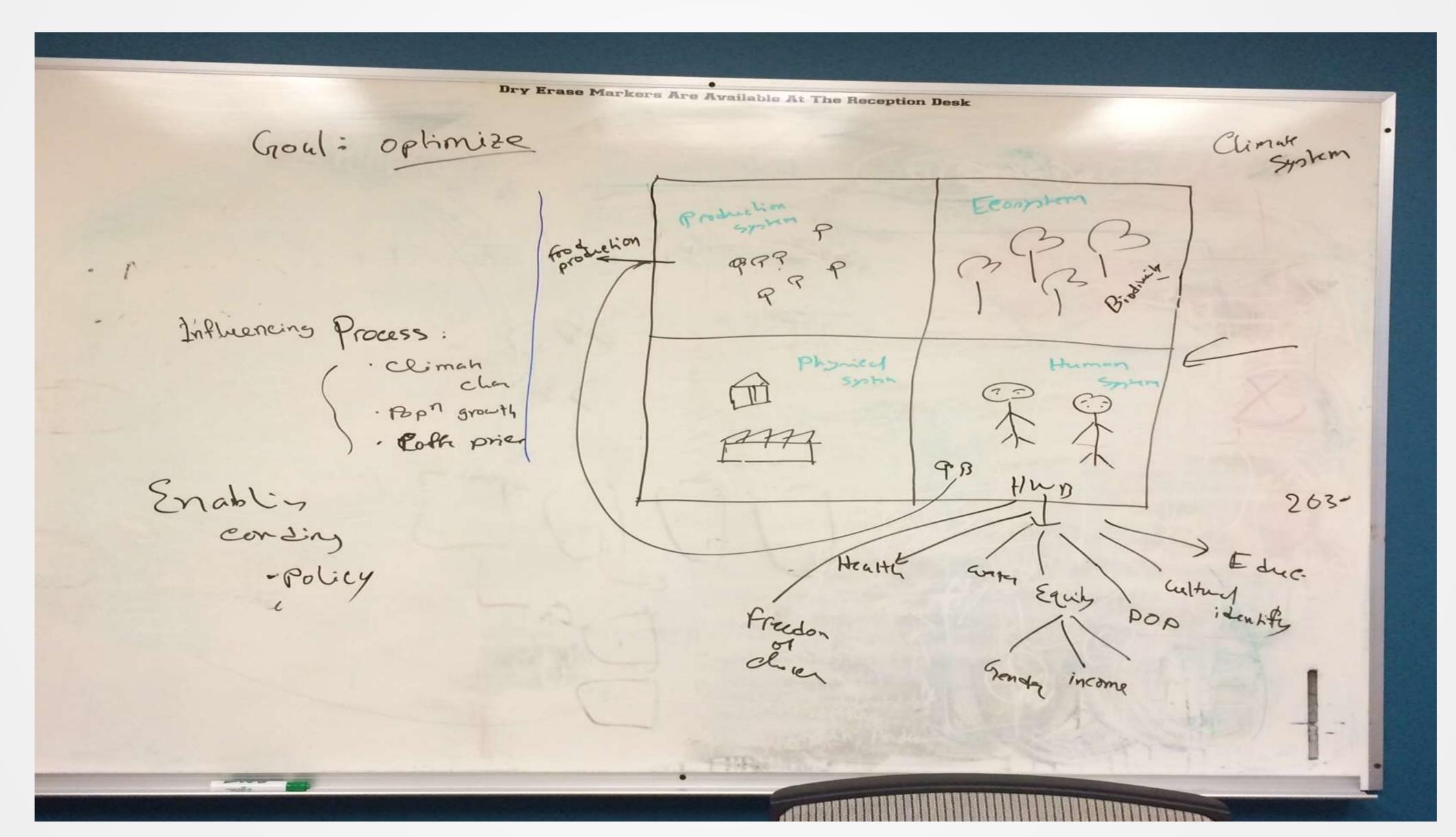
SUSTAINABLE LANDSCAPES: THE FUTURE WE WANT



