Africa LEDS project: achievements & next steps – component 2

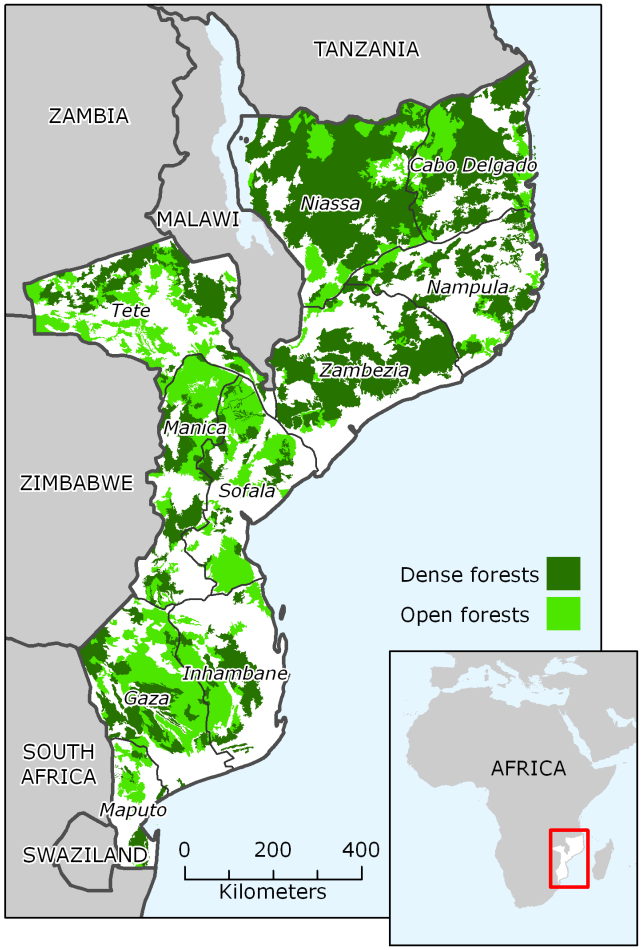
Presentation for Mozambique

AFRICA LEDS Partnership
Advancing climate-resilient low emission development in Africa

LEDS GLOBAL PARTNERSHIP

European Commission

Background



- Forest cover: 40 million ha (51% of the country surface)
- Mainly Miombo forests (dry forests)
- Annual deforestation rate: 0.58% (1990-2005)
  - 65% Slash and burn Agriculture
  - 4% Wood fuel
- Irrigated area: 27,000 ha

Background of modeling actions

The modeling in the country consists on mitigation of emissions using renewable energy sources, avoided emissions, and carbon sequestration from Silvicultural practices and provide socio-economic benefits such as increased income (including job creation and profitability).

Thus, for the development of modeling actions in these areas identified by the country modelling team are the Long-range Energy Alternatives Planning System (LEAP) for Energy and REDD Abacus for agriculture and land use change systems.

- **Objective of Modeling**
- Modeling the emission reduction replacing fuel powered irrigation pumps with Solar Powered Irrigation (SPI)
- Modeling the emission reduction by replacing slash-and-burn (SAB) agriculture with Agroforestry Systems

Background of modeling actions

Fuel powered irrigation pumps

Solar Powered Irrigation (SPI)

Slash-and-burn (SAB) agriculture

Agro-forestry system

Background of modeling actions

The sector shortlisted from NDCs as most representative of country's climate and socioeconomic aims are:

- **MASA**: Ministério da Agricultura e Segurança Alimentar
- **MIREME**: Ministério dos Recursos Minerais e Energia
- **MITADER**: Ministério da Terra, Ambiente e Desenvolvimento Rural
- **MOPHRH:** Ministério das Obras Públicas e Habitação e Recursos Hídricos
- **MEDH:** Ministério da Educação e Desenvolvimento Humano
- **MEF:** Ministério da Economia e Finanças
- **MCTESTP:** Ministério de Ciência e Tecnologia, Ensino Superior e Técnico Profissional

The models were built upon the folowing sectors:

- **MASA**: Ministério da Agricultura e Segurança Alimentar
- **MIREME**: Ministério dos Recursos Minerais e Energia

Achievement (contn'd)

- Explain how the integrated model was built

- An integrated methodology was used to build mitigation scenarios of 21 years (spanning 2010 to 2030) for the energy and agriculture sector.

- The fuel powered irrigation system (FPI) emission was used as business as usual (BAU) of energy sector, while solar powered irrigation system (SPI) as its mitigation scenario.

- Slash and burn agriculture (SAB) was used as BAU scenario in the agriculture sector and agroforestry system (AFS) as its mitigation scenario.

- All scenarios of mitigation in both sectors were used for the whole country using **LEAP** model for the energy sector and **REDD Abacus** model for the agricultural sector, while a merged (agriculture and energy system) scenario was done in spreadsheet.

Achievement (contn'd)

- Based on 2010 national statistics
  - 27,000 ha irrigated land
  - Sugar cane (60%), Cereals, Legumes, Roots and Tubers
  - Energy source: mostly from fuel-based pumps; gravity; national grid (hydropower)
- Projections based on national strategies
  - Based on national irrigation strategy
  - Increase irrigated land up to 90,000 ha by 2020
  - Assumed the same rate up to 2030
  - Assumed linear trends
- Emissions estimations
  - Emission factors from the Literature (tCO2eq/liter fuel)
  - Crop water requirements (liter water per hectare per year)
  - Sugar cane (60% of the irrigated area) **not included**
  - Irrigation efficiency (rate liter fuel:liter water)

Achievement (contn'd)

- The irrigation scenarios were built using the main irrigated crops of Mozambique as reference to estimate the mitigation impact of SPI in energy sector. The main crops were classified as vegetables, roots and tubers, cereals, pulses and sugar cane.

- AFS impact assessment on mitigation was used as option to replace traditional SBA, mainly cassava and maize dominated agricultural systems, two of the main cash crop of smallholder farmers in Mozambique.

- The activity data, emission factors and assumptions made were gathered from various documents published by the national government departments, peer-reviewed and published academic research and information disseminated by technology suppliers.

