ECOSYSTEM SERVICES ACCOUNTING IN SAN MARTÍN, PERU

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Pretoria

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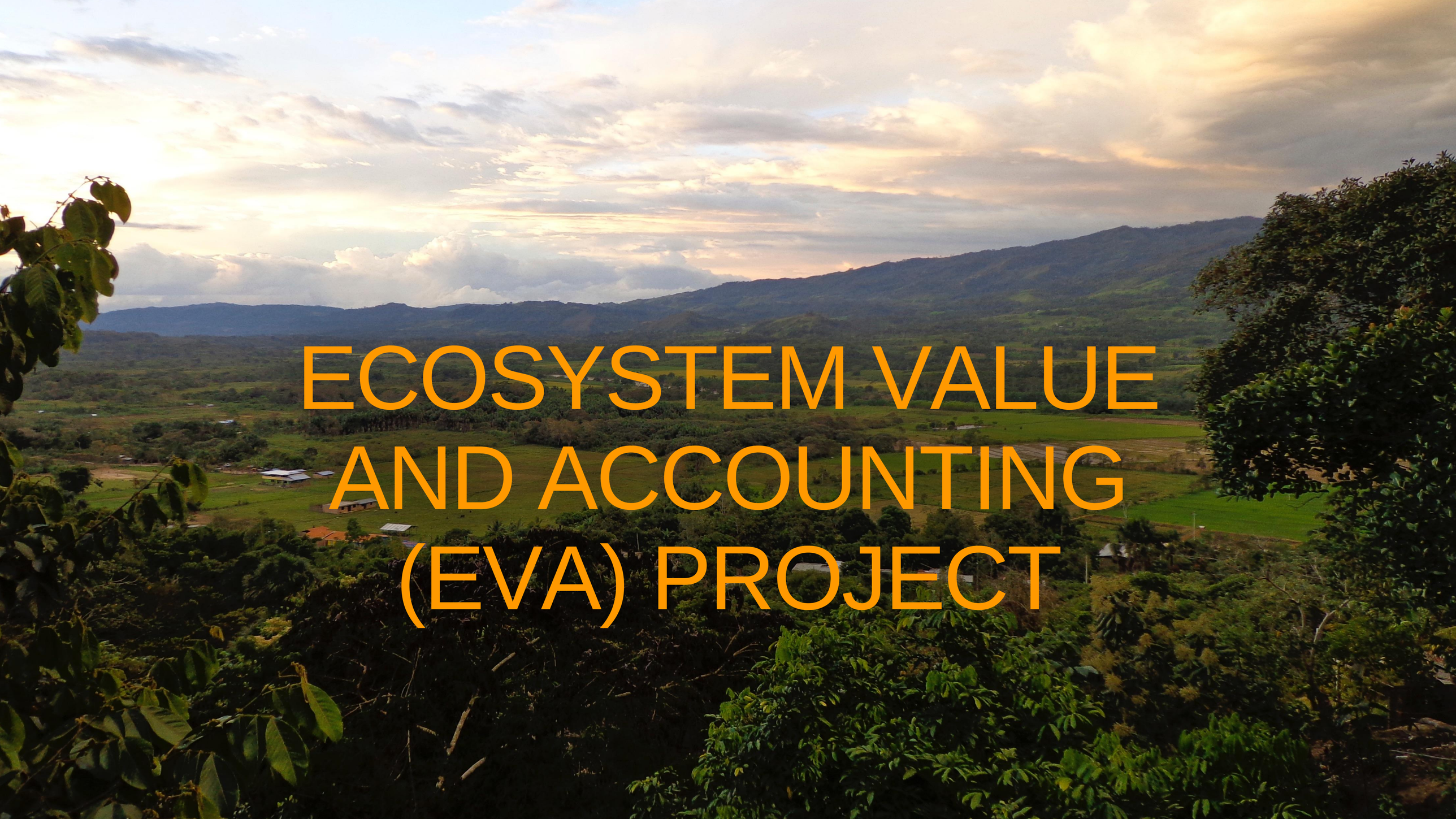
OUTLINE

- Background to the Ecosystem Valuation and Accounting (EVA) project
- San Martín, Peru: description of the study site
- Implementation of the Experimental Ecosystem Accounts in San Martín
- Main findings, the way forward
- Lessons learned


ECOSYSTEM VALUE
AND ACCOUNTING
(EVA) PROJECT

MULTIDISCIPLINARY TEAM

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perú sanmartín regiónverde GOBIERNO REGIONAL