THE DRAWING BOARD





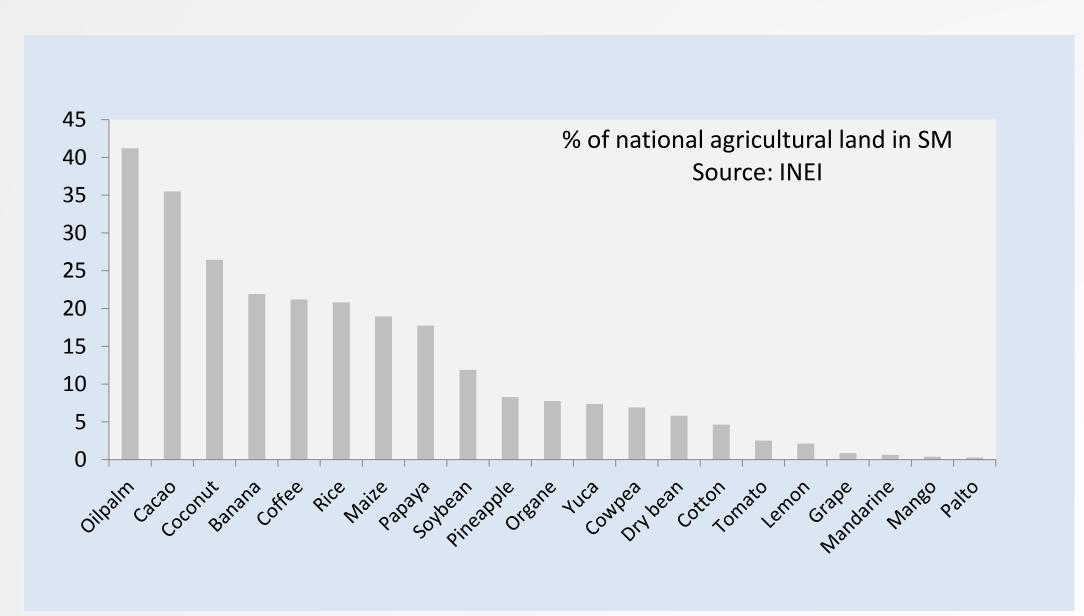
THE STUDY AREA: SAN MARTÍN, PERU

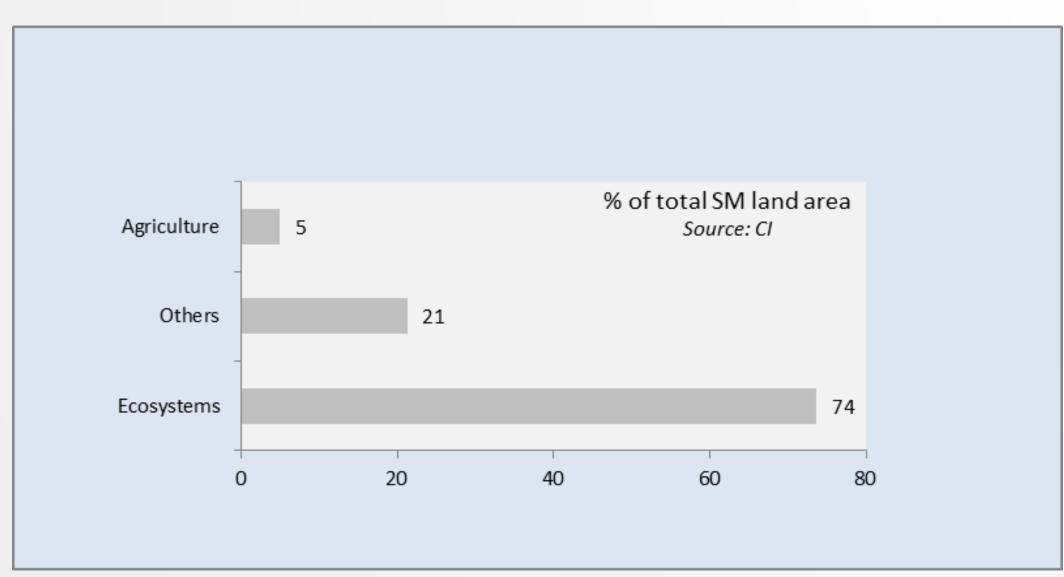
- At the foothills of the Andes Mountains in the Upper Amazon River Basin
- Area: 51.2 thousand km2 home to 728 thousand people
- Main economic sector: Agriculture, forestry and hunting
- Complex landscape: mixed forests, wide range of elevation gradients, high biodiversity and threat

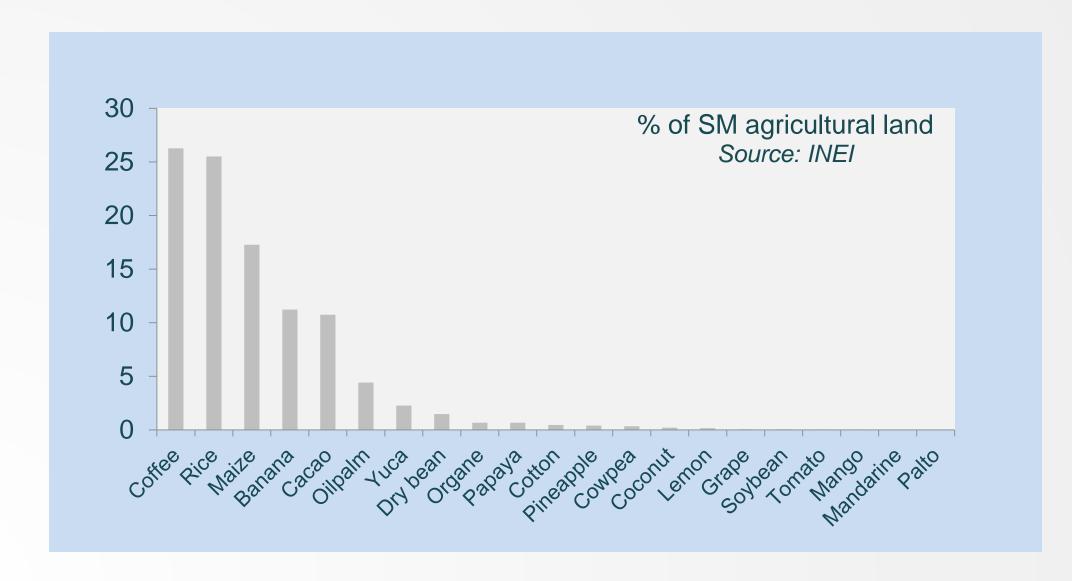


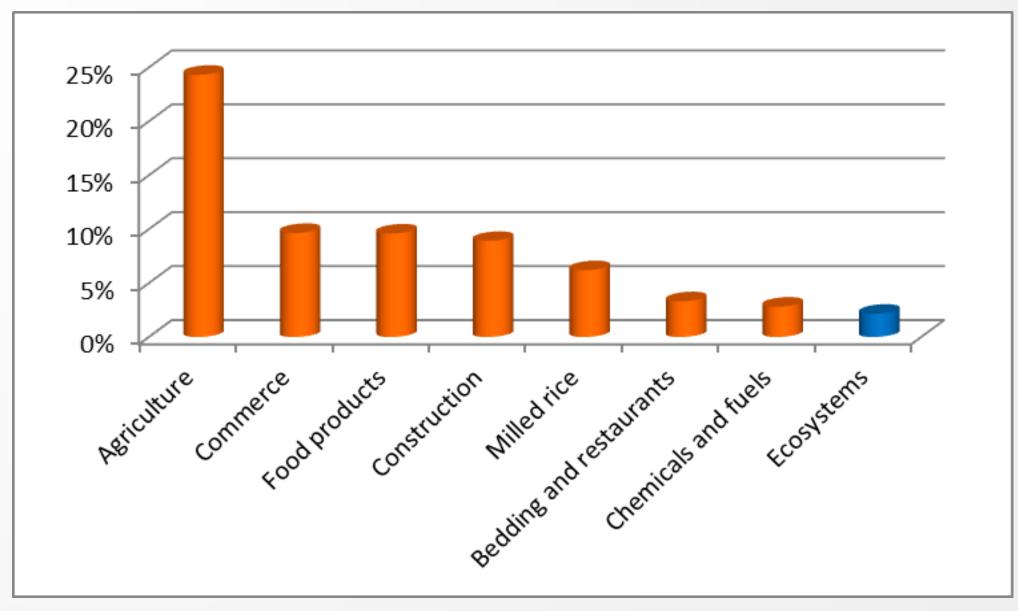


AGRICULTURAL SYSTEMS IN SAN MARTIN











AGRICULTURAL SYSTEMS ANALYSIS

Objectives:

- 1) Assess sustainability of production systems
- 2) Forecasting and scenario building to optimize landscape production





IS A PRODUCTION SYSTEM SUSTAINABLE?

