



Responses to LEDD in Cropland

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***Policy Conference: Research on Responses to Land
degradation and Desertification in croplands***

Berlin, 17 March 2014



Objectives of LEDDRA WP1 on: Land and Ecosystem Degradation and Desertification in Cropland

To review and synthesize theoretical knowledge and to address gaps in existing theories in the case of LEDD in cropland regions.

To use existing and to develop new methodologies and techniques to assess the fit of actual or proposed responses to LEDD in cropland.

To study LEDD in cropland in selected study sites; to assess the impacts and fit of actual and proposed responses to LEDD; to identify actual response assemblages (RAs), and to elaborate optimal responses (ORAs) that effectively address LEDD issues in cropland regions.

To provide policy recommendations for chosen responses and ORAs at international, EU and, national levels for various types of stakeholders.

Selected cropland study sites for the assessment of LEDD and Response Assemblages



Portugal-Spain -
Huelo Baixo Guadiana

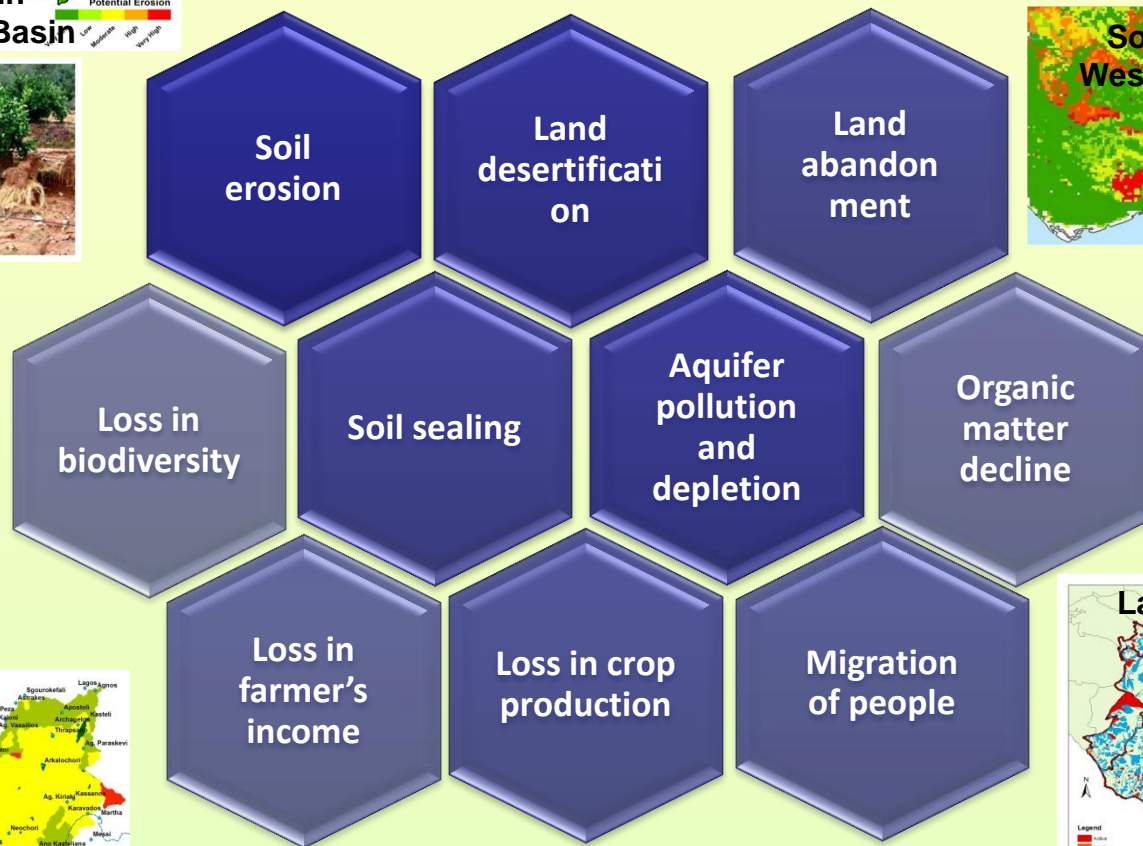
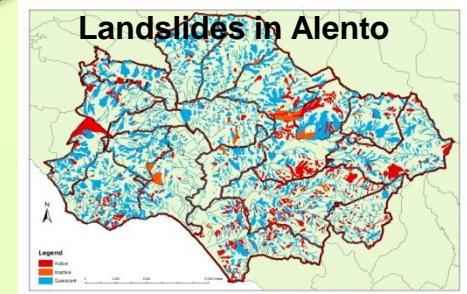
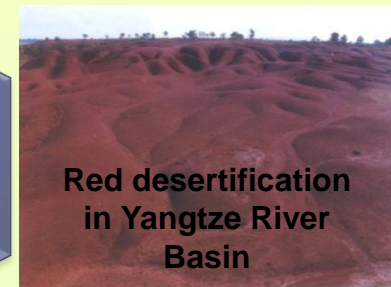
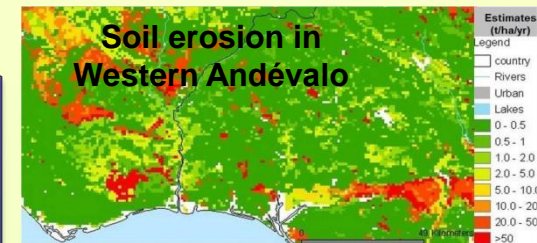
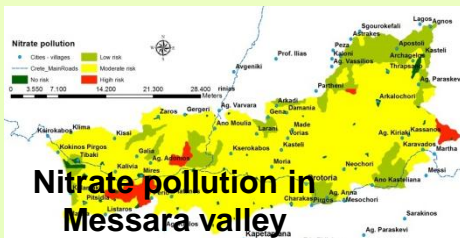
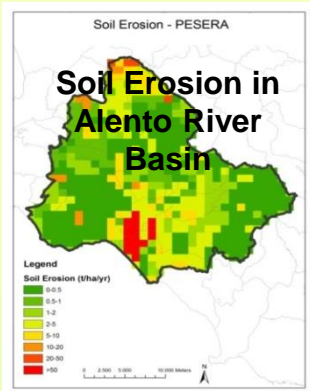
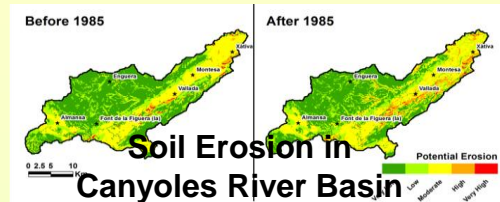
Spain - *Jucar river watershed*