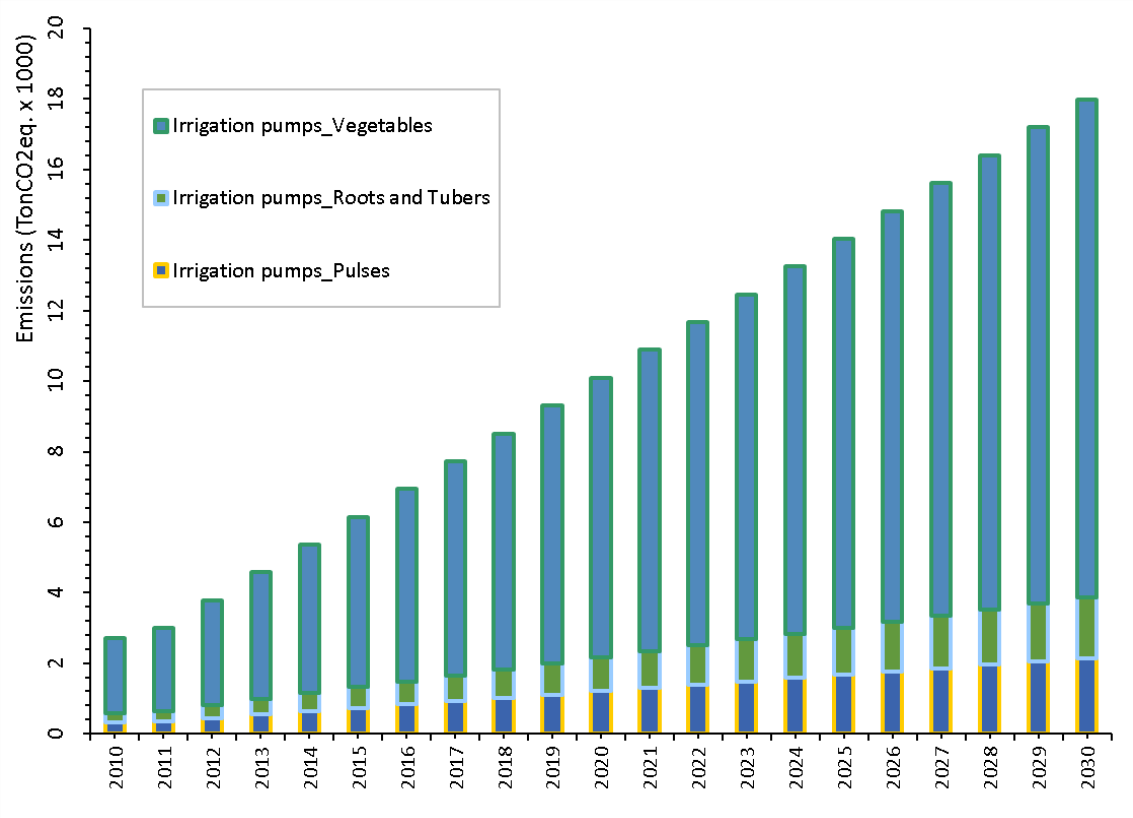
- At the last modeling stage, findings from LEAP were used in REDD Abacus model to generate a scenario of both mitigation options for both energy and agriculture sector.

Achievements (contn'd)

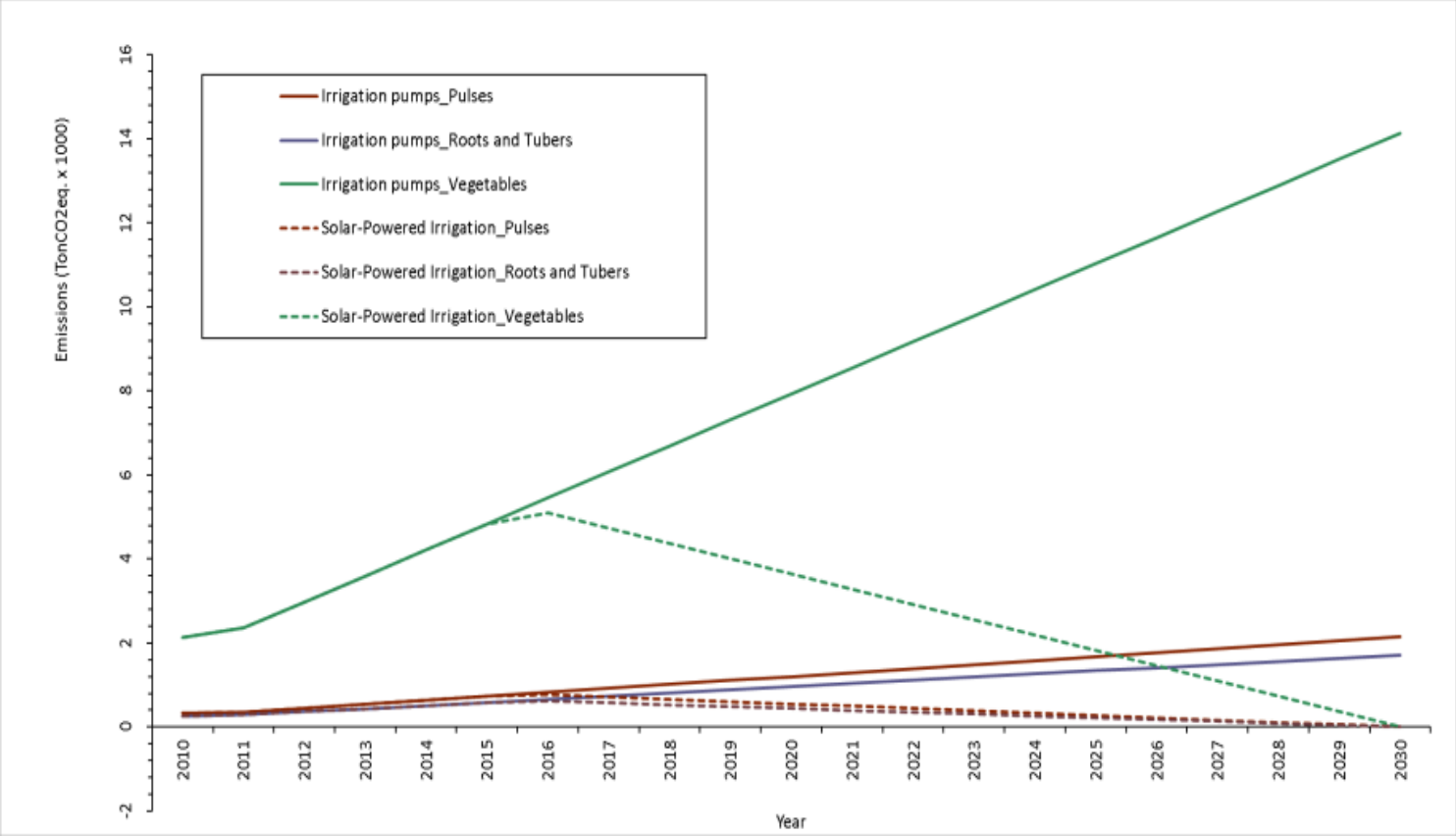
Replacing fuel powered irrigation pumps with Solar Powered Irrigation (SPI)