PERÚ Ministerio del Ambiente

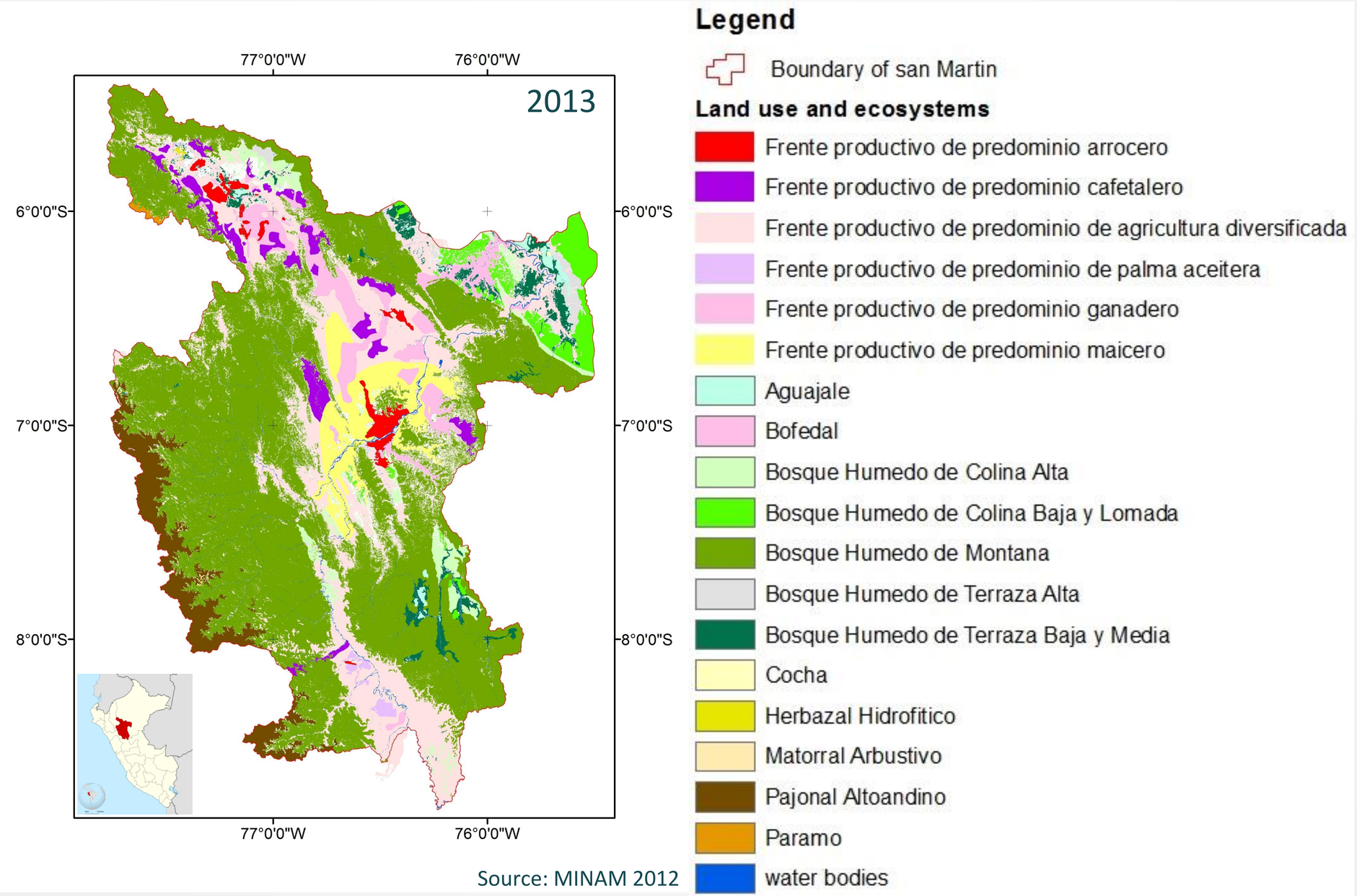
GORDON AND BETTY MOORE FOUNDATION

CSIRO

CLARK LABS
Geospatial software for monitoring and modeling the Earth system

SAN MARTÍN, PERU

ECOSYSTEMS TYPES AND LAND USE



Source: MINAM 2012

ECOSYSTEM ACCOUNTS COMPLETED

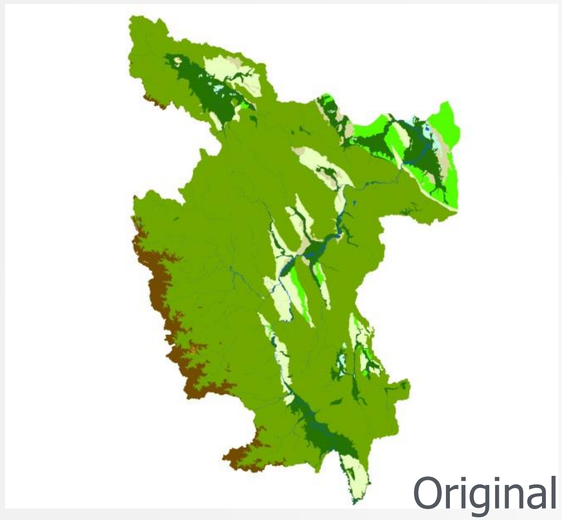
Ecosystem Accounts	Description	Type of Account
Ecosystem Extent	Statistics on the area of ecosystem distributions over an accounting period	Primary
Ecosystem Condition	Statistics on the characteristics that reflect the condition of an ecosystem.	Primary
Ecosystem Services Supply and Use	Ecosystem services flows from the ecosystems (i.e., supply) and to beneficiaries (i.e., use)	Primary
Extended Supply and Use Table	Ecosystem service flows into the SNA Supply Use Table	Primary
Biodiversity	Statistics independent of different ecosystem types on biodiversity values	Thematic
Carbon	Stocks and flows of carbon within ecosystems	Thematic
Water	Stocks and flows of water including inter-ecosystem flows	Thematic

ECOSYSTEM SERVICES QUANTIFIED

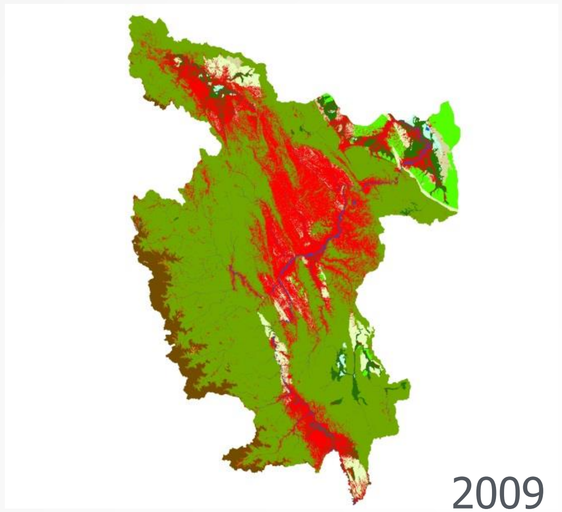
BIODIVERSITY
CARBON STORAGE
AVOIDED SEDIMENTATION
ECOTOURISM
TIMBER
BUSHMEAT
FIREWOOD
WATER PROVISION

EXTENT AND CONDITION

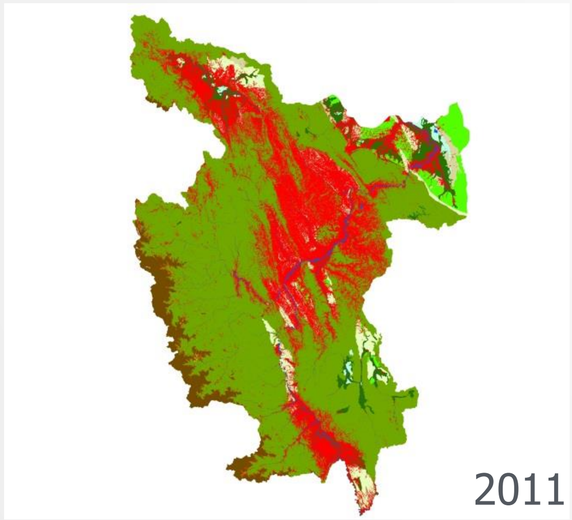
EXTENT: DISTRIBUTION



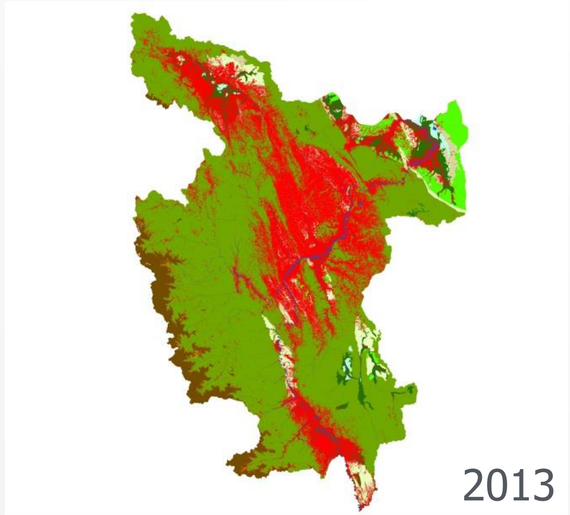
Original



2009



2011



2013

Boques

- Bosque Humedo de Colina Alta
- Bosque Humedo de Colina Baja y Lomada
- Bosque Humedo de Montana
- Bosque Humedo de Terraza Alta
- Bosque Humedo de Terraza Baja y Media

Herbazal

- Matorral Arbustivo
- Herbazal Hidrofitico

Pastizal

- Paramo y Pajonal Altoandino

Bosques Inundables y Cuerpos del Agua

- Bofedal
- Aguajale
- Cuerpos del Agua

Ecosistemas Modificados

- Ecosistemas Modificados

ECOSYSTEM EXTENT

	ECOSYSTEM ASSETS					
	Palm Swamps	Humid Forest with High Hills	Humid Forest with Low Hills	Humid Montane Forest	Lowland Terra Firme Forest	Floodplain Forest
Opening stock of resources Time 2009	27,997	203,601	159,703	2,966,134	53,179	189,224
Additions to stock						
Managed expansion						
Natural expansion						
Upwards reappraisal						
Total additions to stock of ecosystem assets						
Reductions in stock	180	20,202	9,131	91,331	2,834	14,795
Managed regression						
Natural regression Downwards reappraisals						
Total reductions in stock	180	20,202	9,131	91,331	2,834	14,795
Closing stock of resources Time 2013	27,817	183,399	150,572	2,874,803	50,345	174,429

