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Relationship & synergies between monitoring systems for carbon stock change and multiple benefits

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FAO FIAT PANIS

UNDP

UNEP

REDD+, carbon & multiple benefits

- Implementing REDD+ will require a system to establish the success of the mitigation actions
- Monitoring & reporting carbon emissions, removals, carbon stock and forest area changes
- REDD+ can generate multiple benefits – but to understand what these are and how they change - monitor multiple benefits

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REDD+, carbon & multiple benefits

- Which multiple benefits? How to monitor them? How to reduce cost burden?
- Are there any relationships between monitoring systems for carbon stock change and multiple benefits?
- Are there synergies between monitoring carbon stock change & multiple benefits?
- Should the two monitoring systems be distinct or combined into a single monitoring system?
- Should the monitoring system for multiple benefits be mandatory or voluntary?

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Why a monitoring system For multiple benefits?

Decision 2/CP.13

Recognizing that reducing emissions from deforestation and forest degradation in developing countries can promote co-benefits and may complement the aims and objectives of other relevant international conventions and agreements,

Co-Benefits & Safeguards

Ad Hoc Working Group on Long-term Cooperative Action under the Convention

Text to facilitate negotiations among Parties

Note by the Chair*

2. *Further affirms* that when undertaking activities referred to in paragraph 3 below, the following safeguards should be promoted and supported:

(a) Actions complement or are consistent with the objectives of national forest programmes and relevant international conventions and agreements;

(b) Transparent and effective national forest governance structures, taking into account national legislation and sovereignty;

(c) Respect for the knowledge and rights of indigenous peoples and members of local communities, by taking into account relevant international obligations, national circumstances and laws, and noting that the General Assembly has adopted the United Nations Declaration on the Rights of Indigenous Peoples;

(d) Full and effective participation of relevant stakeholders, including, in particular, indigenous peoples and local communities in actions referred to in paragraphs 3 and 5 below;

(e) Actions that are consistent with the conservation of natural forests and biological diversity, ensuring that actions referred to in paragraph 3 below are not used for the conversion of natural forests, but are instead used to incentivize the protection and conservation of natural forests and their ecosystem services, and to enhance other social and environmental benefits;

(f) Actions to address the risks of reversals;

(g) Actions to reduce displacement of emissions;

FCCC/AWGLCA/2010/6
17 May 2010

Which multiple benefits?

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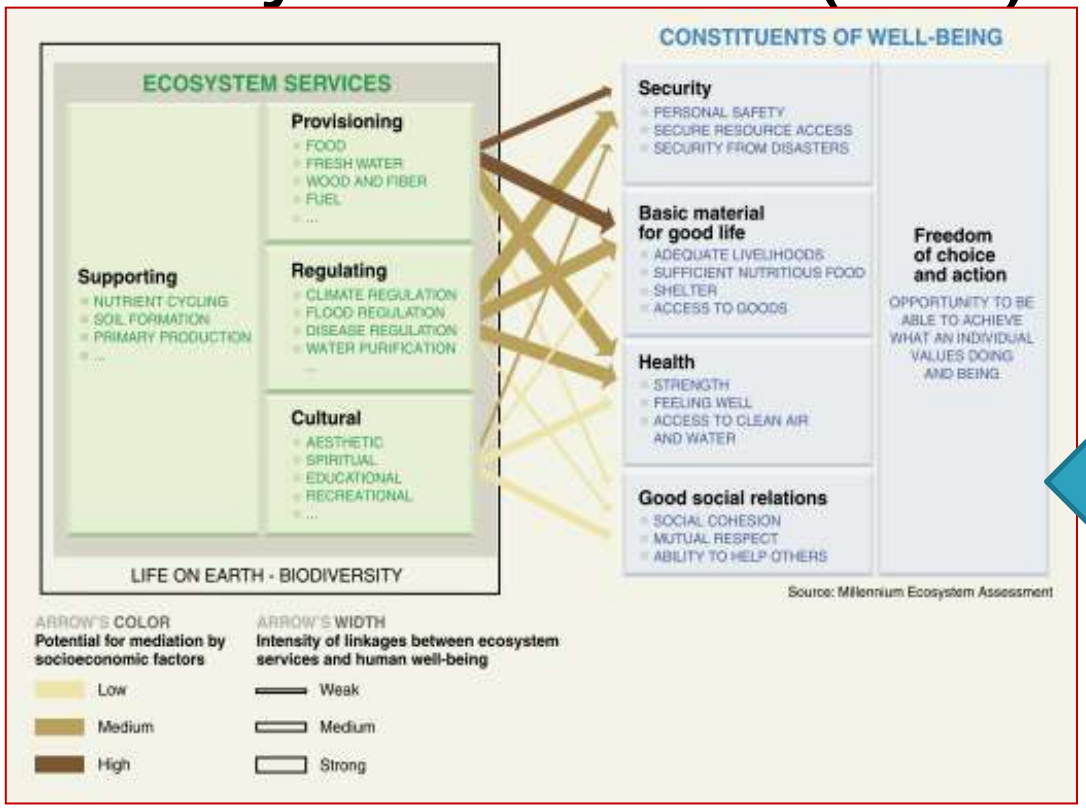
	International (UNFCCC) reporting requirements	Further National REDD implementation requirements, to be defined at country level
Carbon	Stock and changes of carbon pools in the six land use categories	Localized carbon information is required on carbon in ecosystems, landscape, species, and tree components for each category of land use, and tailored to national REDD implementation.
Multiple Benefits (co-benefits)	(Co-benefits Incentive Systems)	**Goods (Non-wood and wood products)** **Ecosystem and other services (biodiversity conservation, water conservation, soil Conservation, cultural and spiritual values, forest pasture)** Uses and users of goods and services Socio-economic, livelihoods, food security and Poverty indicators Land tenure

Indicative information requirements for REDD implementation, related to carbon, natural resources and their management and uses (Framework for Action 2009-2014 on MRV, UN-REDD Programme; May 2010)

Which multiple benefits?

