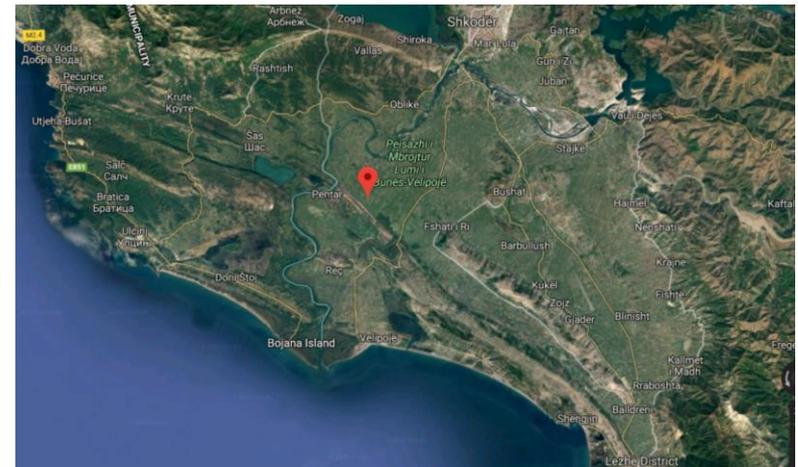
Step E

Deciding on **long-term goals**, and **flexible ways** of reaching them



Area identification

Small or large?



Stakeholder identification and involvement

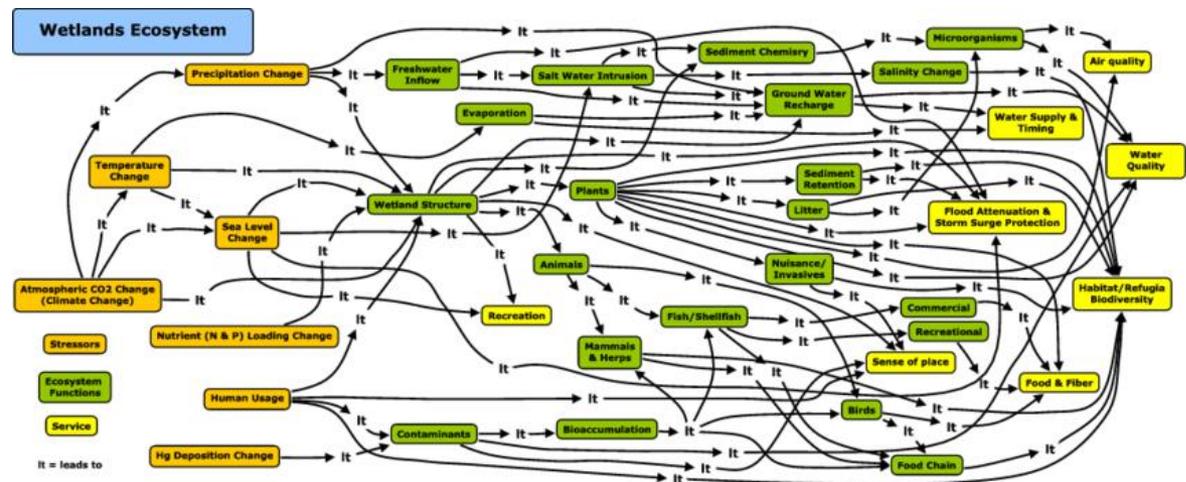
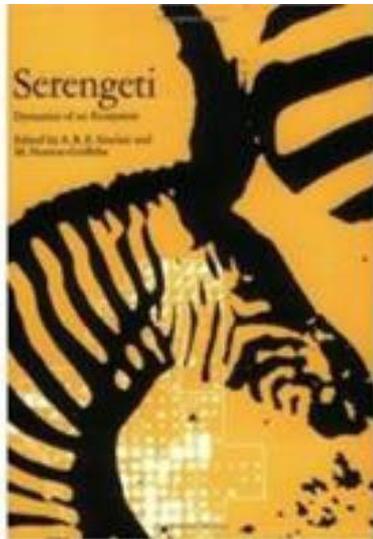
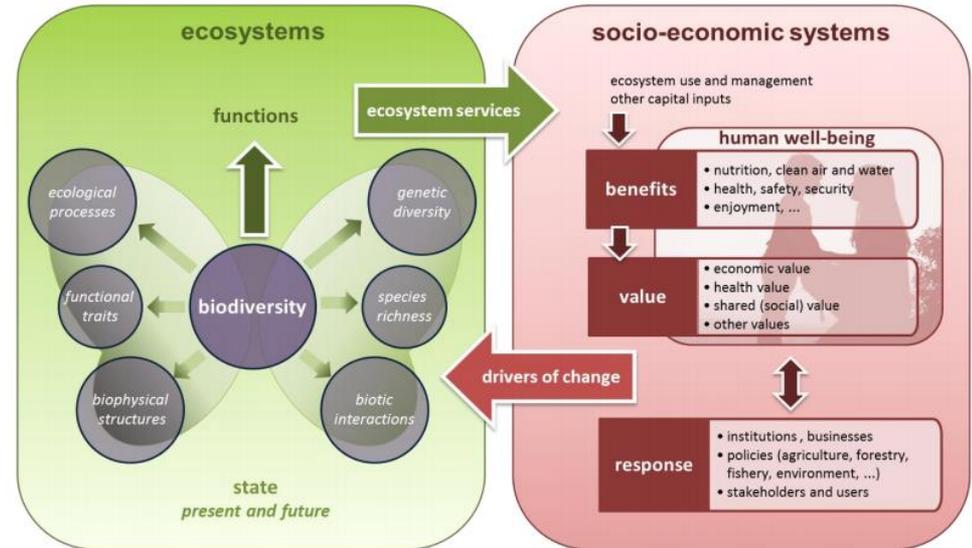
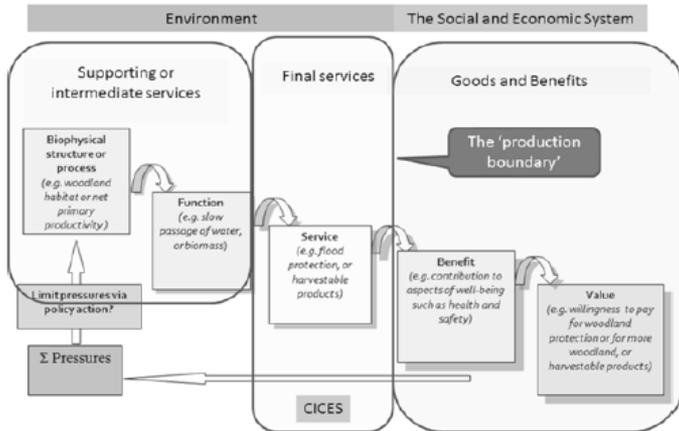
- Implement group: management agencies, environmental and socio-economic scientists, NGOs, profit sectors
- Constituent group: all stakeholders having an interest including local association