ECOSYSTEM CONDITION

ECOSYSTEM ASSET		EXTENT AND CONDITION						
		Benchmark	2009		2011		2013	
		Extent (Ha)	Extent (%)	Condition	Extent (%)	Condition	Extent (%)	Condition
Forests	Palm Swamps	28,353	98.7%	0.90	98.4%	0.90	98.1%	0.90
	Humid Forest with High Hills	382,089	53.3%	0.63	49.5%	0.62	48.0%	0.61
	Humid Forest with Low Hills	193,040	82.7%	0.79	79.6%	0.78	78.0%	0.77
	Humid Montane Forest	3,618,298	82.0%	0.81	80.2%	0.80	79.5%	0.79
	Lowland Terra Firme Forest	102,942	51.7%	0.63	50.2%	0.63	48.9%	0.61
	Floodplain Forest	472,582	40.0%	0.57	37.9%	0.56	36.9%	0.55


ECOSYSTEM SERVICE
FLOWS
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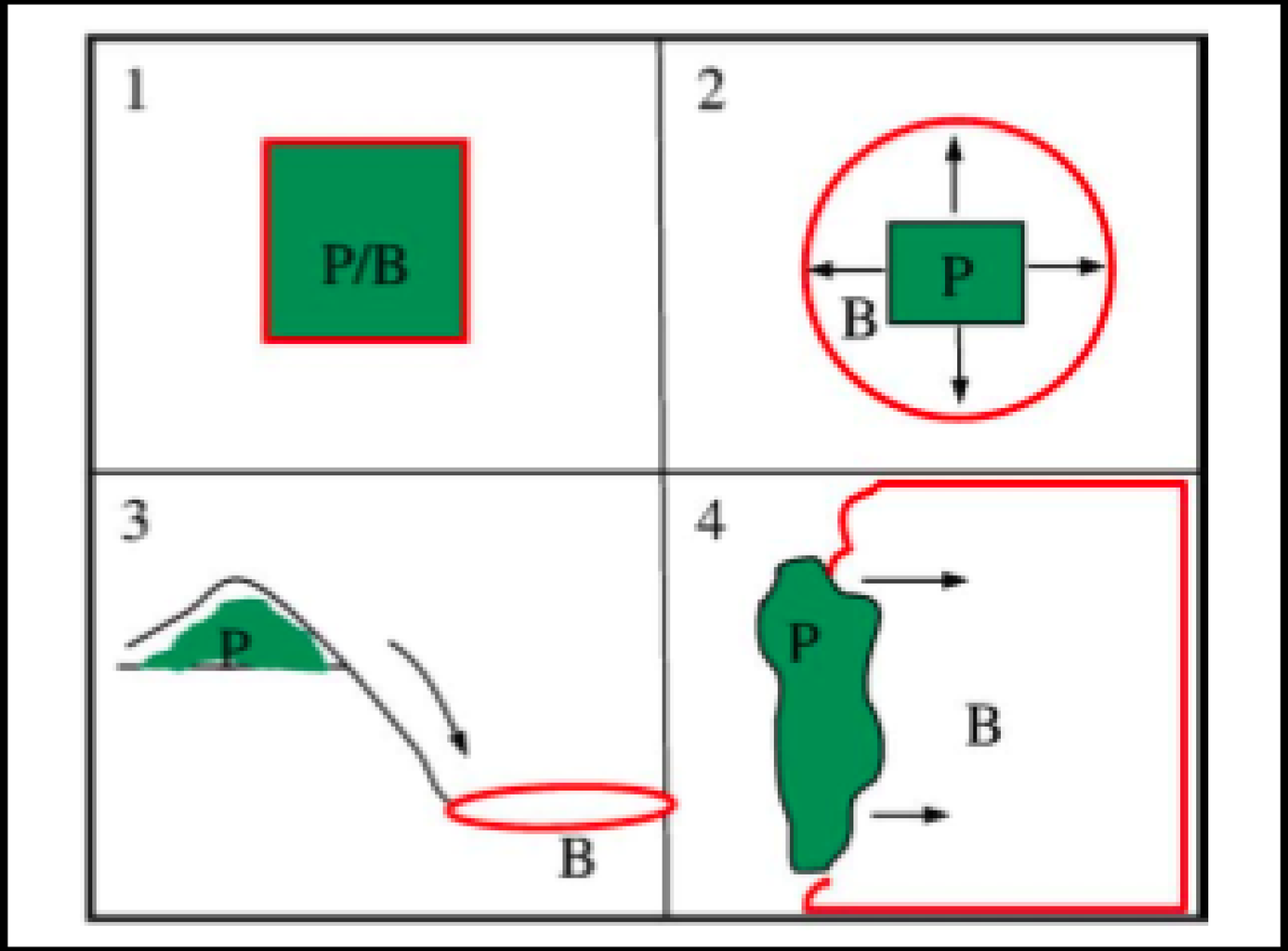
Spatial context of service flows