Replacing fuel powered irrigation by solar powered irrigation

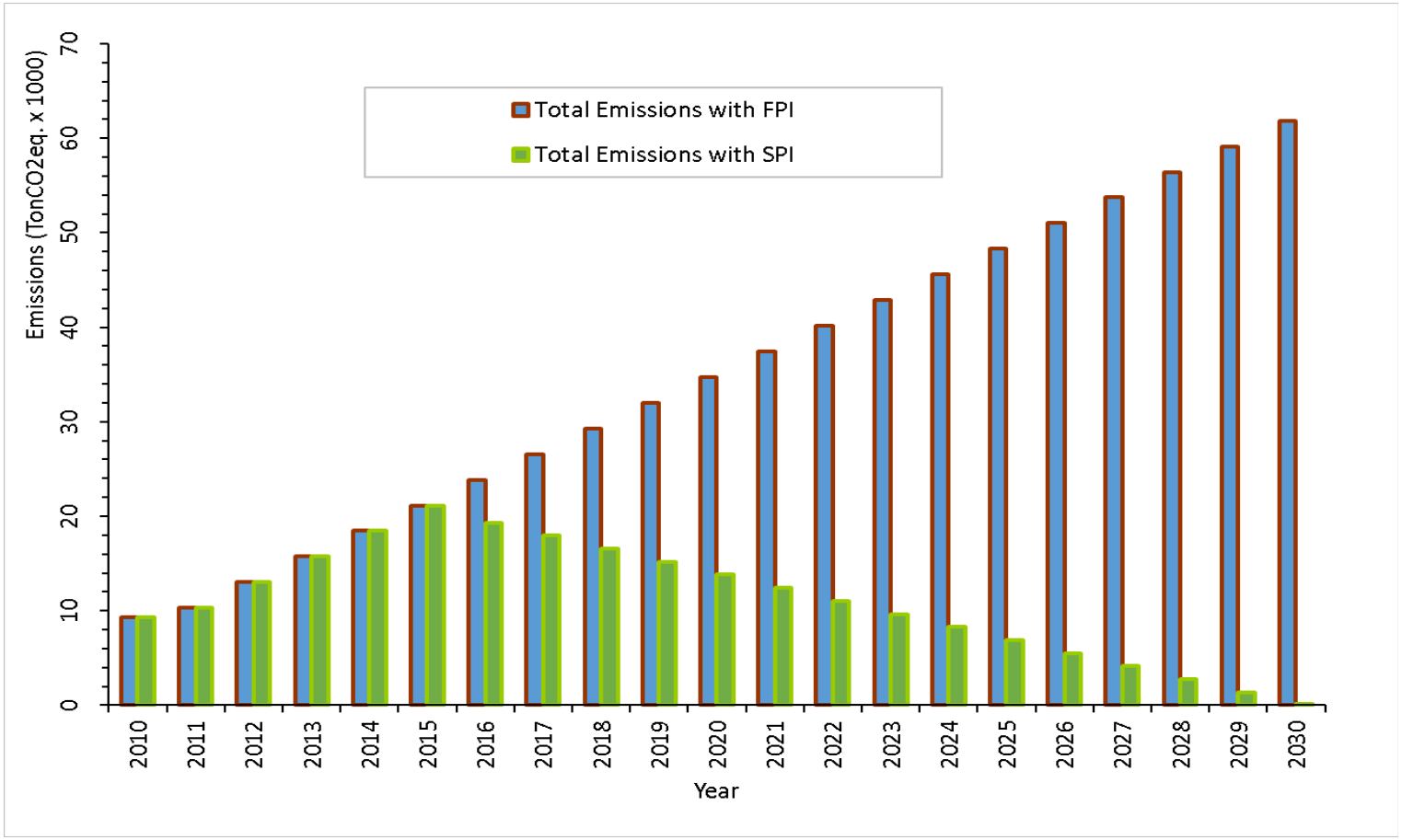
Emissions of CO2eq from FPI systems by crop type between 2010 and 2030.



Emission of tCO2eq of fuel powered irrigation (BAU) by solar powered irrigation for each crop group.