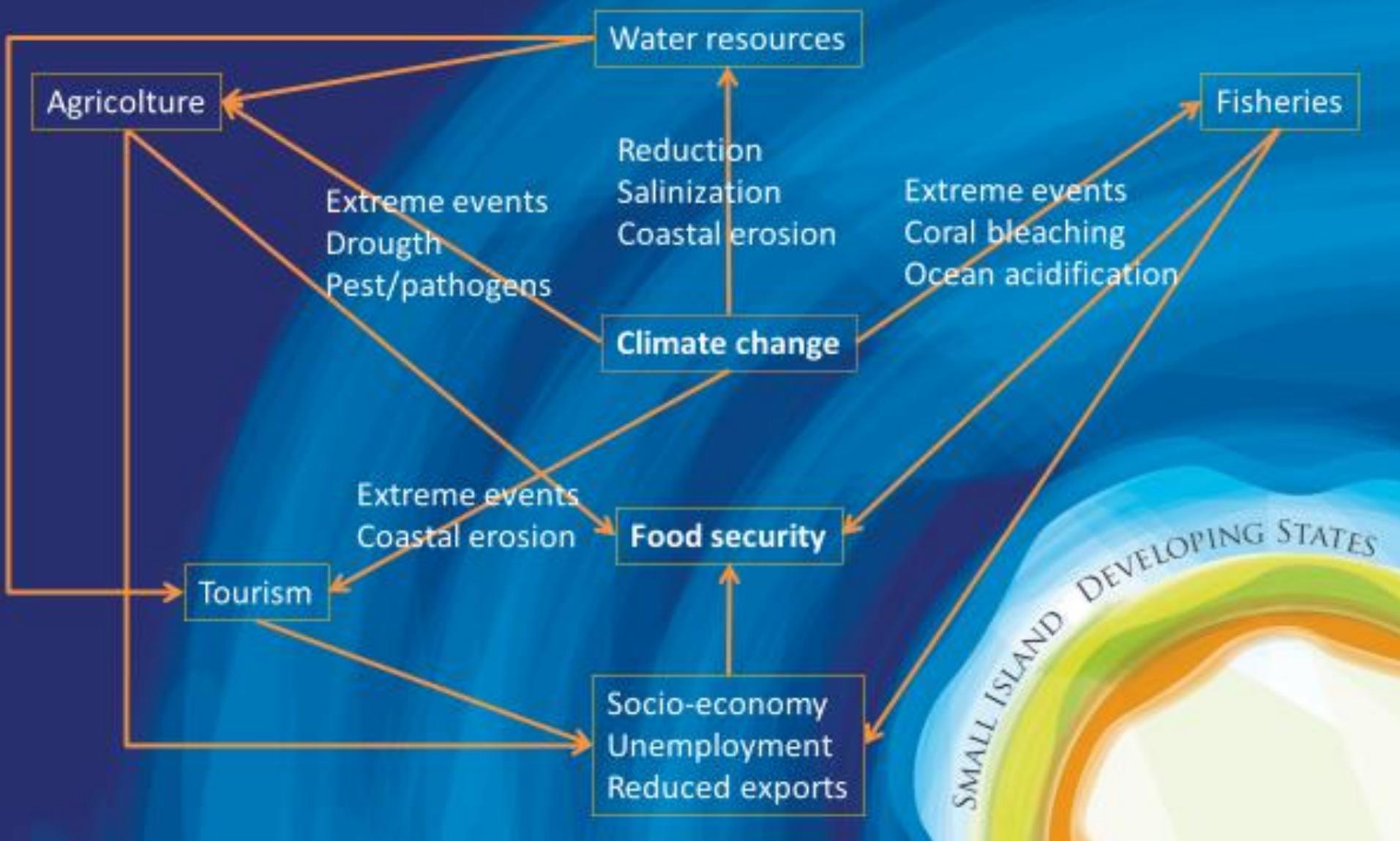
Participatory approach

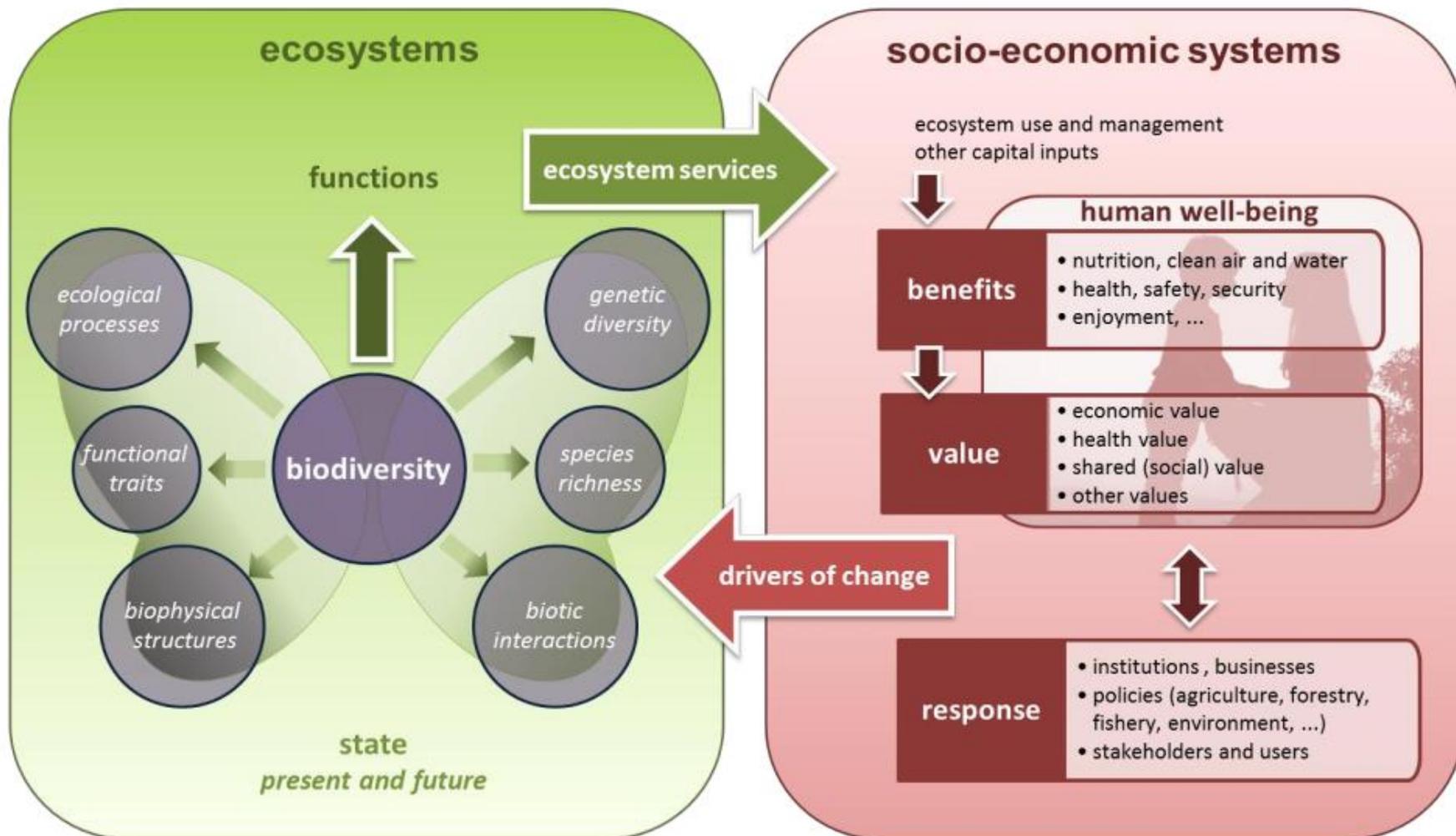


Understanding and mapping the system



Climate change impacts on Food security

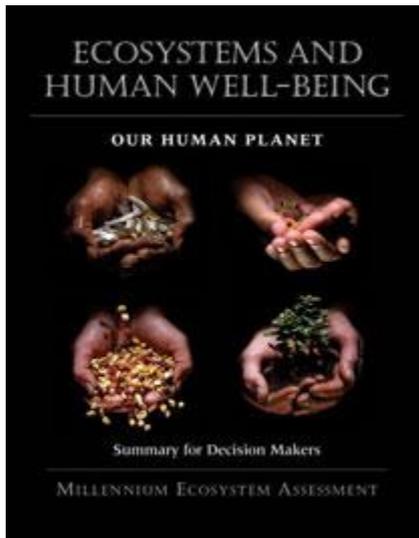




Ecosystem Services

The Millennium Ecosystem Assessment (MA) was called for by the United Nations Secretary-General Kofi Annan in 2000. Initiated in 2001, the objective of the MA was to assess the consequences of ecosystem change for human well-being and the scientific basis for action needed to enhance the conservation and sustainable use of those systems and their contribution to human well-being.

<https://www.millenniumassessment.org>



MA. The Millennium Ecosystem Assessment (MA) was the first large scale ecosystem assessment and it provides a framework that has been adopted and further refined by TEEB and CICES. The MA organises ecosystem services into four well known groups:

1. provisioning services
2. regulating services
3. cultural services
4. supporting services

Ecosystem Services



**The Economics
of Ecosystems
& Biodiversity**

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TEEB > RESOURCES > Ecosystem Services

Ecosystem Services

Share 188

This tables presents the different categories of ecosystem services that ecosystems provide.

Provisioning services
Regulating services
Habitat or supporting services
Cultural services

