



# Earth Observation for Environmental Management

International trends & developments

How to promote earth observation  
applications?

How to get funding?

Capacity building



## ***0. Introduction***

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HCP international:  
consulting, marketing of earth observation

Coordinator GEONetCab:  
project for promotion & capacity building of  
earth observation applications



## *Earth observation applications*

- On the verge of reaching new user communities
- These new user communities need to be involved
- Weakest link / last mile aspects are important
- Marketing needed: promotion & capacity building



## *Life cycle of products & services*

Initialization

System analysis & design

Rapid prototyping

System development

Implementation

Post-implementation



MARKETING EARTH OBSERVATION  
PRODUCTS AND SERVICES

PART # 1





## *Assessment of business & funding opportunities*

- Categories of environmental management products & services
- Life cycle phase of product or service
- Regional context, level of technological & economic development
- Optimum marketing mix



***1. International trends & developments in environmental management***



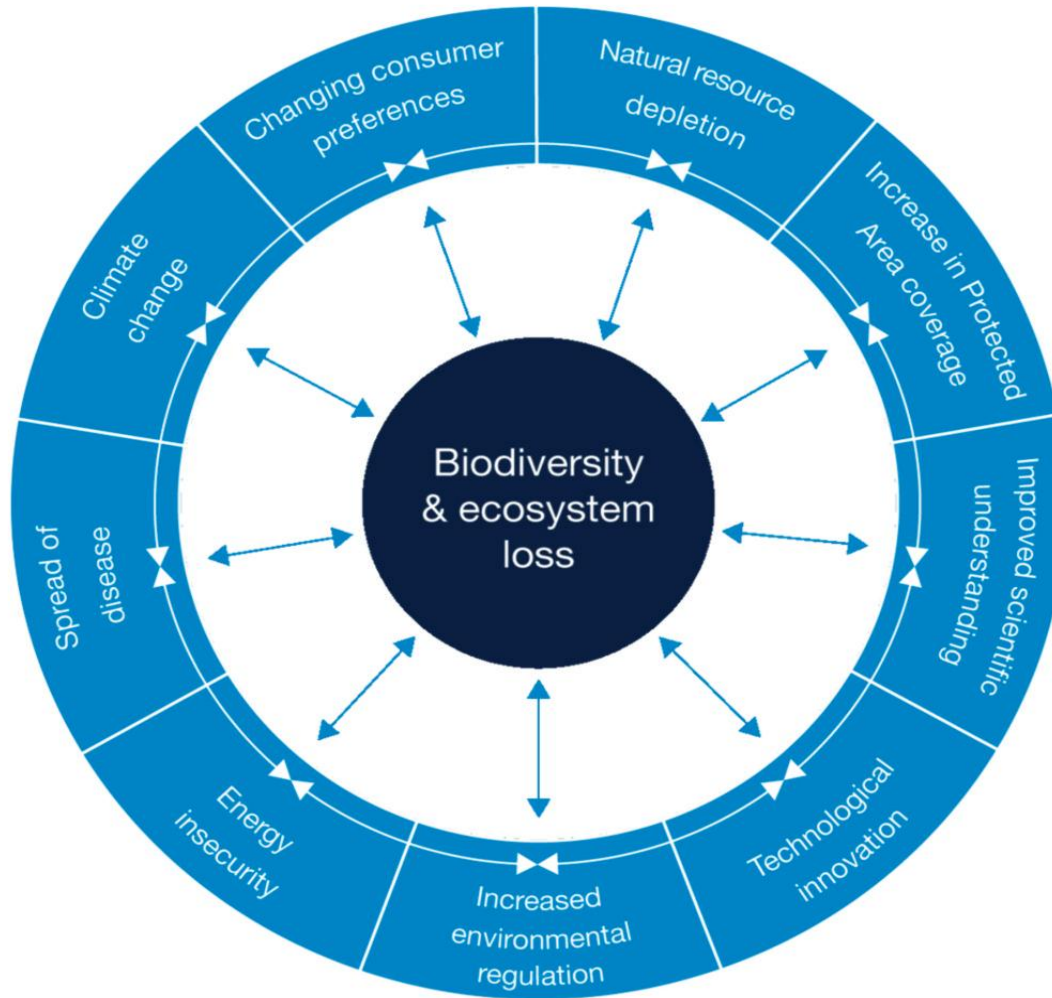
## *Payment for Ecosystem Services (PES)*

### *The Economics of Ecosystems and Biodiversity (TEEB)*

Studies on how to estimate economic benefits of management of the environment for:

