Expert Workshop for the How2Guide for Bioenergy

Biomass Resources and Bioenergy Potential in South America – Focus on Biofuels

Methodology for Assessing the Feasibility of Sustainable Production in Bioenergy Projects

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FGV Projetos

Piracicaba, 28th November 2014

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PRESENTATION STRUCTURE

FGV Presentation

FGV Zoning Methodology & Application

Mozambique Case

FGV's Vision about Feasibility Assessments in the Bioenergy Roadmap Development

MISSION

GENERATE, SHARE AND APPLY KNOWLEDGE FOR BRAZIL'S SOCIAL AND ECONOMIC DEVELOPMENT

FGV EDUCATION, RESEARCH AND PROJECTS

RECOGNIZED KNOWLEDGE

- PUBLIC LAW PRIVATE FOUNDATION ESTABLISHED IN 1944
- FIRST INSTITUTION TO OFFER PUBLIC AND BUSINESS ADMINISTRATION GRADUATION COURSES IN LATIN AMERICA
- RANKED AS A MAJOR THINK TANK IN LATIN AMERICA, ONE OF THE TOP 30 IN THE WORLD (PENNSYLVANIA UNIVERSITY)
- RANKED AMONG THE WORLD'S BEST 100 UNIVERSITIES BY A NEW YORK TIMES SURVEY
- FIVE SCHOOLS AMONG THE BEST HIGHER EDUCATION INSTITUTIONS IN BRAZIL, ACCORDING TO THE BRAZILIAN MINISTRY OF EDUCATION
- RESPONSIBLE FOR THE MAIN INDEXES OF BRAZILIAN ECONOMY, INCLUDING INFLATION RATES AND ECONOMIC PERFORMANCE MEASUREMENT INDEXES.

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MISSION

TO CONTRIBUTE TO THE COUNTRY'S DEVELOPMENT THROUGH THE APPLICATION OF THE KNOW-HOW PRODUCED BY FGV FOUNDATION'S SCHOOLS AND INSTITUTES

FGV PROJETOS
OVERVIEW

OVER 1300 PROJECTS
DEVELOPED

180 ONGOING PROJECTS

800 EMPLOYEES
AND COLABORATORS

PROJECTS IN MORE
THAN **15 COUNTRIES**

FGV PROJETOS

30 YEARS EXPERIENCE IN TECHNICAL
ASSISTANCE

TECHNICAL PERSONNEL COMPOSED
BY MASTERS
AND PHDs

GEOGRAPHICAL DISTRIBUTION
ALL OVER BRAZIL
AND ABROAD

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Context in bioenergy sector

Technical Cooperation Agreement between:

- **Brazil-USA** technical cooperation agreement **to develop bioenergy in countries in the tropical belt.**

- **Technical cooperation agreement between the European Union and Brazil**, for a feasibility study to produce biofuel and food in **Mozambique**.

- **Results:** **13** countries have received the feasibility studies for project development: ethanol, biodiesel, electricity, steam and food projects.

- Argentina	- El Salvador	- Senegal
- Dominican Republic	- San Cristóbal y Nieves	- Guinea Bissau
- Honduras	- Guinea	- Mozambique
- Guatemala	- Liberia	- Zambia
- Haiti		

13 countries → 65 feasibility studies → 45 Projects previously approved by local governments.

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Environmental

Cooperation Agreement

Agricultural

UNEP United Nations Environment Programme

Embrapa

Strong commitment to environmental issues.

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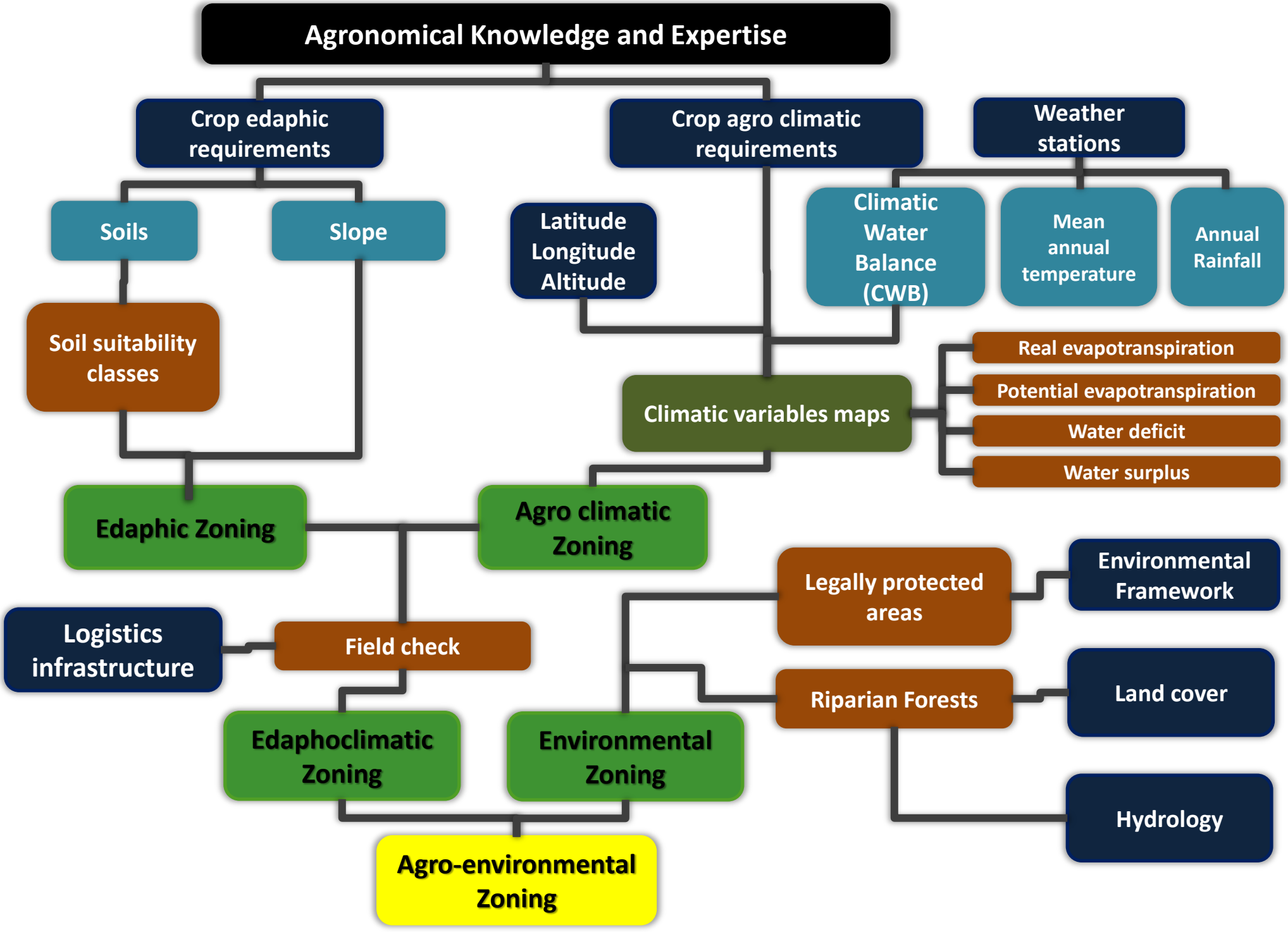
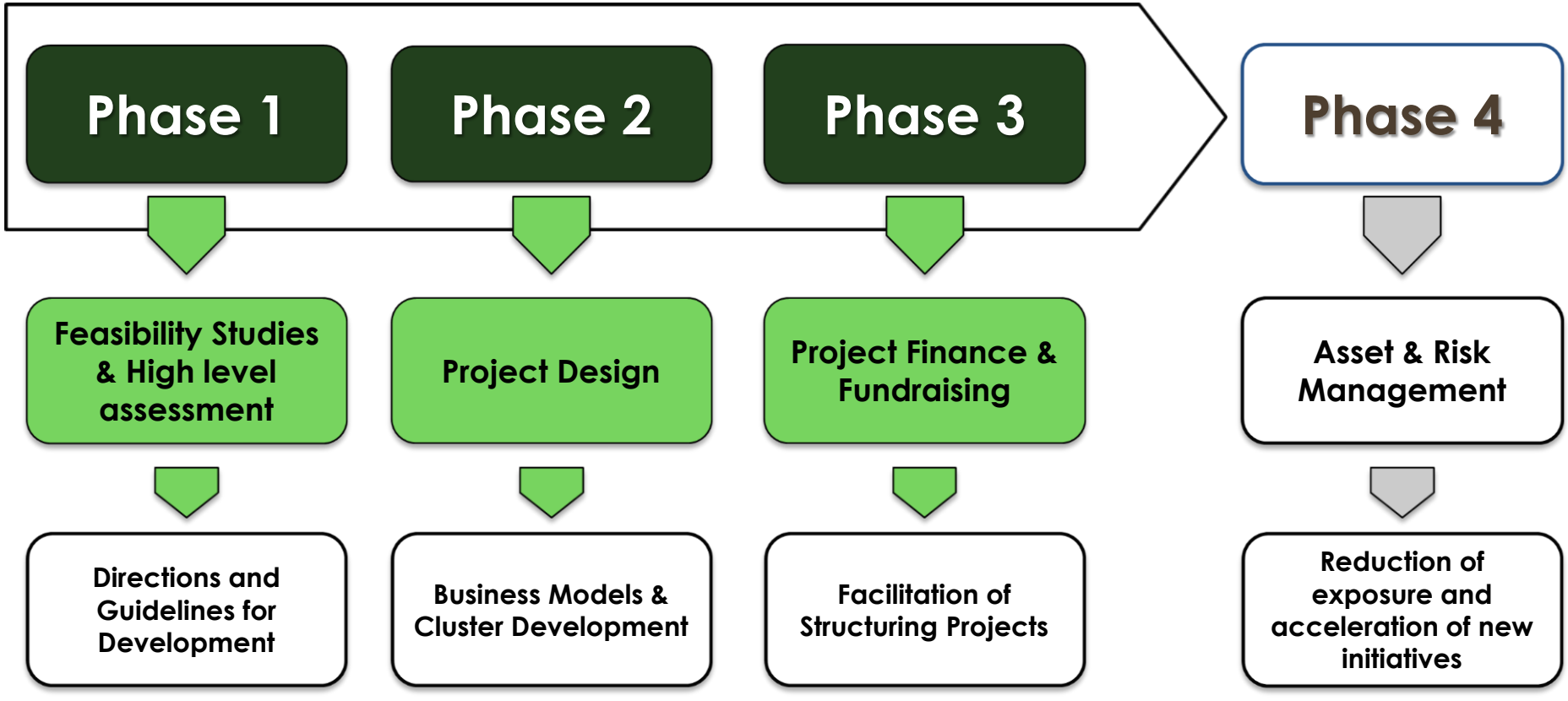
ZONING METHODOLOGY