Provisioning Services are ecosystem services that describe the material or energy outputs from ecosystems. They include food, water and other resources.



Food: Ecosystems provide the conditions for growing food. Food comes principally from managed agro-ecosystems but marine and freshwater systems or forests also provide food for human consumption. Wild foods from forests are often underestimated.



Raw materials: Ecosystems provide a great diversity of materials for construction and fuel including wood, biofuels and plant oils that are directly derived from wild and cultivated plant species.



Fresh water: Ecosystems play a vital role in the global hydrological cycle, as they regulate the flow and purification of water. Vegetation and forests influence the quantity of water available locally.



Medicinal resources: Ecosystems and biodiversity provide many plants used as traditional medicines as well as providing the raw materials for the pharmaceutical industry. All ecosystems are a potential source of medicinal resources.

RESOURCES

- [Guidance Manual for TEEB country studies](#)
- [Case studies](#)
- [Training Resource Material](#)
- [Glossary of terms](#)
- [Ecosystem Services](#)
- [Useful links](#)

Latest Publications



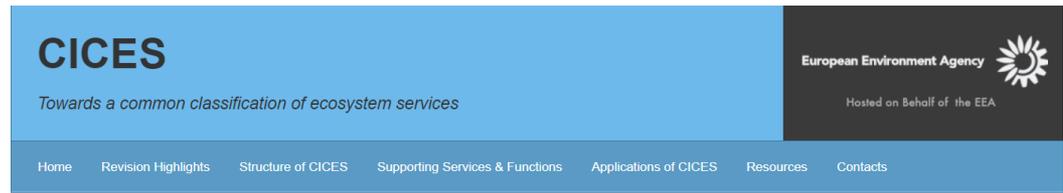
TEEB AgriFood Interim Report

The Interim Report introduces the key questions, issues and arguments to be addressed by TEEB AgriFood.