Ecosystem services (MEA)



Ecosystem Aspects of multiple benefits

Some networks or monitoring activities related to ecosystem services

International Initiatives

- **GEO-BON** (Global Earth Observation - Biodiversity Observation Network) **& GEO-FCT** (Forest Carbon Tracking);
- **GFW, WRI** (Global Forest Watch; World Resources Institute);
- **GOFC-GOLD** (Global Observation of Forest and Land Cover Dynamics);
- **FRA, FAO** (Global Forest Resources Assessments of the Food and Agricultural Organization of United Nations);
- **ILTER** (International Long Term Ecological Research Network)
- **TEMS, GTOS** (DBs of Terrestrial Ecosystem Monitoring Sites by the Global Terrestrial Observing System)
- **IABIN** (Inter-American Biodiversity Information Network);
- **GBIF**(Global Biodiversity Information facility);

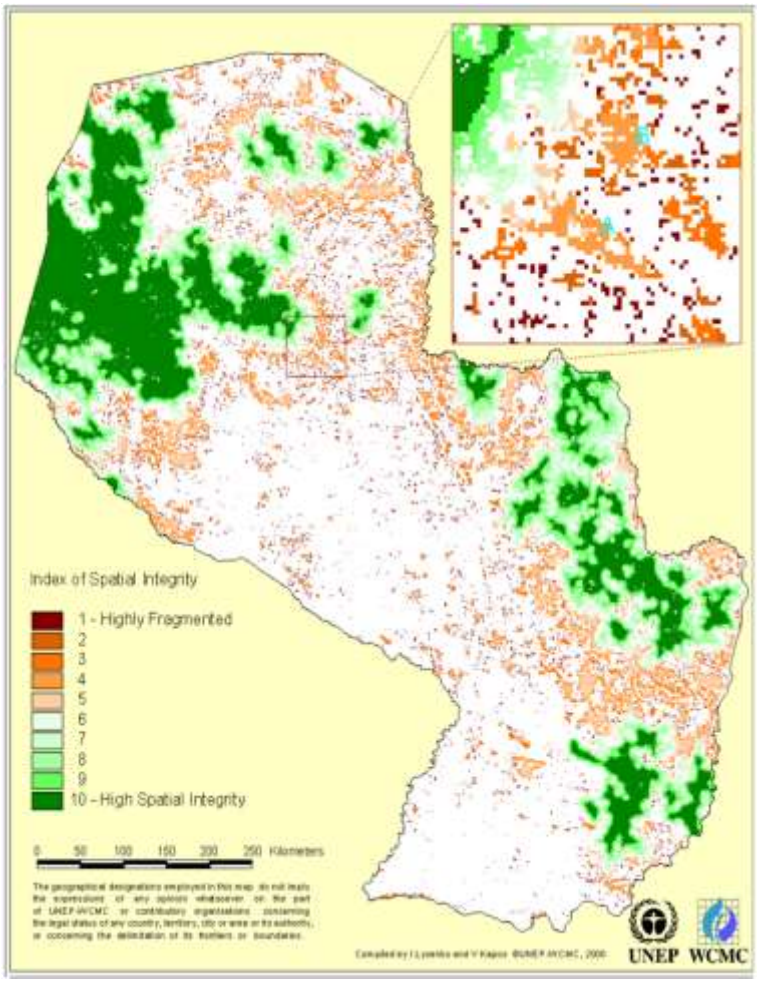
National Initiatives

- **NATIONAL FOREST INVENTORIES**
- **OTHER MONITORING SYSTEMS**
  - Satellite Land Monitoring System;
  - National Environmental Agencies;
  - Water Resources Agencies
  - Independent Monitoring Systems
- **LTER** (Long Term Ecological Research Network)
- **LOCAL COMMUNITY MONITORING**

Biodiversity

"***Technological advances, refined methodologies and growing databases make our systems for monitoring biodiversity increasingly effective"….***
"remote sensing is without a doubt one of the indispensable tools for detecting changes in multiple facets of biodiversity over time"