Agronomical Knowledge and Expertise
Crop edaphic requirements
Crop agro climatic requirements
Weather stations
Soils
Slope
Latitude
Longitude
Altitude
Climatic Water Balance (CWB)
Mean annual temperature
Annual Rainfall
Soil suitability classes
Real evapotranspiration
Potential evapotranspiration
Water deficit
Water surplus
Climatic variables maps
Edaphic Zoning
Agro climatic Zoning
Legally protected areas
Environmental Framework
Logistics infrastructure
Field check
Riparian Forests
Land cover
Edaphoclimatic Zoning
Environmental Zoning
Hydrology
Agro-environmental Zoning

DEVELOPMENT APPROACH: 4 PHASES PROGRAMME

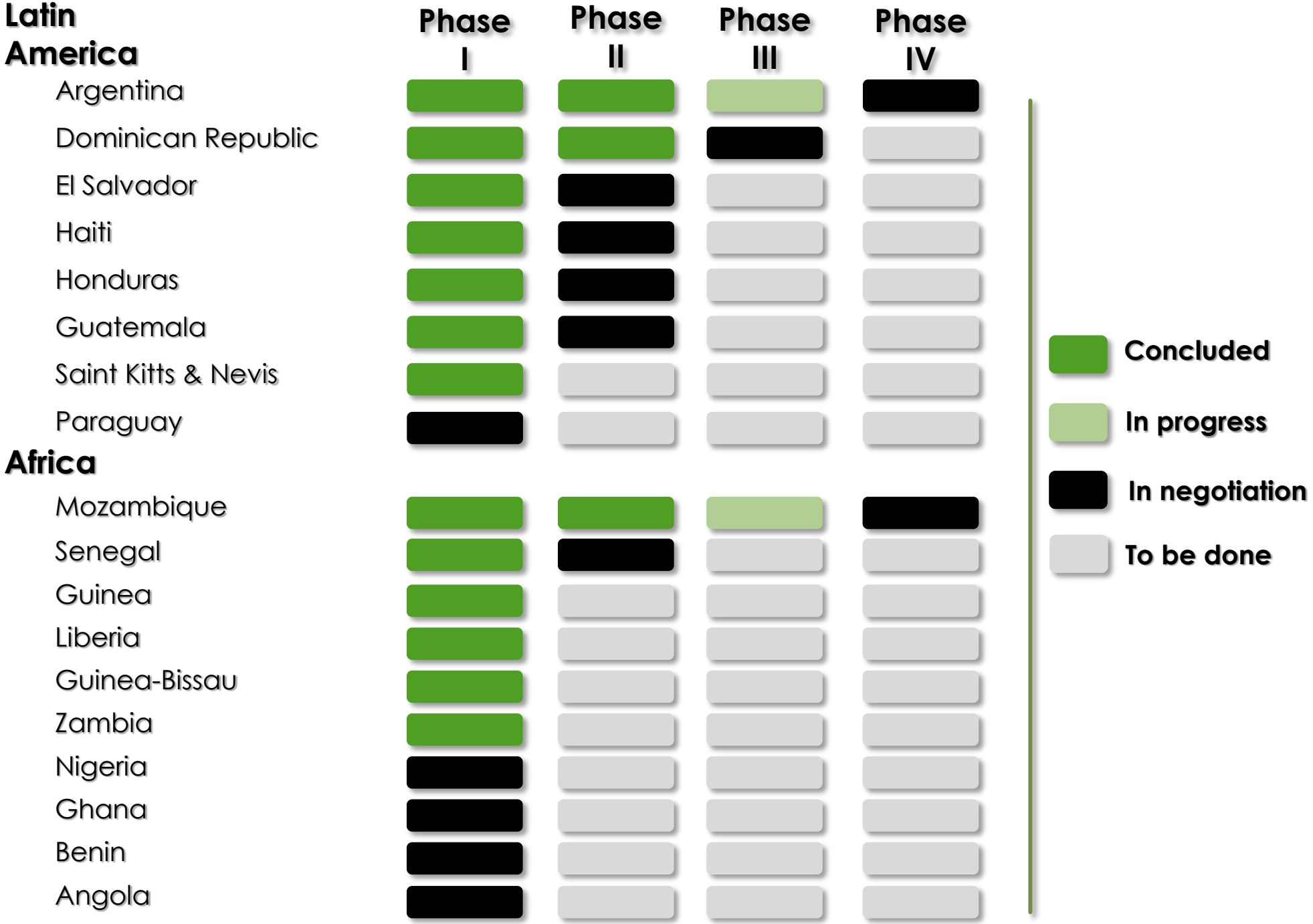


Progressive approach that relies on long term Strategic Planning.

Each successive level requires information in higher resolution.

Mapping for decision making must occur in the proper scale.

CURRENT STATUS



PHASE 1: NATIONAL LEVEL ASSESSMENT

Data collection and analysis

- Legal Framework
- Environmental Data
- Social & Economic Dynamics
- Infrastructure
- Policies & Strategies

Diagnosis and Evaluation of Opportunities

- Zoning
- Structured Strategic Analysis

Development Plan

Goals, Actions & Schedule

National level GIS data

Focus on information previously available

SPATIAL DATA IN DEVELOPING COUNTRIES

Major constraints

- Historical series of climatological data
- Soil maps
- Land Use and Land Cover
- Consolidated and Up to Date Framework on Environmental Protection and Conservation

The scale of an appropriate spatial database for decision making at the national level fits between 1:1,000,000 and 1:5,000,000.