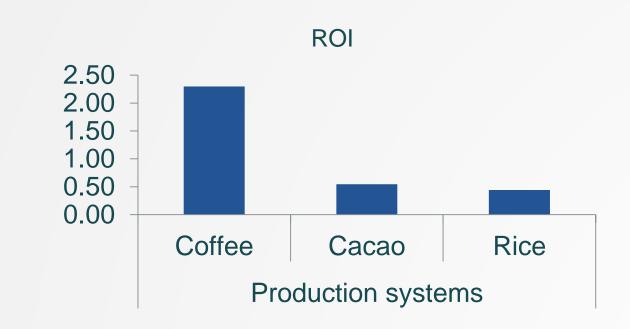
- Is it financially profitable?
- Does that leave low environmental footprint?
- Does that make social equity?



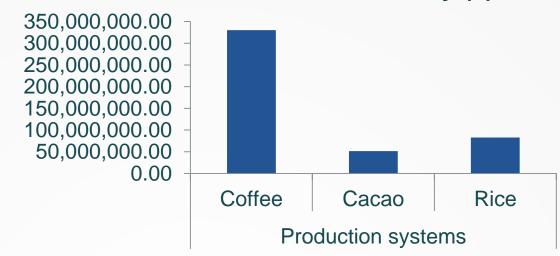


"DASHBOARD" OF SUSTAINABILITY (STYLIZED, NOT VALIDATED)

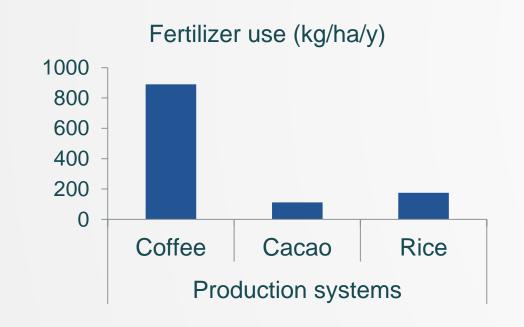




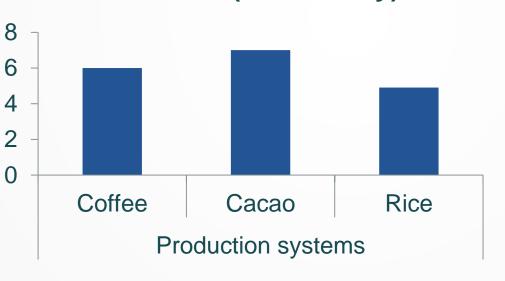




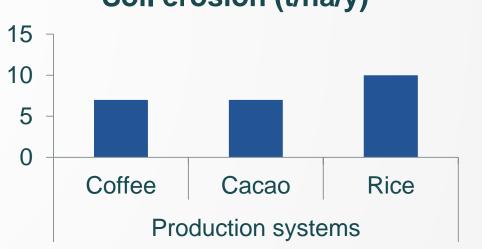




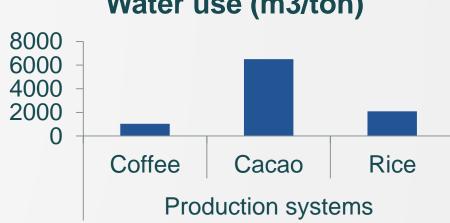
Emission (tCO2e/ha/y)



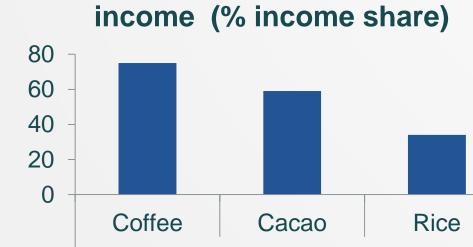
Soil erosion (t/ha/y)



Water use (m3/ton)



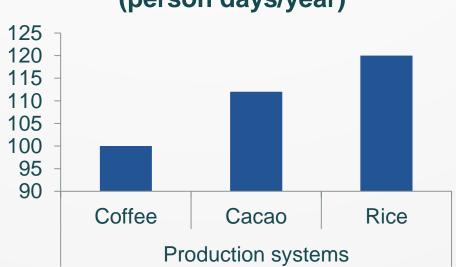
cial



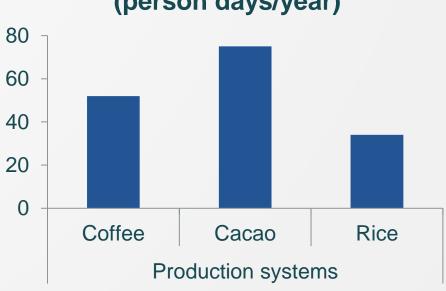
Contribution to family

Production systems

Employement generation (person days/year)