Italy- *Alento River basin*

China - *Zhang Jiachong area*

Greece- *Messara valley*

LEDD problems and their impact on socio-ecological resilience in cropland

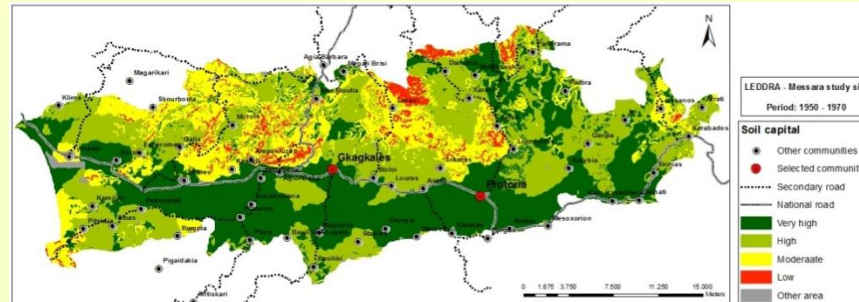


LEDD problems and their impact on socio-ecological resilience in cropland

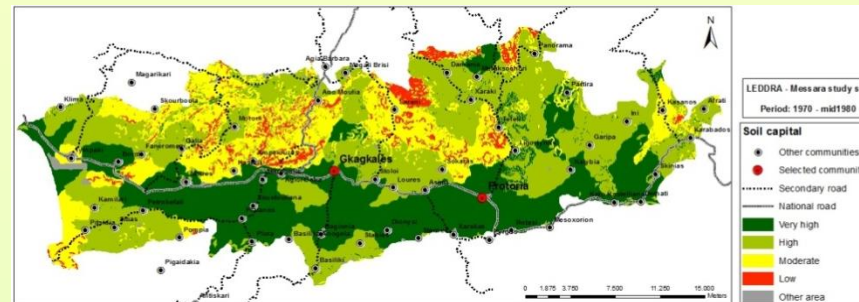
Impact of LEDD problem “soil erosion” on natural capital (soil)