This is determined by the less accurate information layer.

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ZONING APPLICATION:

MOZAMBIQUE

FGV IN MOZAMBIQUE

Feasibility Study of Biofuels Production in the Republic of Mozambique

- Nationwide study to determine the potential for development of agricultural and forestry crops for energy purposes.
- 14 crops analysed.

Support of Agriculture Development Master Plan for the Nacala Corridor in Mozambique – ProSAVANA-PD

- Agriculture development Master Plan which contributes to social and economic development by engaging private investment to promote sustainable production systems and poverty reduction in the Nacala Corridor Region.
- Study area: about 10 million hectares distributed in 19 districts.

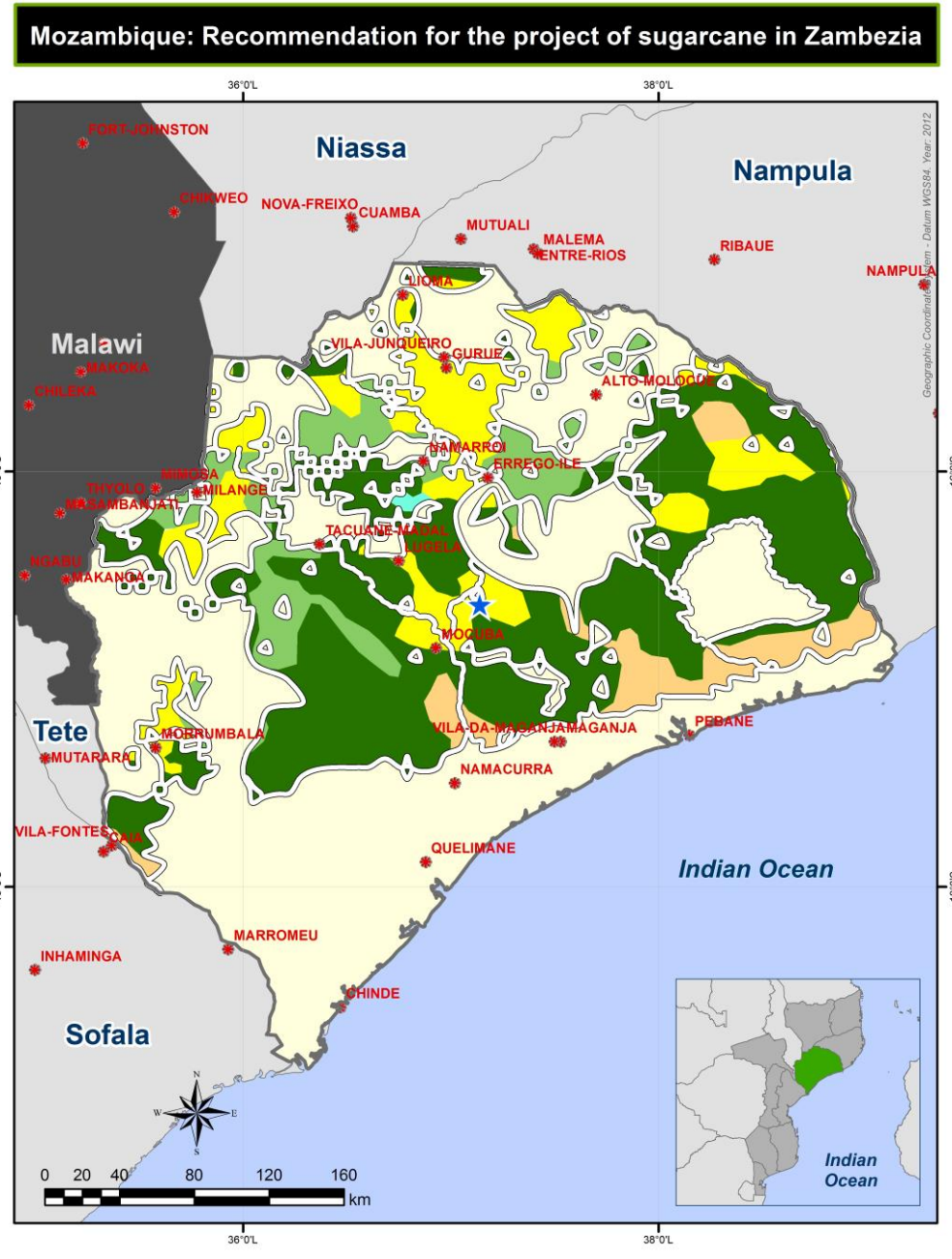
Feasibility Study of Biofuels Production

Sponsored by VALE S/A with the support of the Brazilian Government through the Ministry of Foreign Relations (Itamaraty)

Seven value chains were recommended:

- Sugarcane – Ethanol, sugar and electricity
- Elephant grass – Electricity
- Eucalyptus – Charcoal
- Cotton – Oil, fiber and byproducts
- Sunflower – Oil and byproducts
- Castor bean – Oil and byproducts
- Soybean – Oil and byproducts

Feasibility Study of Biofuels Production



Approximately 19% of the territory suitable for sugarcane.

Recommendation of a pioneer project in accordance to suitability, land use, logistics and demography in a scale of 1:2,000,000.

Recommendations for disturbed areas and guidance for best practices.

Necessary to proceed to Phase 2 and advance with the Project Design.

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ProSAVANA-PD

Triangular Co-operation Programme for Agricultural Development of the Tropical Savannah in Mozambique (ProSAVANA)

Co-ordinated by the Ministry of Agriculture of Mozambique (MINAG), the Japan International Cooperation Agency (JICA) and the Brazilian Cooperation Agency (ABC).

FGV Projetos as the Brazilian technical institution responsible for jointly implementing the Master Plan Project.

- 26 crops were studied.