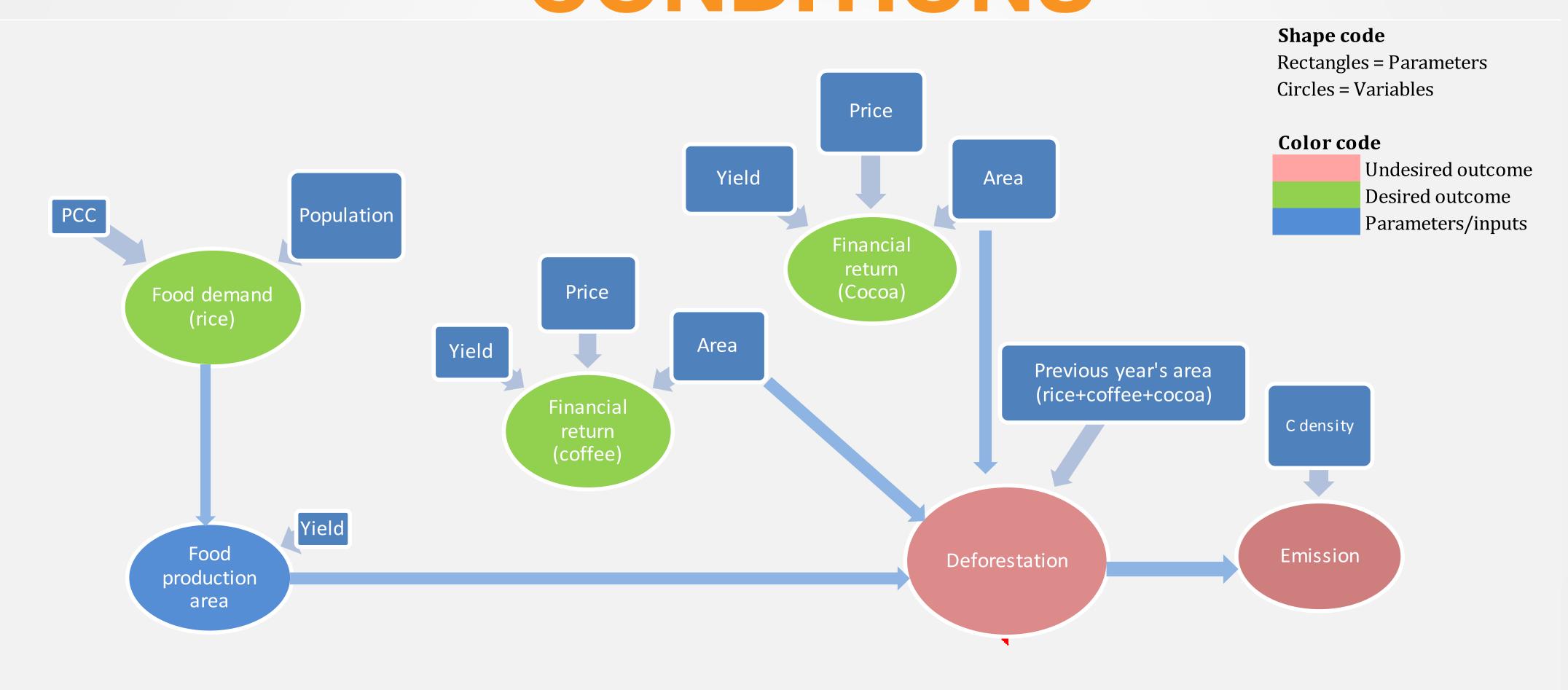


Women employement (person days/year)