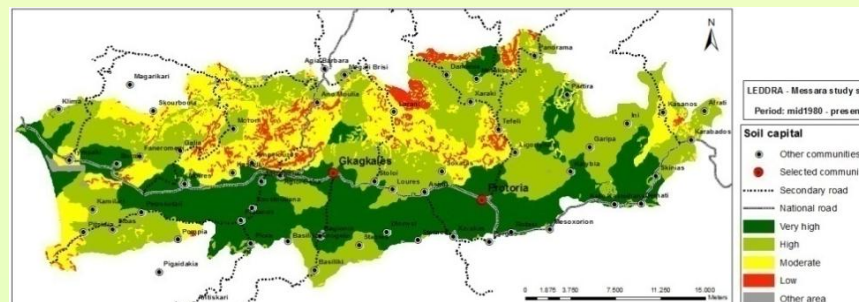
Decrease



Period 1950-1970



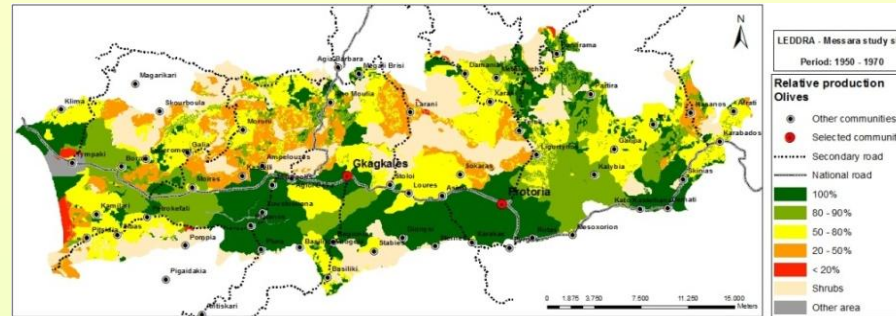
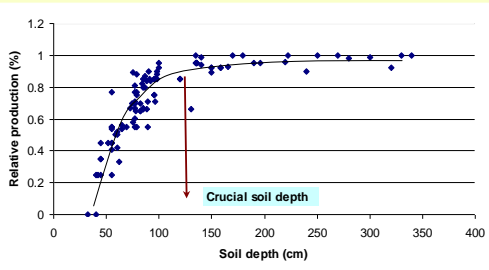
Period 1970-mid 1980



