

Mapping land degradation at JRC

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The Joint Research Centre (JRC) is a Directorate-General of the European Commission.

The JRC provides independent scientific and technical advice to the European Commission to support a wide range of EU policies.

GLOBE4DEV

Global Observatories for Biodiversity and the Environment for Development

Main deliverables are information systems

- The Digital Observatory for Protected Areas (DOPA)
- The ACP Portal
- A web based version of the World Atlas for Desertification

A new World Atlas of Desertification (WAD) is being compiled under the coordination of the Joint Research Centre (JRC) of the European Commission, in partnership with the United Nations Environment Programme (UNEP).

Current version available from

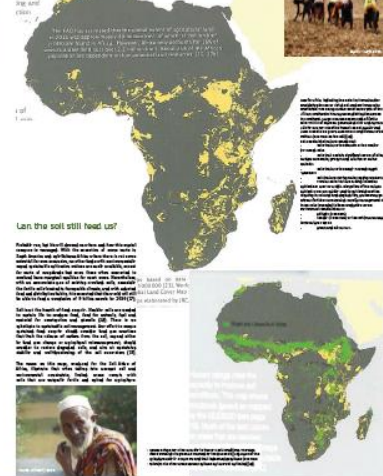
<http://wad.jrc.ec.europa.eu/>



grazing pressure and marginalisation

Chapter III.3.4

Healthy soil
crops for



... we can stop it

NASA Photo of the Rio de la Plata in G-M view (33155-2000 - sci.jcr.nasa.gov)
 SumatraA is visible on the right and Montserrat at the coast on the left. Soil erosion, sediments carried from the Rio de la Plata and Uruguay change colour the water temperature.

Source: *Journal of the American Medical Association*, 2000, 284: 1033-1038.

The wide-angle sensor and technical innovation used to determine relative air speeds around the car are also an example of the use of technical innovation to reduce air resistance in terms of human comfort and efficiency. The car's aerodynamic features and wind tunnel testing are also an example of the use of technical innovation to reduce air resistance in terms of human comfort and efficiency. The car's aerodynamic features and wind tunnel testing are also an example of the use of technical innovation to reduce air resistance in terms of human comfort and efficiency.

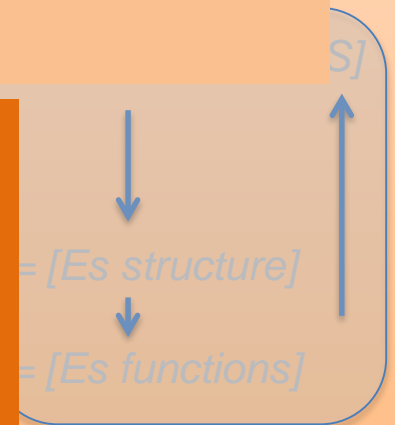


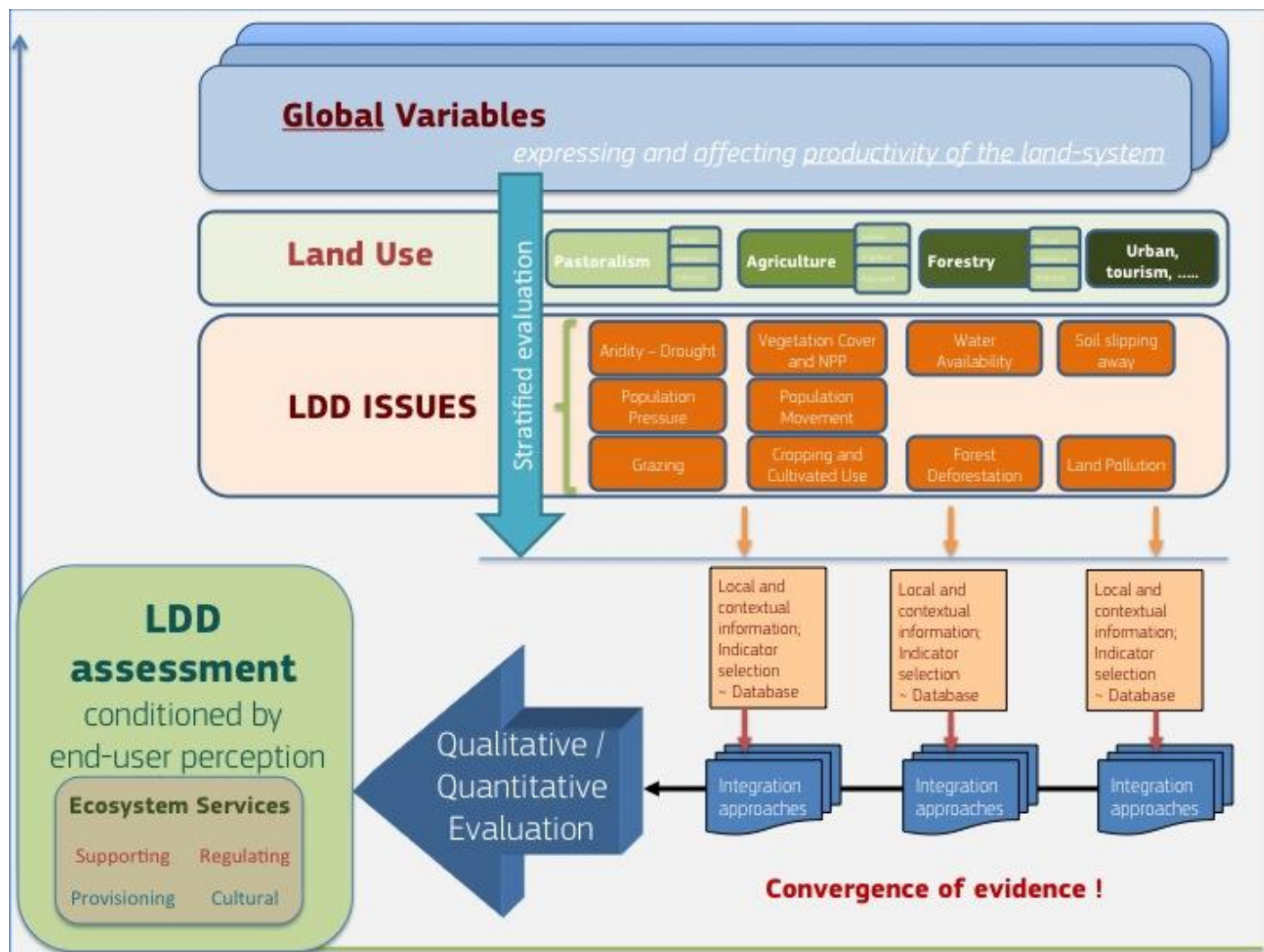
[Definition framework (DSD WG1)

a) Desertification is best to be treated as an extreme case of land degradation, which is expressed in a persistent reduction or loss of biological and economic productivity of lands that are under use by people whose livelihoods depend on this productivity, yet the reduction or loss of this productivity is driven by that use.