- Business
- Policy makers
- Local and regional authorities

# Potential losses





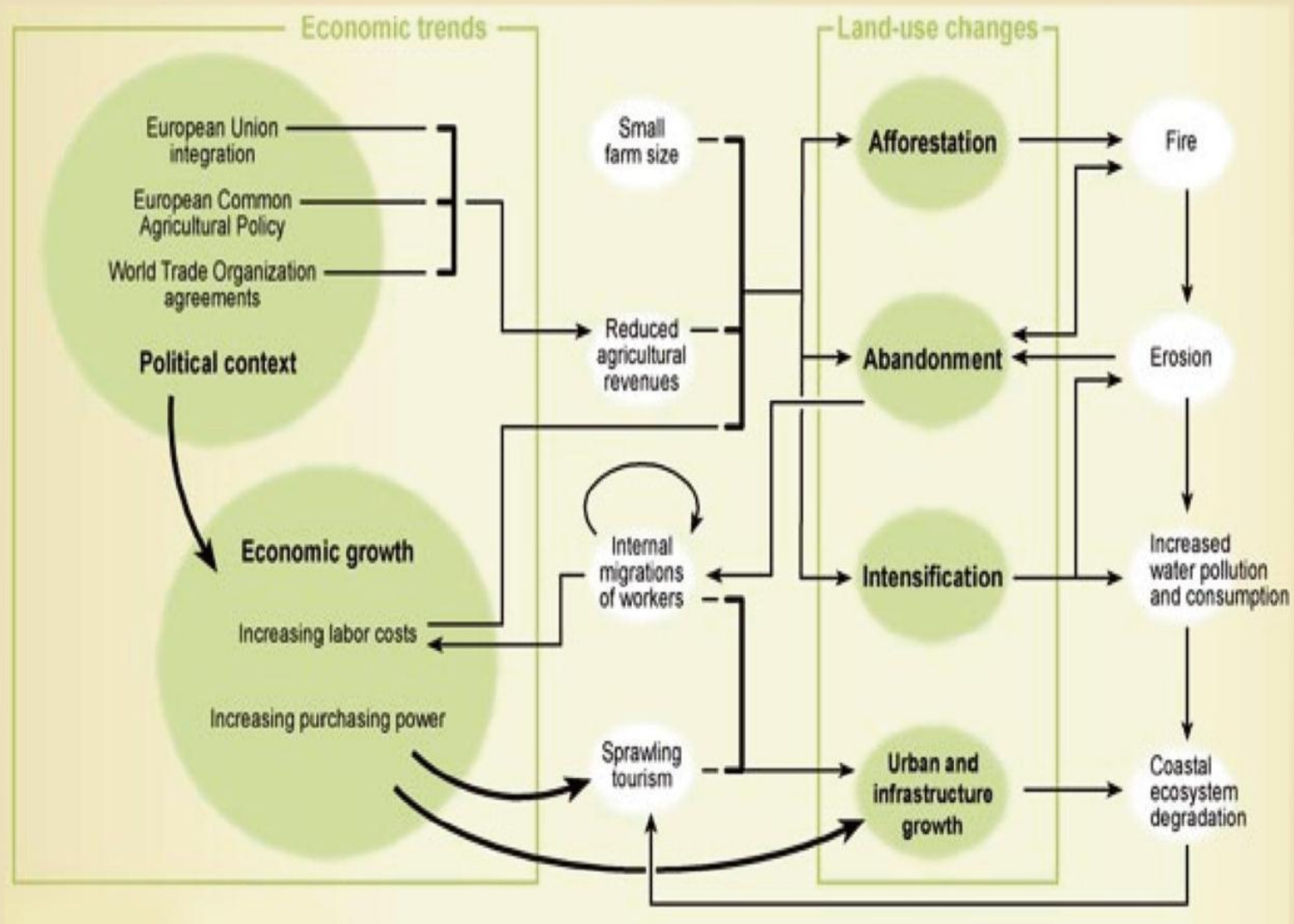
## *6 major challenges*

- Freshwater scarcity
- Climate change
- Habitat change
- Invasive species
- Overexploitation of oceans
- Nutrient overloading