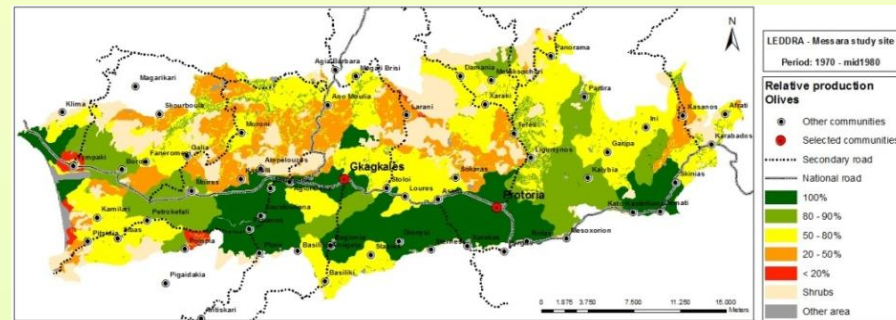
Period mid 1980-2010

LEDD problems and their impact on socio-ecological resilience in cropland

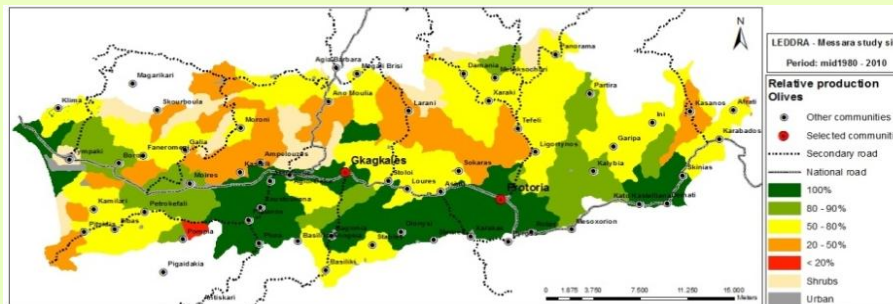
Impact of LEDD problem “soil erosion” on the critical function “olive oil production”



Period 1950-1970



Period 1970-mid 1980



Period mid 1980-2010

Decrease

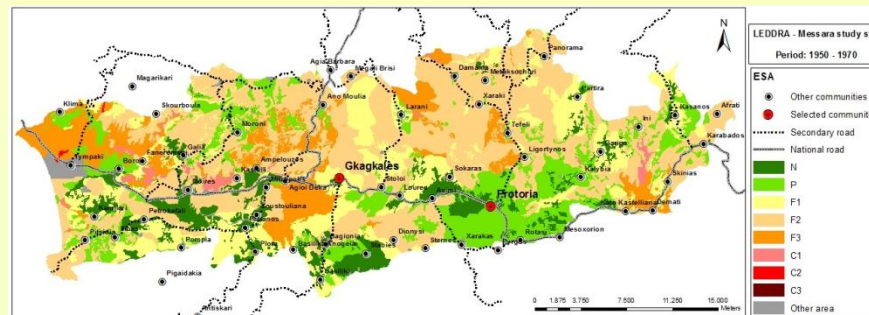
Policy Conference – Berlin, Germany, March 17, 2014

LEDD problems and their impact on socio-ecological resilience in cropland

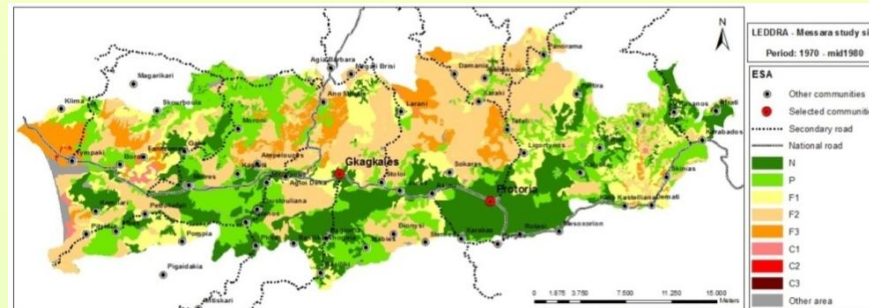
Impact of LEDD problem “soil erosion” on land desertification