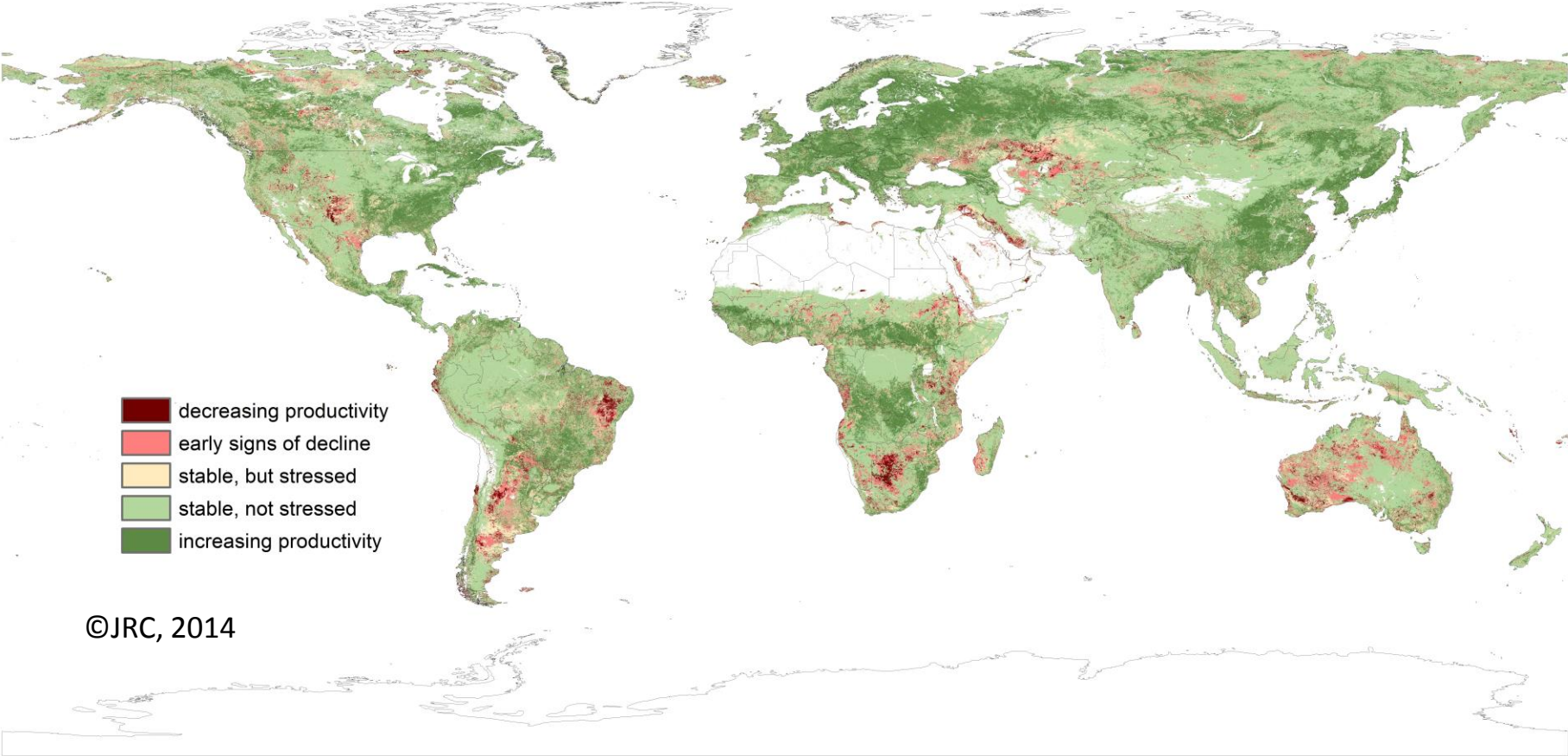
...**loss** of biophysical/biological and
economic **productive capacity** of the land
(*ES equilibrium*) that is under use ...

... where / why there is loss of land
productivity and if this leads to land
degradation (= loss of resource/nat.
capital)