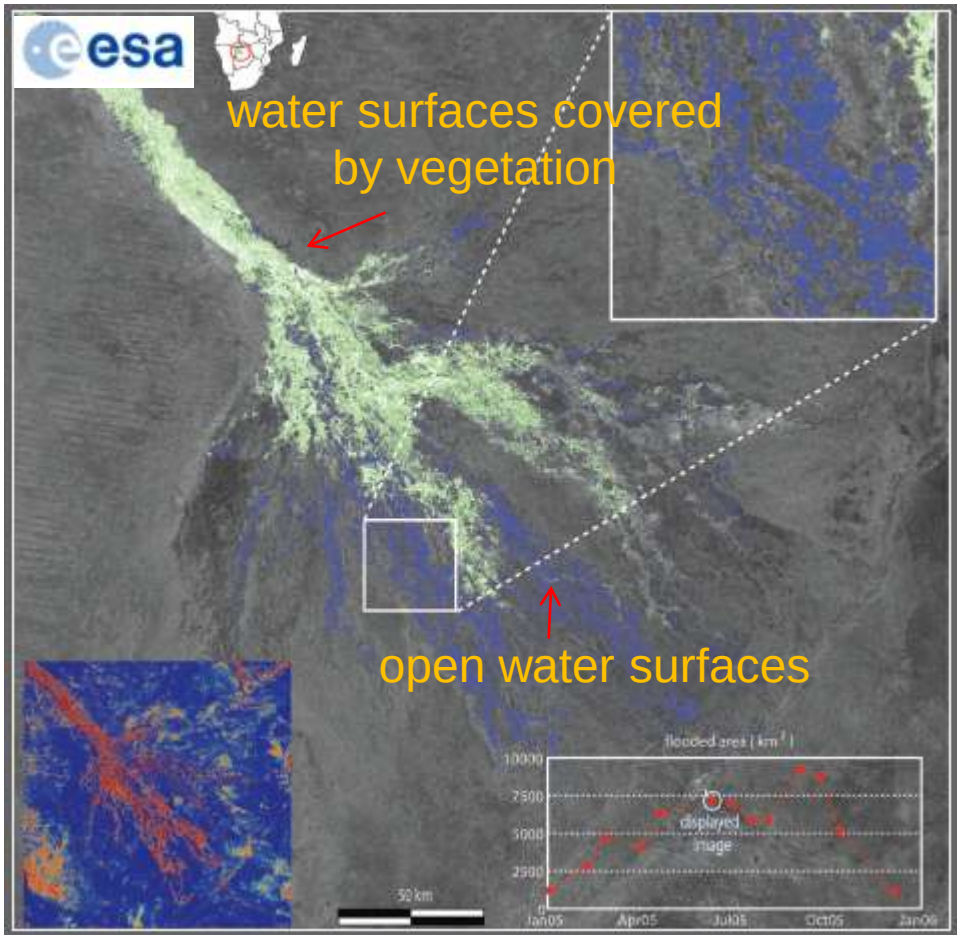
Forest Fragmentation



The forest cover of Paraguay displayed by integrity classes derived from the index of Forest Spatial Integrity