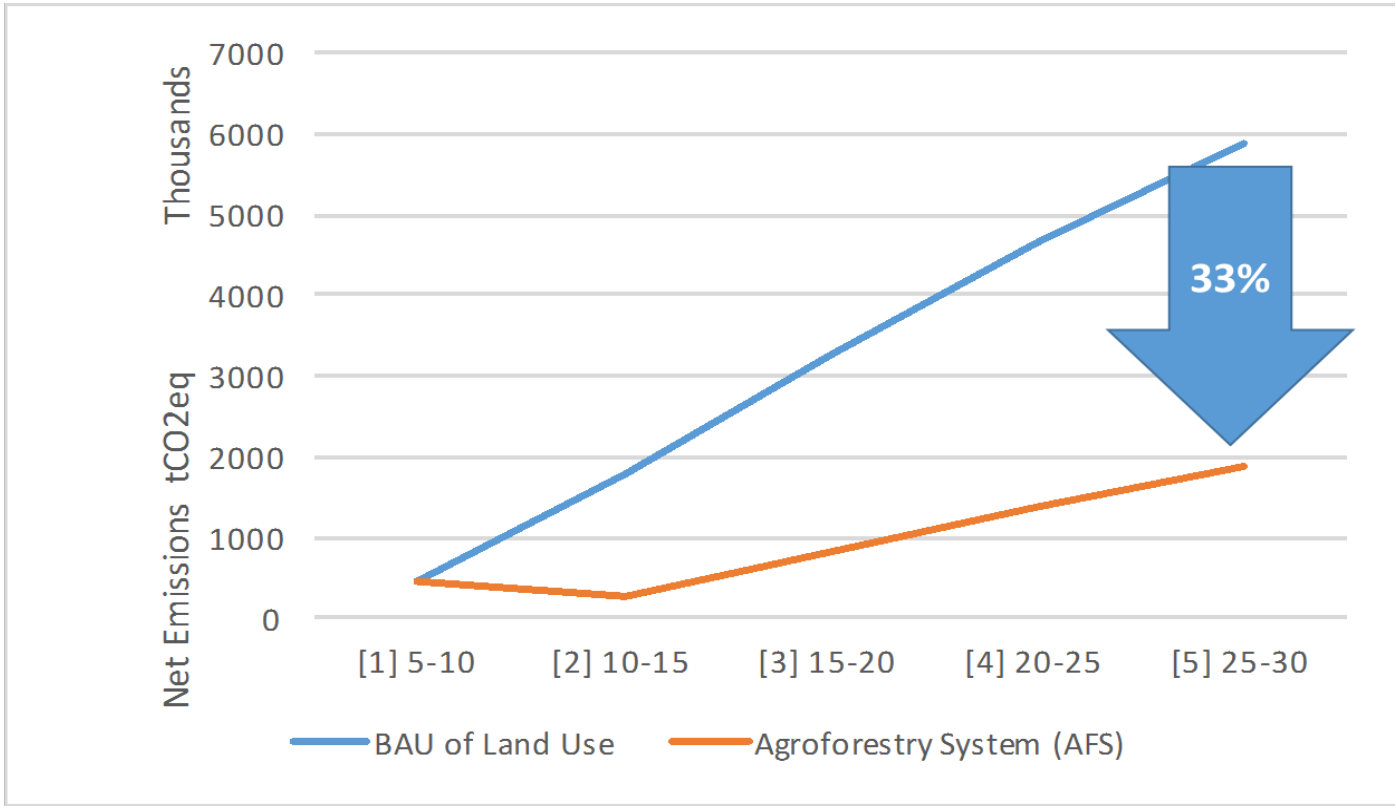


Emission reduction from FPI (BAU) by SPI between 2010 and 2030.



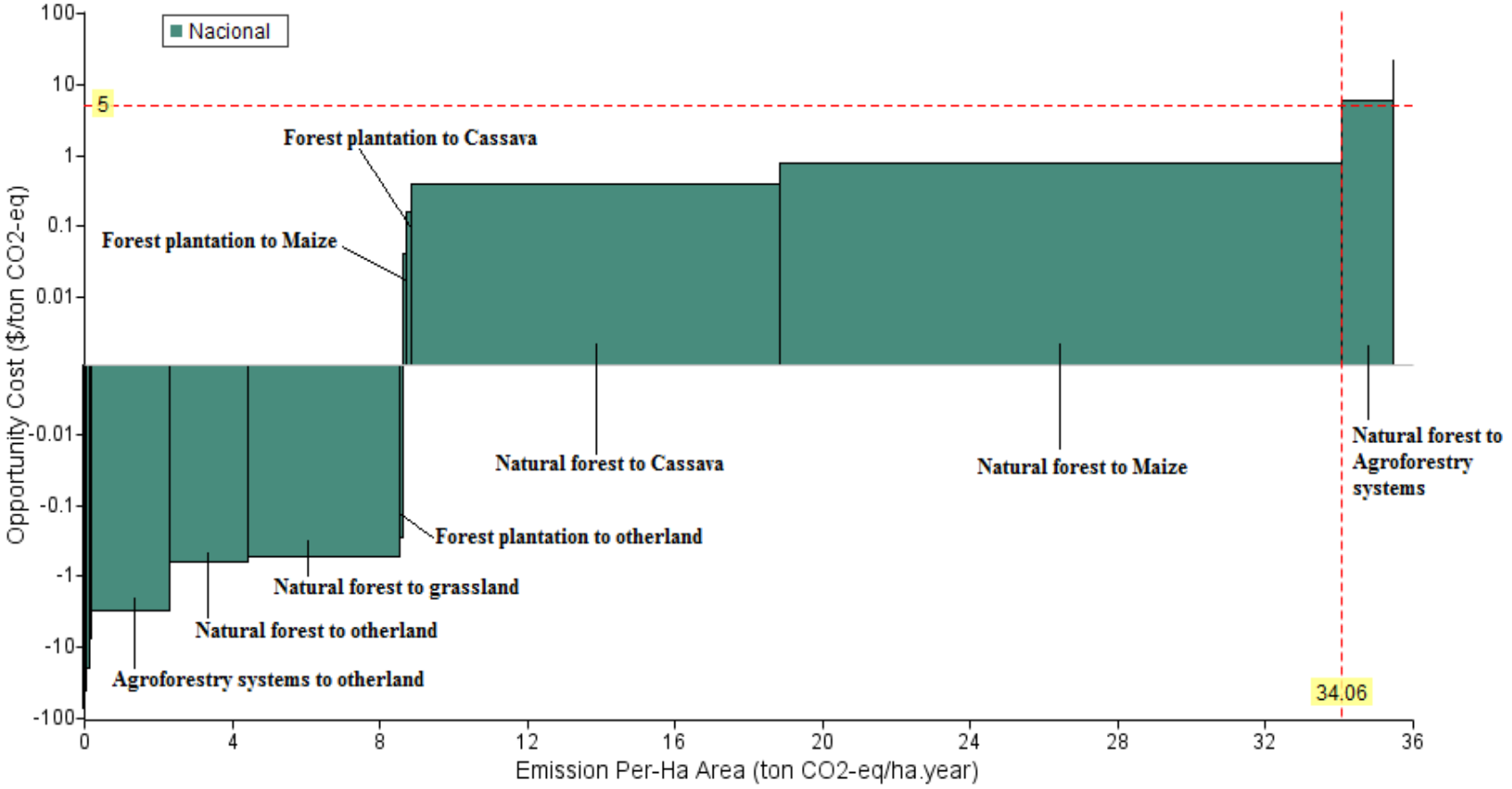
Replacing slash and burn agriculture by agroforestry system

Emission reduction resulting from slash-and-burn agriculture (BAU scenario) and replacement of 50 % of the slash-and-burn agriculture area by AFS.