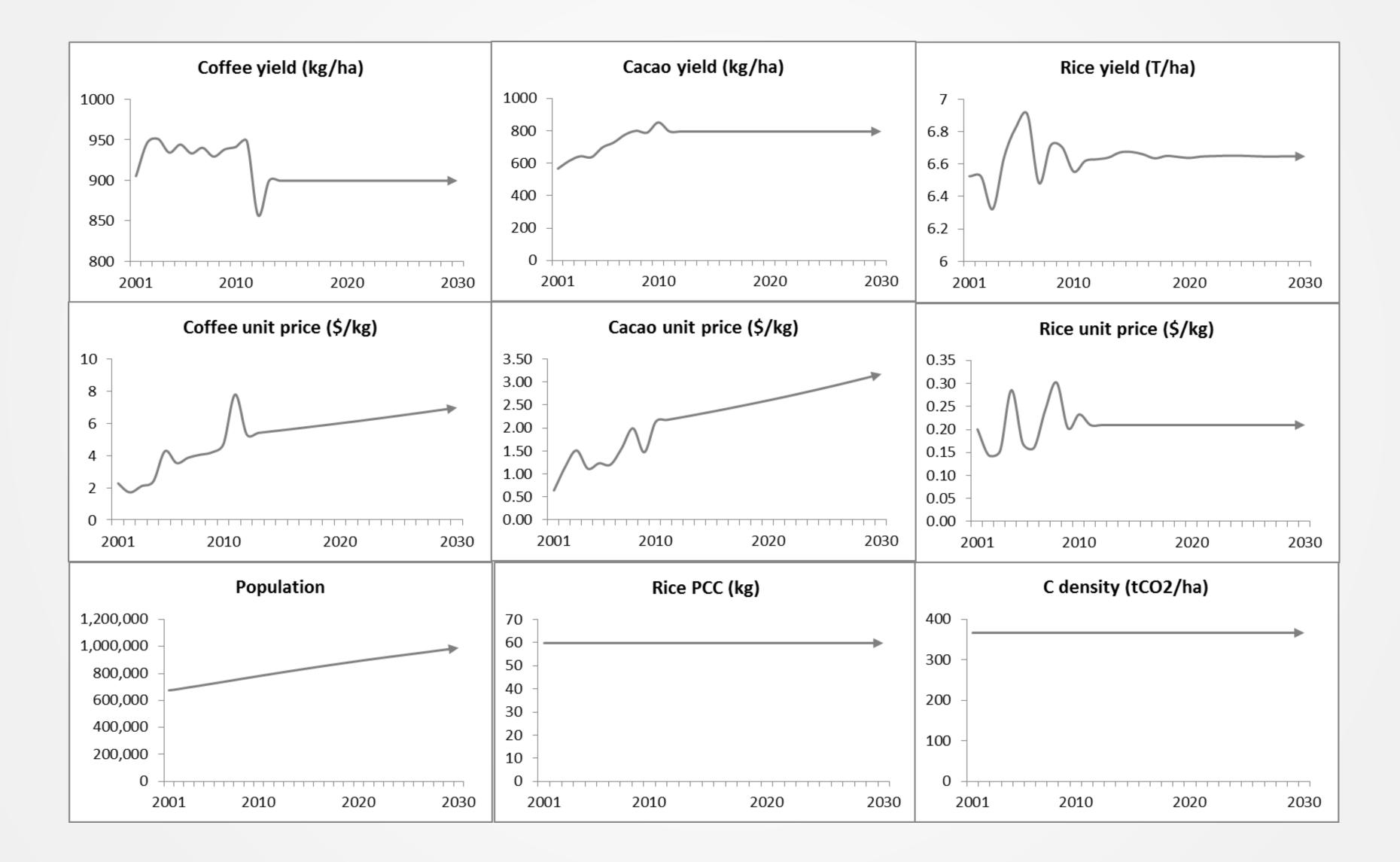


SUSTAINABILITY IN THE FUTURE CONDITIONS



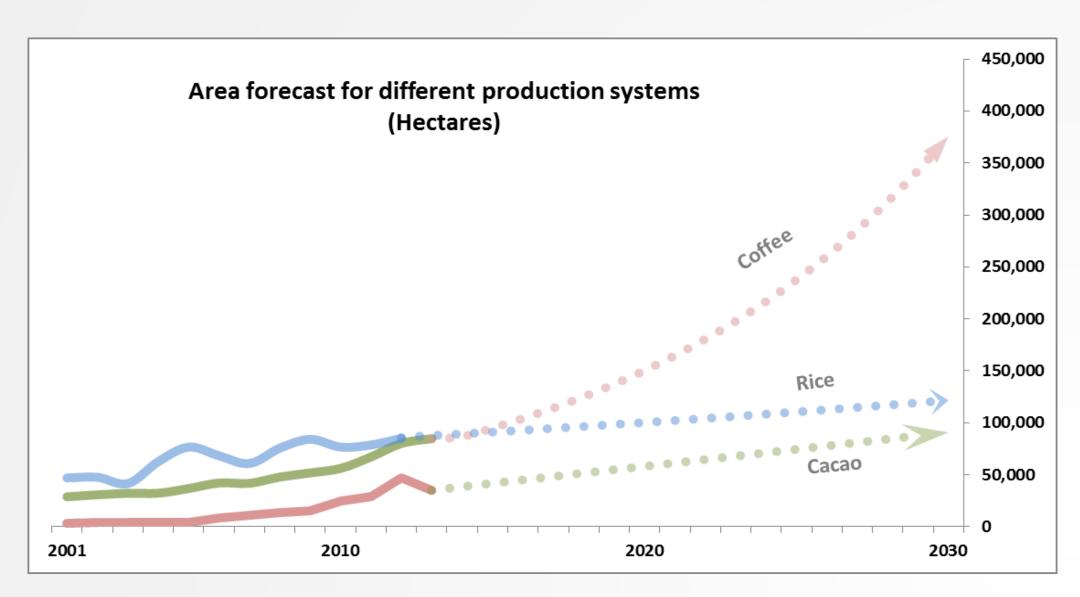


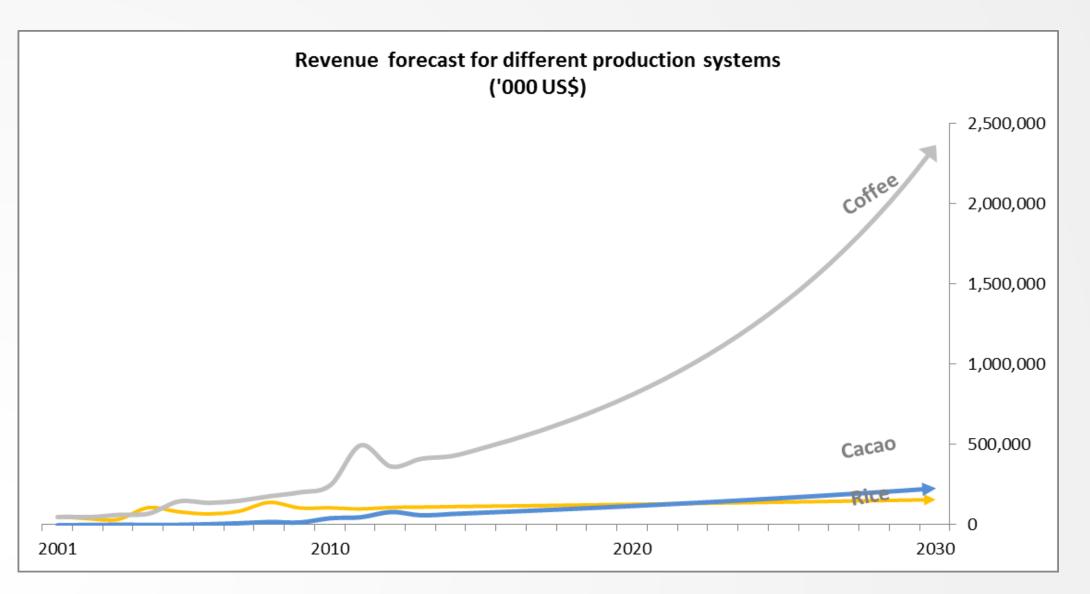
MODEL INPUTS

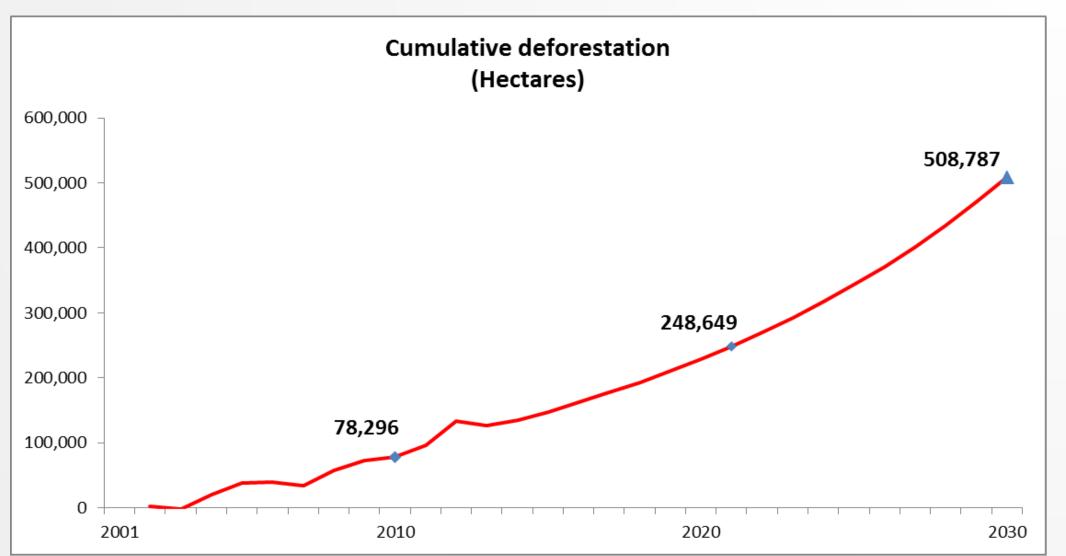


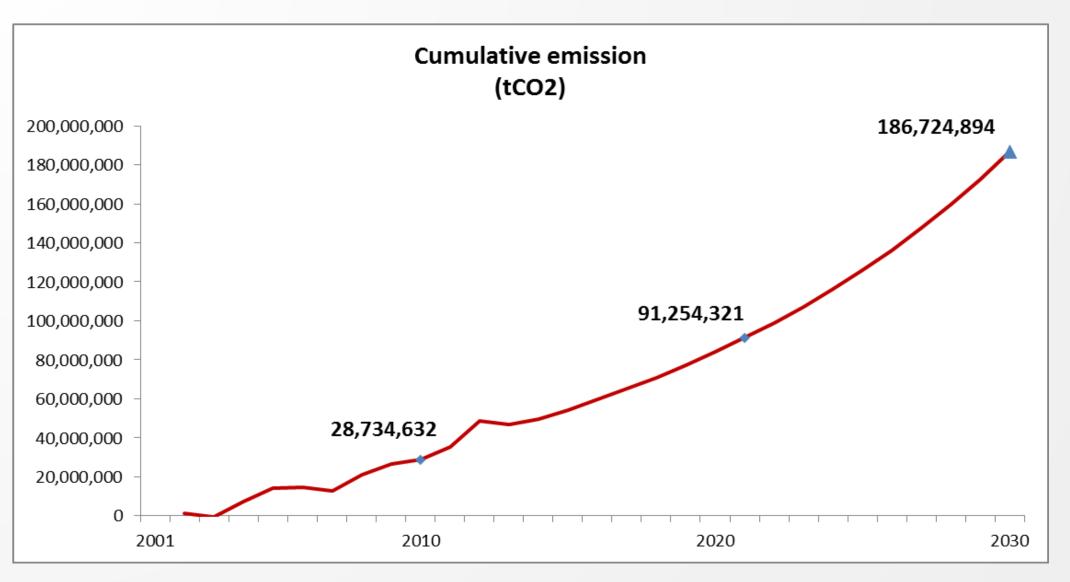


PROJECTIONS (UNCONSTRAINED)



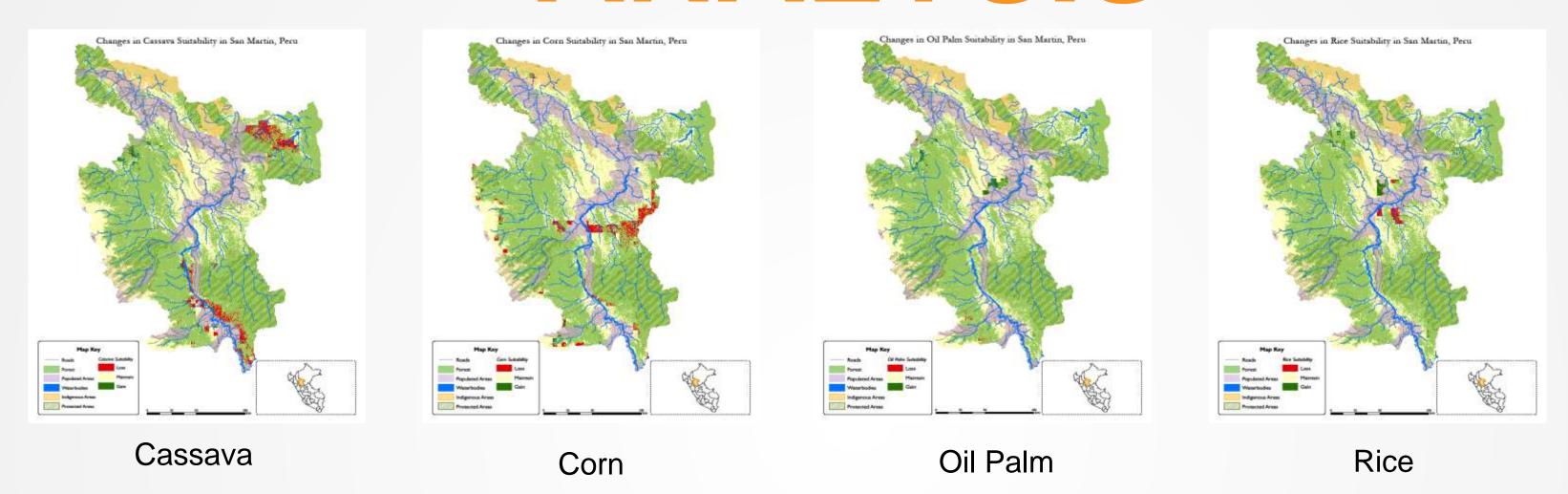








AGRICULTURAL SUITABILITY ANALYSIS



- Depending on the crop, areas of expansion in suitability in 2050 will vary 4-19%
- The crops with the highest areas of potential expansion are oil palm, cassava (19%) and rice (18%)
- Corn is projected to expand in only 4% in the future based on areas currently suitable, but can
 potentially experience a reduction in suitable area of 47%.
- Losses in the area suitable for production of the other 3 crops are smaller, ranging from 2-14%



WHAT INFORMATION IS NEEDED TO SCALE UP INVESTMENT IN SUSTAINABLE LANDSCAPES?

- Investors and commodity sourcing companies
 Is this a good place to invest?
- National and sub-national governments and international development institutions
 - How to impact green growth and sustainable development?
- Landscape level governments, managers, producers and their partners

 Are we investment ready?