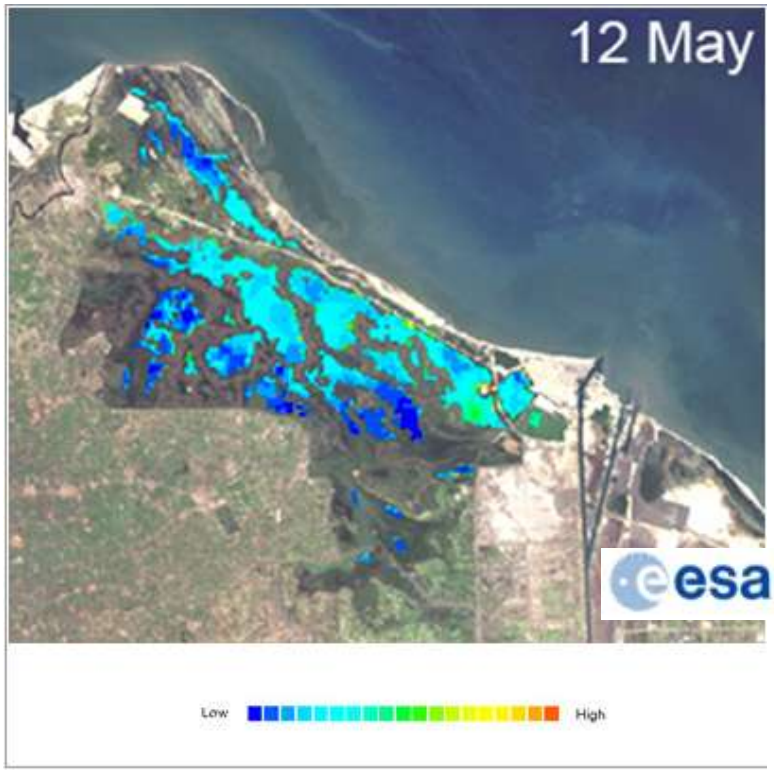
Kapos et al. 2000

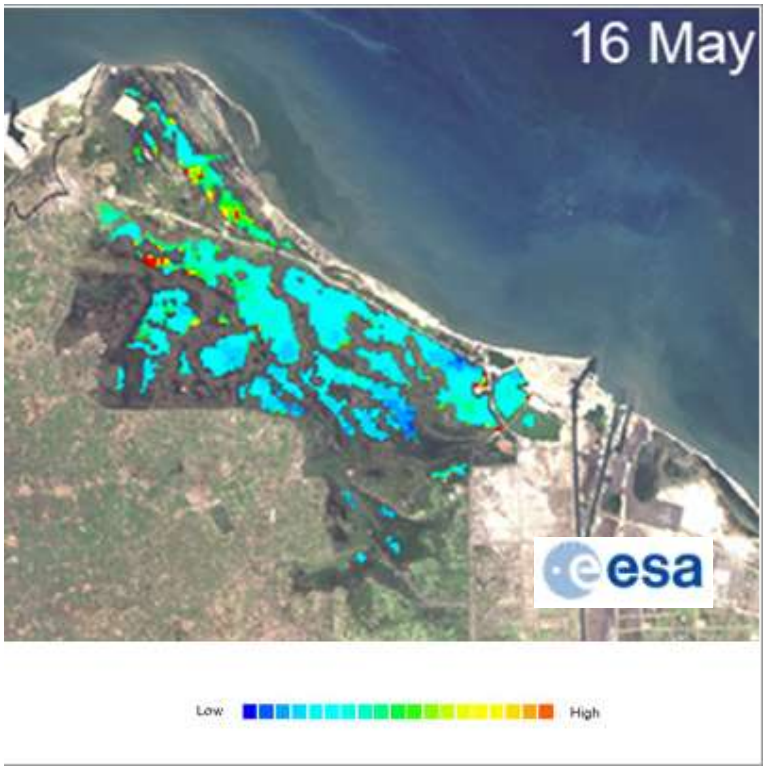
Flooding patterns



Flooding patterns of the Okavango Delta (Botswana) from Envisat Advanced Synthetic Aperture Radar (ASAR) time-series.