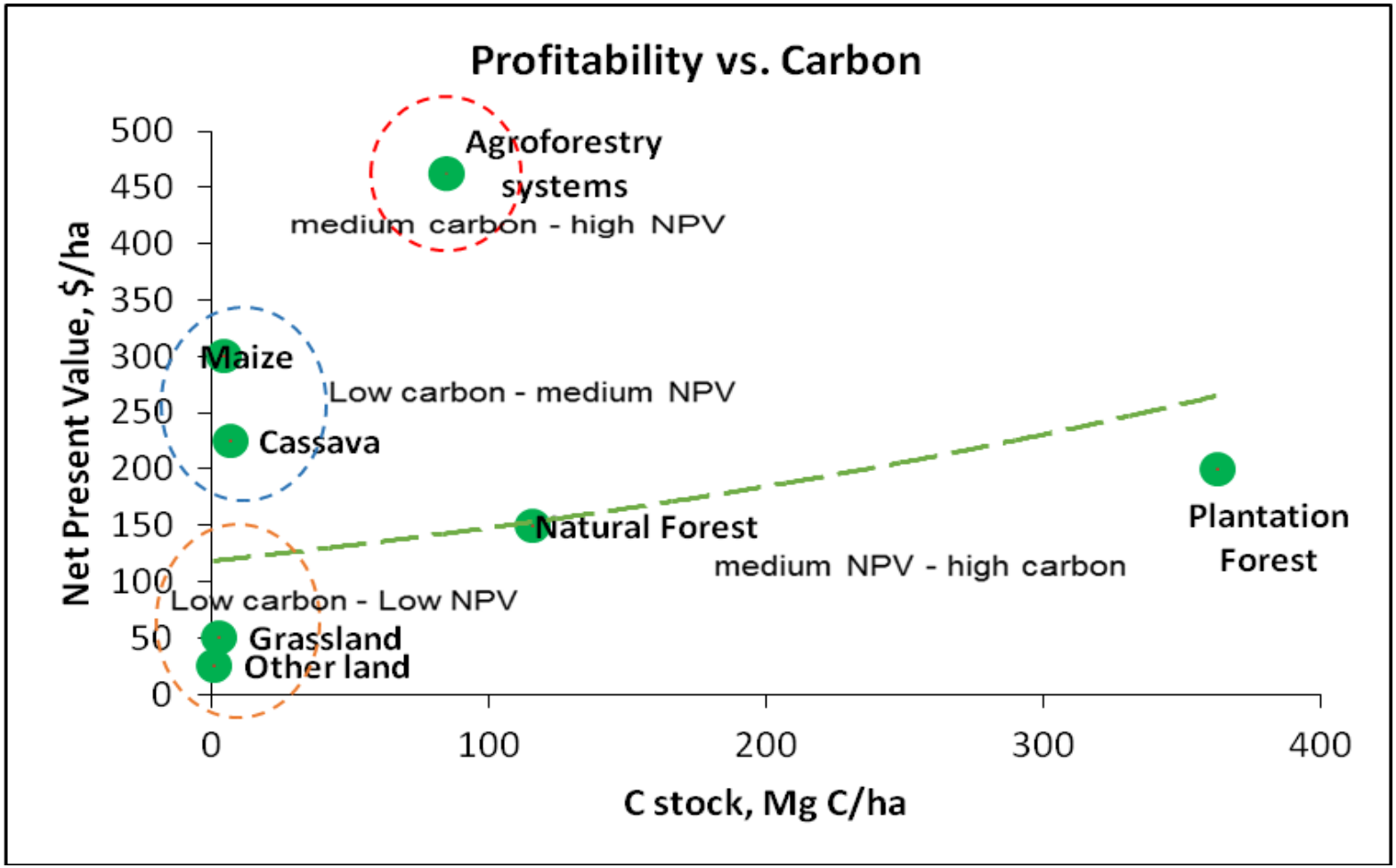


Replacing fuel powered irrigation by solar powered irrigation

Cost of emission reductions/Opportunity cost
Abatment curve of emission

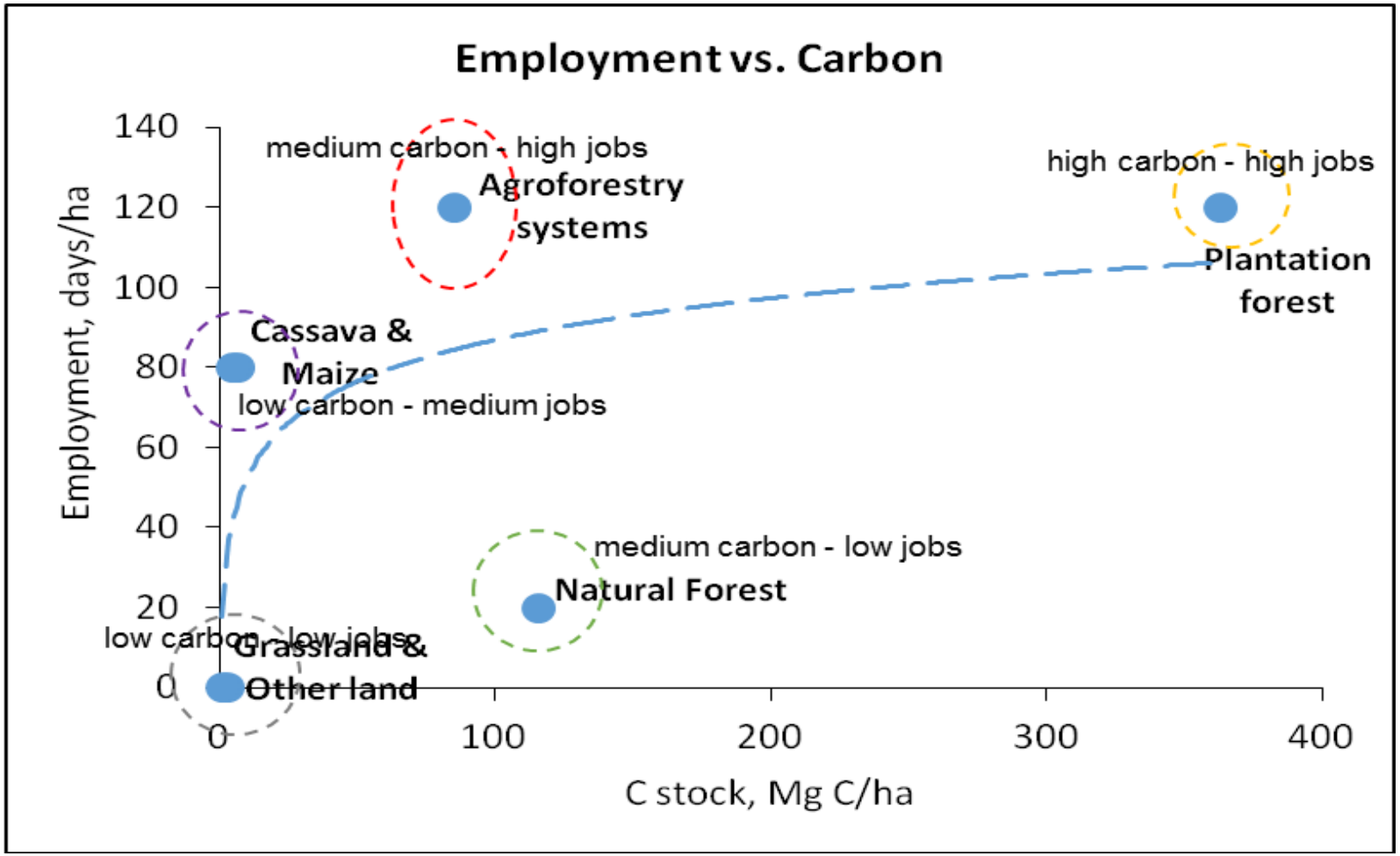