SUSTAINABLE LANDSCAPES "RATING TOOL"

 Structured set of criteria for key policy and governance conditions

Themes

- Land use planning and management
- Land and resource tenure
- Biodiversity and ecosystem services
- Stakeholder coordination and participation
- Commodity supply chains

Formats

- Scorecard: summary of rating for each criterion A = high/full/clear, B = medium/partial, C = low/not addressed
- Assessment: detailed evidence for rating with links to supporting information (laws, reports, data etc.)

DRAFT Sustainable Landscapes Rating Tool - assessing jurisdictional policy and governance enabling conditions

Example rating of a jurisdictional landscape - October 2016

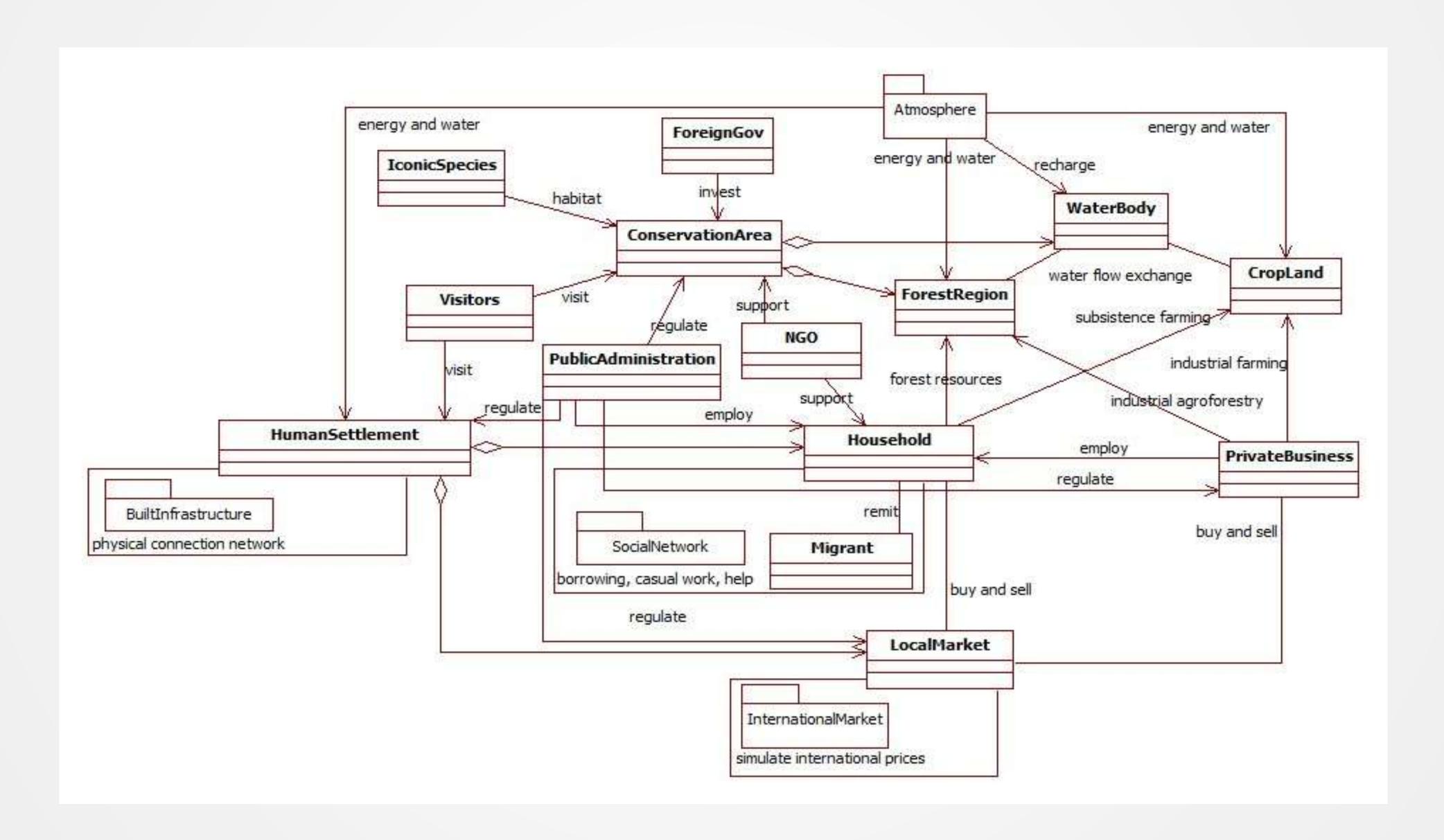
A – high, full, clear B – medium, partial C – low, not addressed II – insufficient information NA – 1. Land use planning and management	not applicable
1.1 Land use plan/zoning	
a) Developed through a participatory process	В
b) Formally adopted	В
1.2 Social and environmental impact assessments and plans to mitigate risks	
Require special attention to impacts on vulnerable and marginalized people that have been identified for the landscape	В
b) Require special attention to high conservation values and/or biodiversity and ecosystem service priorities	A
c) Require a plan to mitigate all significant negative impacts	Ā
d) Opportunities are provided for public comments on draft reports and comments are addressed in final versions	В
e) All impact assessment reports and plans are publicly accessible	C
1.3 Process for delivering authorizations for land use change	
a) Consistent with the land use plan	В
b) Depends on results of impact assessment	A
1.4 Institutions/agencies responsible for land use planning and management	
a) Roles and responsibilities of entities responsible for planning and management of different land use types are defined	Α
b) Managed with financial transparency	II
c) Have resources and capacity eg for enforcement	С
1.5 Data and spatial analysis of land use change and impacts	
a) Includes spatial analysis of conversion of major habitat types	Α
b) Includes projection of future land use change using internationally recognized methodology (eg forest reference level)	A
c) Includes degradation of important habitat types (e.g. forests)	С
1.6 Data and analysis of drivers of deforestation and degradation	
a) Includes direct and indirect drivers of deforestation	В
b) Includes planned and unplanned deforestation	С
c) Includes drivers of conversion/degradation of non-forest ecosystems	В
1.7 Strategy and action plan to address drivers of deforestation and degradation	
a) Addresses all significant drivers	Α
b) Formally adopted	A
c) Includes action plan (with targets, schedule, roles, responsibilities, budget and secured finance)	C
d) Evidence/reports available on implementation	В
1.8 MRV system for land use emissions	
a) A system is in place to measure, report and verify (MRV) GHG emissions from land-use	С
1.9 Policies across sectors that affect land use	
a) Policies exist for relevant sectors that affect land use	Α
b) Coherence across sector policies	П
1.10 Land use policies at sub-national and national levels	
a) Coherence across policies at different levels of government	Ш
2. Land and resource tenure	
2.1 Inventory and map of land and resource rights	
a) Includes overlapping rights	В
b) Covers the entire jurisdiction	В
2.2 Clarity of tenure rights	
a) Land tenure rights are clear	Α
Absence of overlapping rights, including for above and below ground resources	C
c) Includes carbon rights	A
2.3 Customary rights to land and resources	
a) Collective customary rights of indigenous people and local communities are recognized	Α
b) Customary rights of all marginalized and vulnerable groups are recognized – eg women	C
c) Free, prior and informed consent is required for all activities that affect collective customary and statutory rights	c
2.4 Land titling/registration process	
a) Land titling/registration process is clear	Α
b) Land use titling is functional	c
2.5 Measures to protect people from involuntary resettlement	
Include a process for fair compensation Include restriction of access to resources important for livelihoods as well as habitation	A B
b) Include restriction of access to resources important for livelihoods as well as habitation	