[| next >](#)

[read more](#)

Ecosystem Services



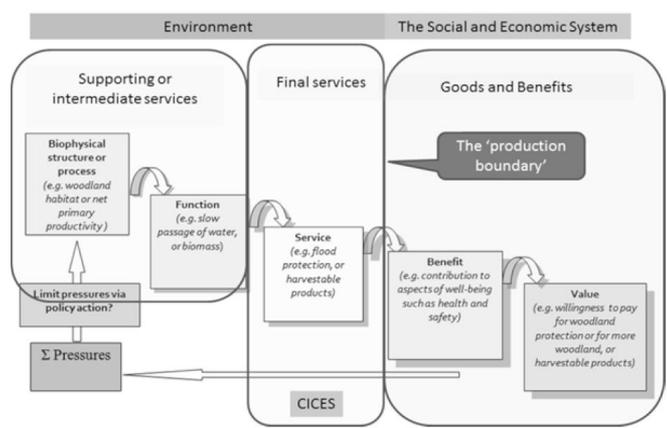
CICES Version 5.1 now available

News

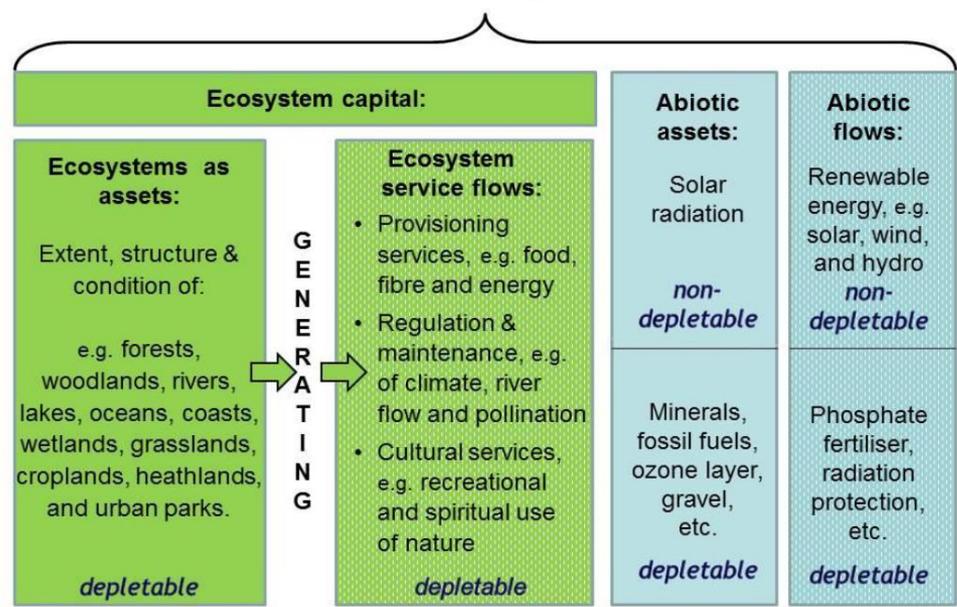
CICES V5.1 which updates and extends V4.3 is now available. The new version and the associated technical guidance can be downloaded [here](#).

See revision highlights for an overview of the changes

The Common International Classification of Ecosystem Services (CICES) developed from the work on environmental accounting undertaken by the European Environment Agency (EEA). It supports their contribution to the revision of the System of Environmental-Economic Accounting (SEEA) which is currently being led by the United Nations Statistical Division (UNSD).



Natural capital



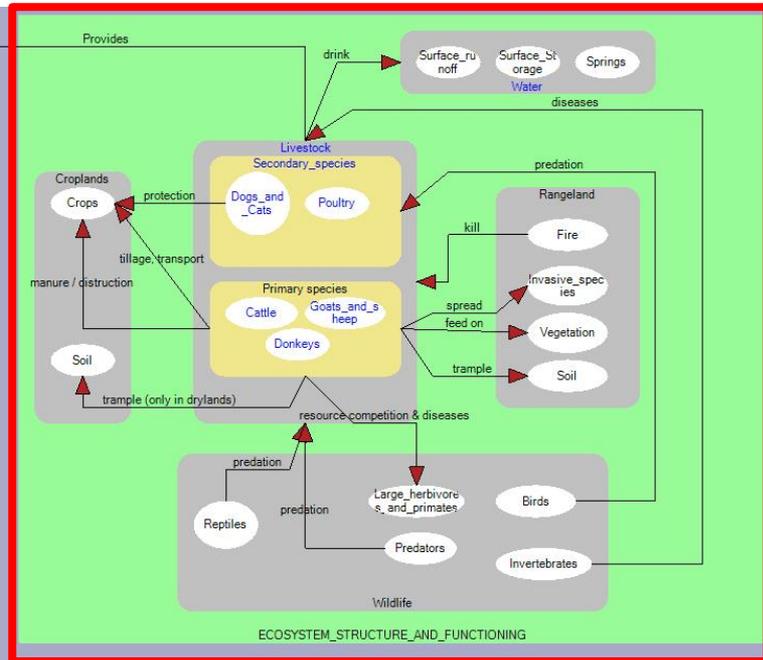
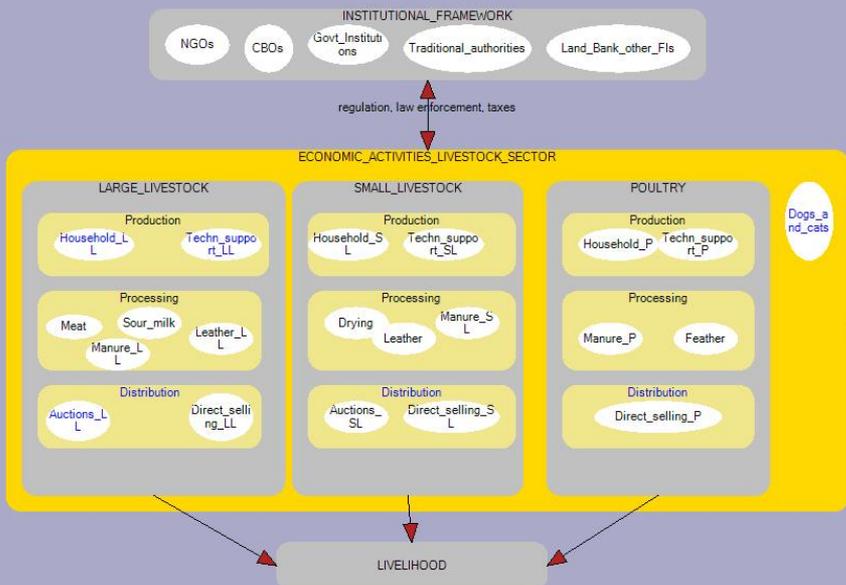
Ecosystem Services