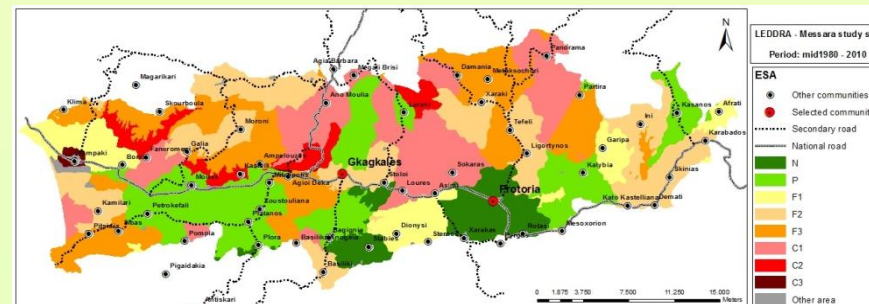
Increase



Period 1950-1970



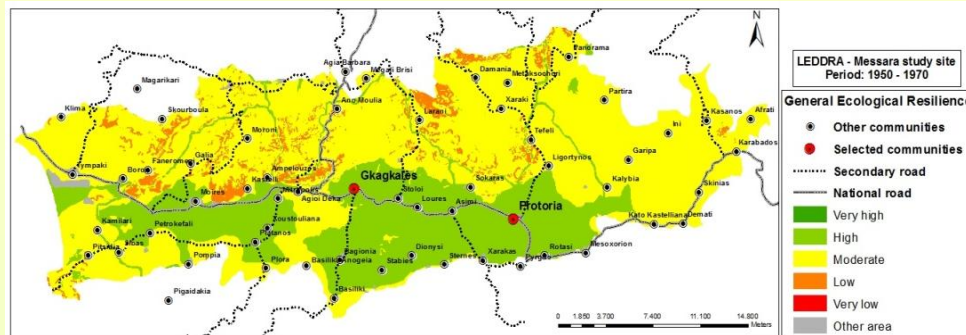
Period 1970-mid 1980



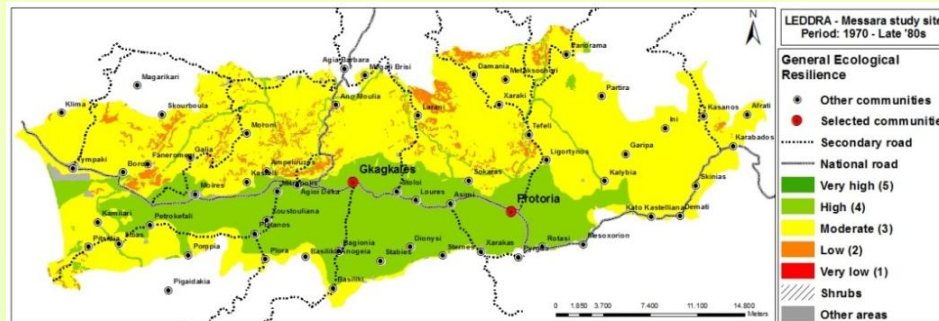
Period mid 1980-2010

LEDD problems and their impact on socio-ecological resilience in cropland

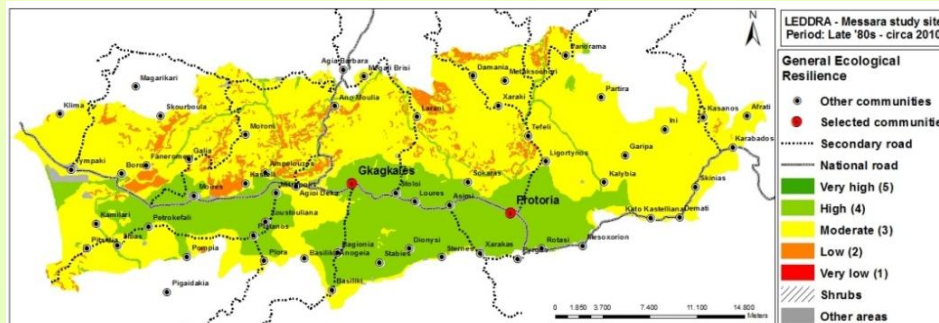
Impact of LEDD problem “soil erosion” on general resilience of the SES



Period 1950-1970



Period 1970-mid 1980



Period mid 1980-2010

Decrease

Natural and human drivers or causes of LEDD problems in cropland

Reduction of agricultural area due to low land productivity or urban expansion

Intensification of crop production and concentration in productive soils

Low prices of agricultural products

Expansion of tourism especially in the coastal areas

EU and national subsidies

Fires for expansion of agricultural land

Climate variability

Out-migration of people to urban areas

Increase of water availability in the Yangtze River Basins (China).

Previous and current responses to LEDD

Previous responses to soil erosion

- Land use change
- Traditional farming
- Land terracing
- Crop rotation
- Inter-cropping



- Over-cultivation
- Drilling wells and expansion of irrigation
- Expansion of agriculture into natural areas
- People emigration and reformation of land
- Increasing industrialization
- Grain for green (China)



Previous and current responses to LEDD

Current responses to soil erosion and land desertification

- Over-cultivation
- Integrated land management
- Terraces re-building
- Various initiatives for increasing profitability
- Land abandonment
- Mechanization
- Management of oil-mill waste water
- Subsidies from EU for crop removal favoring land degradation
- Plans for small watershed
- Natural forest protection in reservoir watersheds
- Reforestation
- Water harvesting

