TEEB AGRI-FOOD

THE ECONOMICS OF ECOSYSTEMS & BIODIVERSITY

AGRI-FOOD SYSTEMS IN THE MAU FORESTS COMPLEX

CO-DESIGNING FUTURE CLIMATE RESILIENCE AND SHARED PROSPERITY

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TEEB AGRIFOOD KENYA THEORY OF CHANGE

Based on principles of deliberative democracy and the assumption that public decision making should result not from aggregation of separately measured individual preferences but from open public debate.

Communities respect the process of determining the value of land through a collective process, thus avoiding inflation of prices for pastoralists regenerative agriculture and those using common grazing areas

TEEB AGRIFOOD KENYA IMPACT

Accelerated restoration of the Mau Forest Complex through empowered communities, that supports sustainable agrifood systems, improved and resilient livelihoods and just transitions to prosperity, through improved natural capital and ecosystem services that help reduce the impacts of climate change

DELIVERY MECHANISMS

Prosperity Collaboration Workshops; Community AgroForestry Training Programme; Seed grants; Business coaching; Assessment and Monitoring Field Trips; Motivated communities; Regular co-ordination meetings; Spatial Analytics and Research Tools; Stakeholder Management.

INPUTS

Motivated communities that engage and participate
Technical and specialized expertise

PROBLEM

Mau Forest Complex degraded with loss of forest cover, surface water, soils biodiversity and ecosystem services, reduced agricultural production and vulnerable livelihoods

Root Causes: Poor incentives for local communities to engage in conservation of Mau Forest Complex; spatial planning and Land Tenure challenges or non-existent; inadequate/ inaccessible information to support planning and management; weak and fragmented implementation and enforcement of current Policies; disconnect between local communities and Kenya Forest Service, researchers and other stakeholders; limitation in the Plantation Establishment and Livelihood Improvement Scheme (PELIS).

OUTPUTS

- Project Management, Monitoring and Evaluation in place
- Skills and capacities to undertake nature-based projects enhanced
- Four scenarios co-designed and agreed by communities generating by 2030 annual incomes per ha ranging from BAU 300 USD; Large-scale agroforestry 757 USD; Forest gardening 1,800 USD; Carbon farming 2,500 USD and carbon sequestration up to 66t CO_2e/ha/year
- Networks established for improved co-ordination of activities and coordinated policy design and decision making
- Knowledge platform co-designed and information generation activities running
- Nature-based enterprise skills established
- Policy recommendations and advocacy proposed

Risks to be mitigated: political power relations cause conflicts and changes to goodwill; significant climate change impacts; changing market dynamics; weak governance; population pressure leading to increased consumption levels

OUTCOMES

Enhanced, sustained action on forest restoration and transformation to sustainable agri-food systems.

- Community actions in place to restore >20,000ha of indigenous forest and 500km of surface river flows by 2030 with an aim to reach 1970s conditions by 2050
- Natural capital and carbon projects able to sequester 1.3 million tCO_2e/ha/year and generate > 2,500 USD per year for >100,000 households
- Enhanced implementation of CIDP policies to support improved nature-based and agri-food livelihoods
- Greener financial systems and markets for natural capital assets and ecosystem services
- Knowledge platform and digital twin capabilities in place to support community actions and government policies on restoring the Mau Forest Complex

Assumes: proposal is acceptable to all stakeholders; no political interference; stakeholder partnership/ participation will work well; local community participation will be sustained; new knowledge, technologies will be embraced; catalytic seed funding for projects.