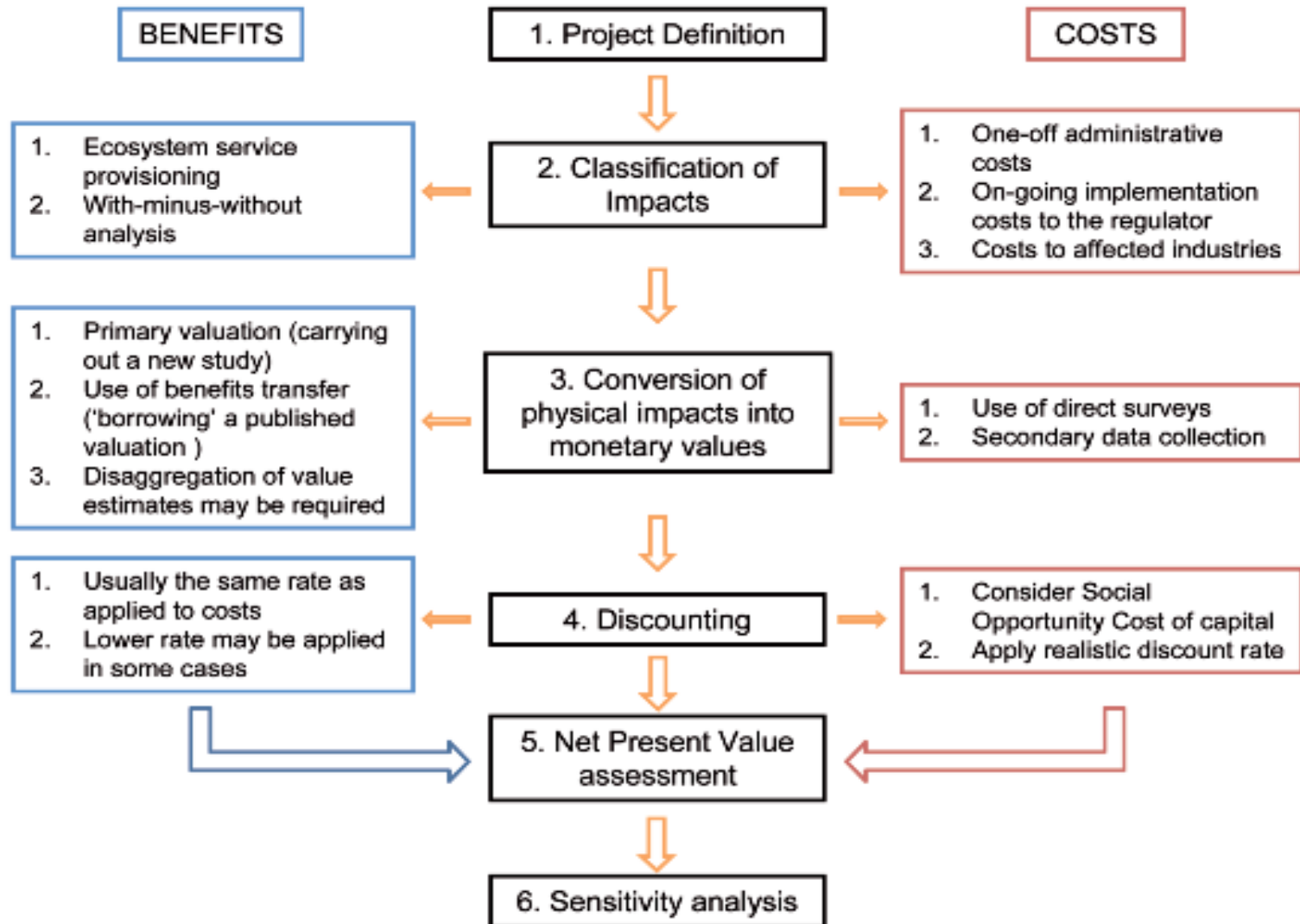
## *Examples of standards, frameworks & methodologies*

- International certification, such as FSC
- Individual standards, such as Starbucks' C.A.F.E.

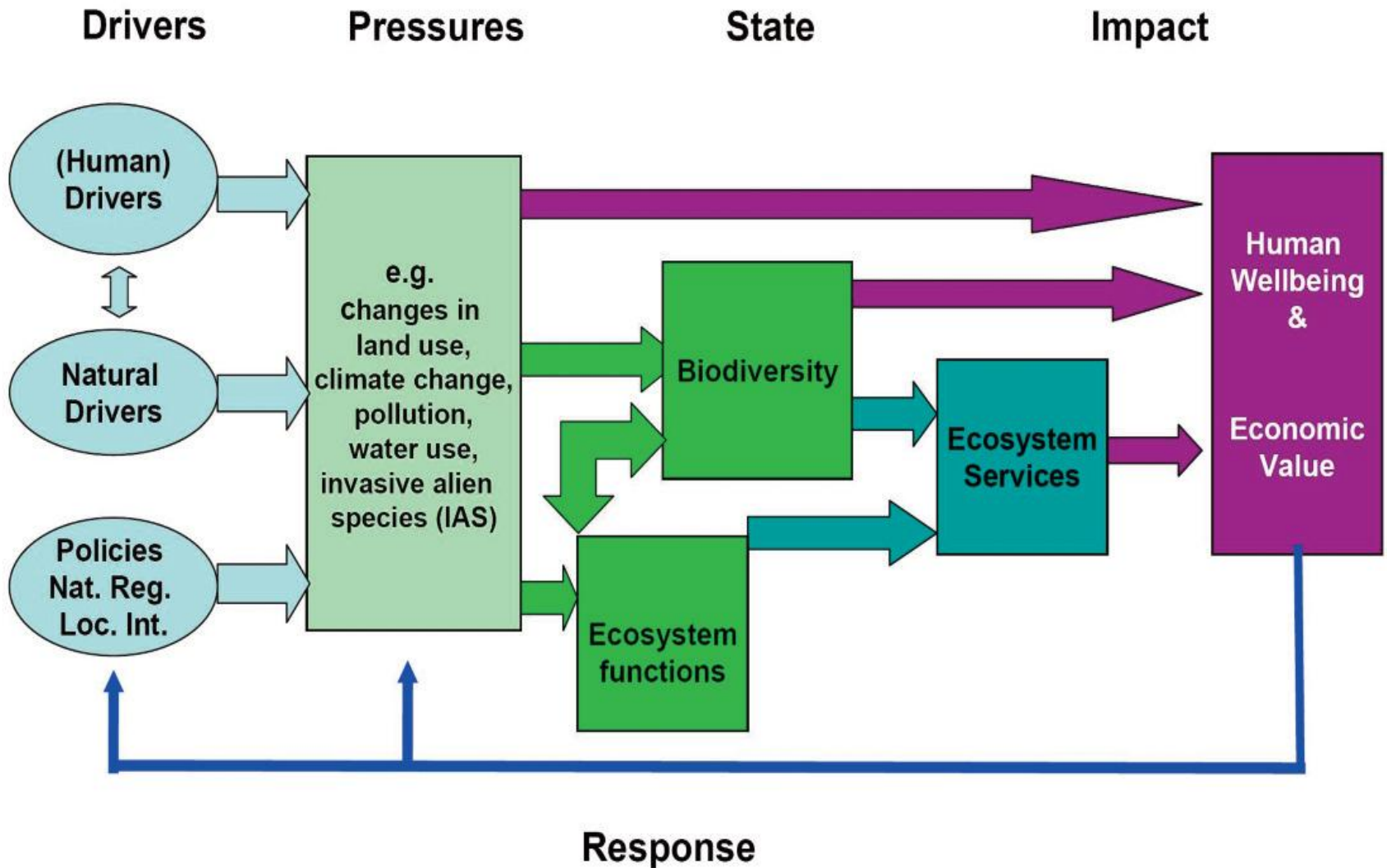
# Major drivers (Europe)