Necessary elements to implement successfully “fitting” responses

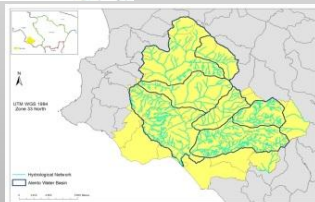
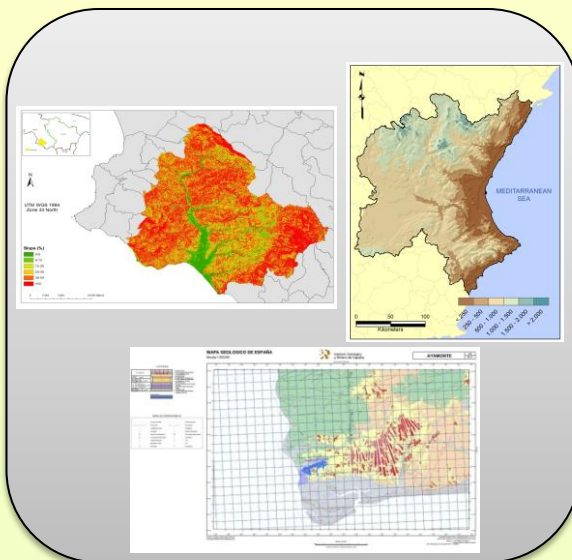
Description of biophysical system

Climate

Soils /
Geology /
Topography

Hydrology

Ecosystem /
Land use



Necessary elements to implement successfully

"fitting" responses

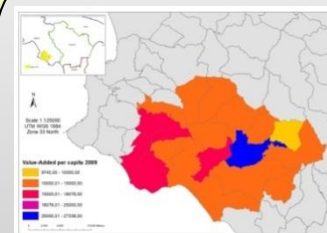
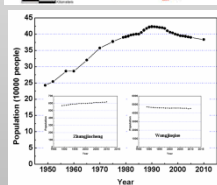
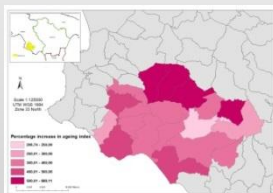
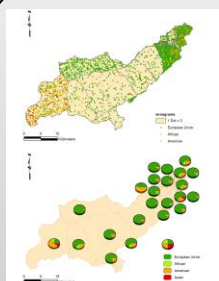
Description of socio-economic system

Demography

Economy

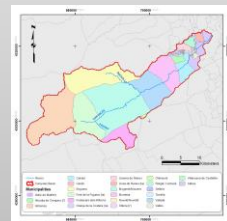
Administration

Infrastructure

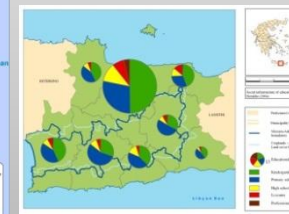
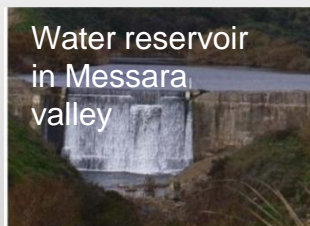