MASTER PLAN CONTEXT

Nacala Corridor

3 Provinces
19 Districts
107.176 km²

2012 Pop. Data

4.300.000 Inhabitants
~**40** hab./Km²
875.492 Households

2030 Pop. Data forecasts*

7.600.000 Inhabitants
~**70** hab./km²
1.767.441 Households

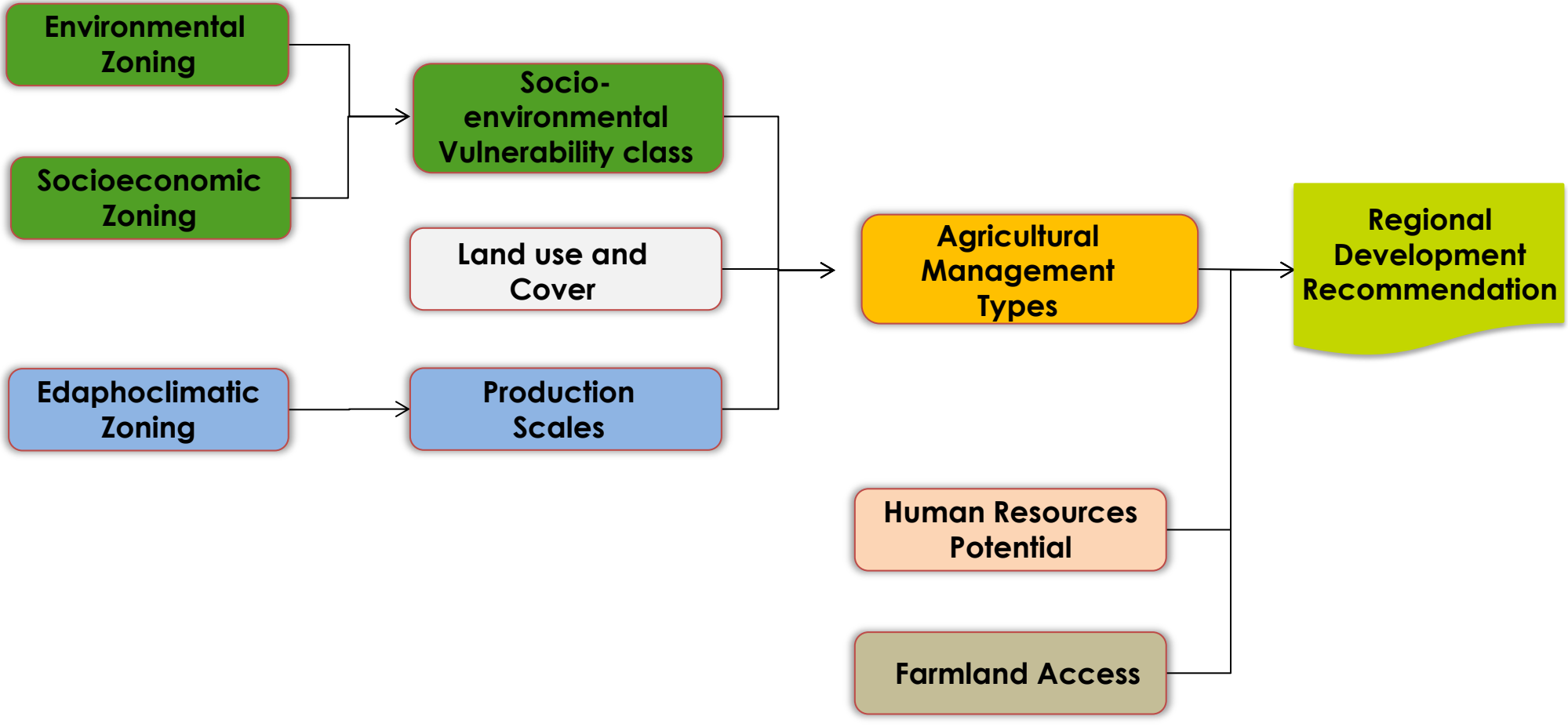
76% Pop. Growth

Agriculture production must Increase to maintain the actual welfare levels.

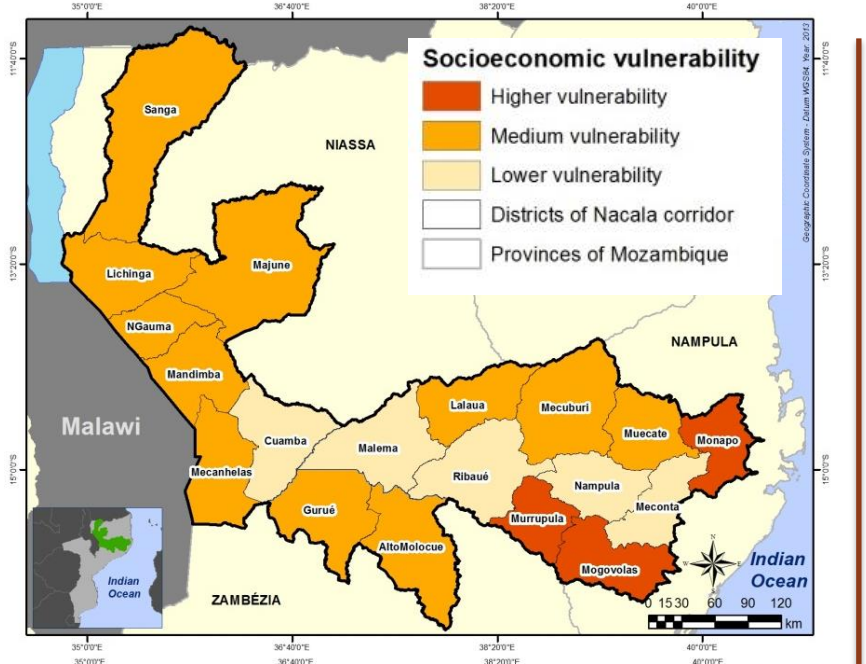
*Instituto Nacional de Estatística de Moçambique, 2007