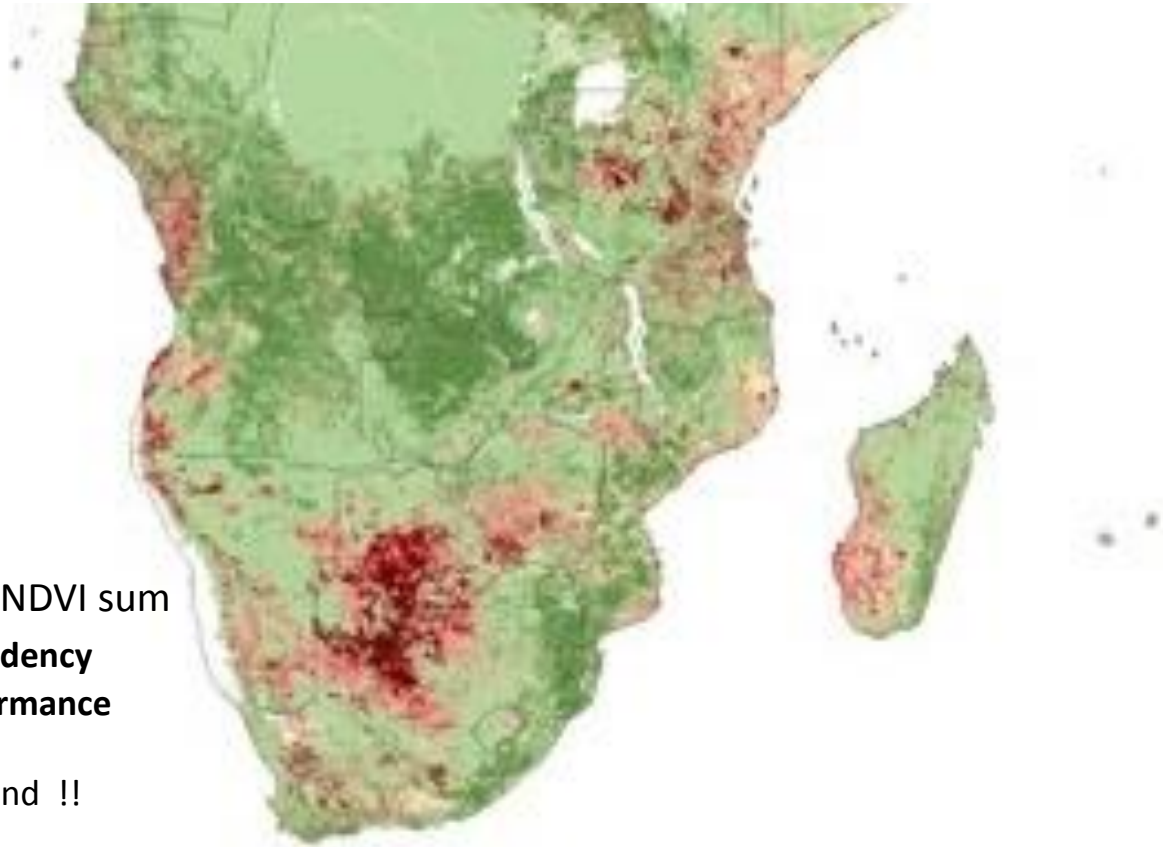




Land system productive capacity dynamics ('99-'13)

- 
- decreasing productivity
 - early signs of decline
 - stable, but stressed
 - stable, not stressed
 - increasing productivity

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Land system productive capacity dynamics ('99-'13)

Based on annual/seasonal growing period NDVI sum

1km SPOT data 1999-2013: **long term tendency**

1kmSPOT data 2008-2013: **current performance**

540 observations on +- 150 M points on land !!

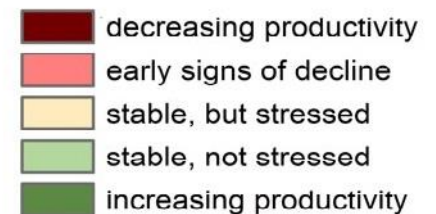
ecosystem functioning stratification

seasonality mask

seasonal productivity (where season)

yearly productivity (where no season)

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NOAA GIMMS 3G NDVI
1982-2010 (29 years)

SPOT VGT NDVI
1998-now (15yrs)

Phenology and Productive Variables

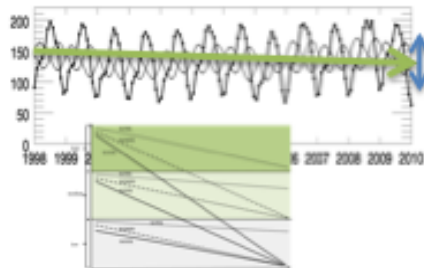
Standing Biomass
Annual Cyclic Production
Permanent Veg. Fraction
Start of Season
Season length
Max of Season
.....

SPOT VGT NDVI
2006-2010 (5 years)

Phenology and Productive Variables

Standing Biomass
Annual Cyclic Production
Permanent Veg. Fraction
.....