employed
unemployed

Unemployment
in Messara
valley

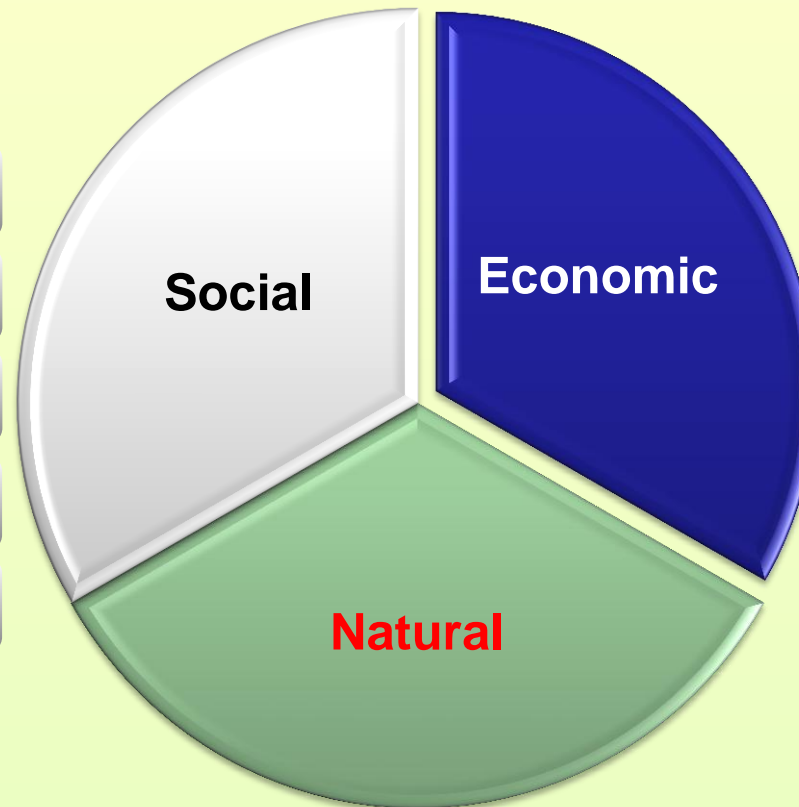


Administrative
structure of
Western
Andévalo



Necessary elements to implement successfully “fitting” responses

Description of capitals



Demographic capital

Human capital

Cultural capital

Social capital

Institutional capital

Produced capital

Financial capital

Landesque capital

Technology

Animal/Plant capital

Water capital

Climate capital

Soil capital

Vegetation capital

Necessary elements to implement successfully “fitting” responses

Description of functions



Cooperation networks

Social re-vitalization

Governing

Migration

Credit availability

Productivity

Market integration

Poverty

Economic
opportunities

Modernization /
Mechanization

Globalization

Infrastructure

Primary
Production

Regional Surface Energy
Balance

Regulation of
Hydrological Processes

Fit and misfit of responses to LEDD

**A certain
response must
secure**

- Capitals (natural, economic and social)
- Critical functions (primary production, regulation of hydrological processes and surface energy balance, etc)
- Socio-economic resilience of the SES.

Fit and misfit of responses to LEDD

The achievement of previous goals the following criteria must be satisfied

Protect soil water storage capacity

Secure low salt content in soils

Reduce flooding risk in lowland areas

Minimize water pollution

Protect land from desertification

Support high potential for change

Secure high robustness of the SES

Provide adequate redundancy of the SES

Fit and misfit of responses to LEDD

Fitting of a responses has been based on:

System level properties: Resilience, Adaptability, Transformability

Lower level properties: Potential available for change, Robustness, Diversity, Redundancy, Connectedness, etc.

SES characteristics: capitals and functions

What an unfit response?

Response example:

Over-cultivation of olive plantations, a mono-cropping system

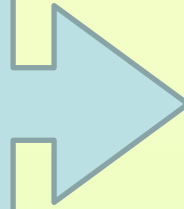
- 1. Deterioration of hydrological processes and surface energy balance**
- 2. Increase of soil erosion and land desertification risk**
- 3. Higher water pollution risk**
- 4. Loss in biodiversity**
- 5. Decrease in soil and water capital**
- 6. Temporal improvement of life**
- 7. Higher quantity of production**
- 8. Increase in farmer's income**
- 9. Improvement on technology and infrastructure**
- 10. Possible human health problems**
- 11. Lower quality of products**

Fit and misfit of responses to LEDD

Example of fitting the response “Intensive cultivation”

Main characteristics:

- Mechanization
- Intensive cultivation - irrigation
- Chemical fertilizers
- Construction of greenhouses
- Infrastructure (dams, roads etc.)