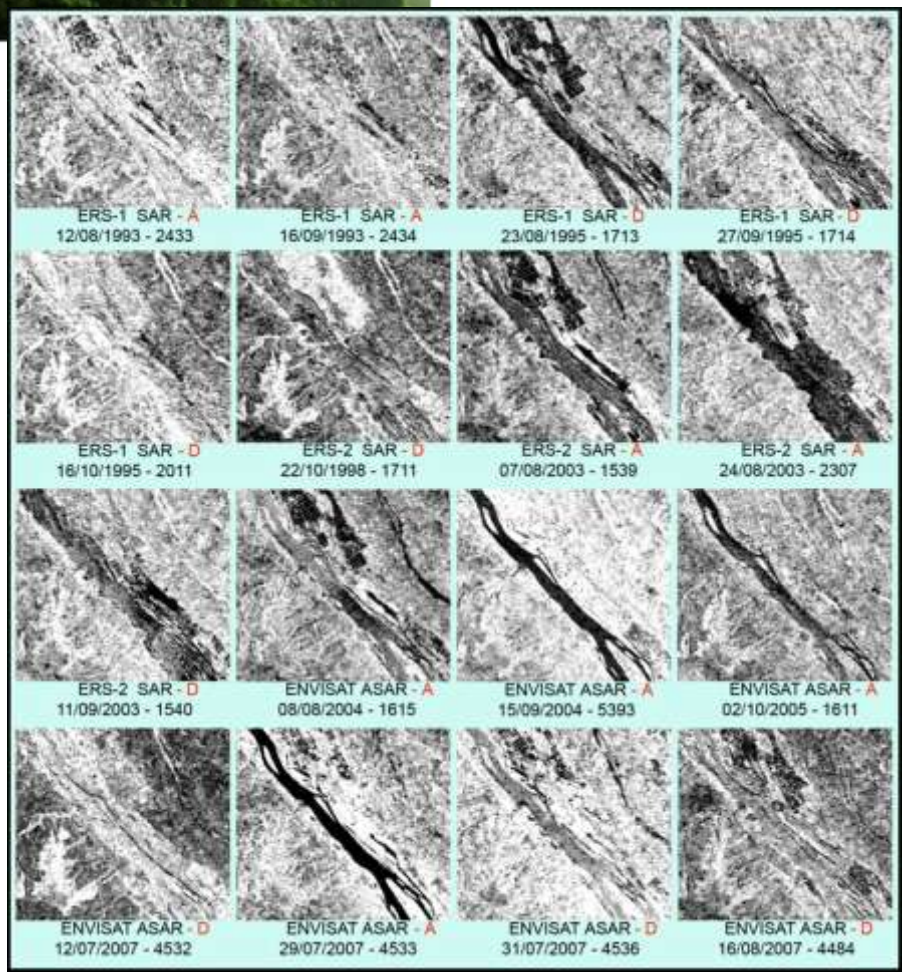
Water turbidity



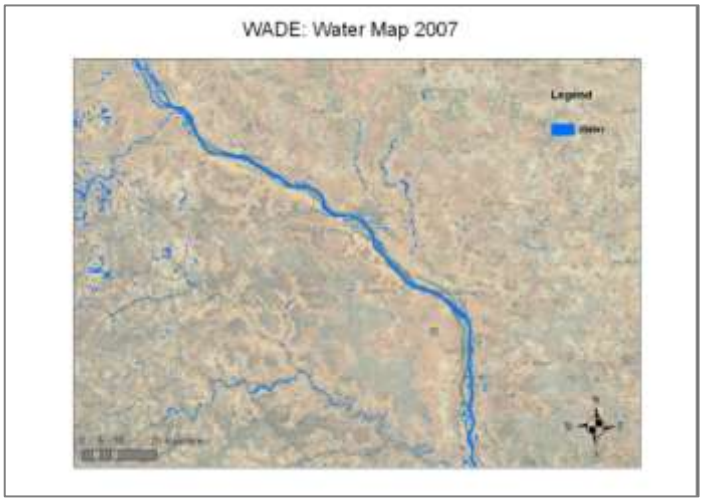


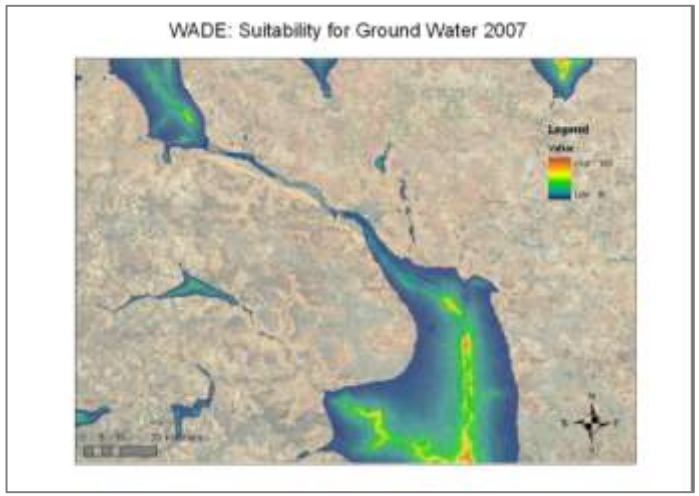
Relative **water turbidity** over the Lake Manzalah area in Egypt derived from Envisat MEdium Resolution Imaging Spectrometer (MERIS).

Water Map & Ground Water Suitability



Synthetic Aperture Radar (SAR) data from ESA's Envisat and ERS satellites over the Niger River.

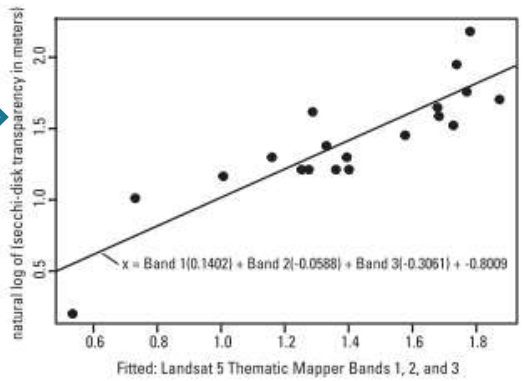


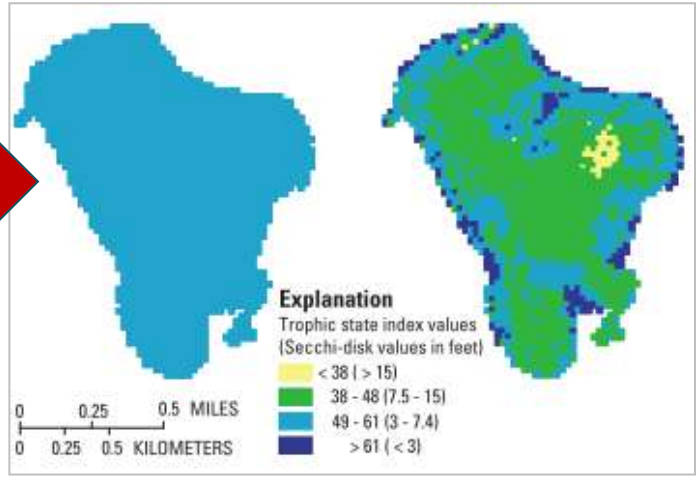


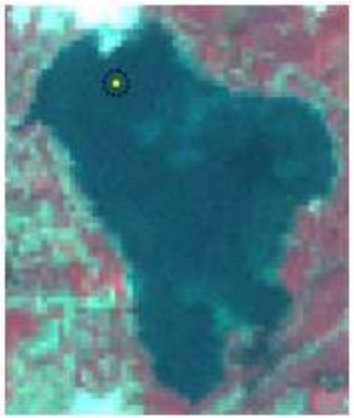
Lake trophic states

Lake trophic states and classification ranges for:

- trophic state index
- total phosphorus
- Secchi-disk transparency
- cholorophyll a.







Information averaged from nine cells surrounding a 2002 Secchi-disk transparency (SDT) measurement from a 2002 Landsat 5 TM satellite image of Lake Lansing, Michigan (USGS 2007).

Relationships

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Monitoring carbon stock changes for REDD+

Monitoring carbon stock change requires assessing:

(1) Location: i.e. land unit (ha); land use categories; carbon pools

(2) Quantification: carbon density (carbon ha^{-1}) and carbon stock (stratified by eco-regions, forest type, C pools)

(3) Changes: quantitatively variation of carbon stock over time

Monitoring carbon stock changes for REDD+

- different REDD+ activities and LULUCF

-different carbon pools & tier level

-different parameters/indicators all related to carbon

➡ IPCC guidance

➡ Remote sensing & ground-based inventories with different resolution, intensity & time frame (e.g. NFIs repeated every 5 yrs)

Monitoring changes of ecosystem aspects of multiple benefits for REDD+

Monitoring ecosystem aspects of multiple benefits requires assessing:

(1) **Location** : land unit (ha); eco-region; ecosystem; forest type; niche

(2) **Quantification**: quantity/quality of ecosystem aspects of multiple benefits (info could be also stratified)

(3) **Changes**: quantitative or qualitative variation of ecosystem aspects of multiple benefits

Monitoring changes of ecosystem aspects of multiple benefits for REDD+

- different natural & human-induced activities (including also REDD+ activities) & LULUCF

-Different parameters/indicators related to different ecosystem services (biodiversity, timber, NTFPs, soil, water, etc.)