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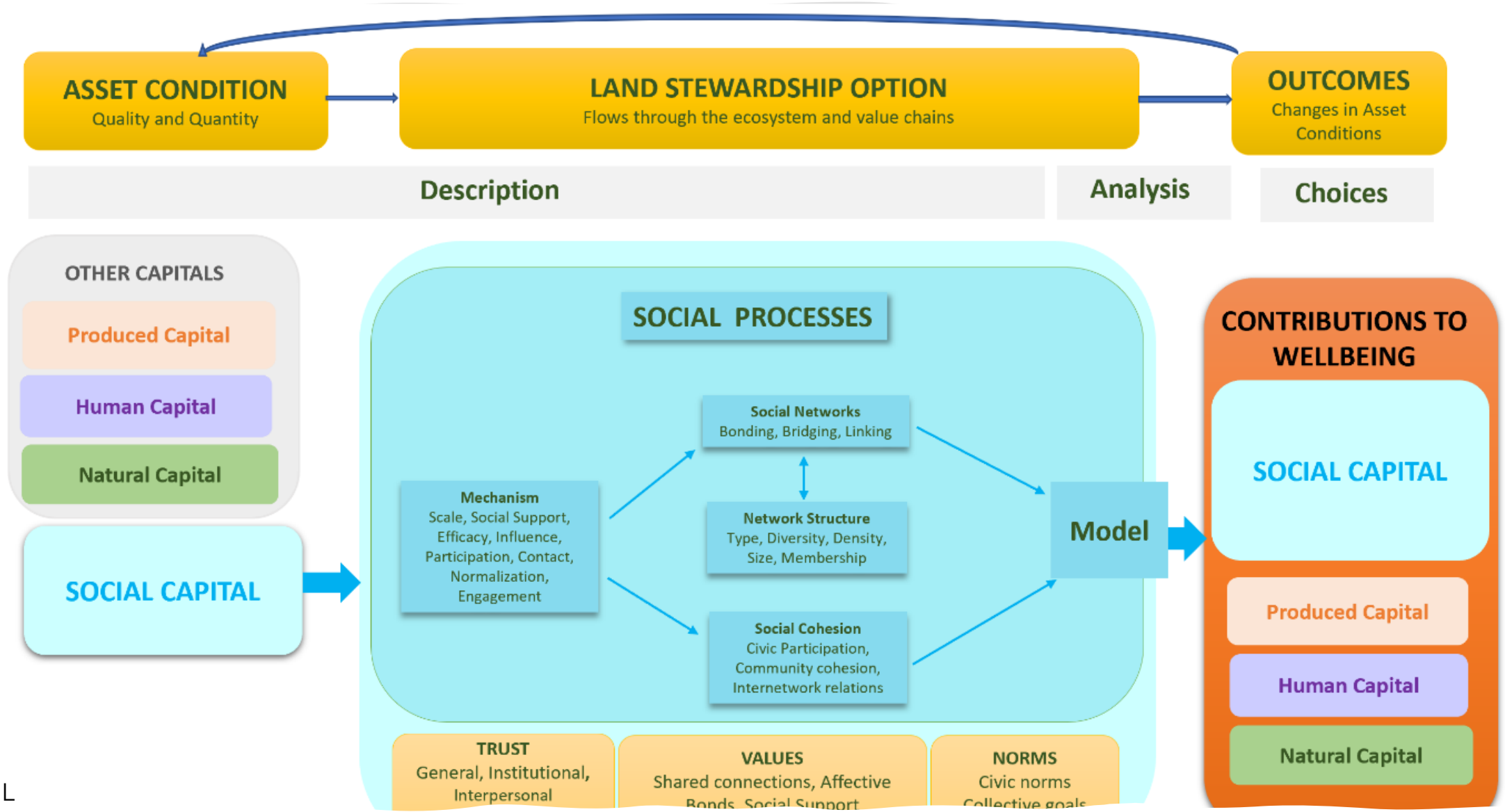
HUMAN CAPITAL IN THE CORE AREA MAU FOREST 2009 - 2030

Human Capital Indicator	2009	2014	2017	2022	2030
Population Size	850,291	996,296	1,095,572	1,282,097	**1,629,935**
Proportion of Population Below Age 15 (%)	50.38	48.11	46.6	43.55	**42.28**
Proportion of Population Above Age 64 (%)	2.45	2.03	1.81	1.68	**2.001**
Proportion of Population in the Working Ages (15-64) (%)	47.16	49.85	51.59	54.77	**55.71**
Dependency Ratio	112.03	100.6	93.83	82.57	**79.71**
Fertility (Average No. of Children Per Woman)		**6.0**	**5.68**	**5.13**	**4.27**

2019 Census cites 13.26 million people in the Mau Region

SOCIAL CAPITAL FRAMEWORK FOR THE MAU FOREST COMPLEX



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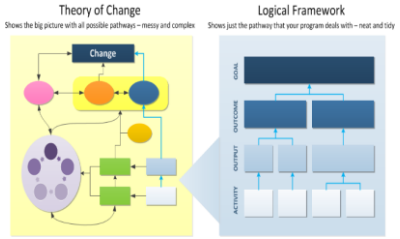
SOCIAL CAPITAL ANALYSIS PATHWAY