<p>Provisioning services</p>	<p>Includes all material and biota-dependent energy outputs from ecosystems; they are tangible things that can be exchanged or traded, as well as consumed or used directly by people in manufacture.</p> <p>Within the provisioning service section, three major divisions of services are recognised:</p> <ul style="list-style-type: none"> • Nutrition includes all ecosystem outputs that are used directly or indirectly as foodstuffs (including potable water) • Materials (biotic) that are used directly or employed in the manufacture of goods • Energy (biomass) which refer to biotic renewable energy sources and mechanical energy provided by animals <p>Provisioning of water is either attributed to nutrition (drinking) or materials (industrial etc.). It is considered as ecosystem service because its amount and quality is at least partly steered by ecosystem functioning. For this reason seawater is not included.</p> <p>The provisioning services groups are further divided in classes and class types.</p>
<p>Regulating and maintenance services</p>	<p>Includes all the ways in which ecosystems control or modify biotic or abiotic parameters that define the environment of people, i.e. all aspects of the 'ambient' environment. These are ecosystem outputs that are not consumed but affect the performance of individuals, communities and populations and their activities.</p> <p>Within the regulating and maintenance section, three major service divisions are recognised:</p> <ul style="list-style-type: none"> • Mediation of waste, toxics and other nuisances: the services biota or ecosystems provide to detoxify or simply dilute substances mainly as a result of human action • Mediation of flows (air, liquid, solid masses): this covers services such as regulation and maintenance of land and snow masses, flood and storm protection • Maintenance of physical, chemical, biological conditions: this recognises that ecosystems provide for sustainable living conditions, including soil formation, climate regulation, pest and disease control, pollination and the nursery functions that habitats have in the support of provisioning services. <p>All the regulation and maintenance divisions are further divided into service groups, classes and class types.</p>
	<p>The hierarchical classification allows these to be distinguished by type of process and media.</p>
<p>Cultural services</p>	<p>Includes all non-material ecosystem outputs that have symbolic, cultural or intellectual significance</p> <p>Within the cultural service section, two major divisions of services are recognised:</p> <ul style="list-style-type: none"> • Physical and intellectual interactions with biota, ecosystems, and land-/seascapes • Spiritual, symbolic and other interactions with biota, ecosystems, and land-/seascapes <p>The two cultural divisions can be broken down further into groups, classes and class types. The hierarchical classification allows these to be distinguished using criteria such as whether it involves physical or intellectual activity.</p>

THE GREAT LIMPOPO TRANSBOUNDARY AREA

Livestock economic sectors sustains the livelihood of local communities

Ecosystem structure and functions



Ecosystems services



Identification of indicators, data collection and analysis

- Identification of SMART indicators (Specific, Measurable, Achievable, Relevant, time-Bound)
- Indicator-based monitoring protocols
- Intensive interdisciplinary field campaign, on-the-job training (field campaign with PA staff, local researchers, NGOs, etc.)



All relevant scientific disciplines



Involving local people!

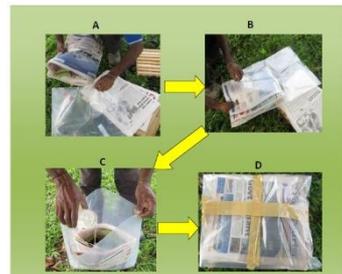
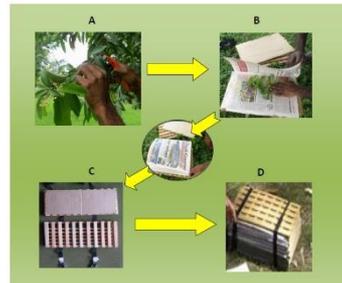
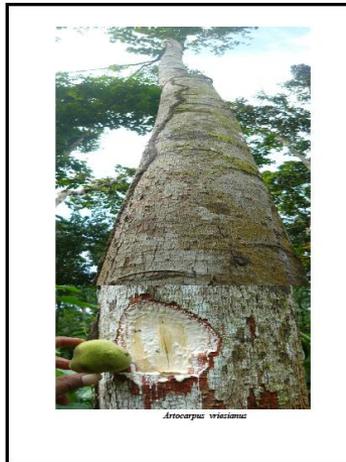