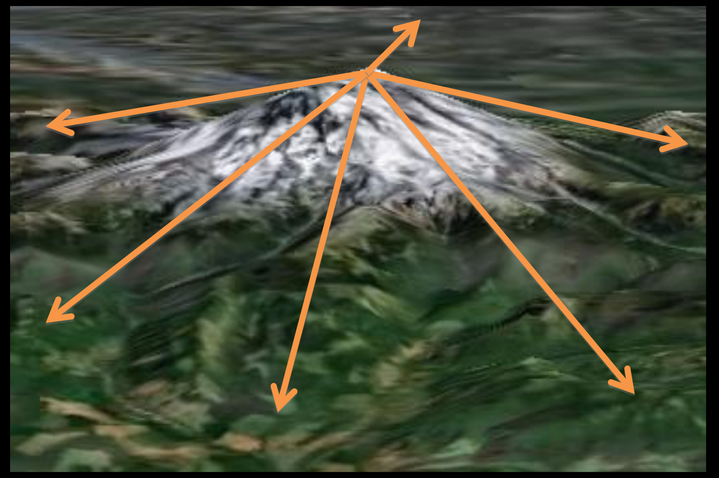


Fisher eta l. 2009

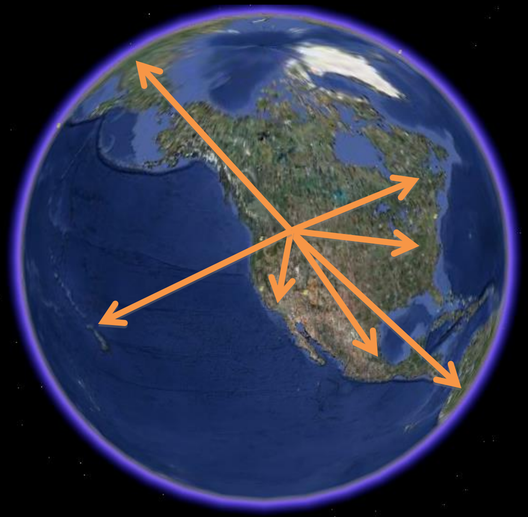
Types of service flows

Hydrologic services

Aesthetic viewsheds



Carbon sequestration, some cultural values



Recreation, flood regulation, coastal protection

Recreation, aesthetic proximity, some cultural services

BIOPHYSICAL APPROACHES

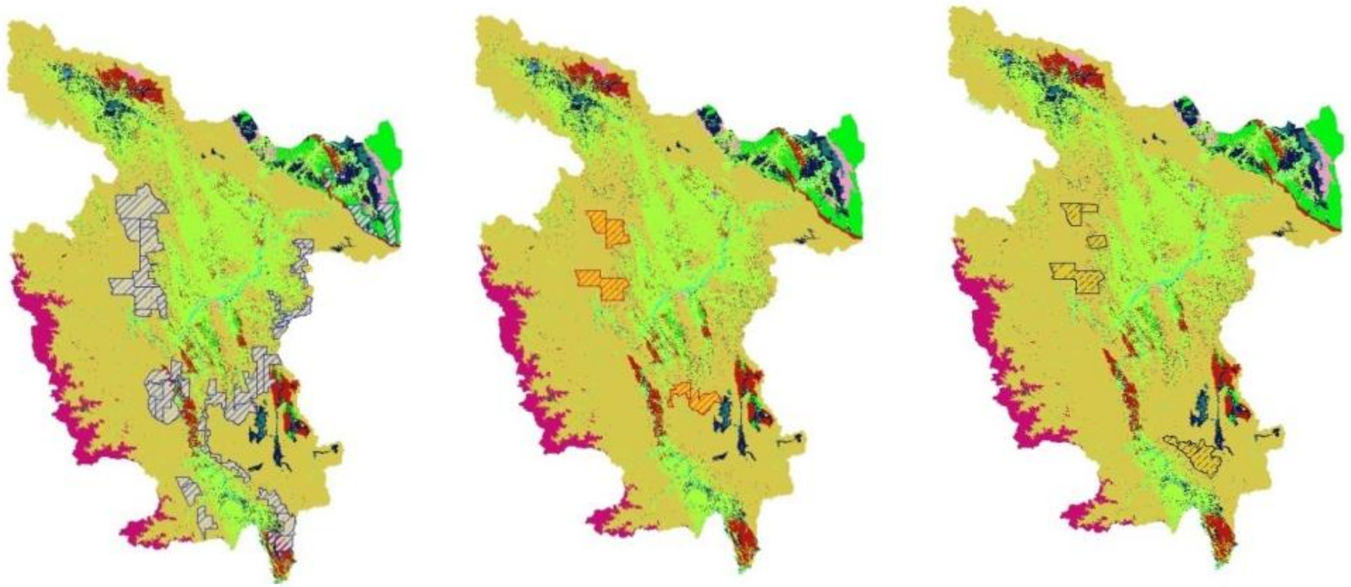
Ecosystem service	Analytical approach	Data
Timber	*Spatial analysis:* ecosystems-timber concession overlap analysis *Biophysical analysis:* end-use-specific timber supply from ecosystems	Spatial data layers of concession areas; Govt. data on reported timber harvest
Firewood	*Spatial analysis:* modeling accessibility *Firewood supply:* contribution of ecosystems	Spatial data: DEM, population centers; Firewood data: Govt. statistics
Bush meat	*Spatial analysis:* modeling hunting pressure *Bushmeat hunting:* contribution of ecosystems	Spatial data: DEM, population centers; Bushmeat hunting data: Literature
Water provisioning and avoided sediment	*Spatial analysis:* water flow and sediment model *Direct water use:* water uptake by beneficiaries *Inter-ecosystem flows*	Ecosystem maps; HydroSHEDS and WaterWorld datasets; Govt. data on water permits
Ecotourism	*Spatial analysis:* Mapping tourist destinations *Biophysical analysis:* analysis of tourist visits and length of stays	Tourist destination coordinates; # of visitors; # of hotel beds
Carbon	Carbon stocks in different ecosystems Changes in C stock due to land cover change	Ecosystem maps (MINAM) Carbon density (Carnegie) LiDAR data

VALUATION APPROACHES

Ecosystem service	Valuation method used
Timber	Resource rent Variables: revenue, harvest cost, processing costs, sales tax
Firewood	Resource rent Variables: opportunity cost of labor, firewood price
Bush meat	Resource rent Variables: opportunity cost of labor, bush meat price for different species
Water provision	Production inputs: for public and private water use Net Return to Water (NRTW): for rice irrigation
Ecotourism	Tourism cost approach Variables: tourist arrivals, length of stays, travel cost, food cost, lodging costs
Carbon	Social Cost of Carbon REDD benefits

TIMBER ACCOUNTING

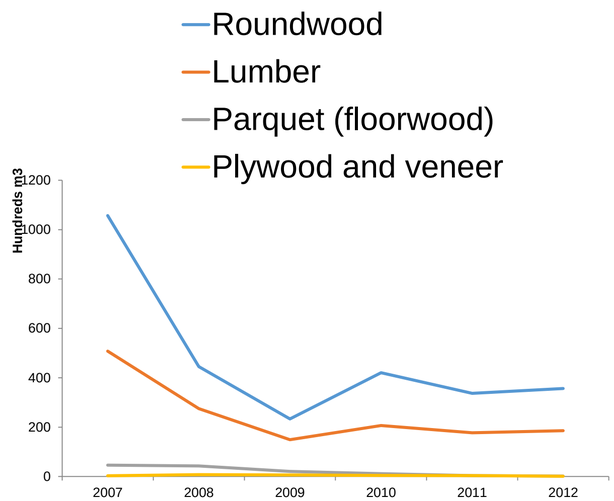
Spatial analysis



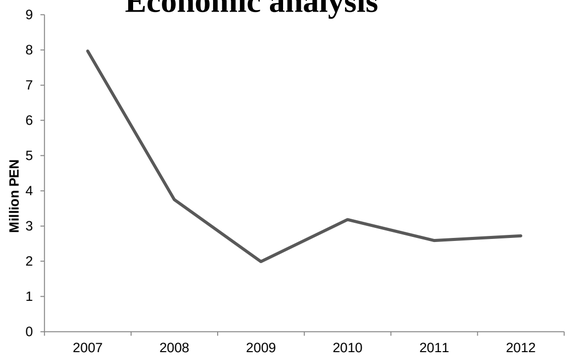
(a) (b) (c)

Figure: Timber concession areas spread across ecosystems ((ecosystem types shown in the background) including general concession areas (a), active 2012 (b) and active 2013 (c)