1 Focus and scale

Perspective	Actors	Policy "approach"
Communitarian		
Local associations Co-operatives	Community groups Voluntary organisations	Recognition of the social assets of the group or organisation
Network		
Bonding and bridging community ties	Tribal groups Entrepreneurs Business Groups Information brokers	Decentralise Create enterprise zones Bridging social divides
Institutional		
Political and legal institutions	Private and public sectors	Civil and political freedoms, transparency and accountability
Synergy		
Community networks and state-society relations	Community groups Civil society Firms States	Coproduction, complementarity, Participation, linkages Enhance capacity and scale of local organisations

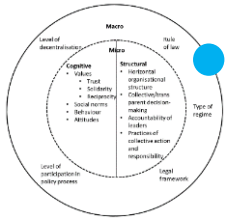
Problem definition



2 Determinants & Outcomes

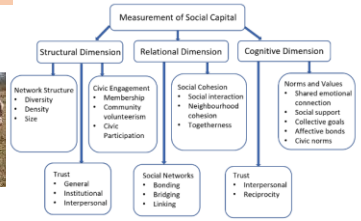
3

Types and Levels

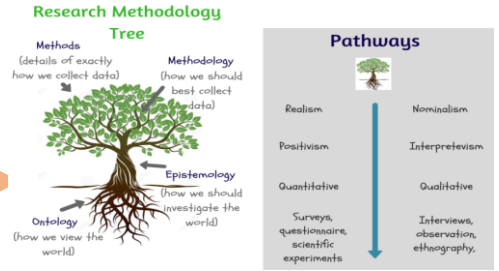


Focal Groups

Dimensions

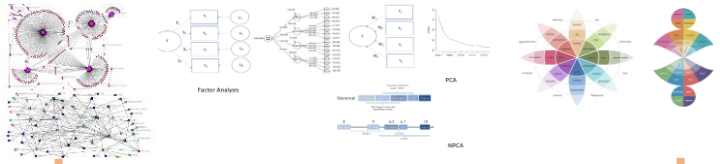