Economic and social benefit of Agroforestry against other land use



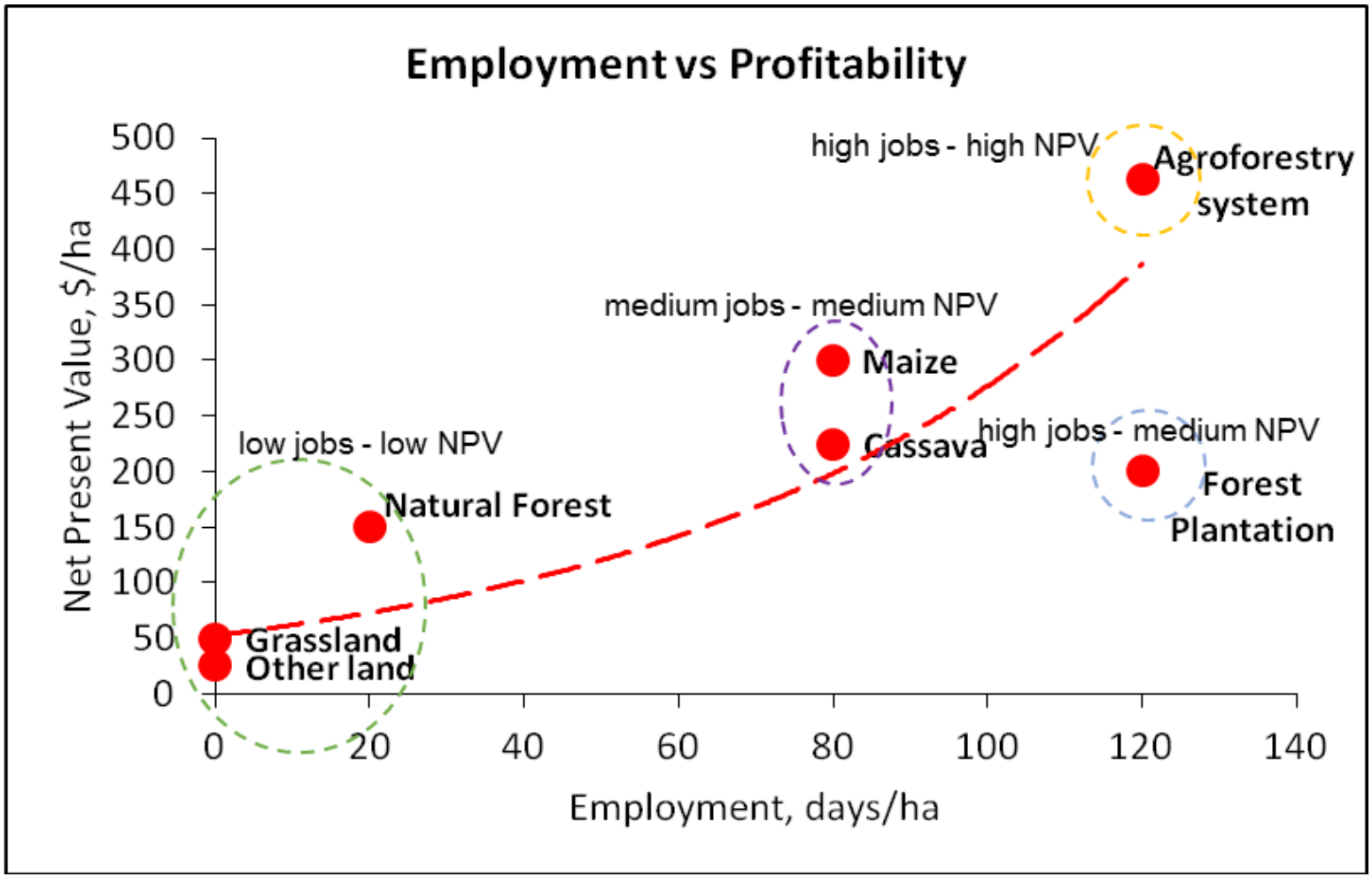
Cluster analysis between profitability and carbon stock amongst land cover.