Biophysical analysis



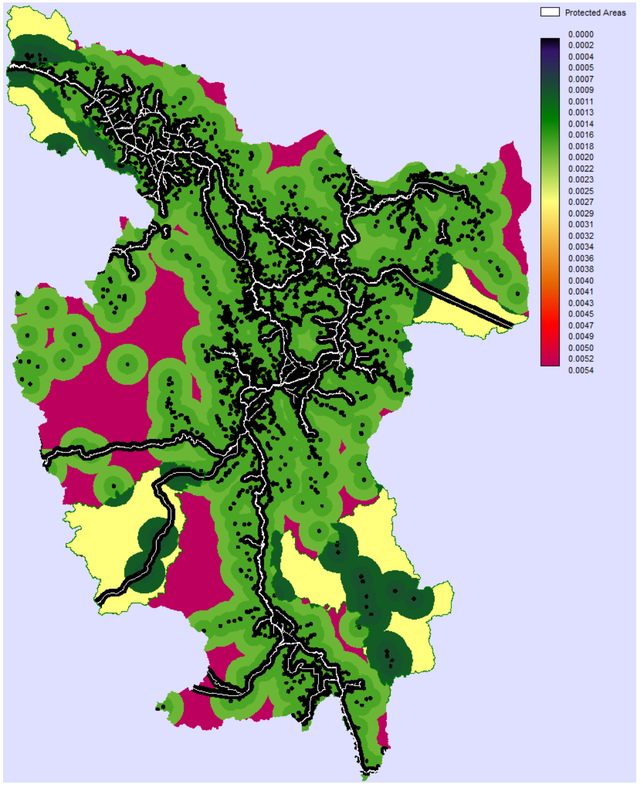
Economic analysis



NTFP: Bushmeat

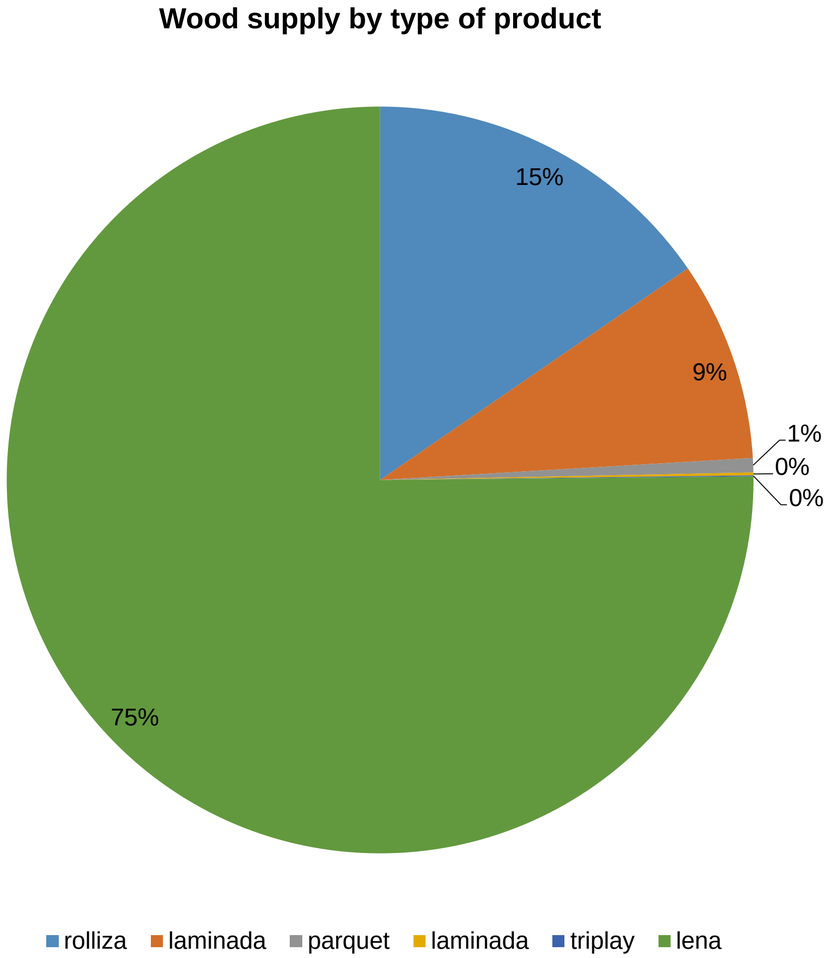
- Subsistence hunting and for market (11%). Meat, skin and pets.
- Extraction by rural households can represent 0-44% of their family income.
- A study in Peru estimated their annual value at USD $250,000.
- Market price at USD $1.09/kg for intermediary, USD $3.29 per kg for final consumers.
- 90% of extraction for commercialization is exported out of San Martin.
- Location of towns; decreasing hunting pressure (PA); slope and access; annual extraction rate per km2.
- Economic valuation based on RR

Hunting pressure model result

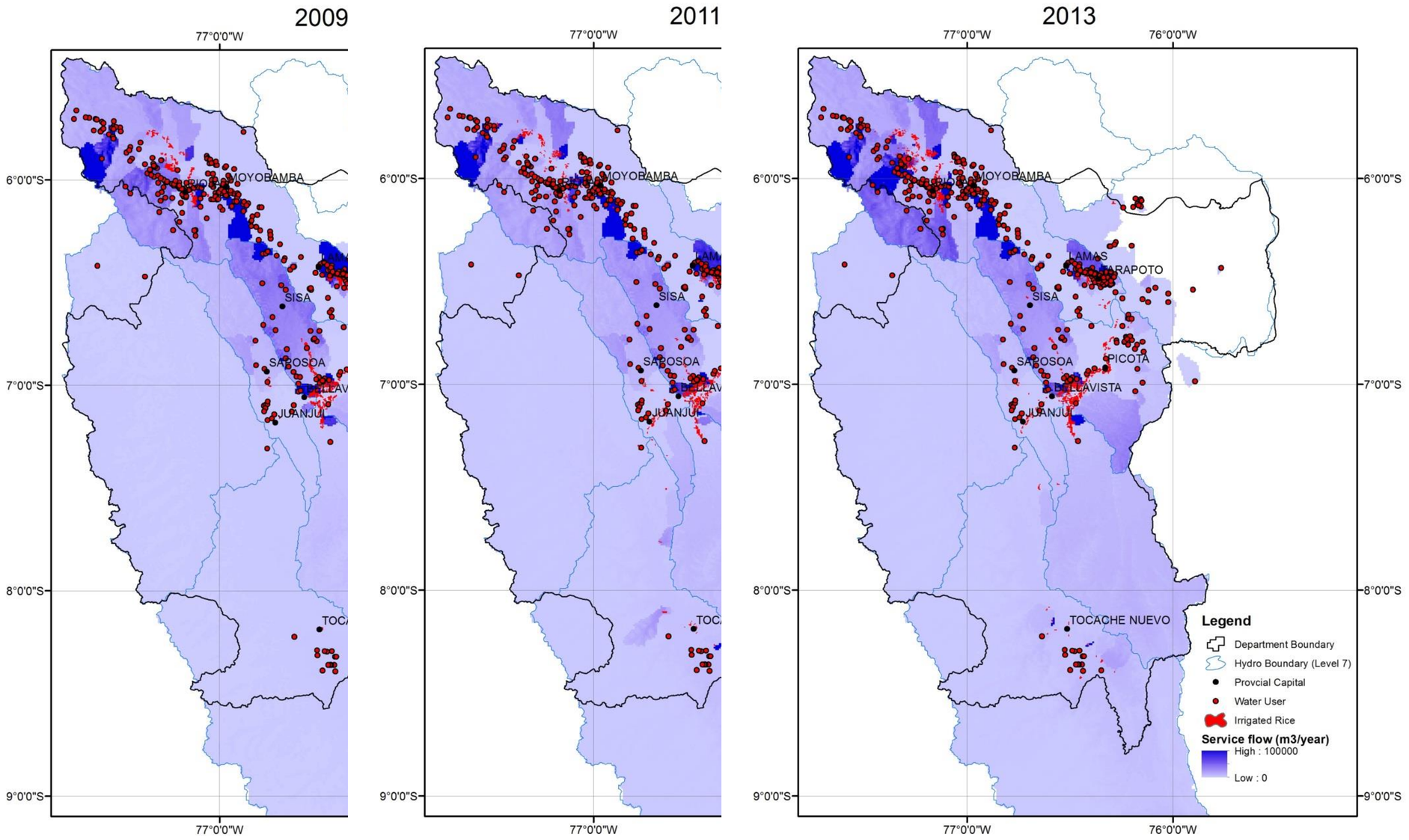


Firewood

- Households: cooking, heating, manufacture, charcoal (60% of rural households)
- Industrial use for brick production and restaurants is unknown.
- Energy matrix in San Martin has not changed (1973-2004, 57% firewood)
- Model uses similar parameters for bushmeat.
- Economic valuation based on RR