4 Methodologies



5 Data Collection

6 Network, Multivariate & Affective Analysis



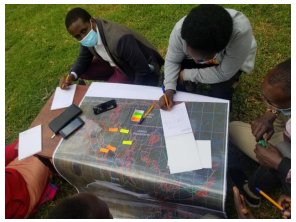
7 Condition

Scenarios Modelling

8

Solutions Co-design

9



10 Livelihoods

COMMUNITY SCHEMA FOR THE TEEB AGRI-FOOD MAU PROJECT

1 Baseline

2 Understand

3 Model

4 Metrics

5 Analysis

6 Scenarios

Community Co- Design

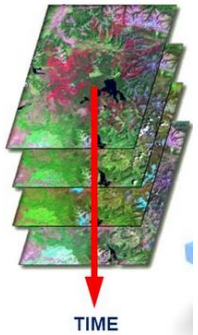
Community Co-Laboratory

Community Co-Production

Community Deliberation

Citizen-led research

Understanding what matters



Analysing what matters

Community surveys

Building metrics of Ecosystem Value & Prosperity

Developing Future Scenarios

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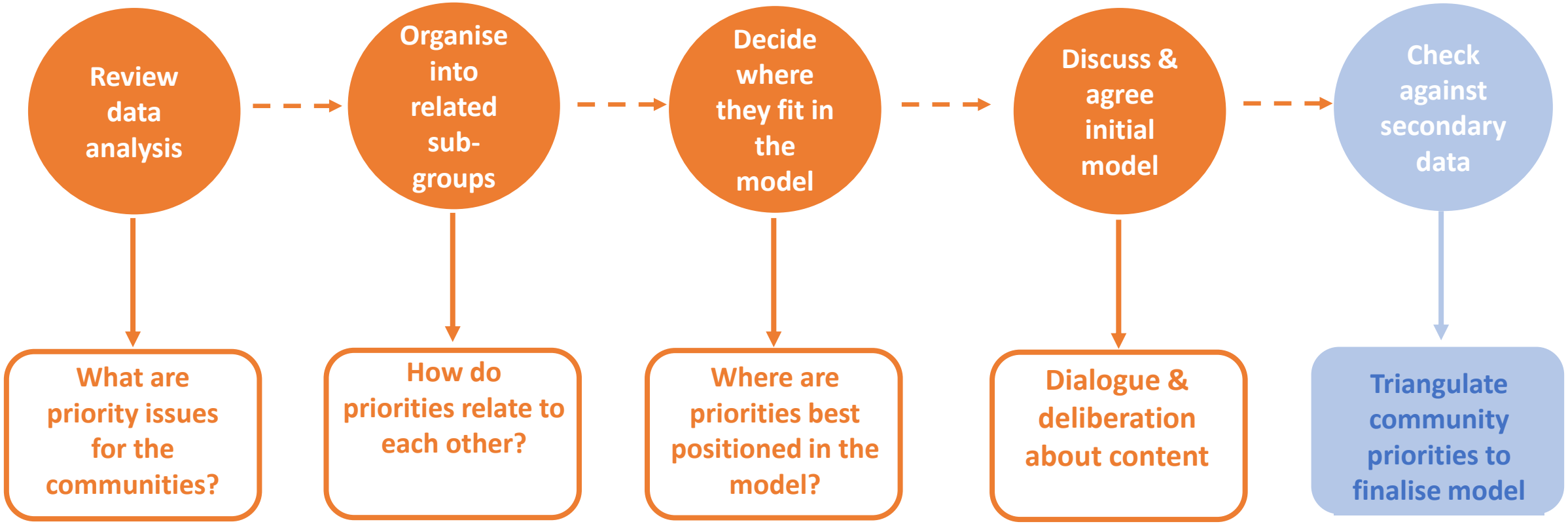
COMMUNITY VALUATION OF ECOSYSTEM SERVICES AND TRADE-OFFS



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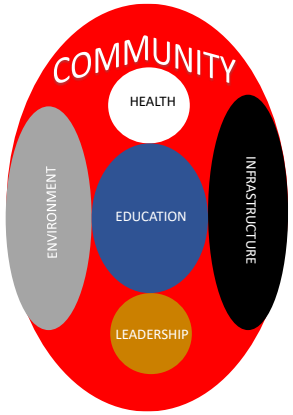
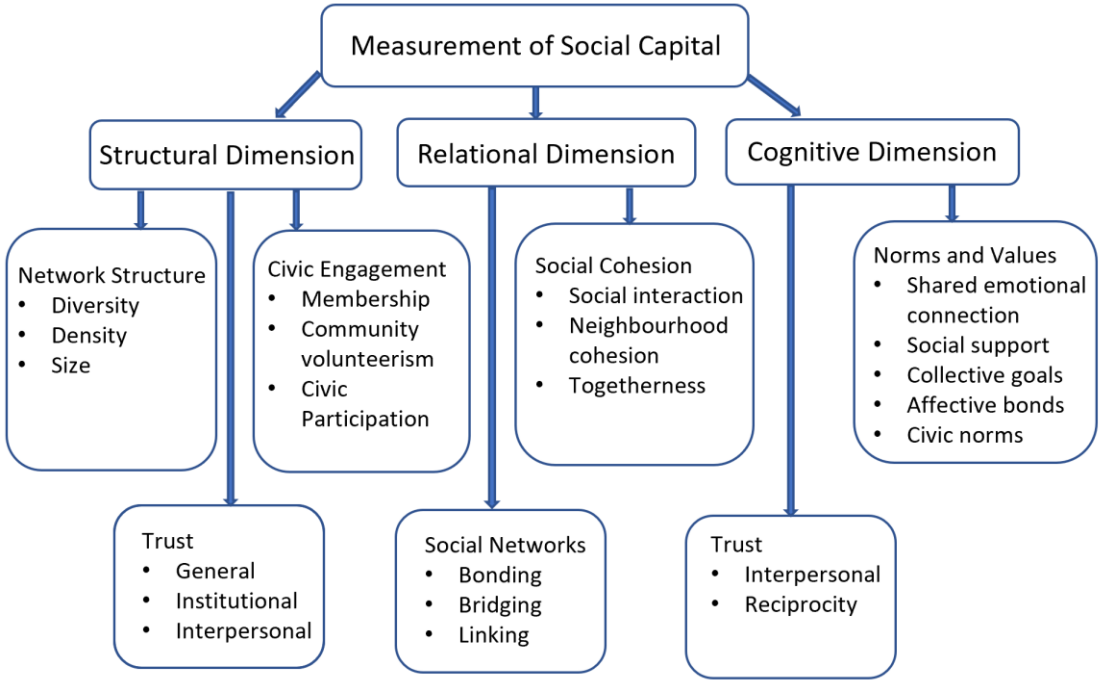
SOCIAL CAPITAL AND COMMUNITY MEASURES OF NATURAL PROSPERITY