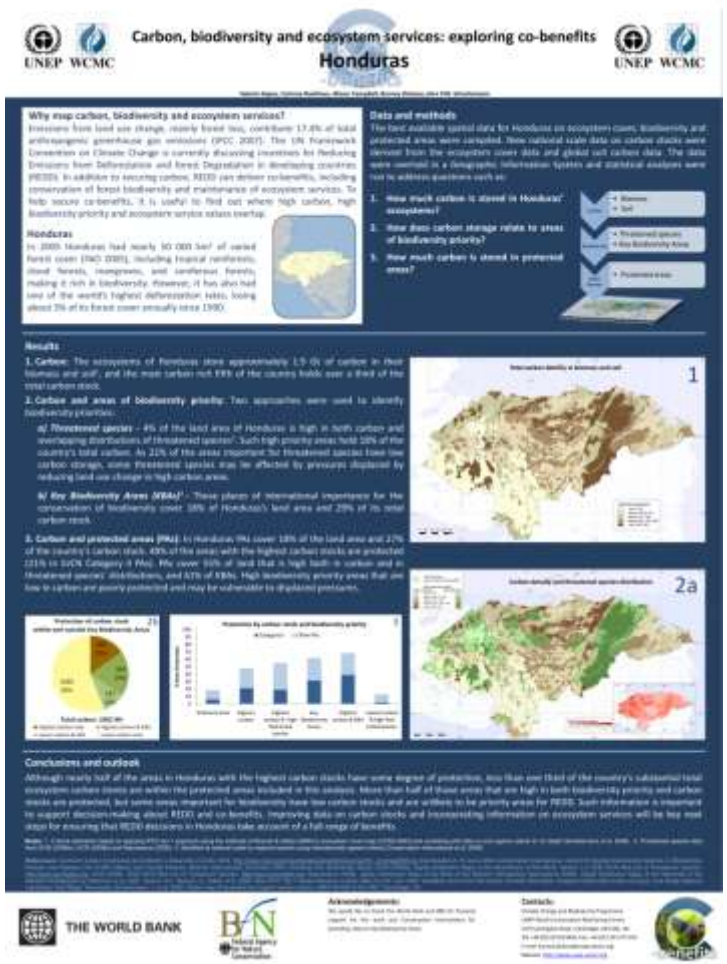
➡ No agreed standards

➡ Remote sensing & ground-based measurements with different resolution, intensity & time frame

Monitoring changes of ecosystem aspects of multiple benefits for REDD+

		Carbon stock	Ecosystem aspects of multiple benefits
REMOTE SENSING	Coarse to medium resolution	e.g. land use categories, forest cover, deforestation, etc.	e.g. topography, forest cover and location and boundaries of different ecosystem and resources, etc.
	High resolution	e.g. Forest degradation; conservation and enhancement of forest carbon stock, etc.	e.g. Forest fragmentation; continuity of streams, etc.
	Multispectral Imagery	e.g. Forest type or species differentiation, Indicator of growth rate, vegetation cover and density, NDVI, soil types, etc.	e.g. composition and thermal properties of ground, turbidity, temperature or pollution of lake and/or river, etc.
	RADAR/ LiDAR	biomass; tree height	Degree of vulnerability of land to floods, landslide, erosion or subsidence, etc.
GROUND-BASED MEASUREMENTS		Calibration of RS; additional information (DBH, carbon pools; allometric equations; BECF), etc.	timber; NTFPs; biodiversity; soil, water and air quality, etc.

Exploring relationships between carbon and **ecosystem aspects of** multiple benefits in REDD+



http://www.unep-wcmc.org/climate/publications.aspx

Synergies

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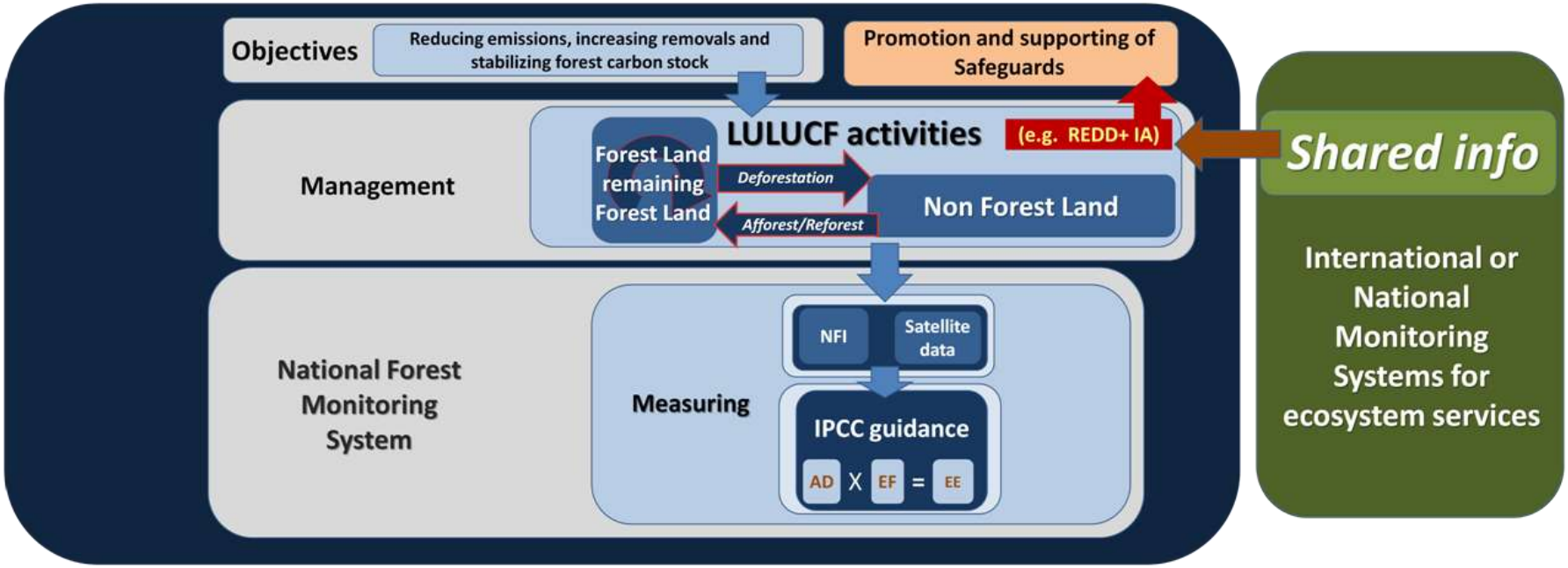
Monitoring system for carbon stock change in REDD+