Long term CHANGE Map:
SB Steadiness Index
+ initial SB levels
+ SB change



Ecosystem Functional Types
Stratification

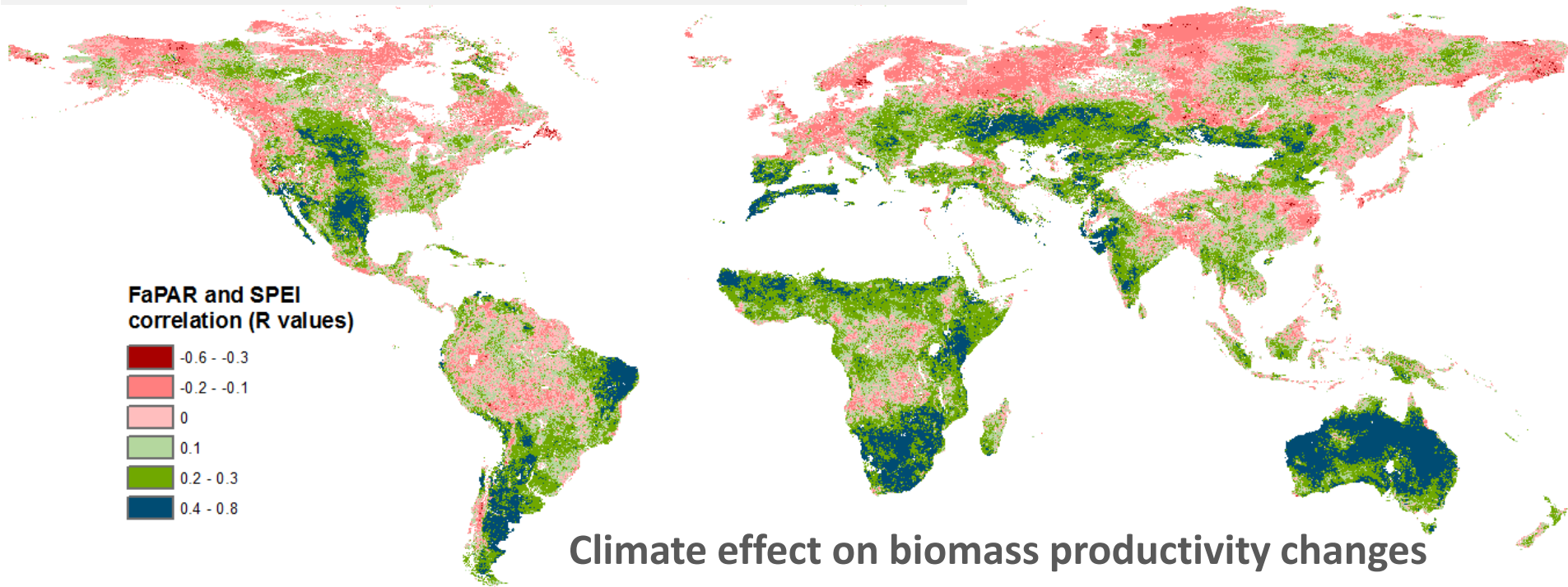
Current STATUS Map:
SB Local Scaling



LAND System
PRODUCTIVITY Dynamics
Map



Looking at causal pathways: drought

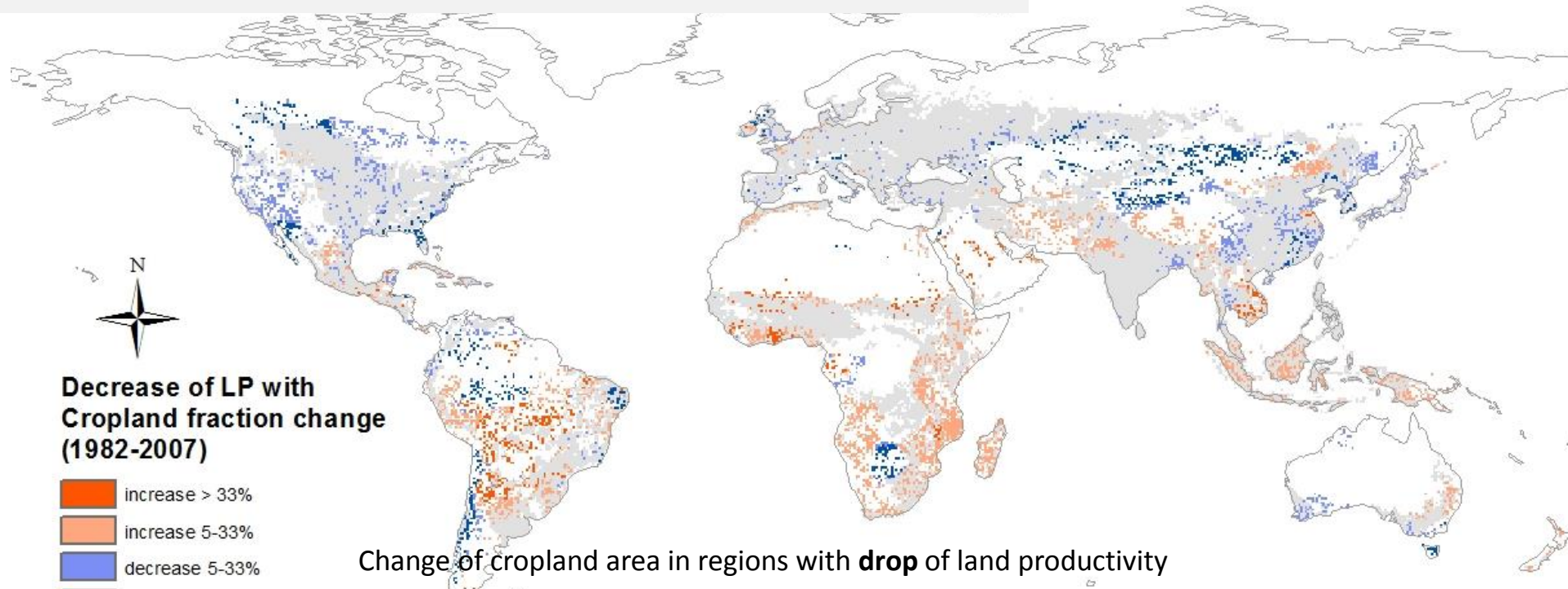


Correlation between FaPAR and SPEI (1982-2010)

SPEI Standardized Precipitation Evaporation Index

FaPAR Fraction of Absorbed Photosynthetically Active Radiation

Looking at causal pathways: agriculture

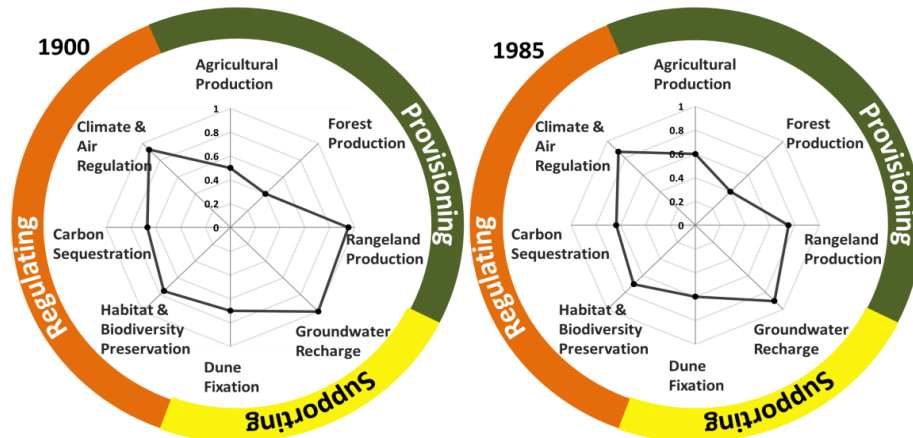


Change of cropland area in regions with **drop** of land productivity

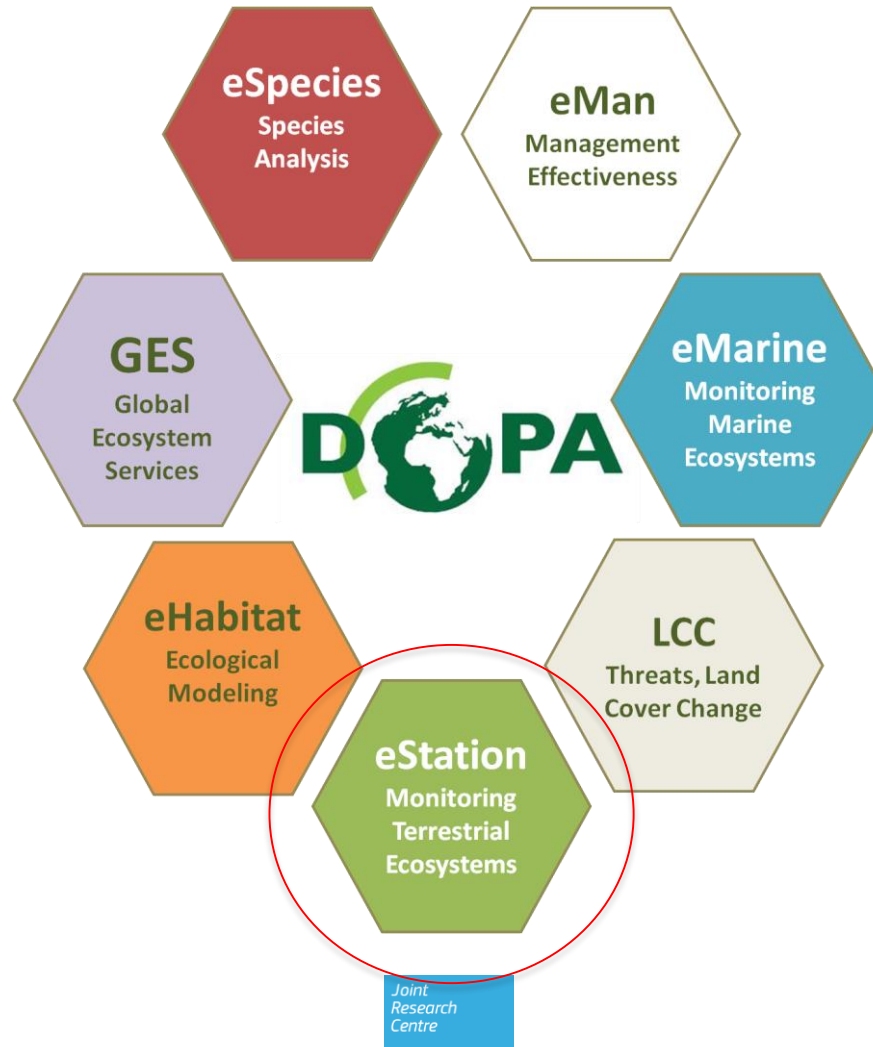
Continent/Region	Increased area [km ²]	Decreased area [km ²]
Africa	3.517.626	343.743
Asia	2.124.133	1.774.110
Australia	141.912	206.172
Europe	55.850	334.003
North America	275.720	1.379.779
South America	2.121.663	931.581