Social capital relates to networks (i.e. social relationships) and the disposition to live and cooperate with others (i.e. social norms). It has both individual and collective components. Social capital involves more than the mobilisation of forms of capital, it represents various tangible and intangible resources, benefits, productivities and savings



Building metrics of Ecosystem Value & Prosperity



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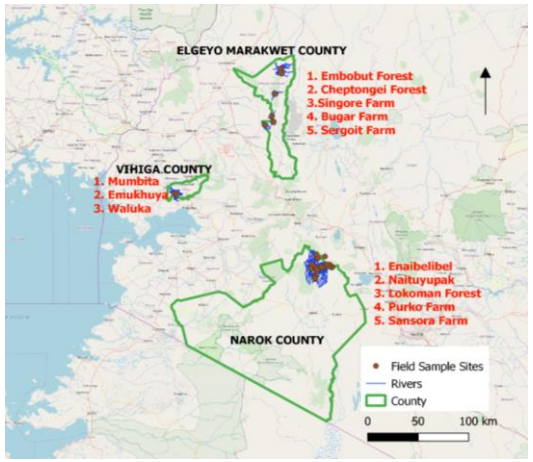
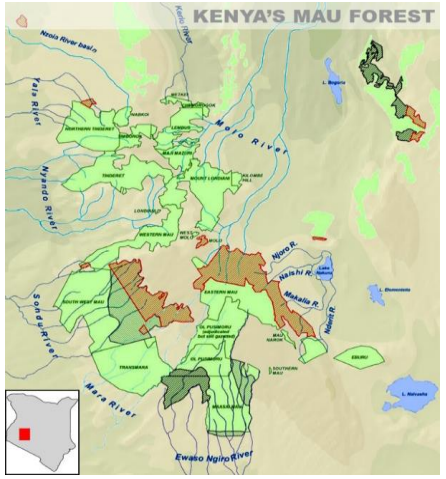
COMMUNITY BIOPHYSICAL AND SOCIAL ASSESSMENTS



Agroforestry



Landscape Restoration

Clean Energy

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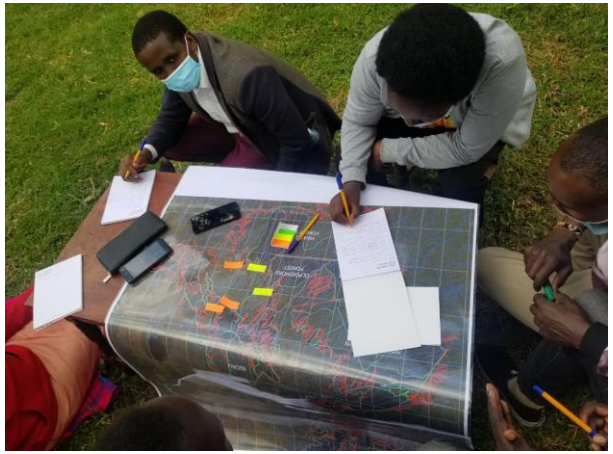
SPATIAL MAPPING OF BIOPHYSICAL AND SOCIAL DATA

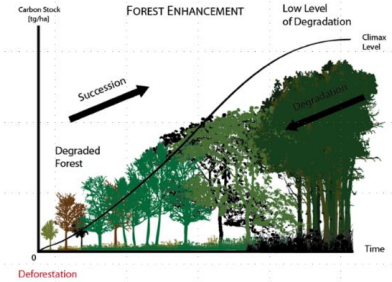


Land·Cover·1990¶

LandCover Class	Area (ha)	Coverage (%)
Dense Forest	43 786.9	93.6
Moderate Forest	482.8	1.0
Open Forest	779.9	1.7
Wooded Grassland	557.1	1.2
Open Grassland	1 188.4	2.5