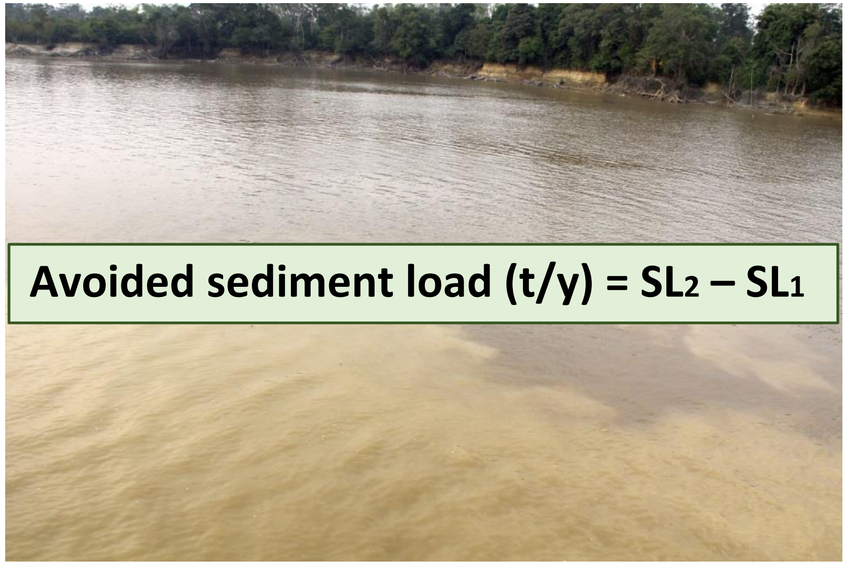


Water Provision Service Flows



Sediment Regulation Service Flows

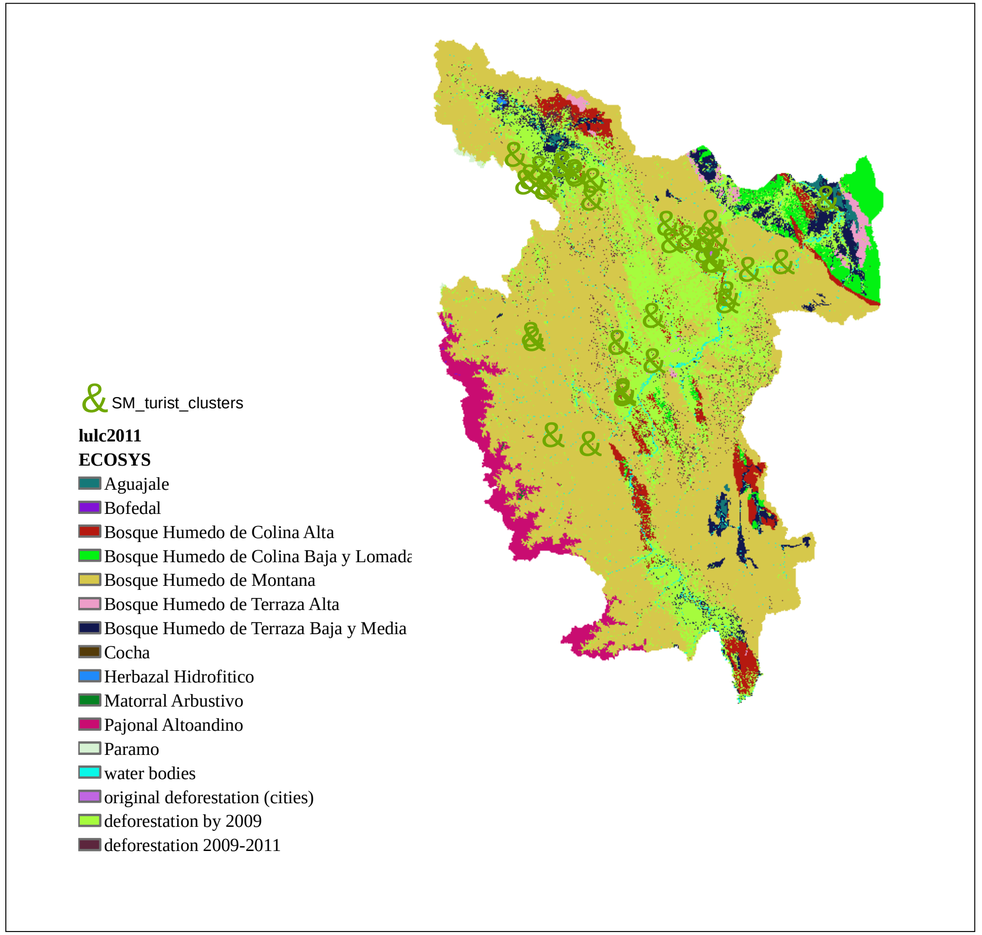
Sediment load (SL_1)



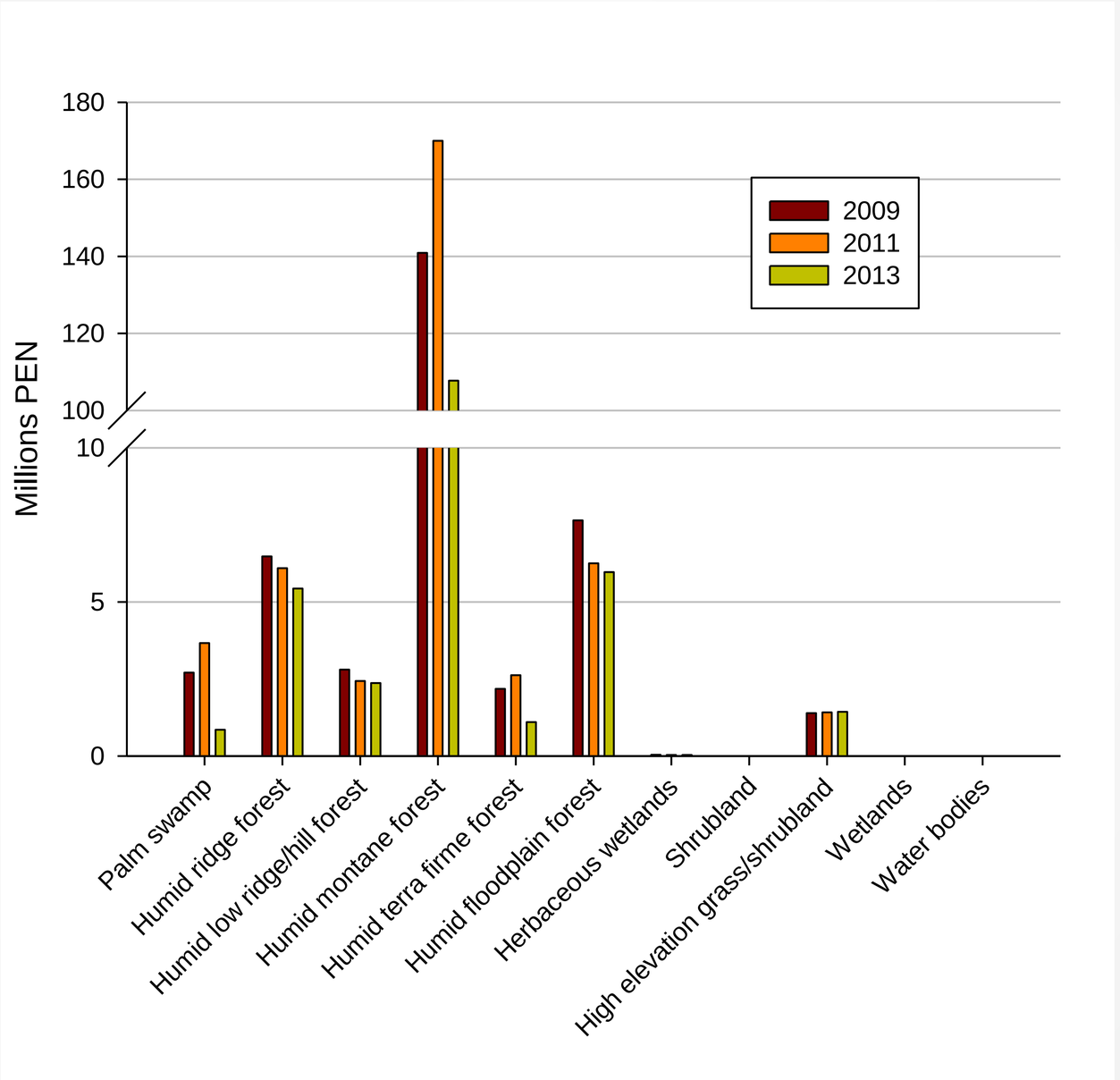
Sediment load (SL_2)