REDD+IA: REDD+ Impact Assessment
NFI: National forest inventory; **AD**: Activity Data;;
EF: Emission Factor; **E.E**: Emission Estimate

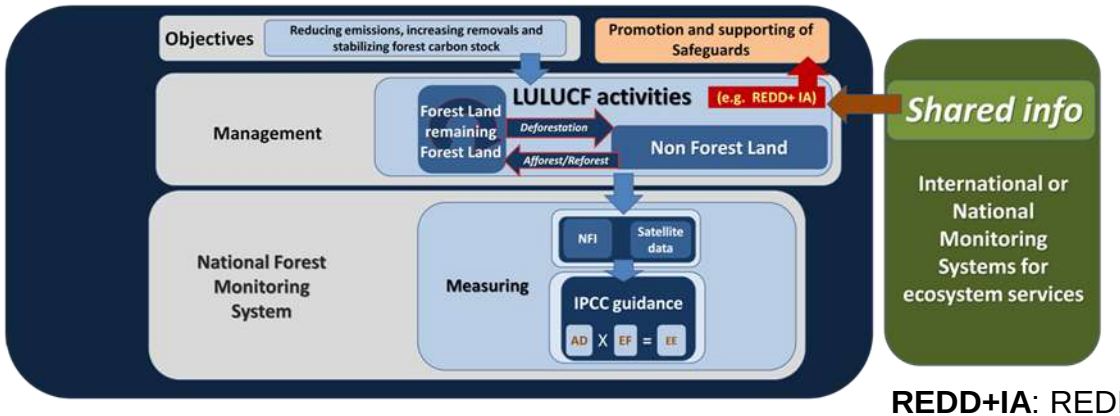
Monitoring system for carbon stock change in REDD+

Clarity:

- Objectives of external monitoring system of ecosystem aspects of multiple benefits are not necessarily directed toward meeting REDD+ objectives;

Effectiveness :

- External monitoring systems of ecosystem services do not benefit from resources (e.g. RS and NFIs) utilised within the monitoring system for carbon stock change but these initiatives could provide information useful to support and promote safeguards;



REDD+IA: REDD+ Impact Assessment
NFI: National forest inventory; **AD**: Activity Data;;
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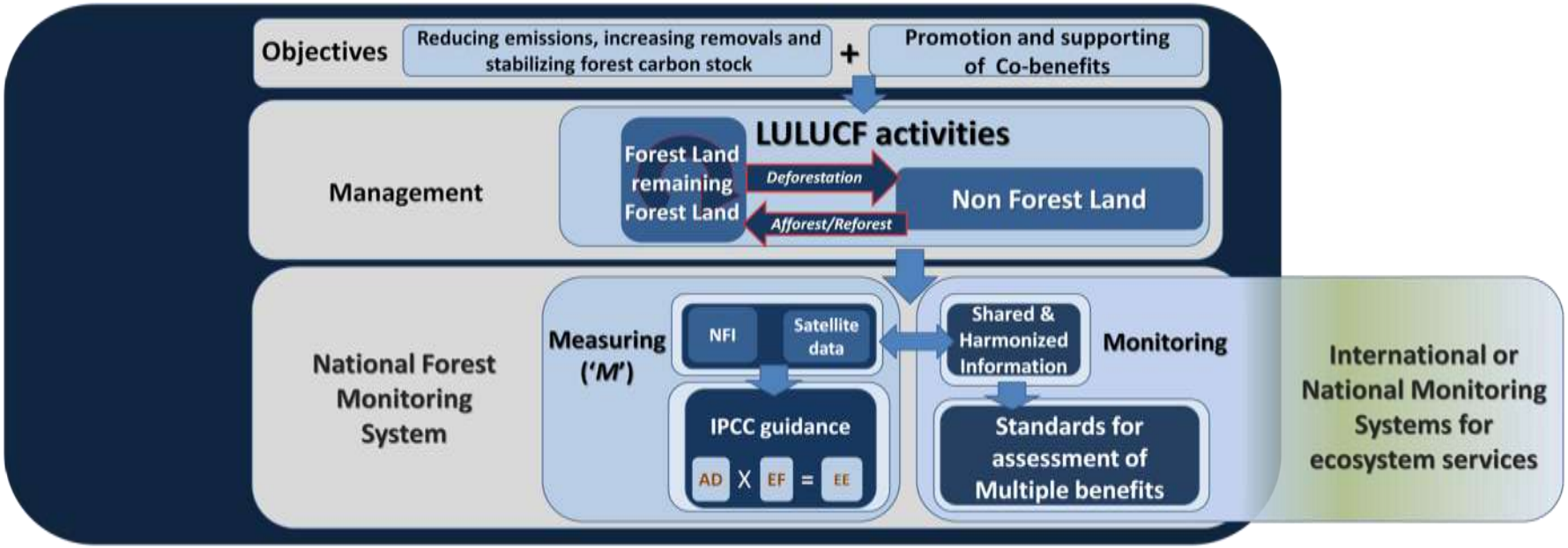
Monitoring system for carbon stock change and ecosystem aspects of multiple benefits in REDD+