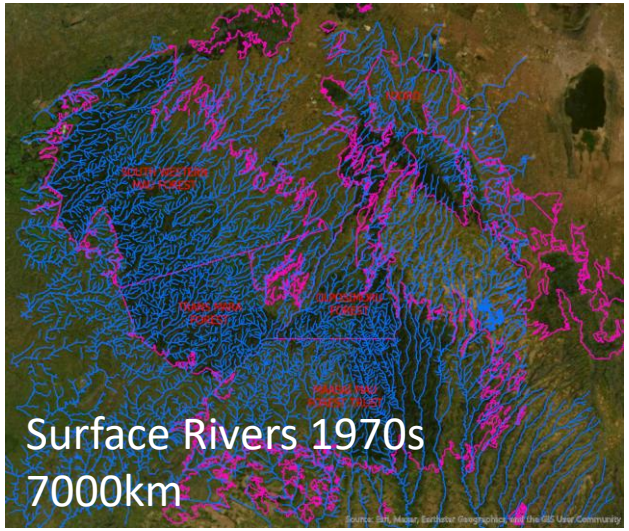
Land·Cover·2015¶

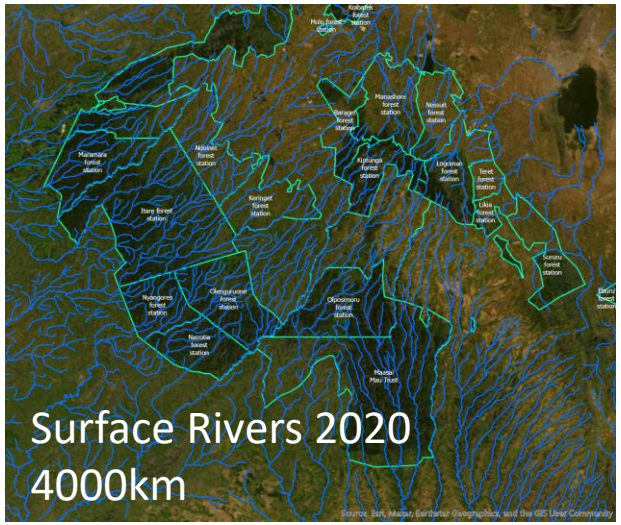
LandCover Class	Area (ha)	Coverage (%)
Dense Forest	29 265.5	62.5
Moderate Forest	891.3	1.9
Open Forest	222.8	0.5
Wooded Grassland	4 716.6	10.1
Open Grassland	1 225.6	2.6
Perennial Cropland	37.1	0.1
Annual Cropland	10 436.1	22.3



Developing data processing tools to detect the different types of forest in satellite images

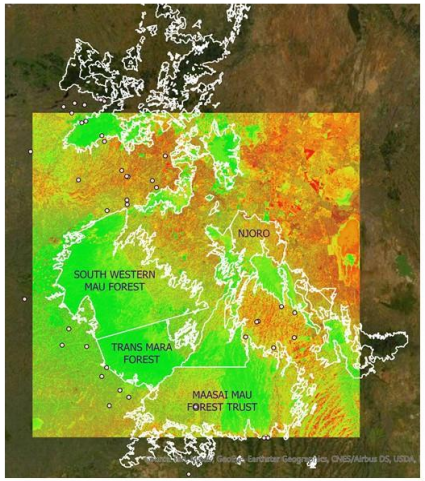
Estimating the biomass and carbon storage in forests across the Mau and Kenya

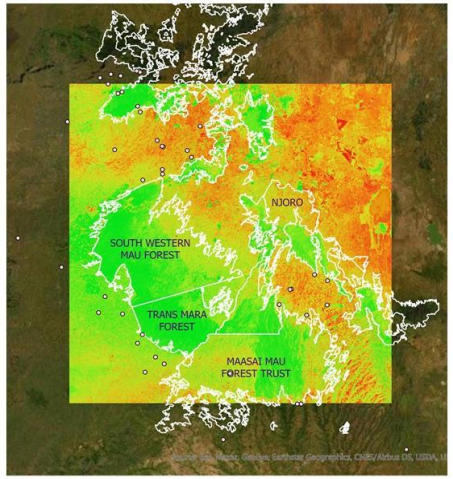




GREY AREAS DEPICT AREAS THAT ARE POPULATED– TARGET FOR FOREST GARDENING

CARBON MAP DEPICTING AREAS HIGHLY AFFECTED THROUGH ORGANIC CARBON LOSS IN RED – TARGET FOR CARBON FARMS





Areas with low soil organic carbon content

MFC outline in 1970

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BUILDING FUTURE SCENARIOS FOR THE MAU FOREST COMPLEX

Scenario 1 Status quo – implementation of current policies on landuse and settlements; small-scale farming (potatoes, peas, maize); tree planting in areas of forest clearance