INTEGRATED ANALYSIS



AGENT-BASED MODELING





AGENTS AND VARIABLES

HumanSettlement

Visitor

Migrant

SocialNetwork

+AveragePath

+CutLink()

+ReferenceBundlePrice

+ComputePrices()

+ImportLocally()

+ExportOutside()

+CreateLink()

+AverageDegree

+ClusterCoefficient

+ComputeStatistics()

Human Agents Natural Agents Household WaterBody Atmosphere CropLand +Surface/Ground +NumberOf Individuals +Urban/Rural +SeasonalPrecipitation +Population +SeasonaAverageFlow +Education +CropType +SeasonalRadiation +DependencyRatio +HouseholdList +SeasonalYield +CarbonConcentration +ComputeFlow() +MainEconomicActivity +WaterConsumption +CarbonSequestration +ComputeStock() +EnergyConsumption +MainEmployee +CropHarvested +Rain() +Flood() +FoodConsumption +MonthlyIncome +GHGEmissions +Heat() +Dry() +PeersInNetwork +GHGEmissions +CheckSuitability() +NetworkCentrality +AggregateStatistics() +Seed() +SocialParticipation ForestRegion +AssessCivilParticipation() +Grow() IconicSpecies +WaterConsumption +ForestType +Harvest() +EnergyConsumption +BiomassSeasonalGrowth +Flora/Fauna +Reset() +FoodIntake +CarbonSequestration +SpatialDistribution +ComputeCarbon() +FoodSelfProducedOrForaged +NumberOfIndividuals +CarbonStorage +ComputeBiomass() +FirewoodAccess +SpeciesHealth +BiomassHarvested +Expand%() +WaterAccess +HotSpots +Shrink%() +BiomassBurnt +FoodExpenses +CheckSuitability() +SpatialDistribution +GHGEmissions +NonFoodExpenses +Migrate%() +AverageDailyExpense +GHGEmissions +Grow() +CheckSuitability() +ChooseDestination() +EmployedWork() +VisitDestination() +Reforest%() +FoodForaging() SpatialDistribution can be +Spend() +Shrink%() +Recreation() a point or a poligon and +CalculateItinerary() +Divide() +Spend() may be a physical location +LogHarvest() +UseSocialNetwork() or an area of influence +NTFPharvest() +ComputeFoodIntake() ConservationArea ClassTypes are specified +Operation 1() +ComputeEnergyConsumption() +SpatialDistribution in a different file +Fire() +ComputeWaterConsumption() +MonthlyIncome +ComputeCarbon() +KeySpecies +ComputeIncome() +MonthlyRemittance +ComputeBiomass() +KeyAestheticFeatures +ComputeDependency() +Viewpoints +ChangeLivelihood() +AskMoney() +DuplicateSelf() +SenMoney() +ComputeBiodiversity() +Die() Governance Agents +ComputeVissitors() +Migrate() +ComputeEcologicalHealth() NGO PrivateBusiness PublicAdministration +Local/International +OrganizationType **Network Agents** +SpatialDistribution +BusinessType LocalMarket +AdminType +SpatialDistribution +HouseholdReach +SpatialDistribution BuiltInfrastructure +LocallyEmployed +PowerProxy +ReferenceBundlePrice +NumberEmployed +LocalInvestments +SpatialDistribution +ProtectArea() +InfrastructureType +TurnOver +Invest() +SpatialDistribution +ProtectHouseholds() +CheckDemand() +PowerProxy +SellLand() +ImproveBuiltInfrstructure() +CheckSupply() +Employ() +ComputeFlow() +Invest() +ComputeImport() +FireEmployers() +BuyLand() +ComputeExport() ForeignGov +ProtectArea() InternationalMarket +SellLand() +ComputePrices() +ProtectHousehold() +Employ()

+ImproveBuiltInfrastructure()

+PolicyTarget: (ConservationArea)

+Investment

+ProtectArea()

+Invest()

+FireEmployers()

+SellLocally()

+Export()

+ComputeProduction()



INDICATORS OF LANDSCAPE SUSTAINABILITY

- Deforestation and fragmentation
- Biodiversity
- Crop production for export and for the region
- Carbon balance
- Food/Water/Energy regional availability and consumption
- Water quantity and quality
- Household Poverty
- Income contribution to national GDP and inequality distribution



CONCLUSIONS

- Landscapes generate a wide range of ecosystem goods and services for different beneficiaries
- But we cannot maximize all the goods and services all at the same time.
 People make choices on the future they want based on tradeoffs and synergies
- A landscape approach gives an opportunity to understand the teleconnections impacting the landscape
- An integrated model that we proposed here provides a forward-looking framework for understanding landscape scenarios now and into the future