NFI: National forest inventory; **AD**: Activity Data;
EF: Emission Factor; **EE**: Emission Estimate

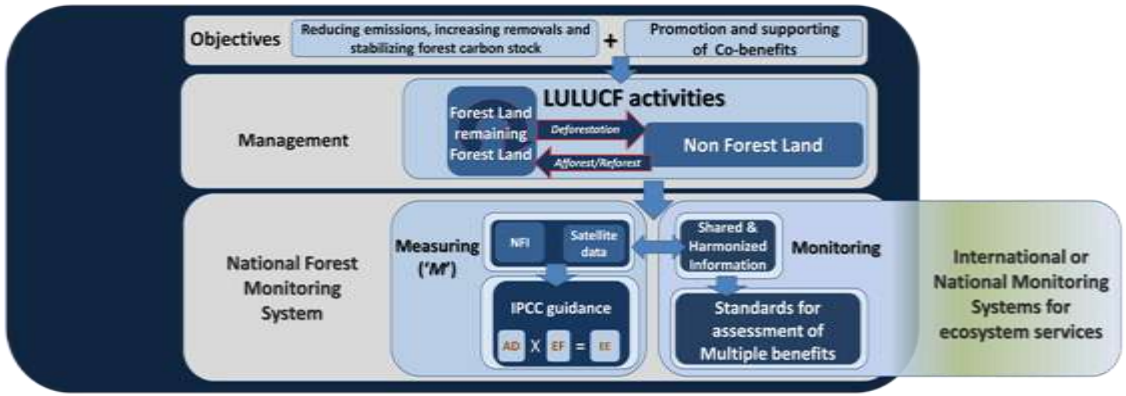
Monitoring system for carbon stock change and ecosystem aspects of multiple benefits in REDD+

Clarity:

- Objectives of a combined monitoring system for carbon stock and ecosystem aspects of multiple benefits are directed toward meeting REDD+ objectives

Effectiveness:

- Resources are used effectively in the combined system;
- External monitoring systems for ecosystem services could inform the monitoring system in REDD+ but they can also benefit from shared and **harmonized** information coming from the combined monitoring system



NFI: National forest inventory; **AD**: Activity Data;
EF: Emission Factor; **EE**: Emission Estimate

Difficulties in monitoring ecosystem aspects of multiple benefits in REDD+

Monitoring ecosystem aspect of multiple benefits requires assessing different parameters & indicators

- Not all the ecosystem aspects of multiple benefits are measurable or have enough data
- difficulties in identifying drivers of changes linked with REDD+
- Resolution (implementation phases)
- No agreed standards
- Resources limited and in REDD+ for carbon assessment
- Current initiatives information may not match up

Conclusions

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Conclusions

- There are clear relationships between monitoring systems for carbon stock change and ecosystem aspects of multiple benefits;

- Carbon stock change assessment uses agreed standards (IPCC) and it refers to land use and some forest and soil characteristics which may also be used for assessing changes of ecosystem aspects of multiple benefits

- Multiple benefits are **multidimensional concepts** and monitoring is challenging (timber; NFTPs; soil; water; air; etc.); methodologies are various and generally they belong to the field of interest

- However, RS and ground-based measurements are used to detect and quantify variables in both monitoring systems.

Conclusions

- A mandatory monitoring system for ecosystem aspects of multiple benefits may require agreed standards (methods)

- Nevertheless there are numerous ongoing initiatives related to ecosystem services at international, national or local level which may benefit REDD+

- Although external monitoring system for ecosystem services may inform REDD+, **synergies may be less effective if objectives of monitoring are different and resources are not shared in an integrated and effective way**

- In REDD+ a combined monitoring system for ecosystem aspects of multiple benefits may be costly although it may be more effective to achieve REDD+ objectives and to promote other international agreements and conventions

Summary

- Relationship between carbon stock change monitoring and ecosystem aspects of multiple benefit monitoring
- Synergies depend on implementation of monitoring system, whether combined or not
- Monitoring ecosystem aspects of multiple benefits is still challenging as other indicators and standards need to be established

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Thank you for listening!

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