Scenario 2 Intensified agro-forestry – expansion of forest for timber products, plantations and major crop production outside forest blocks; drip-irrigation and other agri-innovations; wildlife conservation with livestock exclusion

Scenario 3 Enhanced forest – **forest gardening**, intensive planting and regeneration of indigenous forest species; introduction of policies for community-stewardship; establishment of new, specialised value chains for community produced forest farming products (e.g. nuts, fruits, tea, coffee, honey, traditional herbs and medicines); wildlife-human integration; introduction of policies on payment for ecosystem services (water, carbon, pollination)

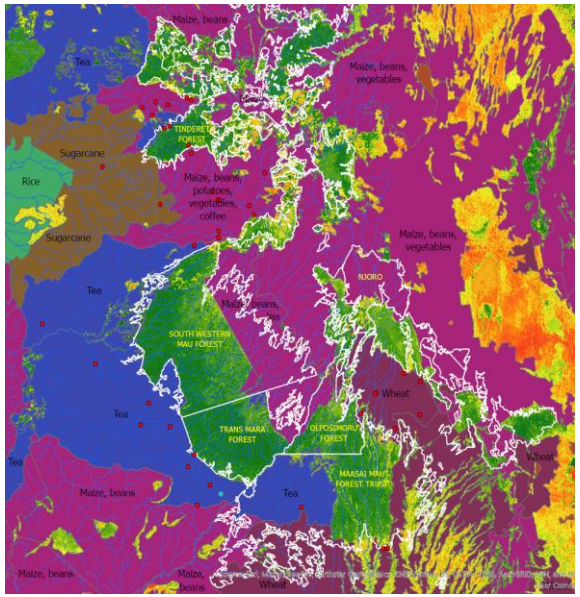
Scenario 4 Carbon farming – integrated use of land including soil organic carbon, above ground carbon; development of carbon registry and projects with baseline calculations; establishment of new secure value chains (IoT and blockchain) for stacking and bundling direct and indirect ecosystem services benefits (water, carbon, pollination, biodiversity)

MAU FOREST COMPLEX COMMUNITY NATURAL CAPITAL SCENARIOS

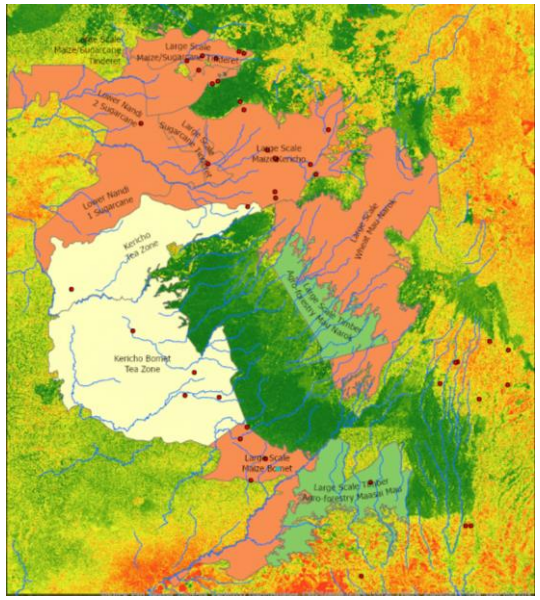
Scenarios (2030)	δCt/ha (above ground & soil organic carbon)	Additional income (2030) from carbon USD/ha/yr*	Basic non-carbon income (2030) USD/ha/yr	Overall income (2030) USD/ha	Forest restoration (ha)	Surface River Restoration (km)
Carbon farming	18	1,783	710	2,493	20,000	500
Forest gardening	12	1,189	627	1,816	15,000	500
Large-scale agro-forestry	5	495	262	757	2,500	0
Business as Usual	0	0	300	300	0	0