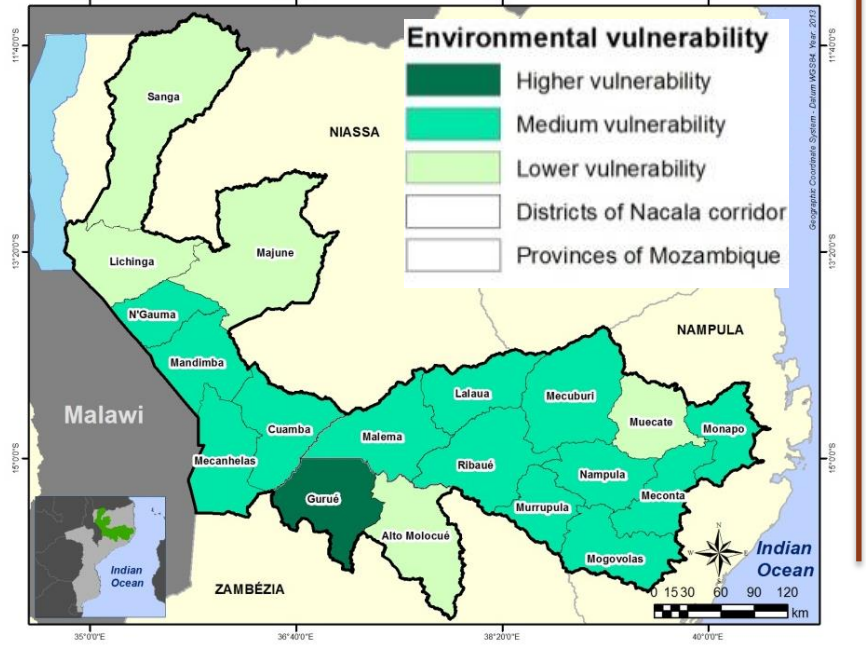
ProSAVANA MASTERPLAN ZONING

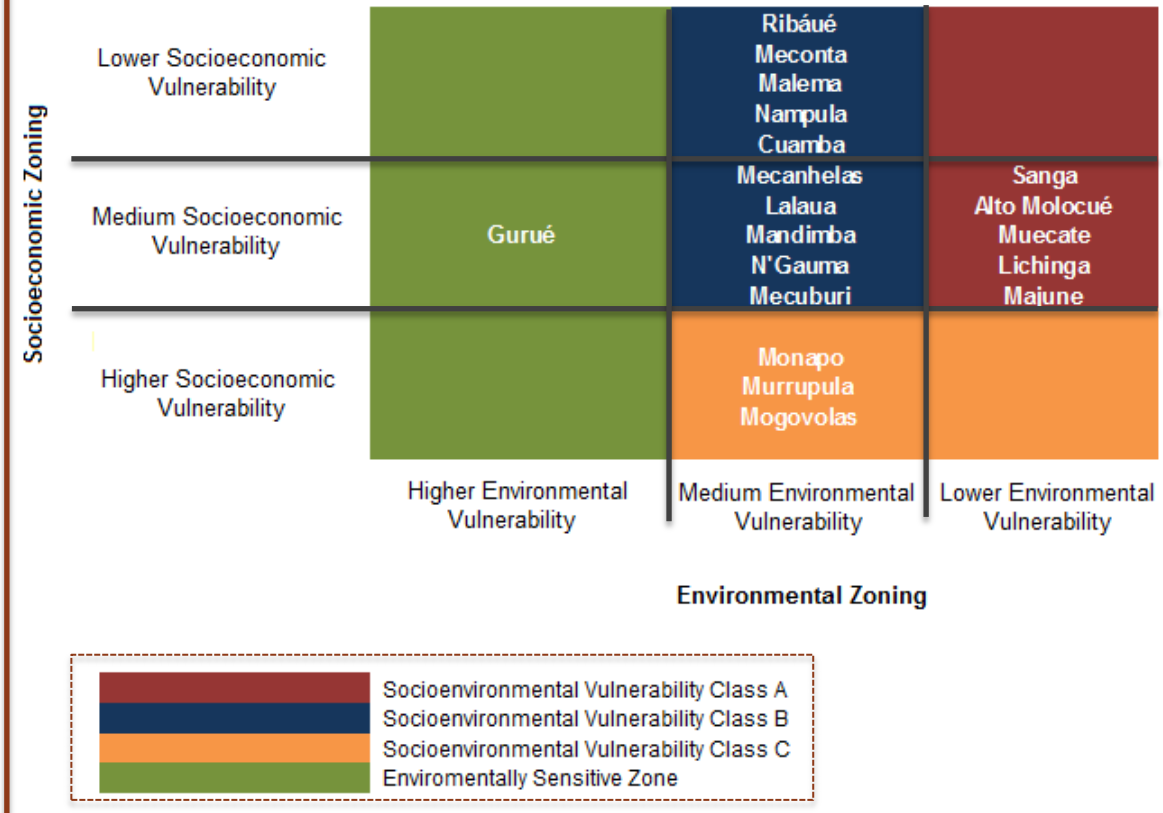
General Overview



STUDY DEVELOPMENT: ZONING







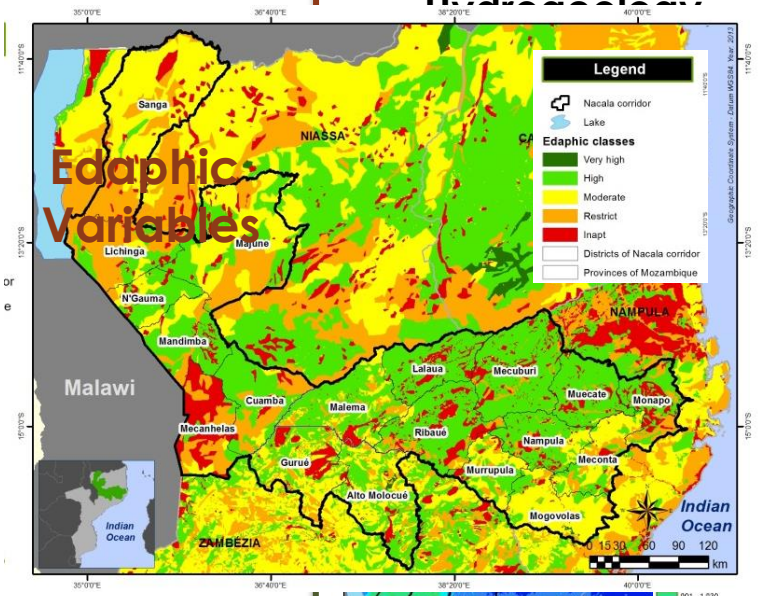
Socio-environmental Vulnerability Classes Definition