# Cost-benefit analysis



# DPSIR framework



# *What can be done? What message?*

*(next page)*

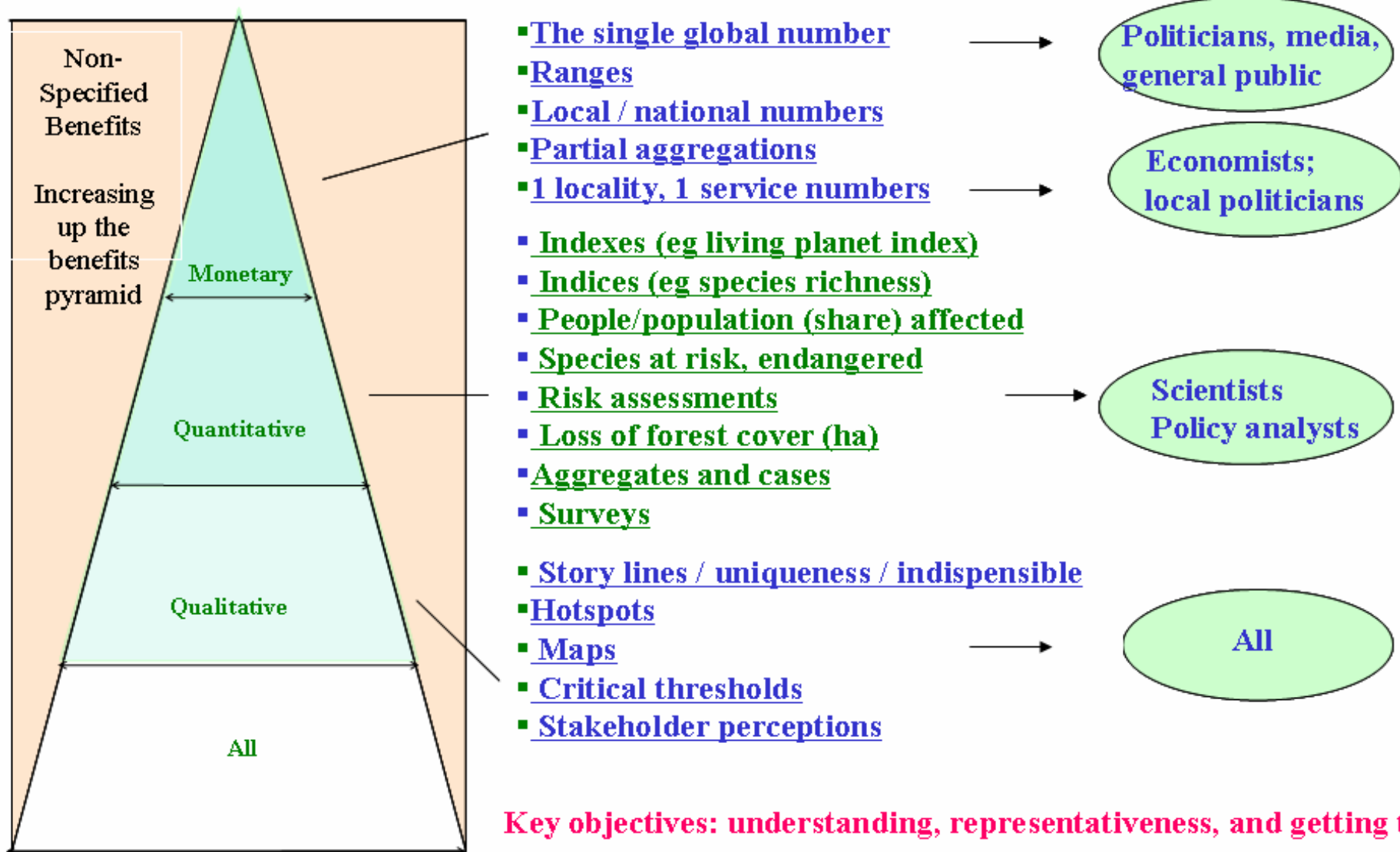
Environmentally oriented policies and public investment as life insurance (rather than luxury)