Resilience

Potential for change

Robustness

Redundancy

Connectedness

CRITERIA

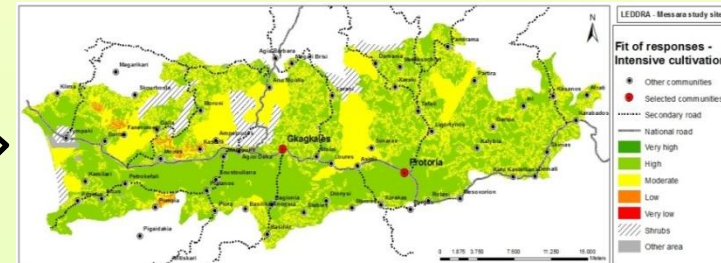
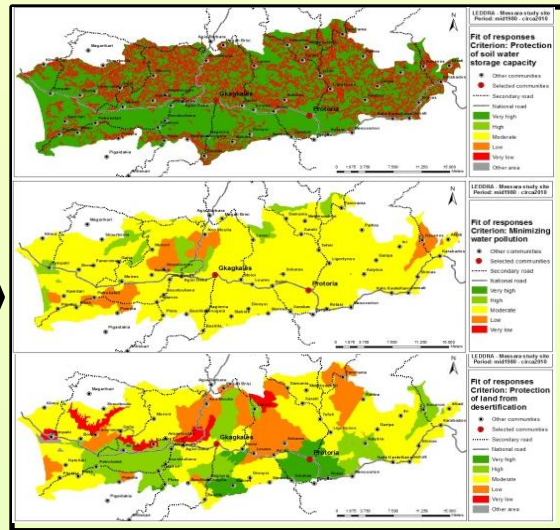
- ✓ Protect soil water storage capacity
- ✓ Secure low salt content in soils
- ✓ Reduce flooding risk in lowland areas
- ✓ Minimize water pollution
- ✓ Protect land from desertification

Fit and misfit of responses to LEDD

Example of fitting the response “Intensive cultivation”

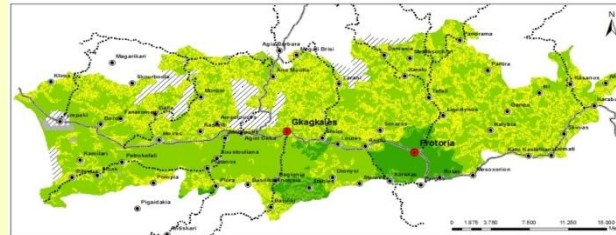
CRITERIA

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- ✓ Protect land from desertification

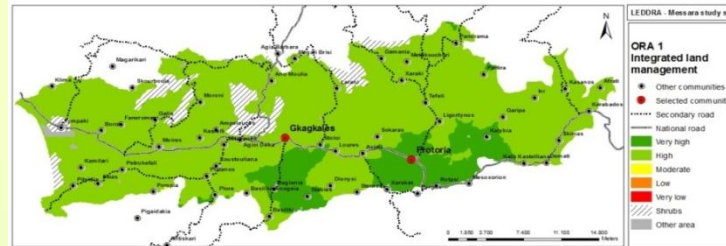


Fit and misfit of responses to LEDD

Example of fitting the response “Intensive cultivation”



Present condition fitting



ORA 1: Reduce soil erosion



ORA 2: Minimizing water pollution



ORA 3: Secure low salt content

The role of policy in implementing “fitting” responses

Questions: Which policies exist for optimization of response “intensive cultivation”?

ORA 1. Integrated land management: (a) Allocated subsidies, (b) willingness of the people to protect environment.

ORA 2. Minimizing water pollution: (a) European Union regulation 91/676/EC on reduction of nitrate pollution, (b) political and financial support.

ORA 3. Secure low salt content: (a) General legislation on protection of the environment, (b) willingness of people to protect the environment, © political and financial support.

The role of policy in implementing “fitting” responses - REMARKS

Many EU and national level policies exist related to LEDD and to combating LEDD

Policies on environmental, regional, urban, rural development, spatial, social and economic issues.

Various instruments utilized for implementation such as administrative, regulatory, financial, economic, physical, education/public awareness raising, etc.

Low or non-implementation can be attributed to:

- (a) lack of knowledge**
- (b) low enforcement of existing policies**
- (c) lack of financial support (drivers)**
- (d) awareness of people on environmental issues**



THANK YOU !



Policy Conference – Berlin, Germany, March 17, 2014