Training courses – scientific research



PAPUA NEW GUINEA FOREST RESEARCH INSTITUTE

(Tree Species ID Training Manual)
Forest Biology Program - 2015



THE UNIVERSITY
OF QUEENSLAND
AUSTRALIA



The New Guinea
Binatang Research
Centre



openforis



INSTITUTE OF ENTOMOLOGY
Biology Centre CAS

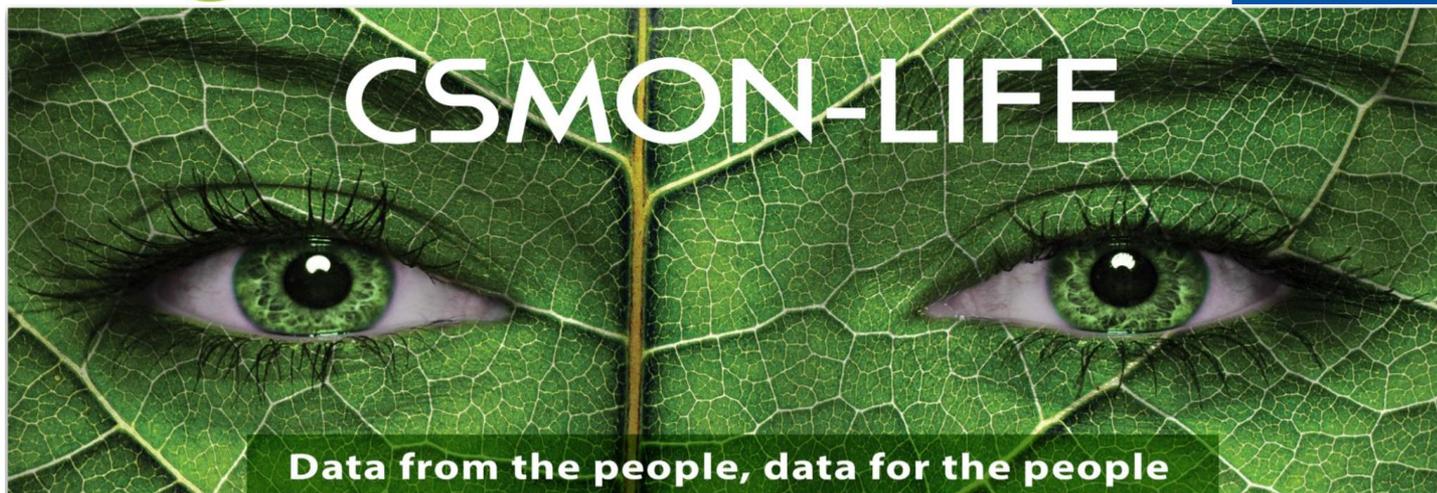


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Technical Assistance



Citizen Science Approach

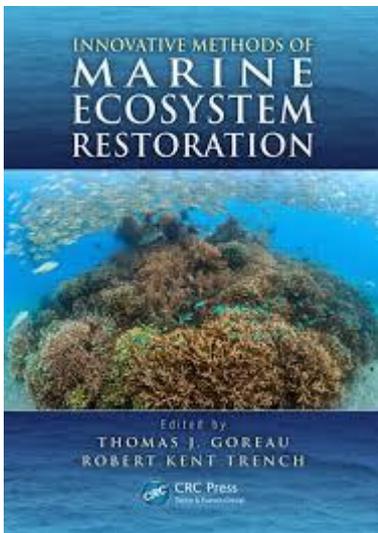
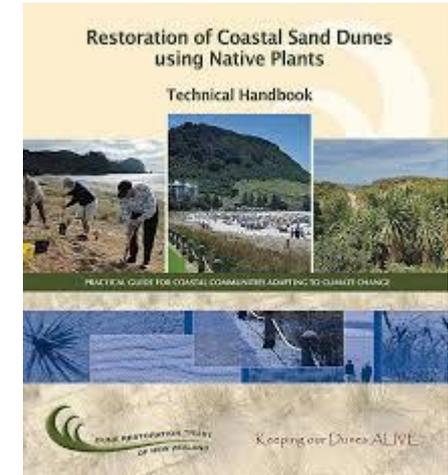


Identification of threats and definition of management options

- Loss of species or other key changes to biodiversity;
- Presence of non-indigenous or invasive species;
- Decreases in fisheries populations due to exploitation;
- Food web alterations;
- Eutrophication;
- Toxic environmental contaminants;
- Energy/noise pollution.



Implementation, monitor, adaptation



Adaptive management

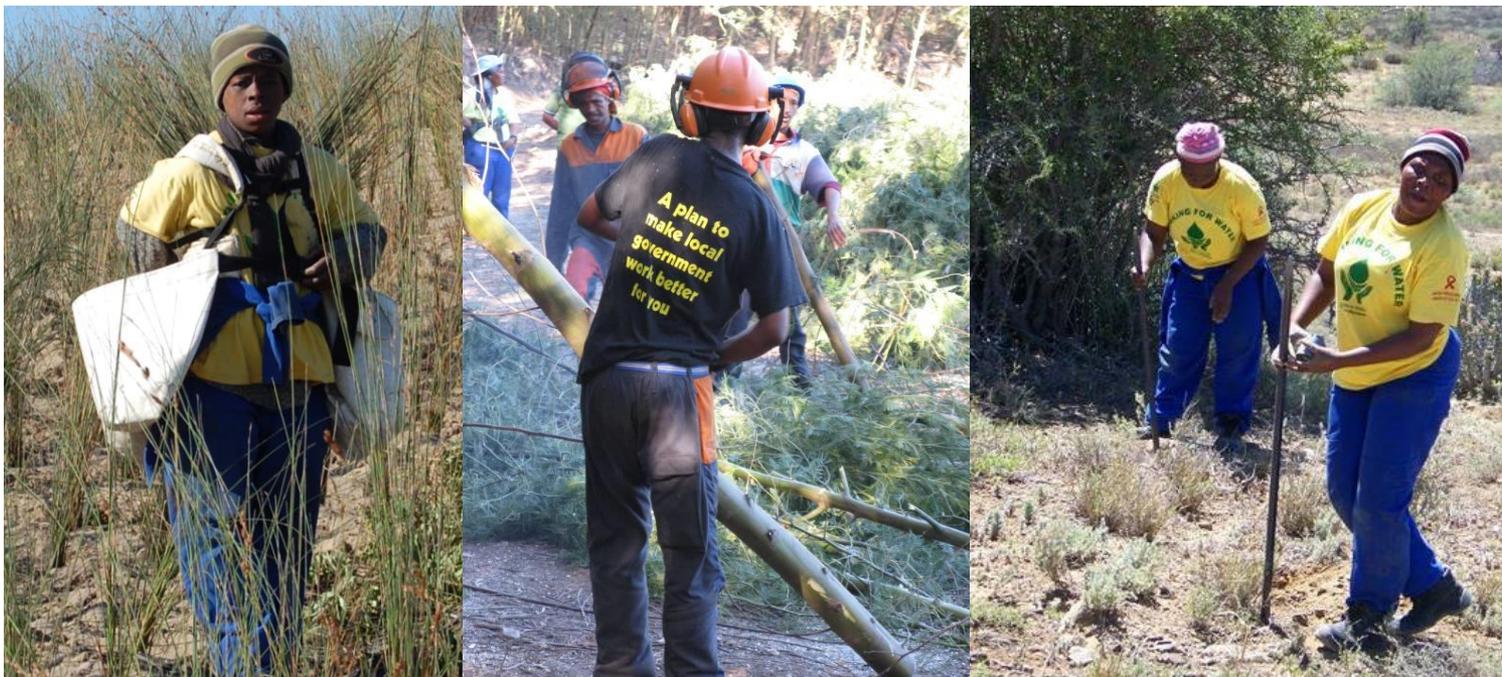


Financial sustainability

- Private sector investments
- Lottery revenues
- Tourist related fees
- Fees for eco-labeling
- Fishing licenses
- Income from local enterprises