ECOTOURISM

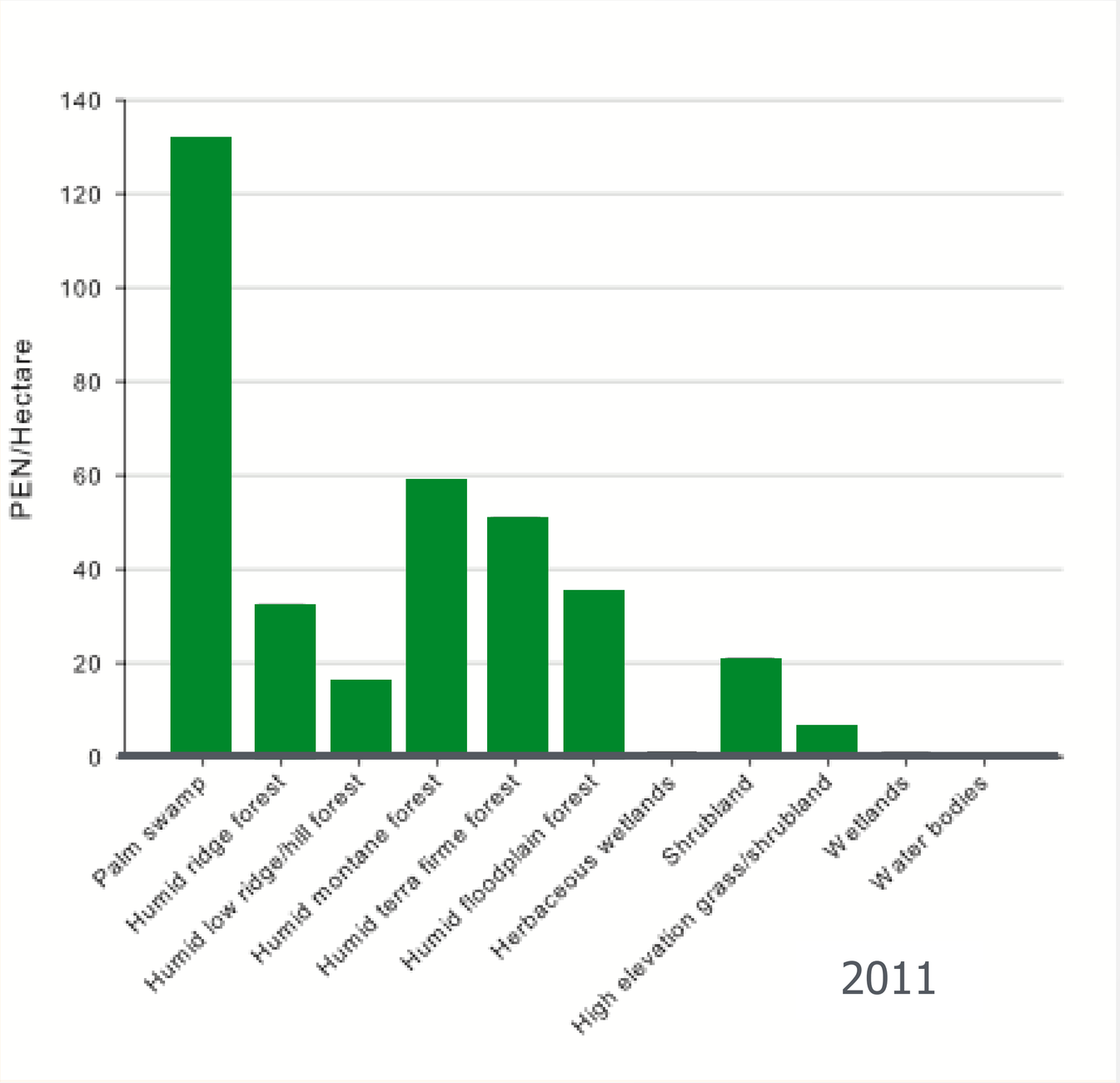
Analyses	Methods	Data
Mapping	Mapping tourist spots in San Martin	Ecosystem maps National park layers Bird watching layer
Biophysical analysis	Survey existing databases for tourist information	Number of visitors Number of tourist-support businesses
Valuation	Per capita expenditure by tourists	Expenses for travel, food costs, overnight stay costs etc.
Reporting	Summarize results, create reporting tables.	Tables and figures produced from the results



SERVICE FLOWS RESULTS



HIGH VALUE ECOSYSTEMS (VALUE PER HA)



VALUE TO THE ECONOMY

CONTRIBUTION OF ECOSYSTEMS TO THE REGIONAL ECONOMY WAS ESTIMATED AS 191 MILLION PERUVIAN SOL (ABOUT US$58 MILLION)