Economic and social benefit of Agroforestry against other land use



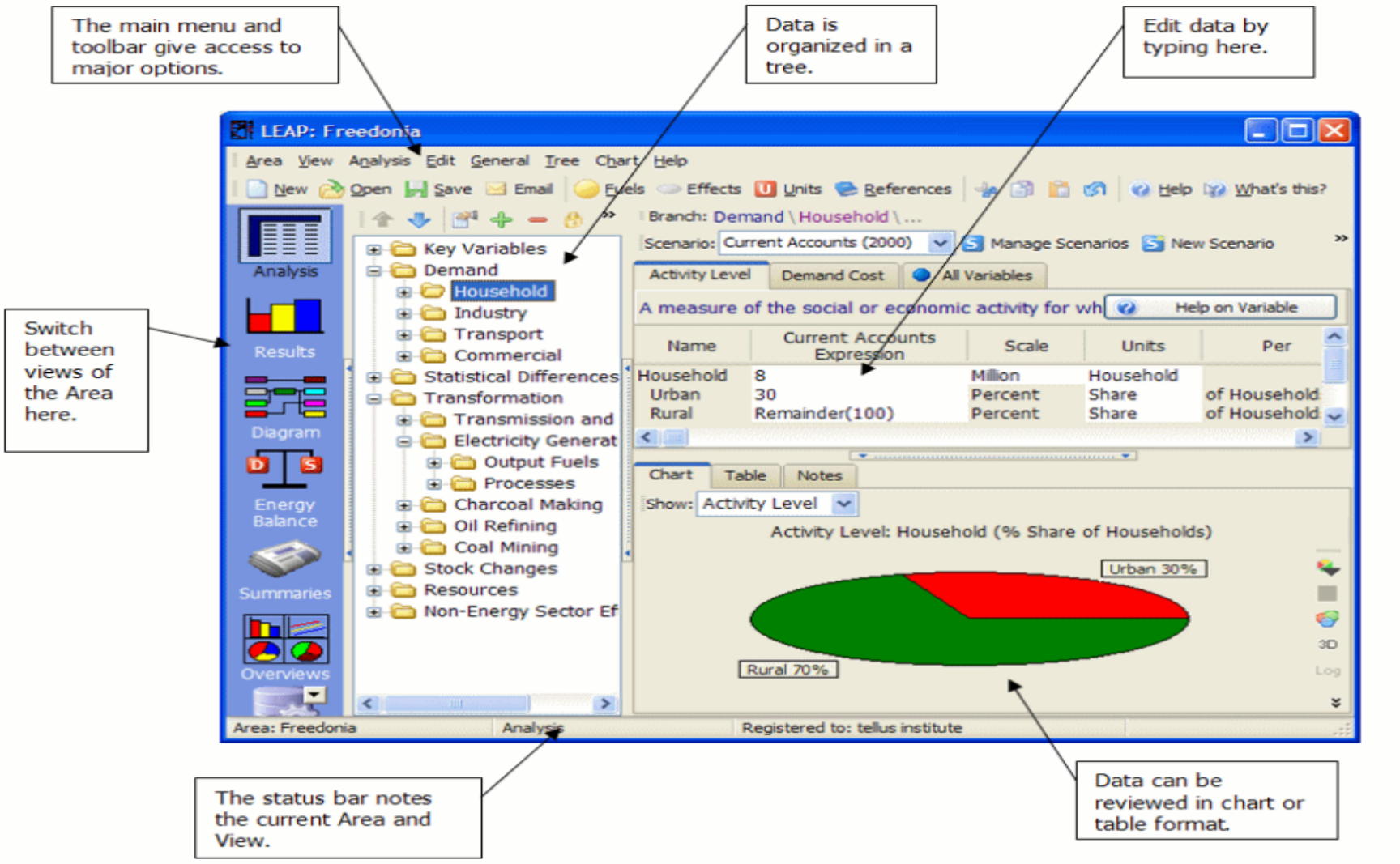
Cluster analysis between carbon stock and employment amongst land cover.