Certification & labeling

Payments for ecosystem services - market profiles:

- Carbon: compliant & voluntary carbon forestry
- Water: compliant water quality trading, voluntary watershed management payments, government-mediated watershed PES
- Biodiversity: compliant & voluntary biodiversity offsets, government-mediated biodiversity PES, individual fisheries quotas
- Bundled: certified agricultural products

# Different measures to represent the monetary & non-monetary benefits. Who is interested in what & how can they best be combined?



**Key objectives: understanding, representativeness, and getting the message across**

## *Key principles of valuation practices*

1. The focus of valuation should be on marginal changes rather than the “total” value of an ecosystem.
2. Valuation of ecosystem services must be context specific, ecosystem-specific, and relevant to the initial state of the ecosystem.
3. Good practices in “benefits transfer” need to be adapted to biodiversity valuation, while more work is needed on how to aggregate the values of marginal changes.
4. Values should be guided by the perception of the beneficiaries.
5. Participatory approaches and ways of embedding the preferences of local communities may be used to help make valuation more accepted.
6. Issues of irreversibility and resilience must be kept in mind.
7. Substantiating bio-physical linkages helps the valuation exercise and contributes to its credibility.
8. There are inevitable uncertainties in the valuation of ecosystem services, so a sensitivity analysis should be provided for decision makers.
9. Valuation has the potential to shed light on conflicting goals and trade-offs but it should be presented in combination with other qualitative and quantitative information, and it might not be the last word.



## *Future policy priorities (EEA)*

- Better implementation and further strengthening of current environmental priorities
- Dedicated management of natural capital and ecosystem services
- Coherent integration of environmental considerations across the many sectoral policy domains
- Transformation to a green economy





## *Considerations*

### *– example of regional strategy (EEA)*

- Eco-innovation in products and services
- Europe has first-mover advantage in air pollution reduction, water and waste management, eco-efficient technologies, resource-efficient architecture, eco-tourism, green infrastructure and green financial instruments.
- Combining climate change mitigation and air pollution abatement legislation could deliver benefits in the order of EUR 10 billion per year through reductions in damage to public health and ecosystems.
- Key elements: European research programmes, European space and EO policy (including GMES and Galileo), INSPIRE and SEIS
- Implement information systems in support to EU 2020 strategy: cloud computing, smart grids and mobile GIS.



## ***2. Steps to promote earth observation for environmental management***



## *State-of-the-art*

Earth observation is new technology.

Learn technical skills, but when back in professional practice, it has to be put to good use.

That involves 'selling' it.

How to do that?

To whom? Could be your own boss, local authorities, communities, etc.



## *Categories of products and services*

- marine and coastal ecosystems (global/regional)
- terrestrial and freshwater ecosystems (global/regional)
- biogeophysical variables (vegetation, soil, radiation, water cycle)
- local applications, such as protected areas
- biodiversity modelling & monitoring
- invasive species monitoring
- ecological forecasting

# *Spatial aspects of ecosystems and biodiversity management*

- Presence and abundance of organisms, their interactions with the environment, and the other ecological processes form spatial patterns over time.
- Patterns of disturbance are heterogeneous and spatially structured.
- Ecological models that account for spatial processes are more realistic and powerful than those that do not.
- Prepare, monitor and achieve assessments and goals, quality data and information must be registered and accurately to both place and time.

## *Where has Earth observation added value?*

### **Population ecology**

- GPS, satellite-telemetry
- Landscape categories may become barriers or corridors to in connection between population clusters.
- Models of landscape dynamics, using geospatial data, generate maps of suitable habitat over time for input to metapopulation models.