Linking to Ecosystem Services concept

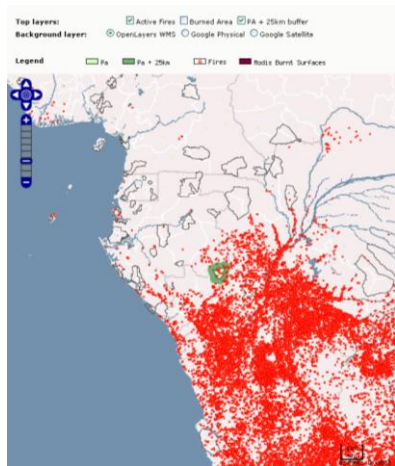
Land use system	Provisioning ESS	Regulating/Supporting ESS
Agriculture (IA,RA)	<ul style="list-style-type: none"> • Agricultural Production • Forest Production 	<ul style="list-style-type: none"> • Climate & Air Regulation • Carbon Sequestration • Habitat & Biodiversity Preservation • Groundwater Recharge • Dune Fixation
Rangelands (R1-R3)	<ul style="list-style-type: none"> • Rangeland Production • Forest Production 	
Rangeland/Agriculture (R/A)	<ul style="list-style-type: none"> • Agricultural Production • Forest Production • Rangeland Production 	



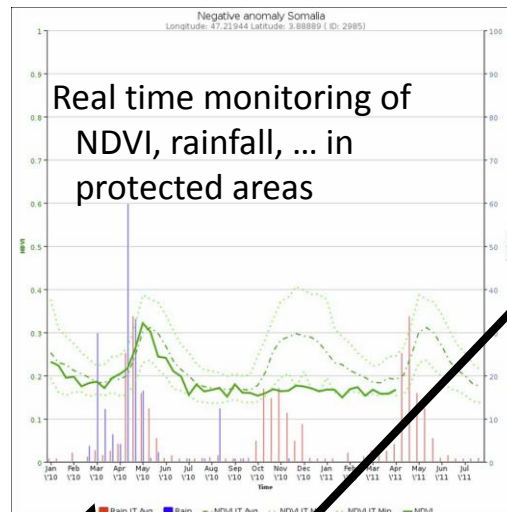
SERVICES FOR MAPPING DEGRADATION



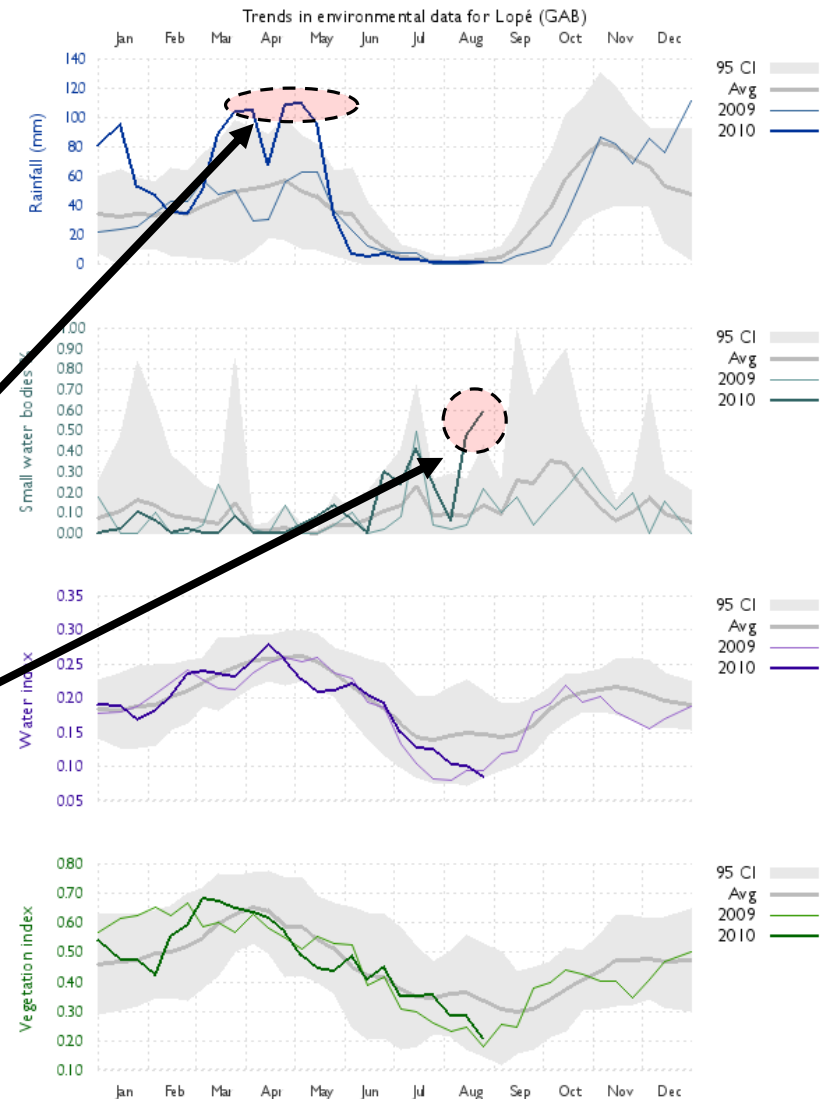
Remote sensing for terrestrial monitoring