Economic and social benefit of Agroforestry against other land use

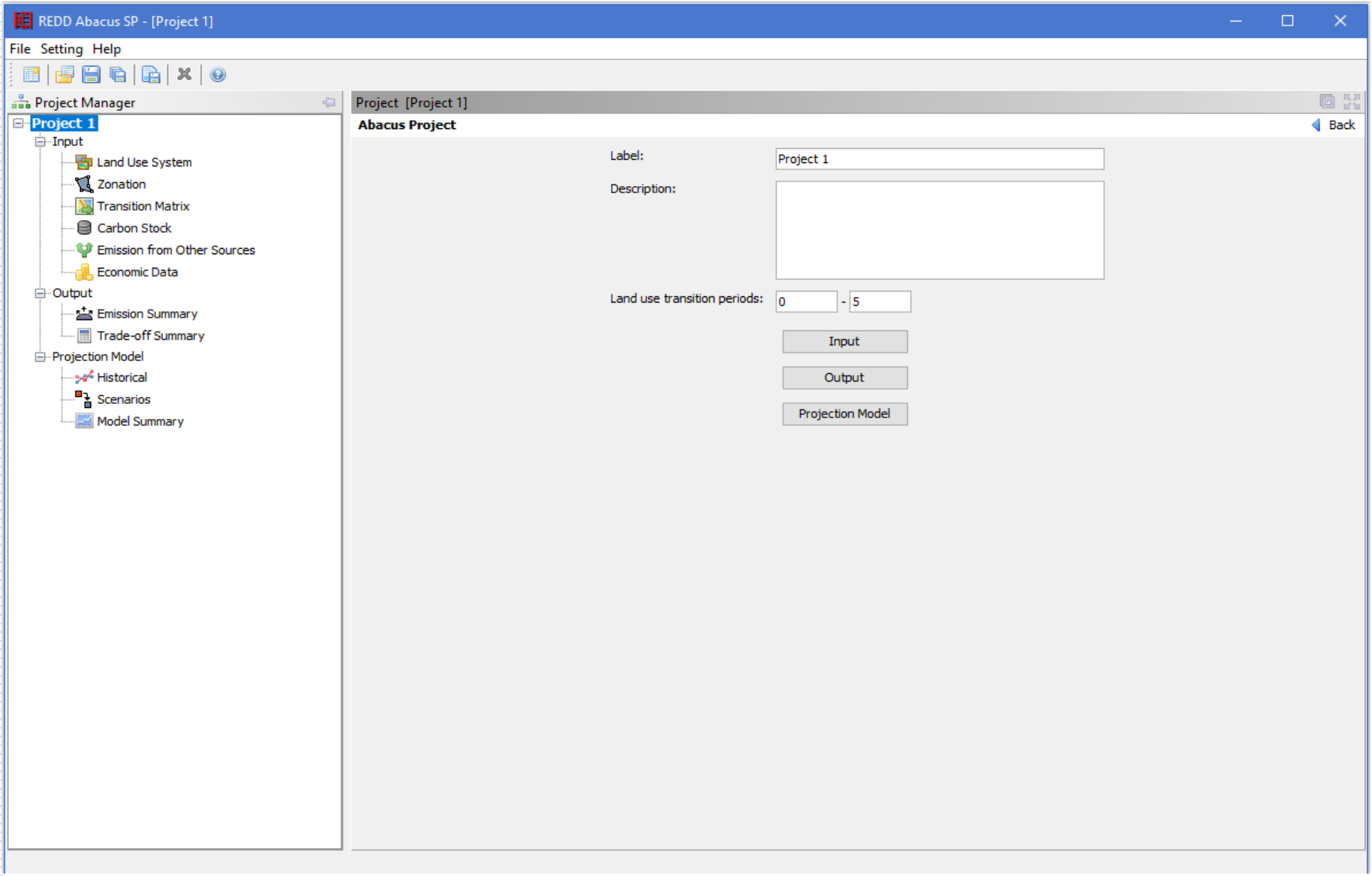


Cluster analysis between profitability and employment amongst land cover.

LEAP model


The main menu and toolbar give access to major options.
Data is organized in a tree.
Edit data by typing here.
Switch between views of the Area here.
The status bar notes the current Area and View.
Data can be reviewed in chart or table format.
LEAP: Freedonia
Area View Analysis Edit General Tree Chart Help
New Open Save Email Fuels Effects Units References Help What's this?
Branch: Demand \ Household \ ...
Scenario: Current Accounts (2000) Manage Scenarios New Scenario
Analysis
Results
Diagram
Energy Balance
Summaries
Overviews
Key Variables
Demand
Household
Industry
Transport
Commercial
Statistical Differences
Transformation
Transmission and
Electricity Generat
Output Fuels
Processes
Charcoal Making
Oil Refining
Coal Mining
Stock Changes
Resources
Non-Energy Sector Ef
Activity Level
Demand Cost
All Variables
A measure of the social or economic activity for wh
Help on Variable
Name
Current Accounts Expression
Scale
Units
Per
Household 8 Million Household
Urban 30 Percent Share of Household
Rural Remainder(100) Percent Share of Household
Chart
Table
Notes
Show: Activity Level
Activity Level: Household (% Share of Households)
Urban 30%
Rural 70%
3D
Log
Area: Freedonia
Analysis
Registered to: tellus institute

REDD Abacus model



Feedback to policy

- Results from LEDS, helped to enrich the NDC by including the AFS and SPI as activity of emission reduction, and generator of socioeconomic benefit.
- The results from LEDS project brought evidences enable the politicians to consider the AFS and SPI as good practices for sustainable development, and was recommended to include in the NDC.
- From the recommendation of LEDS project, INIR is preparing a project on irrigation using solar panel. The proposal has been presented in the workshop in Portugal.
- NDC was presented to the minister council and has been approved, before that was presented in many forum promoting debate and discussion among stakeholders.

Testimonials

- At the beginning the agriculture's sector wasn't considered in the NDC as some of alternative for emission reduction. Therefore, the results from LEDS project allowed NDC to include alternatives of agricultural practices of low emission through using renewable energies.

- From LEDS project also enabled the politicians to include AFS as the good alternative for replacing slash-and-burn agriculture wich has high emissions.

Conclusion

- The results suggested that there is a great deal of opportunities to reduce CO_2 emissions, and increase CO_2 sequestrations in the Agricultural sector with AFS, and energy sector with SPI.
- Use SPI, apart from reducing emissions, provides increased economic returns, and increase opportunities for more people to engage in irrigated agriculture.
- The analyses indicated that there is a medium and long-term potential for replacing SBA by AFS, and this has a potential to generate social, economic and environmental benefits.
- The AFS and SPI assessed in this study were included as activity of NDC implementation, and was pointed out that both AFS and SPI will create socioeconomic opportunities.

Next steps (1)

- LEDS measures will only be successfully implemented, if they are understood and supported by local stakeholders.
- It is necessary to inform policymakers about the economic, social and environmental benefits of available options to promote development while reducing emissions, such as presented in this study.
- Data availability revealed to be the most limiting factor for the simulation. So, we suggest that research institutions be engaged and strongly encouraged to include research lines that generate data and information to support LEDS and NDC.

Next steps (2)

- Statistics on areas, land use change, irrigated area, characteristics of the fuel powered irrigation, and capacity of the solar powered irrigation systems, among others need to be systematically collected to provide a solid base for estimation of emissions and the potential of emissions reduction.

- Therefore, national institutions, such as INIR, and the IIAM are encouraged to engage in systematic data collection and provide a platform to facilitate data access.

- The results of this report have contributed meaningful on the NDC preparation in Mozambique. Moreover, have potential to inform the processes of Biennial Update Report (BUR) and National Communication (NC) in term of emissions and emission reduction potential.

AFRICA-LEDS PROJECT

UNEP

Thank You!

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