Payment for Ecosystem Services and associated
market offsets

Developing a Decision Support System for South Africa's Environmental Programmes



Christo Marais & Matt McConnachie



environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA



**Cooperazione Italiana
allo Sviluppo**
Ministero Affari Esteri

What are South Africa's Environmental Programmes



→ A branch of the Department of Environmental Affairs, consisting of Working for: Water, Wetlands, Forests, on Fire and Land



→ Dual objective of **job-creation** and **environmental management**

→ Arguably the **largest conservation project in Africa**

The challenges and needs of the Environmental Programmes:



- 1. Integration of information** to assist decision makers with the budget allocation process between the programmes and regions
- 2. Information for unlocking** public and private investment
- Need for better **co-ordination between the programmes and optimizing the allocation of resources**, so as to identify trade-offs and opportunities
- Need for a **user-inspired tool**

NATIONAL RESOURCE MANAGEMENT PROGRAM – SOUTH AFRICA

MainFrm

Hide/Show Data Section | Hide/Show Ecosystem Model section | Change DSS application | License information

Map | Layout

Framework | Working on Fire | Working for Wetland | Working for Water | Working for Land

Sub diagram links | Highlight... | Disable data refresh | Sub-Components

WORKING FOR WATER DSS FRAMEWORK

Ecosystem Goods and Services (natural capital)

- Grazing: Biomes, WMAs, Provinces
- Energy and building material: Biomes, WMAs, Provinces
- Biodiversity: Biomes, WMAs, Provinces
- Watershed services: Biomes, WMAs, Provinces
- Carbon balance: Biomes, WMAs, Provinces
- Value added industries (biomass energy): Biomes, WMAs, Provinces
- Capital damage: Biomes, WMAs, Provinces

Current and potential distribution of IAPs

- Quaternary catchments
- Biomes
- WMAs
- Provinces

Selected component: Quaternary catchments

Attributes | Symbol | Current layer: not

Tabular data | Chart

CATNUM	YEAR	ACTUALTOTA
A71L	2011	
A63E	2011	
A71K	2011	
A92D	2011	
A80G	2011	
A80J	2011	
A91K	2011	
A91J	2011	
A63C	2011	
A63D	2011	
A92C	2011	
A72B	2011	
A92B	2011	
A63B	2011	

Analysis (Free Layout) | System Management | Hide Management Tools

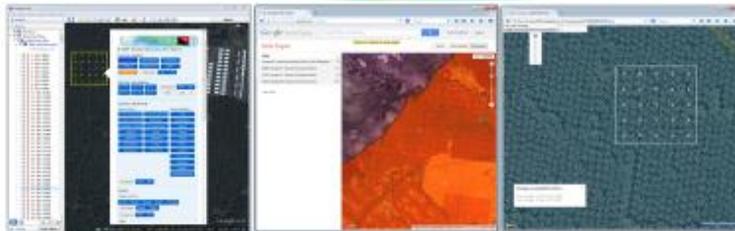
Data collection and use

 **Faculdade de Ciências da UEM**

Departamento de Ciências Biológicas 

Aviso de actividade de formação

Usar **Collect Earth** para medir e monitorizar o estado das florestas em **Moçambique**



Luca Malatesta, Mario Messina, Marcelo Rezende e Giulio Marchi

A actividade de formação é para estudantes da Universidade Eduardo Mondlane interessados em descobrir e aprender uma nova ferramenta desenvolvida pela FAO em colaboração com Google: **Collect Earth**. Collect Earth é uma ferramenta que permite a colheita de dados através do Google Earth, em conjunto com o Google Earth, o Bing Maps e o Google Earth Engine. Os usuários podem analisar imagens de satélites com resolução alta / muito alta para uma grande variedade de propósitos. Collect Earth é livre, de código aberto e de fácil utilização.

A formação será realizada do dia 30 de Maio até o dia 10 de Junho 2016 (Segunda – Sexta feira da cada semana, 9:00 – 17:00)

Teoria:

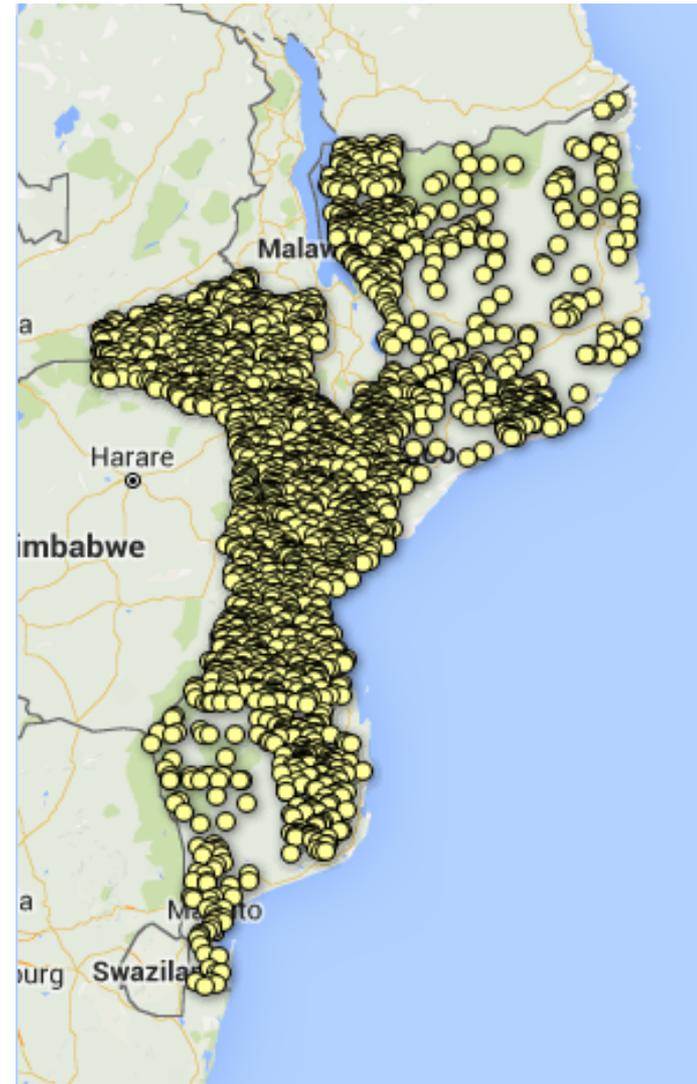
- Introdução ao Global Forest Survey
- Introdução ao Collect Earth

Para inscrições contacte Mario Messina (mario.messina@uniroma1.it).