## *Where has Earth observation added value?*

### **Landscape ecology**

- Interactions between species occur at spatial scales determined in part by the mobility of the organisms.
- Basic element of land inventory for resource management.
- Multi-temporal and hyper-temporal remote sensing and image analysis allow annual cycles, interannual variability, and state-changing anomalies caused by disturbance and succession in ecological communities to be tracked through biophysical measures of productivity, photosynthetic activity, foliar chlorophyll concentration, standing biomass, leaf area index, vegetation species type, and so on.
- Change detection to map changes in land cover that result from natural or anthropogenic disturbances.

## *Where has Earth observation added value?*

### **Ecosystem ecology**

- Interactions between organisms and the environment with an emphasis on the exchange and flow of matter and energy between biota, water, soil and atmosphere.
- Evaluating ecosystem services in support of sustainable ecosystem management requires the use of (spatial) models.
- Inclusion of individual species or functional types in ecosystem modeling and models linked to carbon.

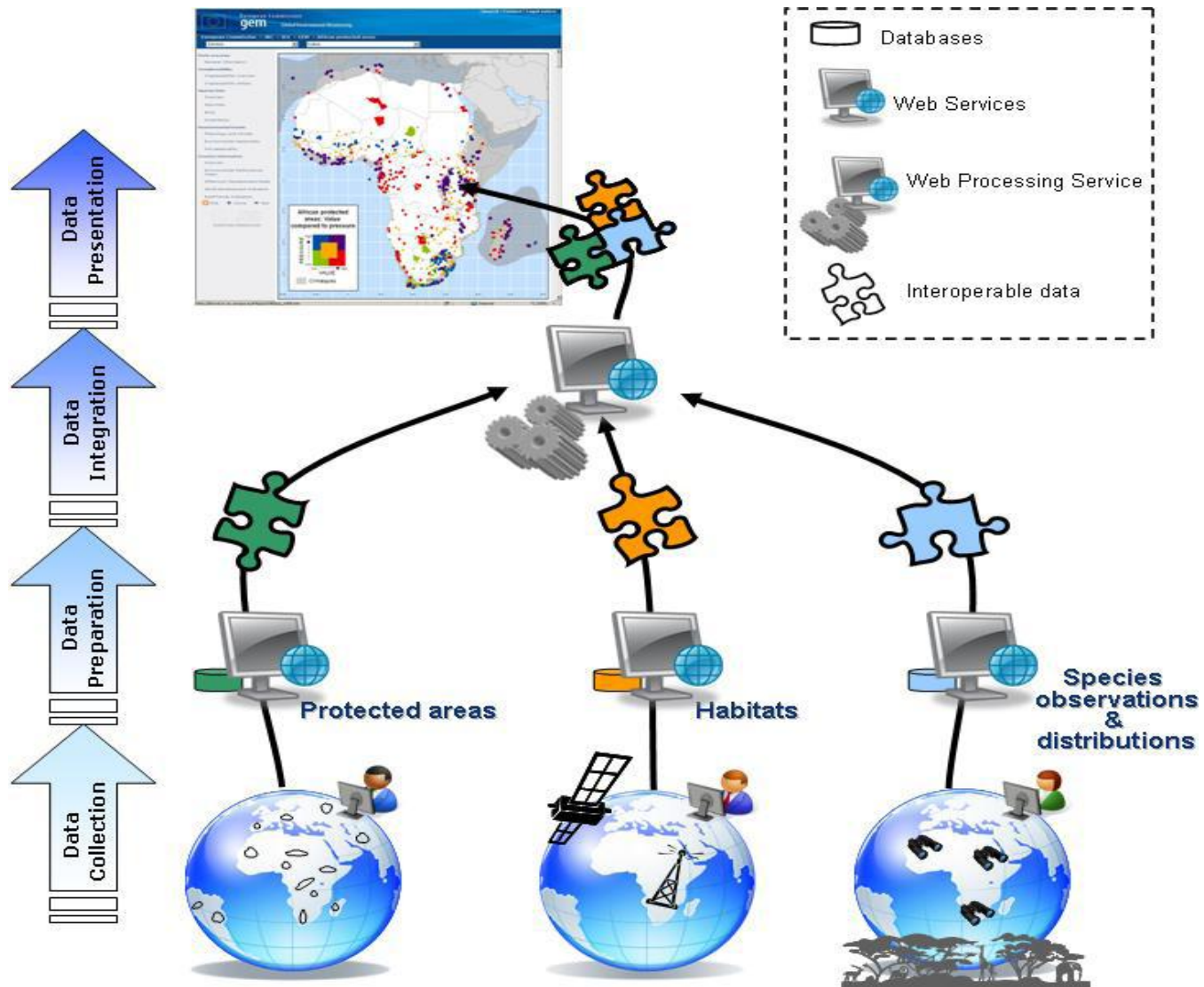


## *Where has Earth observation added value?*

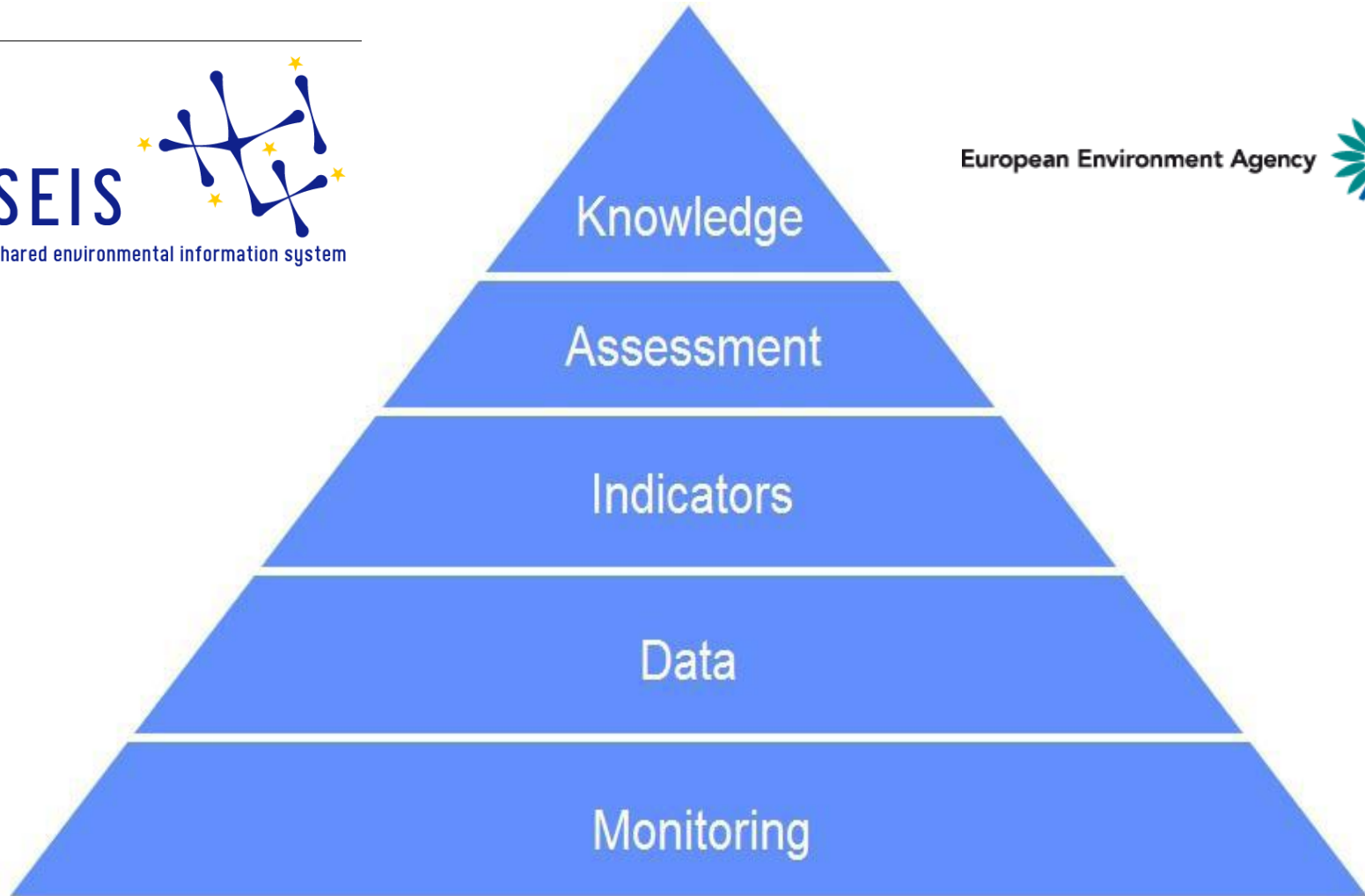
### **Ecosystem goods and services**

- Assessing the status of ecosystem goods and services, provided by the regulation, habitat, production, and information functions of ecosystems.
- Predicting the impact of habitat loss and fragmentation on biodiversity elements and ecosystems processes.

# Example: Digital Observatory for Protected Areas (Africa)



# Example: Shared Environmental Information System (Europe)



## *More references:*

**GEO Task US-09-01a: Critical Earth Observations Priorities**  
*- Ecosystems Societal Benefit Area*

**GEO Task US-09-01a: Critical Earth Observations Priorities**  
*- Biodiversity Societal Benefit Area*

*Overview of observations needs in terms of coverage / extent, spatial resolution, temporal resolution and other aspects + indication of priorities*

**Environmental performance index (Yale, CIESIN, WEF, JRC)**  
*Assessing and comparing environmental performance by country*

**Mapping wetlands using earth observation techniques**  
*Technical background + overview of applications*

## *More references (2):*

**Sensor web technology for sharing environmental data across Europe** *Facilitate exchange of near real-time data exchange between EEA and EU member states, based on open standard web-based approach*