STUDY DEVELOPMENT: ZONING

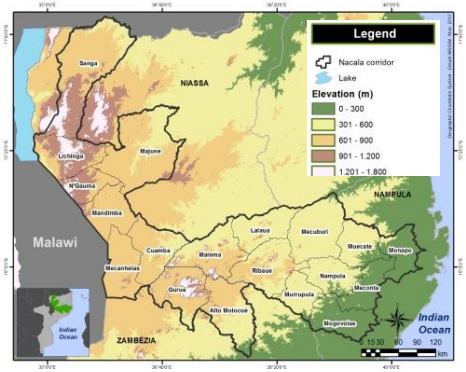
Edaphic zonings

Hydrogeology

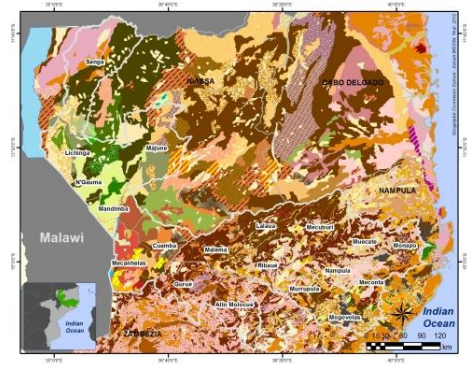
Edaphic Variables



Slope

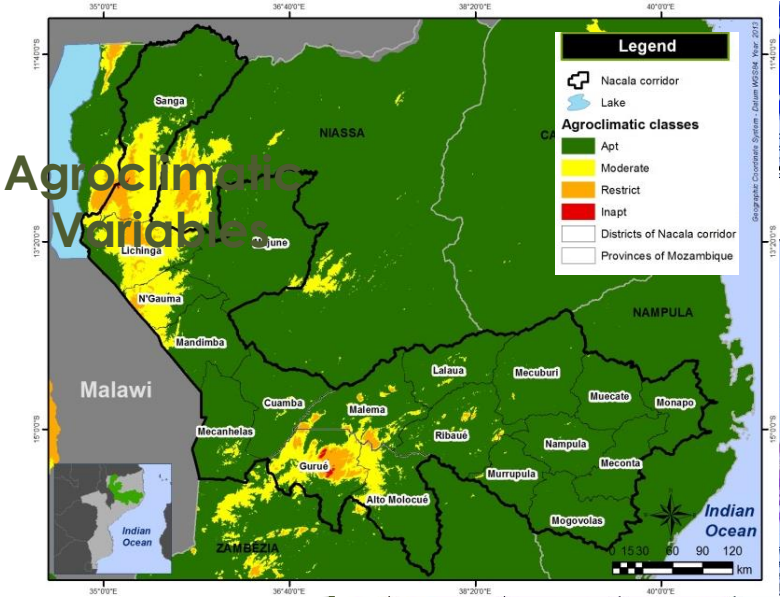


Soils

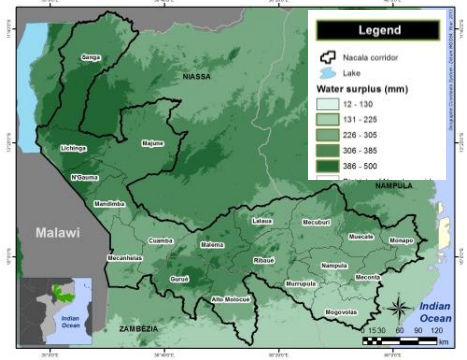


Agroclimatic zonings

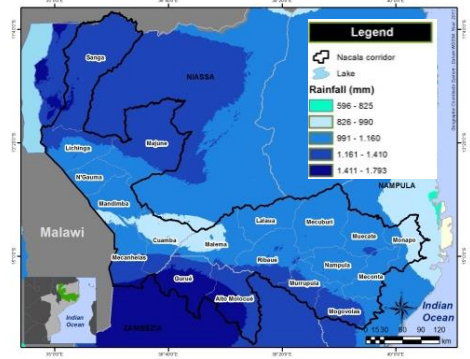
Agroclimatic Variables



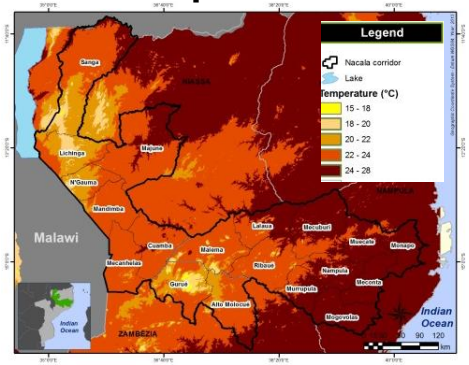
Water Surplus



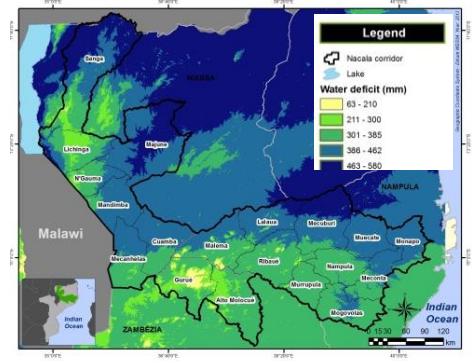
Rainfall



Temperature

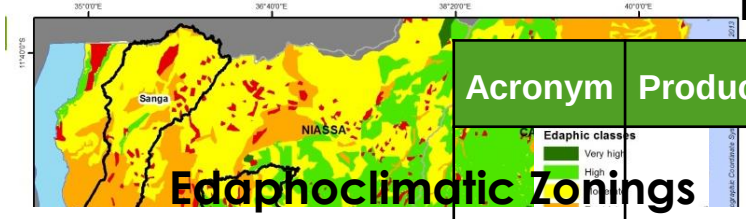


Water Deficit

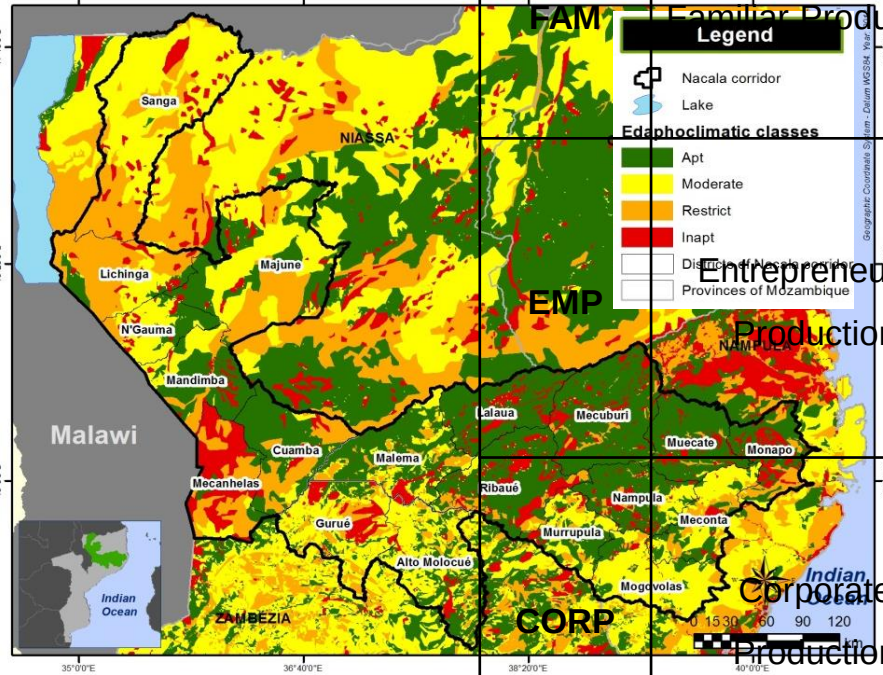


STUDY DEVELOPMENT: ZONING

Edaphic zonings



Edaphoclimatic Zonings



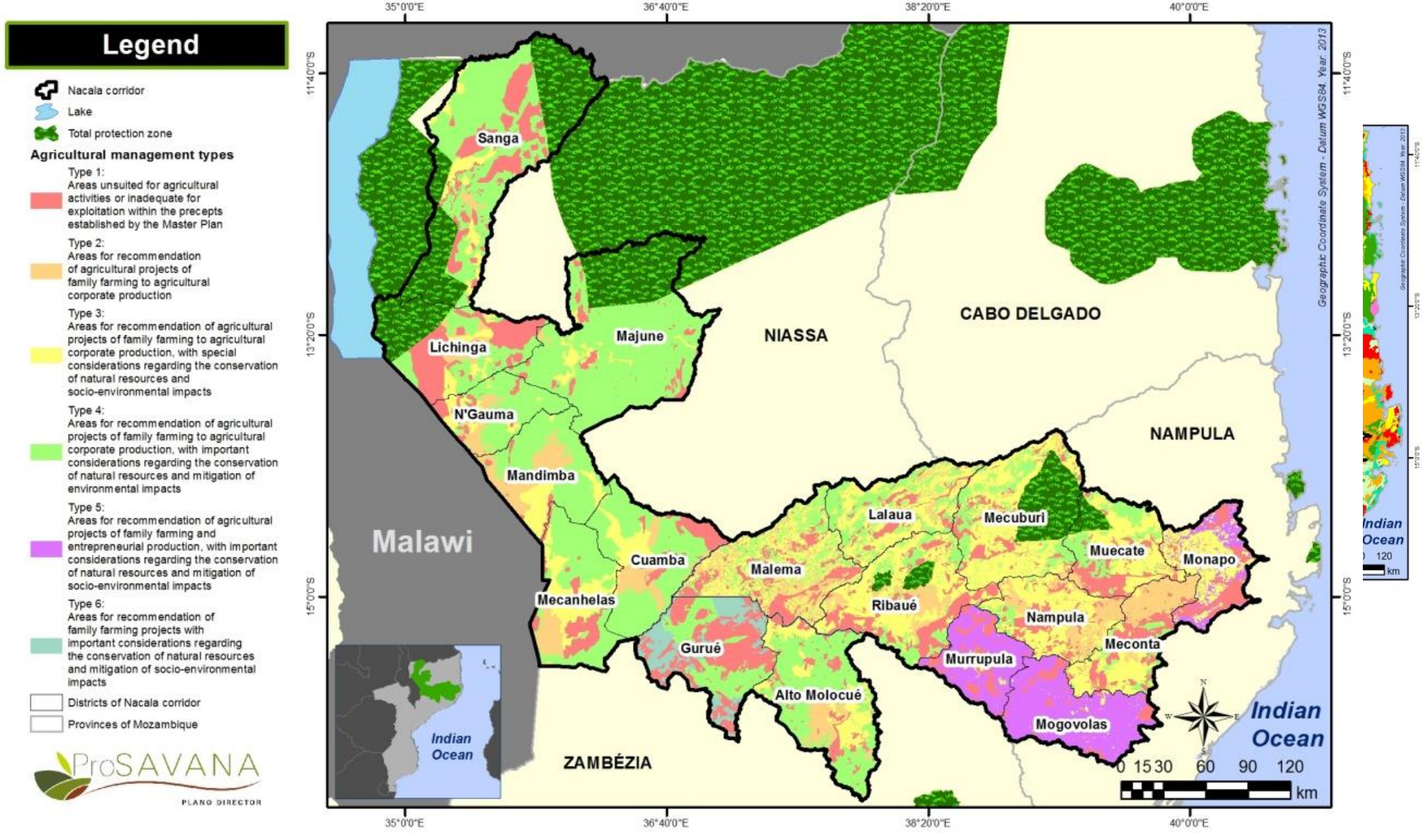
Production Scales

Acronym	Production Scales	Definition
FAM	Familiar Production	Encompasses the activities to develop farm management techniques and associativism
EMP	Entrepreneurial Production	Encompasses the activities to develop production chains where farmers provide raw material for the cluster
CORP	Corporate Production	Encompasses the activities to develop the corporate management agriculture, considering the RAI Principles

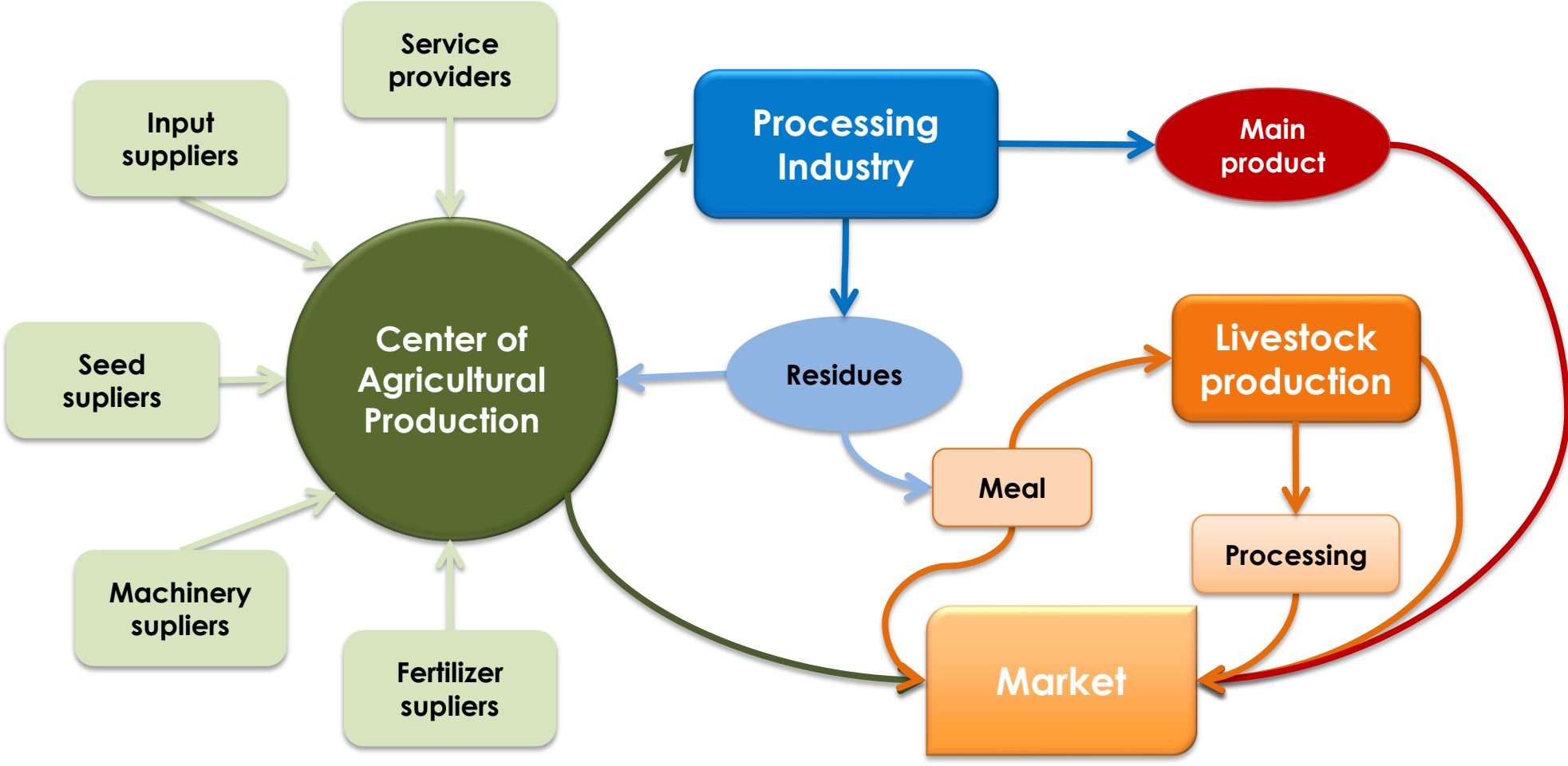
Socio-environmental Vulnerability Classes Definition Data