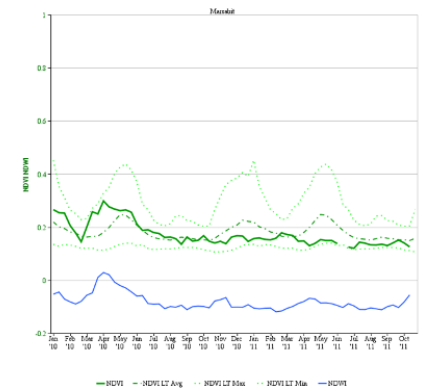
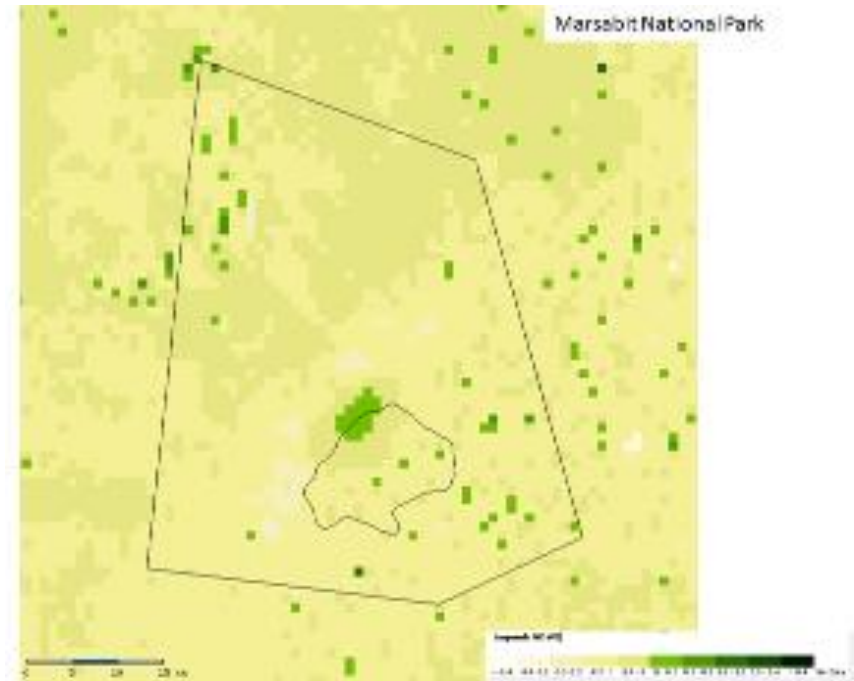
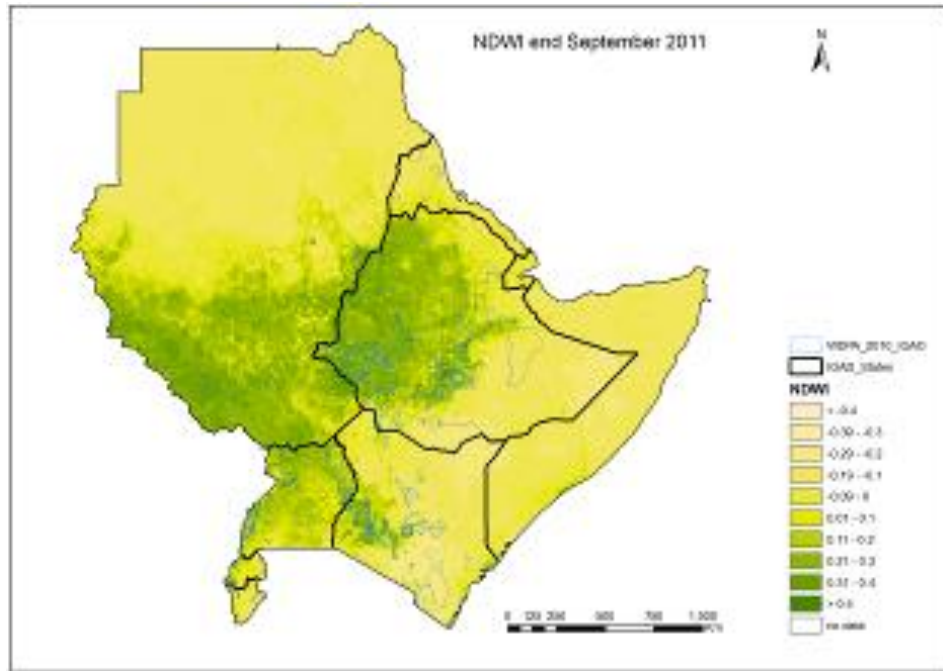
Fire ecology