*1t C = 3.67 tCO_2e;25€-27USD/tCO_2e

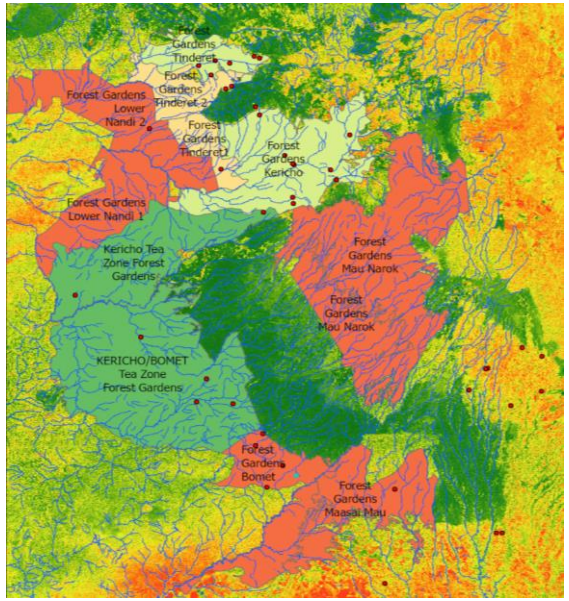
Current BAU



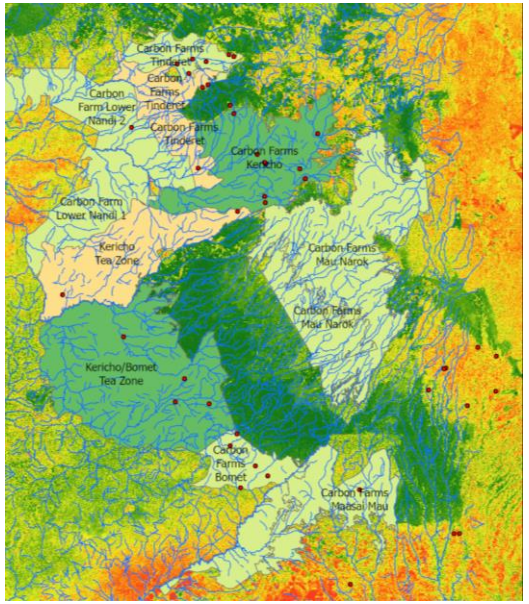
Large-scale agroforestry



Forest gardening



Carbon farming



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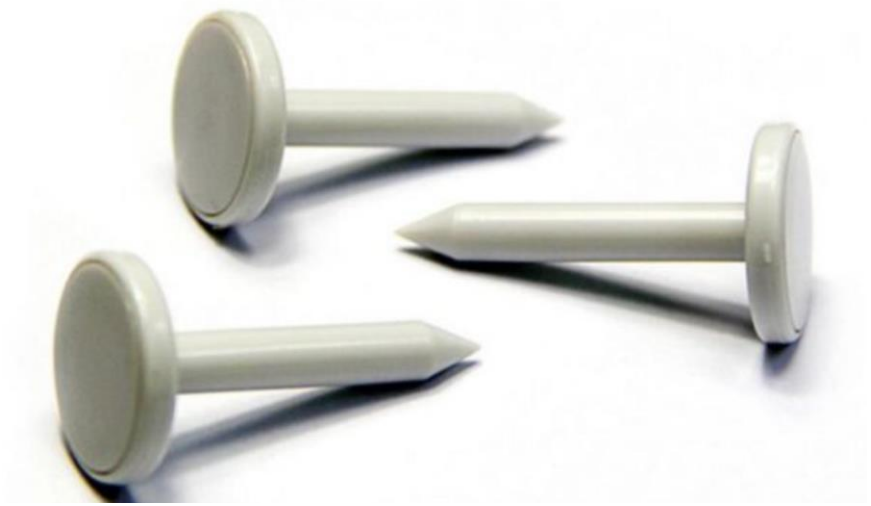
Mau-Mara Natural Capital Communities

MAU MARA VOLUNTARY CARBON MARKET PILOT

Natural Capital Investment Pilot

Forest Restoration (REDD+)
Carbon Sequestration (Net Zero)
Indigenous Medicines
(Biodiversity Net Gain)
Livelihoods (ESG)
Natural Capital "Living Shares"