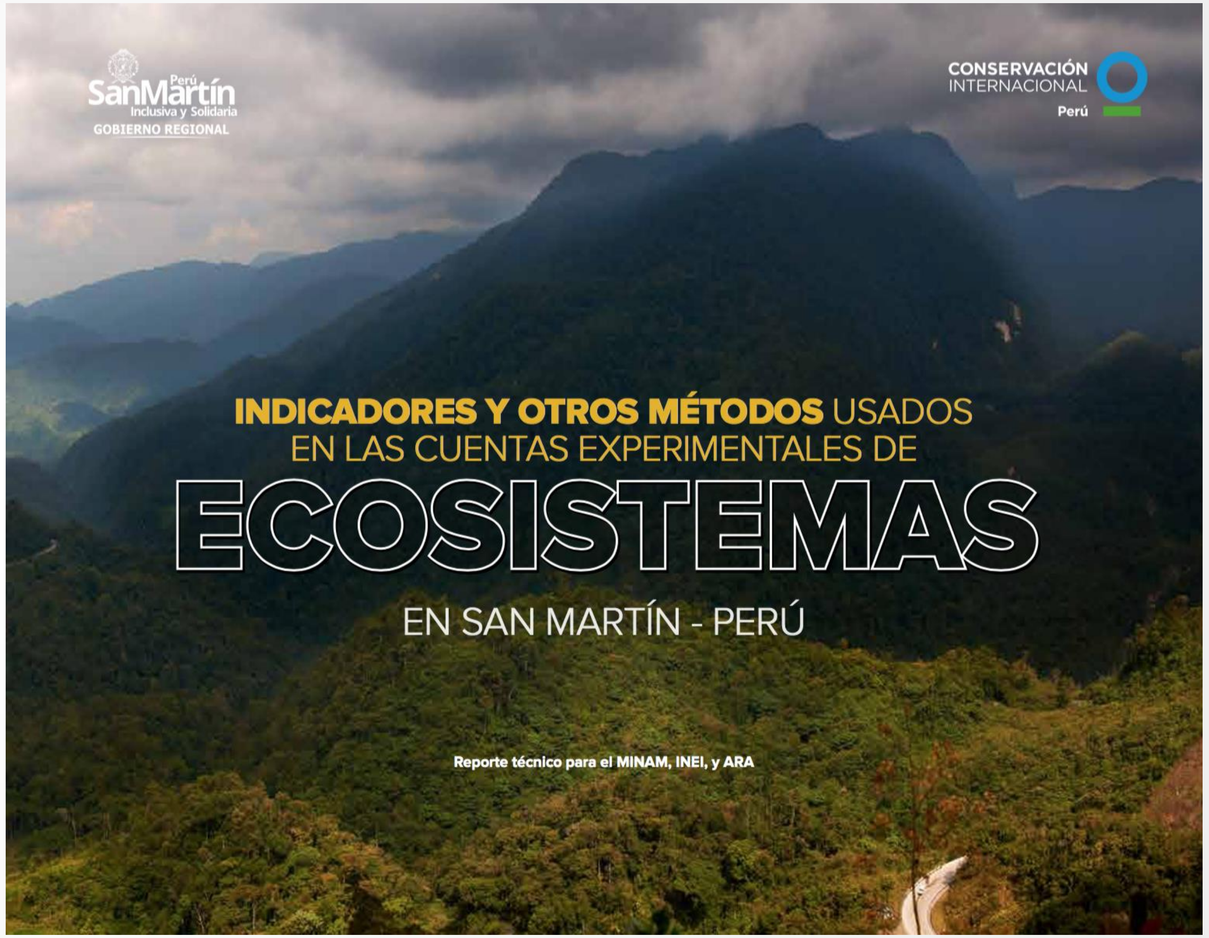
WHICH WOULD REPRESENT THE EIGHTH BIGGEST SECTOR IN SAN MARTÍN

8TH OUT OF 32 SECTORS

Extended Supply and Use Table

		commodities								Industries								Total Final Demand	Total Output
		Nat. Res.	Const.	Manuf	Transp	Util.	Inform.	Fin. Serv.	Other Serv.	Nat. Res.	Const.	Manuf	Transp	Util.	Inform.	Fin. Serv.	Other Serv.		
commodities	Nat. Res.																	Final Demand	Total Commodity Output
	Const.																		
	Manufc.																		
	Transp.																		
	Util.																		
	Inform.																		
	Fin. Serv.																		
	Other Serv.																		
Industries	Nat. Res.	SUPPLY MATRIX																	Total Industry Output
	Const.																		
	Manufc.																		
	Transp.																		
	Util.																		
	Inform.																		
	Fin. Serv.																		
	Other Serv.																		
Total Value Added										Value Added								GDP	
Total Output		Total Commodity Output								Total Industry Output									total Output

AVAILABLE REPORTS



Available on the CI-Peru and WAVE
S Websites

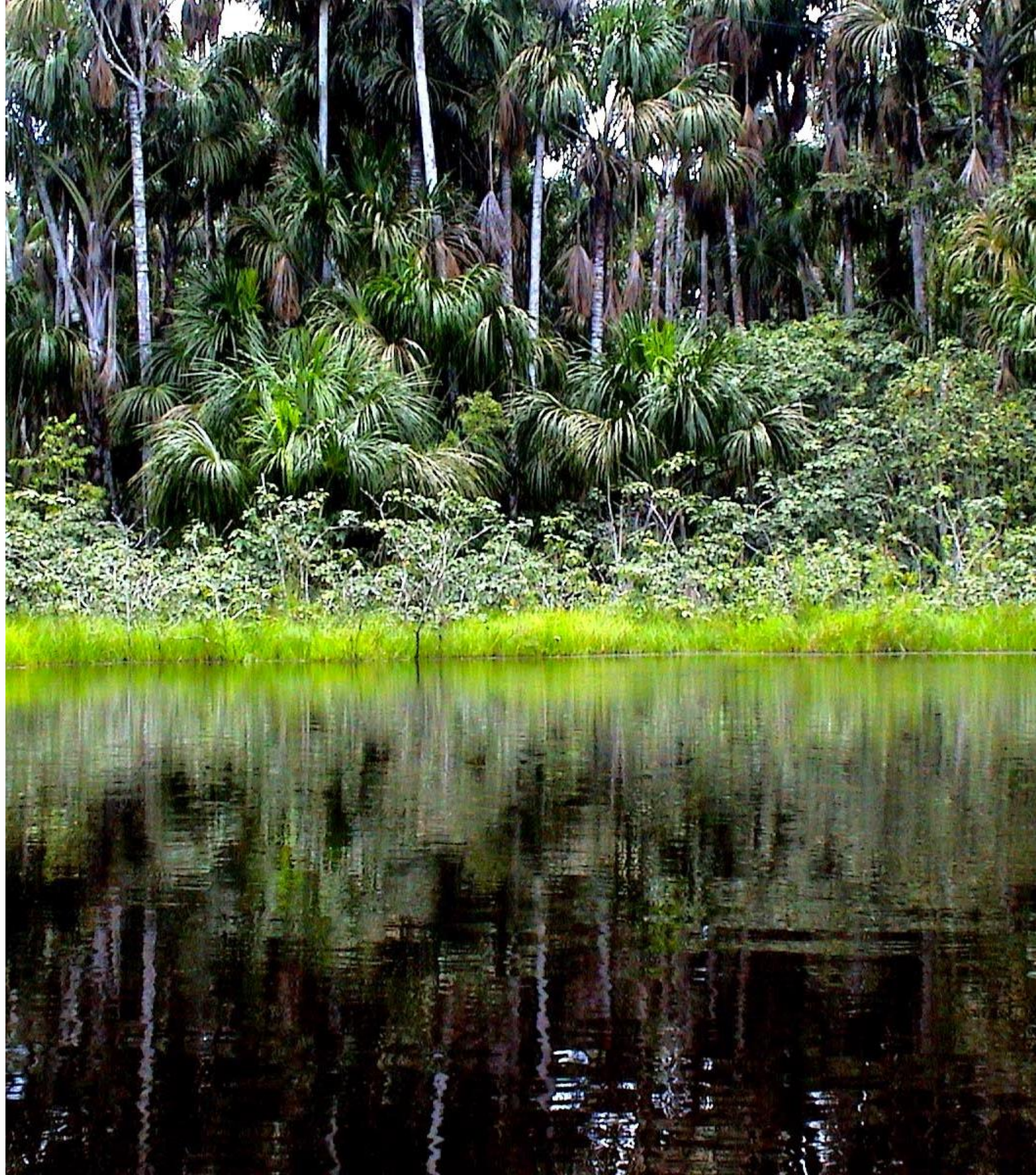
POST ACCOUNT POLICY APPLICATIONS

Index and indicators to make decisions

- Ecosystem Benefits Index (EBI)
- Environmental Performance Index (EPI)

Indicators and analyses for specific sectors

- Ecotourism sector
- Rice and Palm Swamp
- Hydropower energy sector



LESSONS LEARNED

- Ensure accounts are developed to inform key policies and decisions
- Formalize institutional arrangements and leverage strong partnerships
- Data gathering and quality control takes the longest
- Utilize multi-disciplinary teams and expertise, maintain a research component and follow the SEEA guidelines
- Ensure there is time and resources for post-account applications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