Ecological anomalies

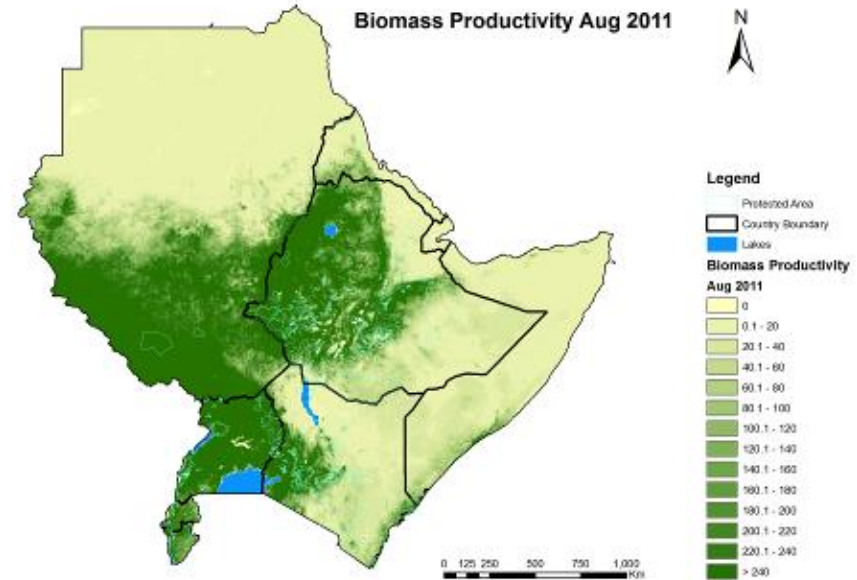
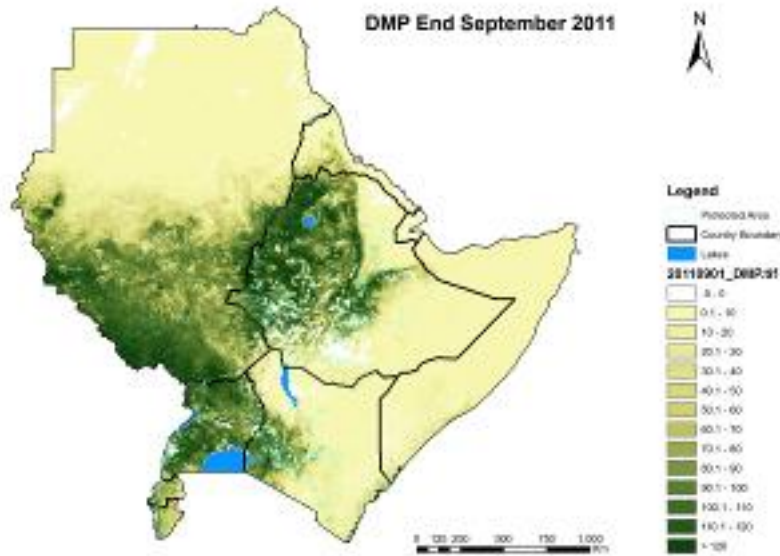