STUDY DEVELOPMENT: ZONING

ProSAVANA: Agricultural management types in Nacala corridor



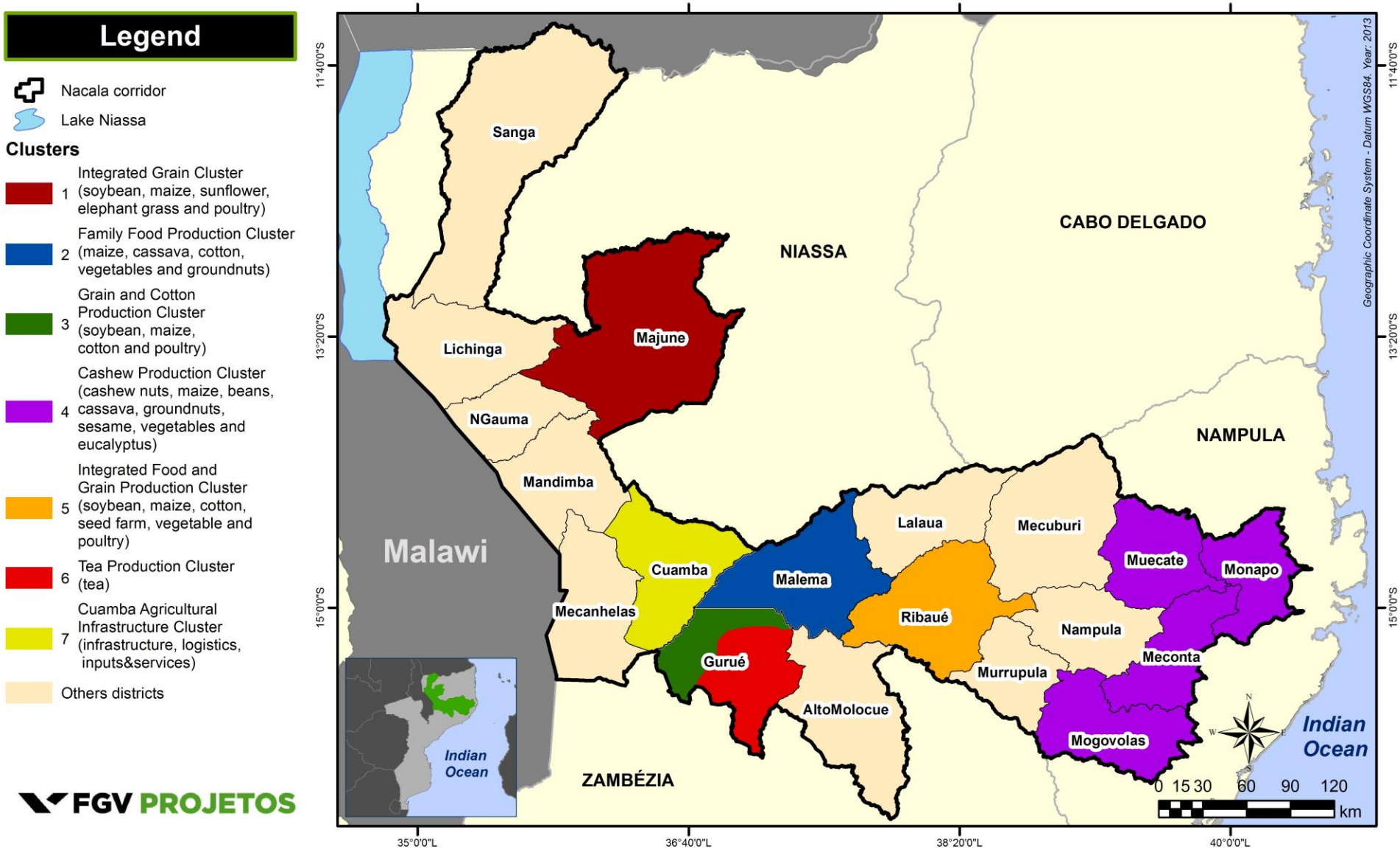
STUDY DEVELOPMENT : CLUSTERS



Clusters are strategic approaches to accelerate the development within a specified territory.	Design of one or more value chains with synergic potential	Different value chains channeling efforts for the cluster's economic development within a lower period	Prior assessments were performed so that the recommended crops in each cluster were based on feasibility and productive potential