**Impact of oil palm plantations on peatland conversion in Sarawak 2005 – 2010 (SARVision)**  
*Study using remote sensing showing developments*

**Monitoring of mangrove degradation East Kalimantan**  
*Practical example*

**Remote sensing of forest transition and its ecosystem impacts in mountain environments** *Practical example*

**A new map of standardized terrestrial ecosystems of the conterminous United States (USGS)**  
*Overview of integrated and comprehensive ecosystem mapping exercise*

## *More references (3):*

**Adequacy of Biodiversity Observation Systems to support the CBD 2020 Targets** *Comprehensive overview of needed and existing observation systems for the Convention on Biological Diversity by the GEO Biodiversity Observation Network GEOBON)*

**Sourcebook on Remote Sensing and Biodiversity Indicators (CBD)** *Potential and examples on forests, dry and sub-humid lands, inland waters, marine and coastal waters, trends in species populations, coverage of protected areas, habitat fragmentation and connectivity, trends in invasive alien species*

**Biodiversity and Climate Change (Convention on Biological Diversity)** *Overview of impact of climate change and adaptation options for polar ecosystems, agricultural ecosystems, dry and sub-humid lands ecosystems, forest ecosystems, inland waters ecosystems, island ecosystems, marine and coastal ecosystems and mountain ecosystems*

**Design of a plan for an integrated biodiversity observing system in space and time (European Biodiversity Observation Network – EBONE)** *Plan for identification of biodiversity indicators, their observation and predictive capabilities*



## *Marketing of earth observation*

Marketing of earth observation is difficult.

New technology, few big companies, lots of small ones.

Lots of reports describing the bottlenecks, like reliability, data access, data continuity, etc.

Means that relatively a lot of effort is needed to promote EO.

## *Points to keep in mind:*

- Look for opportunities, where can you have most success in a short time: quick-wins.
- Target the right audience to start with: who would be interested and listen to you?
- Identify the problem that they are trying to solve: is it the same as yours?
- Learn to speak the same language. Example 'biota': this is a term most managers do not understand and do not care about. Use terms related to ecosystem management and biodiversity conservation.
- Look for examples from elsewhere (success stories): solutions that work and are affordable.





***Be patient:  
introduction of new technology  
and / or applications takes time***



### ***3. How to get funding for your activities***



## *Approach*

- Share information on your subject (a thing you are doing) and think that is interesting for your contact, then look for the link. Could this solve a problem for your partner? Are adjustments necessary? Need other parties be involved? Take it from there.
- LEADS, LEADS, LEADS



## *How?*

- Establish your network.
- Look for opportunities.
- Write a good proposal.
- Promise much, but not too much.



## *Proposal outline*

*(more detailed version in separate document, see also [www.geonetcab.eu](http://www.geonetcab.eu) )*

1. Introduction / relevance
  2. Objective(s)
  3. Activities
  4. Output
  5. Management & evaluation
  6. Risk assessment
  7. Time schedule
  8. Budget
- Annexes



THE REGIONAL ENVIRONMENTAL CENTER  
*for Central and Eastern Europe*



## *Other references*

- Civicus: writing a funding proposal
- Michigan State University: guide for writing a funding proposal
- ESRI: writing a competitive GRANT application
- REC: project proposal writing



*Again:*

- *SHARED PROBLEM*
- *SHARED LANGUAGE*
- *SHARED SOLUTION*

If all else fails, try to link with a more popular (and easy to understand) topic.



## ***4. Capacity Building***





## *General*

Marketing is promotion + capacity building.

Especially for the introduction of new technologies capacity building is important at all levels.

Capacity building is the instrument to increase self-sufficiency and make solutions work.

## *Think of:*

- Different instruments for different levels: workshops for decision makers and awareness raising, detailed technical training for professionals.
- Provide follow-up. Getting funding for good capacity building is difficult: everybody agrees that it is important, but nobody has time.
- Training is usually part of funding of big projects that are managed by big companies or ministries, as a consequence capacity building is forgotten (in the end).
- Aim at small budgets that are available without having to tender.

## *Examples & references*

**The GBIF data portal: a practical “hands-on” tutorial** – *user guide to Global Biodiversity Information Facility*

**Guidelines for Biodiversity Monitoring and for Protected Areas (UNEP)** – *practical guide on how to go about it: definitions, scope, approach, sampling, monitoring*

**GEONetCab capacity building web** [www.geonetcab.eu](http://www.geonetcab.eu)  
*compilation of tutorials, references, open-source software, etc.*

**GEO Portal:** [www.earthobservations.org](http://www.earthobservations.org)

**Focal points:** *general appraisal of water resources, specialist information (such as improving on curve number method), historical analysis (making use of free and open data): integration with other services*

## *More references*

**A Rough Google Earth Guide**

**MEASURE Evaluation Global Positioning System Toolkit  
(USAID)**

**Handbook of Research on Developments and Trends in  
Wireless Sensor Networks: From Principle to Practice**



## Further details:

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