Normalized Different Water Index



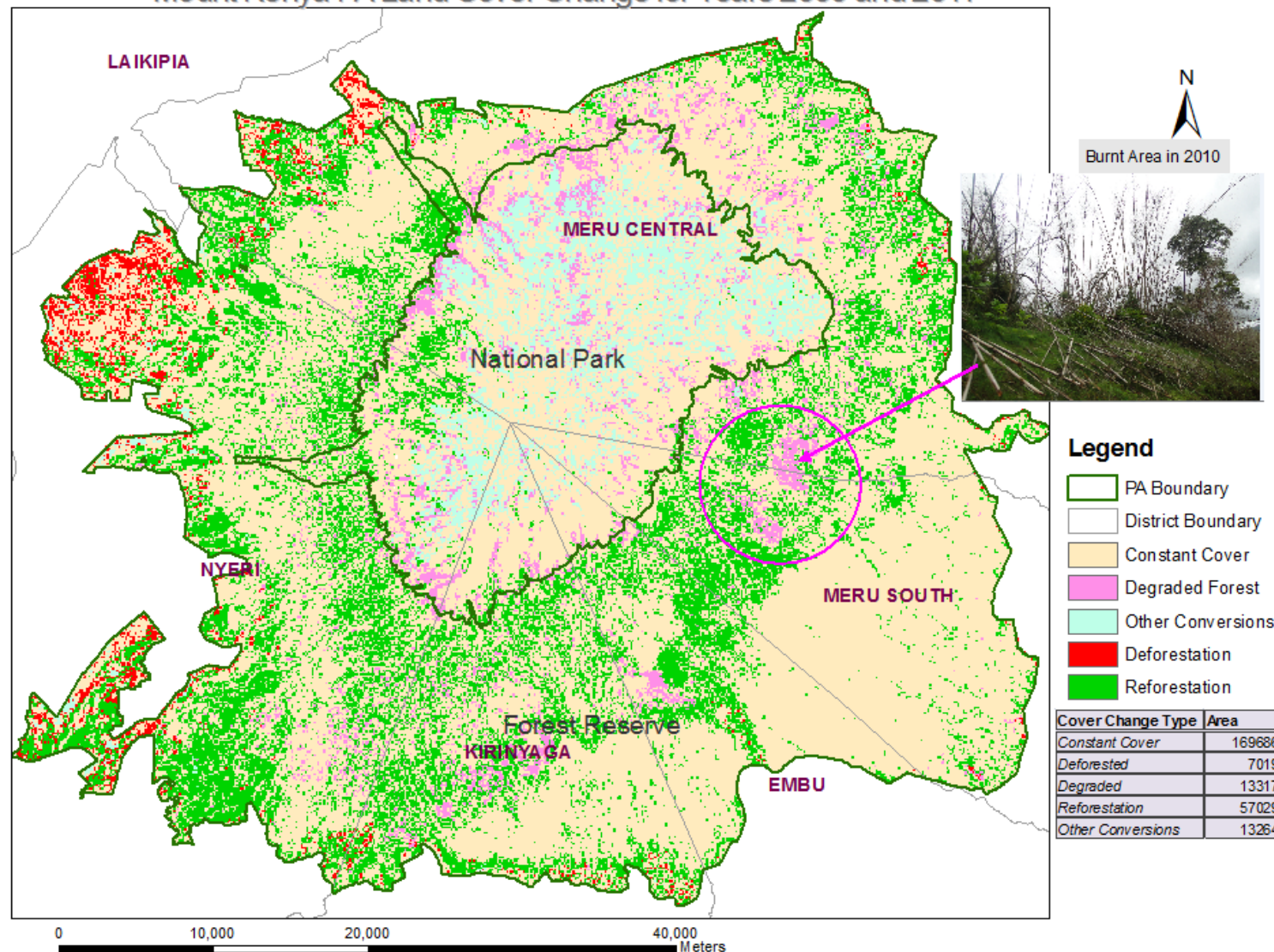
eStation Products Use

Dry Matter Productivity

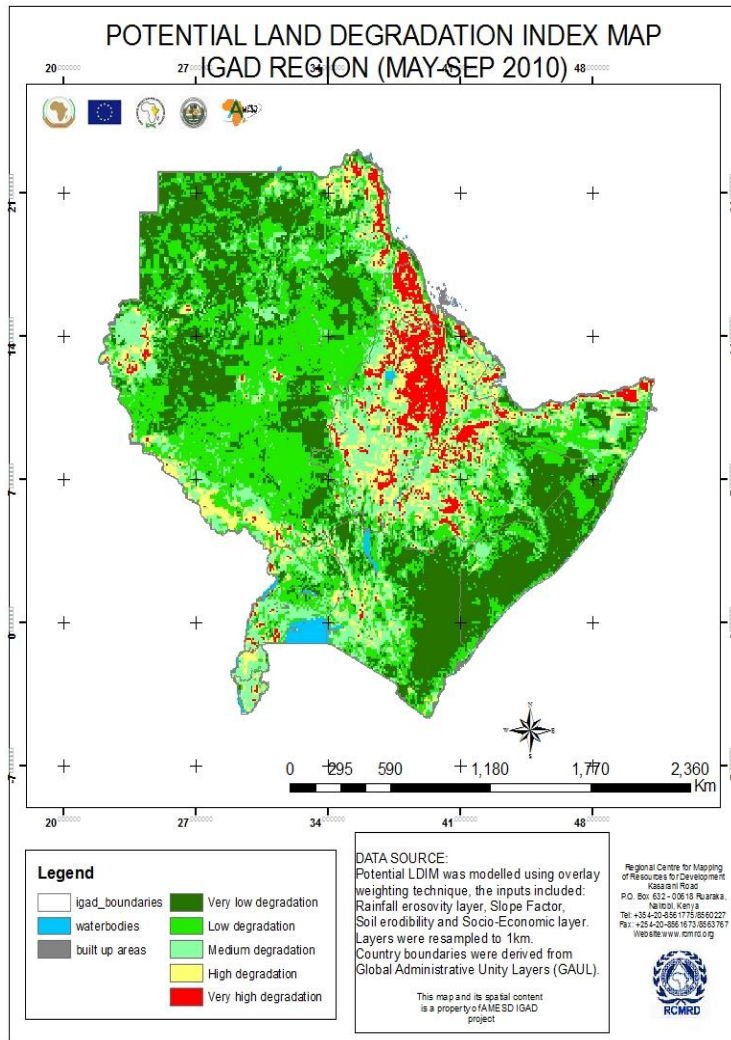


Biomass Productivity

Mount Kenya PA Land Cover Change for Years 2000 and 2011

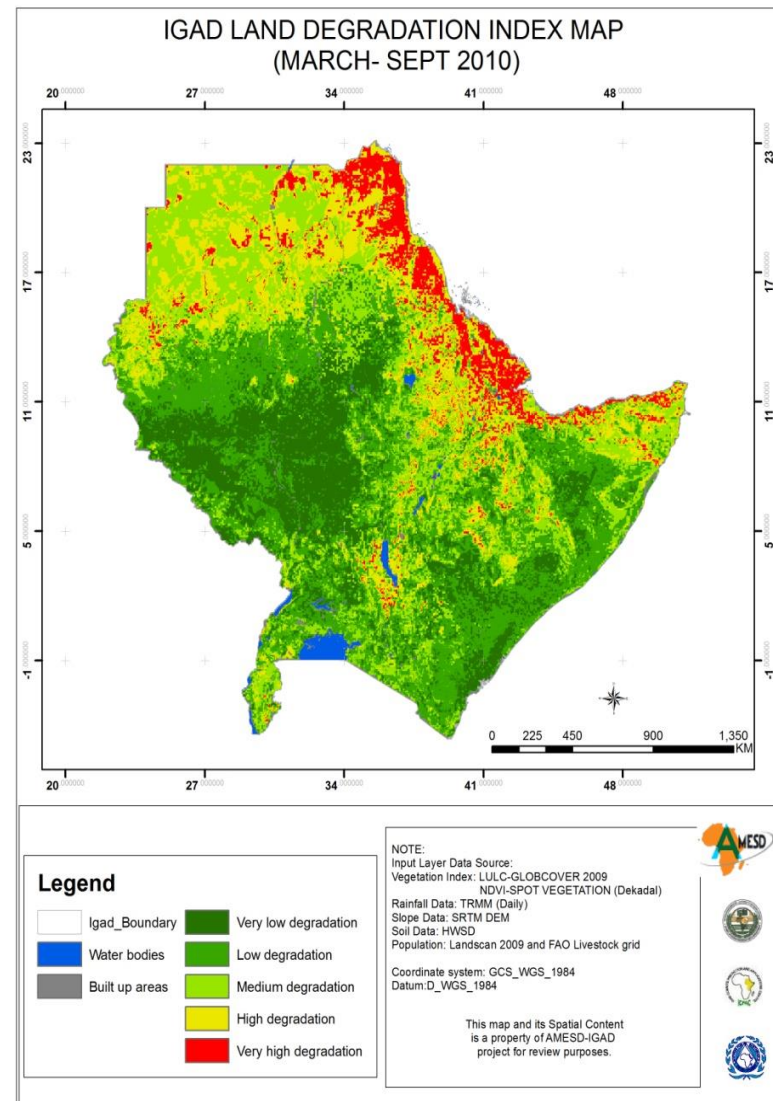


LAND DEGRADATION REGIONAL LEVEL



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Joint
Research
Centre



Acknowledgements:

Monitoring of Environment and Security in Africa programme (MESA) project

Partners (co-applicants)	<ul style="list-style-type: none">▪ Regional Centre for Mapping of Resources for Development (RCMRD), Kenya▪ Ethiopia Mapping Agency (EMA), Ethiopia▪ National Environment Management Agency, (NEMA) Uganda
Associates	<p>Kenya</p> <p>Department of Remote sensing Kenya Forest Services Kenya Wildlife Services</p> <p>Uganda</p> <ul style="list-style-type: none">• Uganda Wildlife Authority• National Forest Authority• Makerere University <p>Ethiopia</p> <ul style="list-style-type: none">• Ethiopia Protected Area• Ethiopia Wildlife Conservation Authority <p>Rwanda</p> <ul style="list-style-type: none">• Rwanda National Forestry Authority• Rwanda Tourism Development Board• Rwanda Environmental Management Authority <p>Burundi</p> <ul style="list-style-type: none">• Institute of Environment and nature Conservation (IECN)• Burundi National Forest Authority <p>Sudan</p> <ul style="list-style-type: none">• High council of Science and Technology• Sudan Forest Corporation <p>Southern Sudan</p> <ul style="list-style-type: none">• Forest department• Wildlife Authority <p>Eritrea</p> <ul style="list-style-type: none">• Ministry of Environment• Forestry Department <p>Djibouti</p> <ul style="list-style-type: none">• Ministry of Environment, habitat and urban development• Ministry of Agriculture• Djibouti University <p>Somalia</p> <p>Ministry of Environment Ministry of Agriculture</p>