O treinamento será em idioma Português e Inglês. As inscrições terminam no dia **27 Maio 2016**, as vagas são limitadas. No final do treinamento os participantes receberão um certificado de participação.

Prática:

- Avaliação do estado das florestas com Collect Earth
- Compartilhar e processar dados recolhidos
- Análise dos dados



Data collection and use

The screenshot shows a web browser window displaying the BioNoMo website. The browser's address bar shows the URL `bionomo.herokuapp.com/en/`. The website has a blue header with the BioNoMo logo and navigation links: "About the project", "Initiative", "Partners", and "Contact". On the right side of the header, there are flags for Mozambique and the United Kingdom.

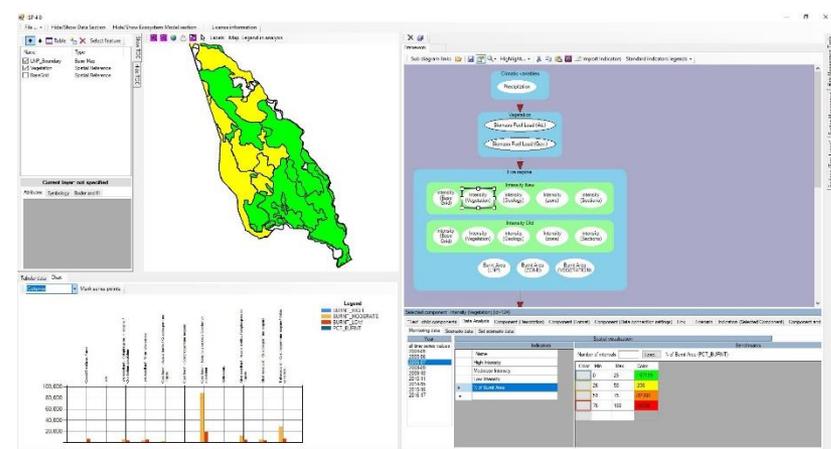
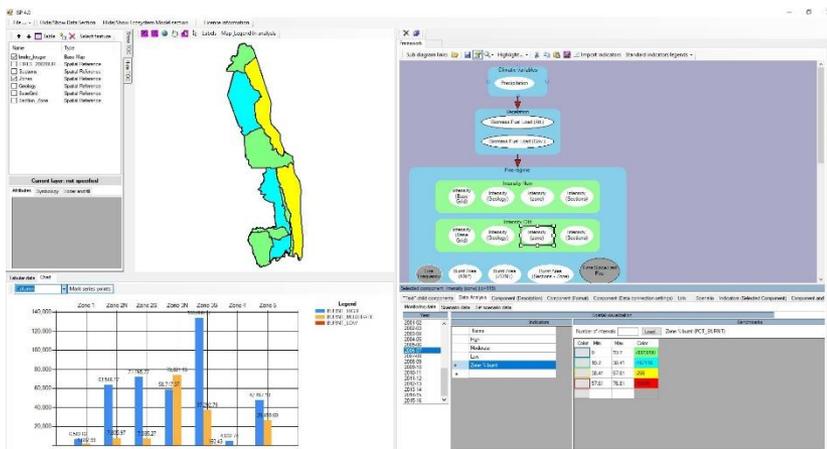
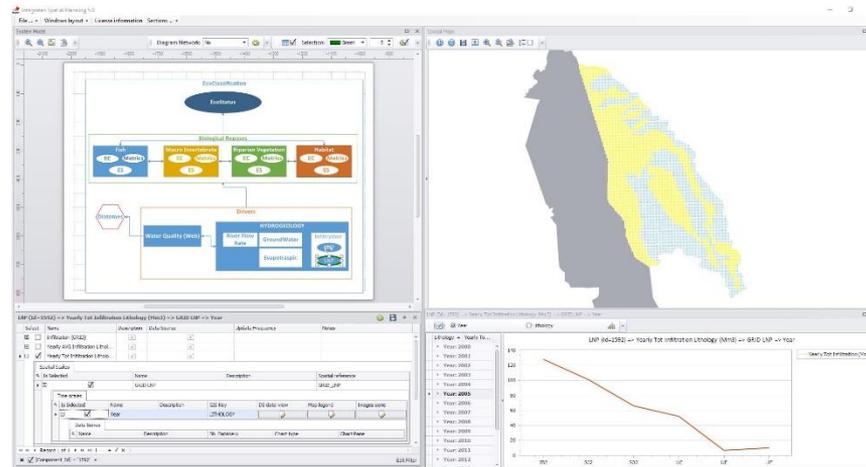
The main content area features the text: "Pilot Version of the biodiversity network of Mozambique: a portal for access to biodiversity information." Below this text is a search input field with the placeholder text "Enter the scientific name then hit <ENTER>". A blue button labeled "Advanced Search" is positioned below the search field.

Below the search area, a section titled "DATA FROM PARTNER INSTITUTIONS" displays four logos and their corresponding data counts:

Institution Logo	Data Count
	1164
	81499
	11769
	123551

The bottom of the browser window shows the Windows taskbar with several open files: "water_dss.JPG", "fire_dss_2.JPG", "fire_dss.JPG", and "wetransfer-9c1542.zip". The system tray on the right shows the date and time as "4:01 AM 9/27/2018" and the language as "ITA".

Transboundary protected area management



Conclusions

- Despite some improvements and local scale success biodiversity is under threat and negative trends are expected to continue.
- Even though we considered a time-lag, current instruments seem to be not fully effective to this purpose.
- The dissemination and implementation at all levels of a structured, systemic, participatory, quantitative and science-based approach to land and sea management is the only feasible way to significantly contribute to the CBD goals.