STUDY DEVELOPMENT : CLUSTERS

ProSAVANA: Clusters in Nacala corridor



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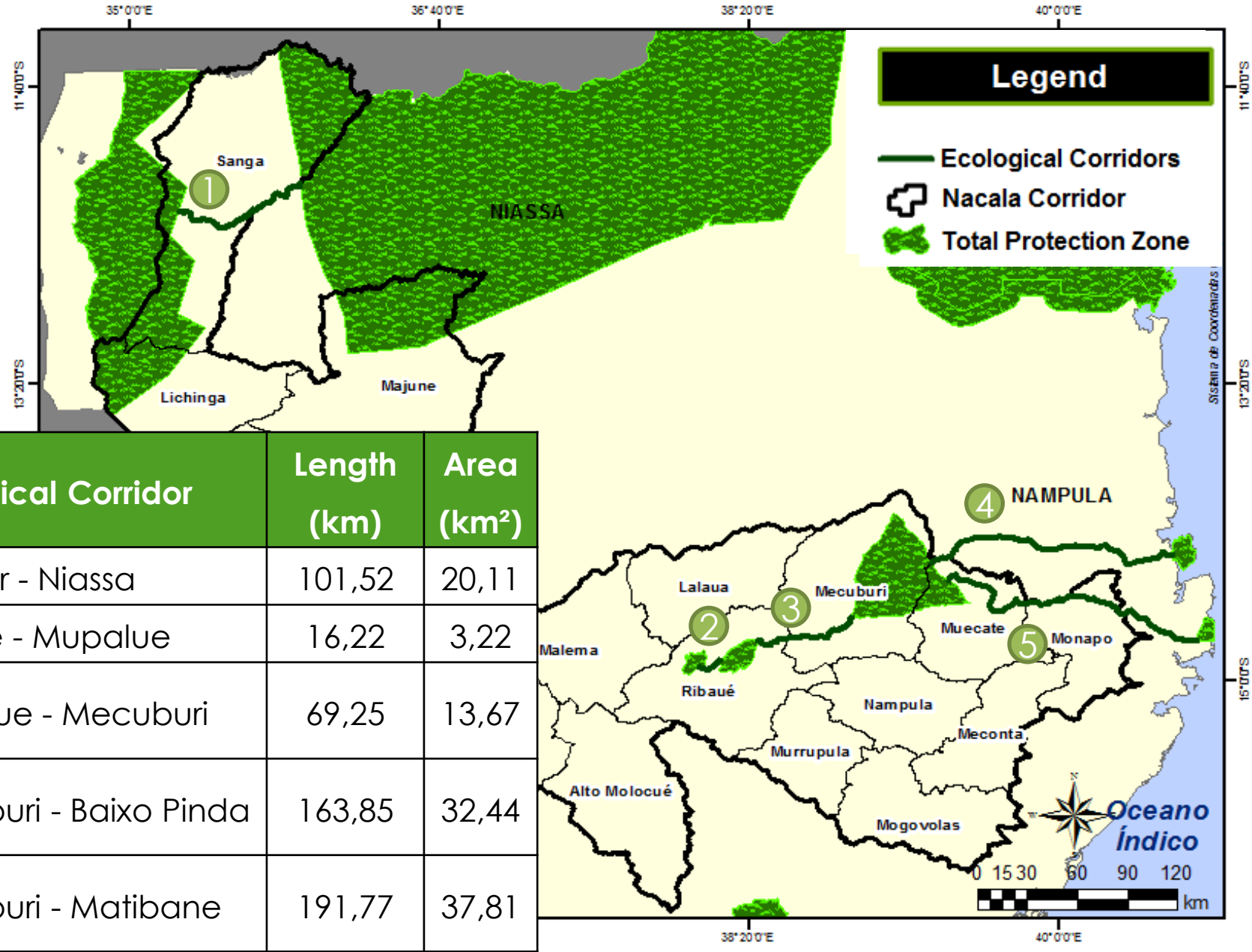
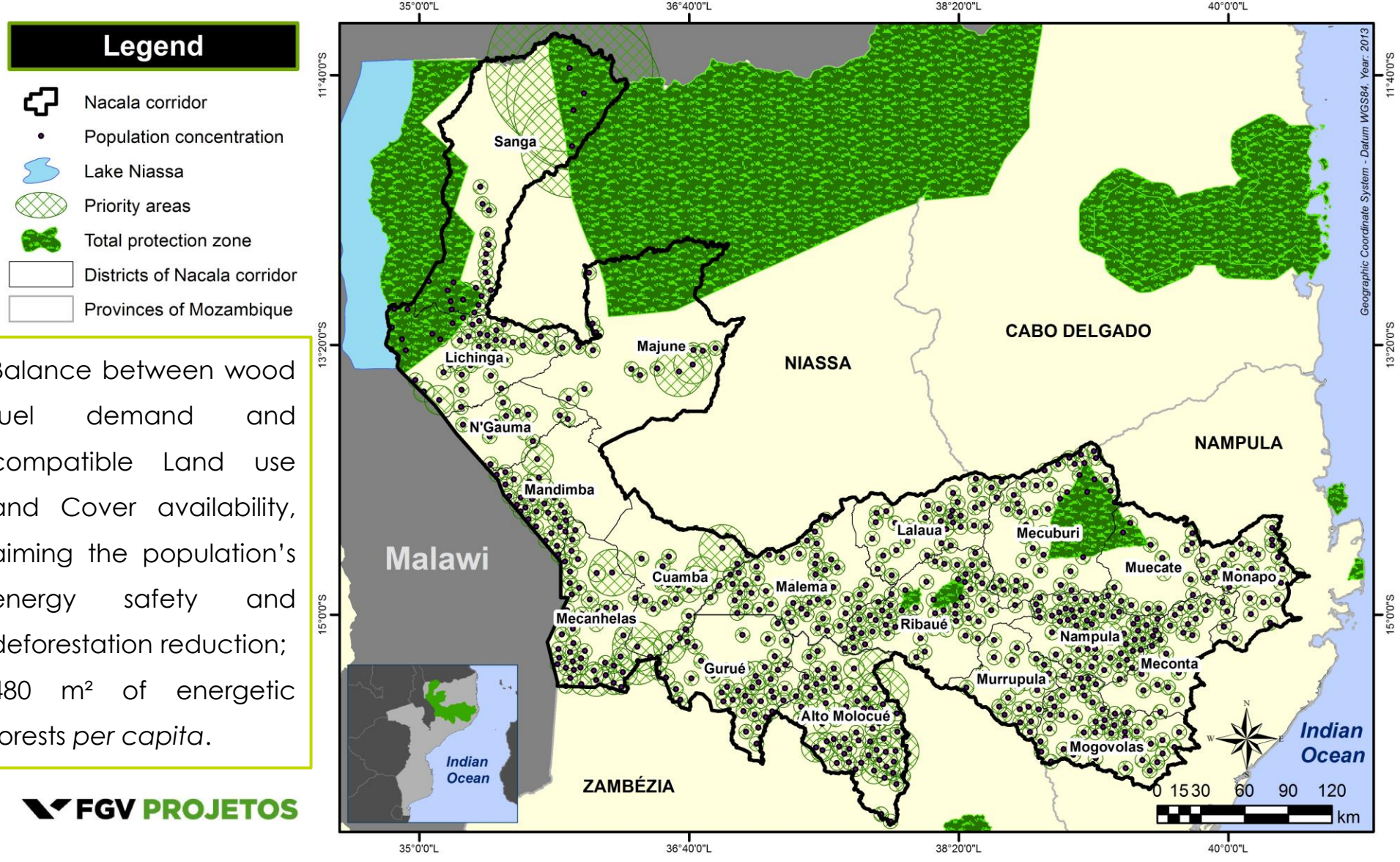
ECOLOGICAL CORRIDORS



Number	Ecological Corridor	Length (km)	Area (km²)
1	Ramsar - Niassa	101,52	20,11
2	Ribaue - Mupalue	16,22	3,22
3	Mupalue - Mecuburi	69,25	13,67
4	Mecuburi - Baixo Pinda	163,85	32,44
5	Mecuburi - Matibane	191,77	37,81
	Total	542,61	107,26

ENERGY FORESTS

ProSAVANA: Priority areas to locate energy forests



- ✓ Balance between wood fuel demand and compatible Land use and Cover availability, aiming the population's energy safety and deforestation reduction;
- ✓ 480 m² of energetic forests *per capita*.

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FGV's Vision about Feasibility Assessments in the Bioenergy Roadmap Development

Zoning as a global resource for decision making

Standardization on acquisition and treatment of data

- GIS data for decision making must allow comparisons at regional, national and sub-national levels;
- Comparison implies a common and well established methodology;
- Information should be constantly updated;
- Spatial data must be analyzed and applied within a context.

Zoning as a global resource for decision making

Guidance on Interpretation and Application

- As for the example of FGV's 4 Phases Programme and FAO's BEFS approach , maps are an additional layer of information;
- Using GIS data for decision making requires understanding the information precision and accuracy, especially when dealing with territorial planning;
- A well planned WebGIS platform with bioenergy development potential information shall foster policy making and investments;
- Therefore, an through approach on the Guidance and Interpretation aspects is recommended, considering the development of a set of instructions for all kinds of users.

Zoning as a global resource for decision making

The Framework Challenge

- As mentioned in the 1st ed. of GBEP indicators report: *the measurements of the indicators will be more relevant to stakeholders if they are placed within the proper domestic context, including information on legal, policy and institutional frameworks*.

- The local framework is the factor of greatest importance in the development of initiatives related to bioenergy.

- It should also be an underlying factor in any analysis of the sector, whether in relation to feasibility studies, or in relation to economic, social and environmental sustainability.

- Nonetheless, a comprehensive information tool that presents local legal specifications should also provide a solid parameter for comparison between the different regulatory frameworks.

Zoning as a global resource for decision making

Wrapping up

- We at FGV believe that a Global Platform with a webGIS interface should be developed through a process planned and carried out in a coordinated way, with well established and documented methodology.
- Along with the Guidance on how to use the information generated, there should be also a commitment to the adoption of solid sustainability criteria in the elaboration of projects, laws and policies related to bioenergy, where the FAO's BEFS approach and the GBEP indicators stand out as strong global references.
- We believe that there should be a plan for continuous improvement of the level of detail of the information available through actions of capacity building at national and local levels.
- Finally, we believe that an database that does not share a standardized basic methodological assumption will not provide reliable information for decision making.

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THANK YOU FOR YOUR ATTENTION!

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