



A PRACTICAL PERSPECTIVE ON KEY FACTORS FOR
APPLYING ECOSYSTEM SERVICE CLASSIFICATION
SYSTEMS IN DEVELOPING COUNTRIES

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Moore Center for Science at Conservation
International

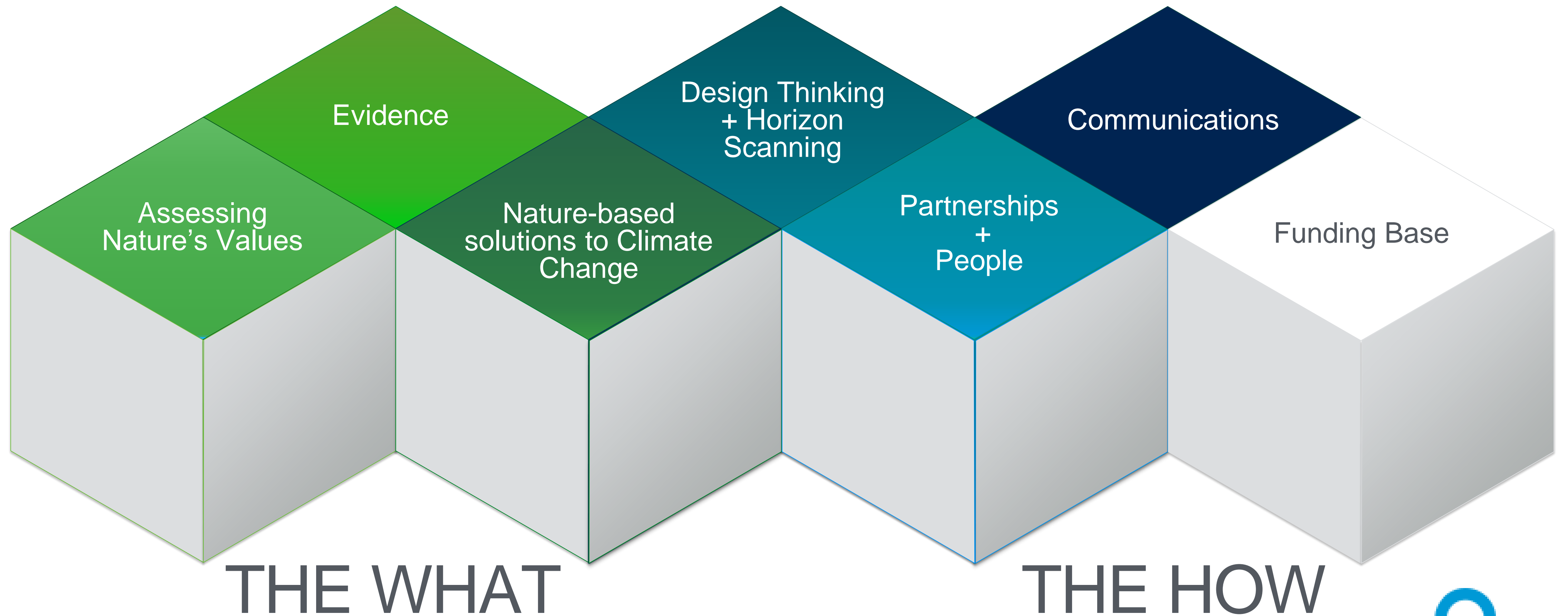
Expert Workshop on Developing Ecosystem Service Classification(s) for
Ecosystem Accounting – Taking Stock & Moving Forward

Wageningen University, Netherlands, 17-18 November 2016

OUR GOAL

to generate the knowledge, tools, and decision support needed to advance nature-based solutions to climate change, sustainable production, and livelihoods.

MCS STRATEGIC FOUNDATION



“We need to take stock and attach value to our natural resources and ecosystems such that we may include their value in planning and decision making processes as well as in our national accounts and balance sheets”

President Ian Khama

President of Botswana

“Natural capital – our ecosystems, biodiversity, and natural resources – underpins economies, societies and individual well-being. The values of its myriad benefits are, however, often overlooked or poorly understood. They are rarely taken fully into account through economic signals in markets, or in day to day decisions by business and citizens, nor indeed reflected adequately in the accounts of society”

President Ellen Johnson Sirleaf

President of Liberia

CI'S PROGRAM IN NCA

Pilots in Ecosystem Accounting

- Peru
- Liberia and others

PAPA: Peru

Strategic Development

- NCA Strategy (Africa, Americas, Asia Pacific, Coastal/Oceans)
- Gaborone Declaration for the Sustainability of Africa

Mapping Essential Natural Capital

- Amazonia, Cambodia, Madagascar and Liberia



KEY OPERATING THEMES

- We follow and promote the SEEA.
 - We draw inspiration from folks like WAVES. Partnerships are vital.
 - Pilot testing / R&D
 - Conservation and sustainable development outcomes.
 - Feed results and experience back to the community.
 - Broader applications
-
- Useful to have an understanding of landscape, stakeholder objectives, and policy objectives when assessing ecosystems and their services



CURRENT ISSUES

- Top down development of extent/condition \leftrightarrow Bottom up development of services
- A focus on process , but it takes time
- Data availability governs choice
- Bias towards certain services
- Coastal/Marine
- MENC as a means of laying some groundwork



KEY FACTORS: WHICH USERS DOES IT MATTER TO? SCIENCE –POLICY – ADVOCACY

Community of Developers

- Robust
- Repeatable
- Cross comparable
- Data
- Etc.

Developing Countries

- Can facilitate better decisions
- Understanding the true value of nature
- Better planning
- Better management
- Better allocation
- Practical and policy relevant
- Has other applications: PES, SDG's.



KEY FACTORS (ENABLING/LIMITING)

- Policies
- Education, exposure
- Unclear Concepts and Scale Issues
- Data is limiting factor (but should not be)
- Structure and institutional arrangements
- Information infrastructure





SAN MARTIN, PERU

ECOSYSTEM
SERVICES

BIODIVERSITY

CARBON STORAGE

AVOIDED SEDIMENTATION

ECOTOURISM

TIMBER

BUSHMEAT

FIREWOOD

WATER PROVISION



**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.**

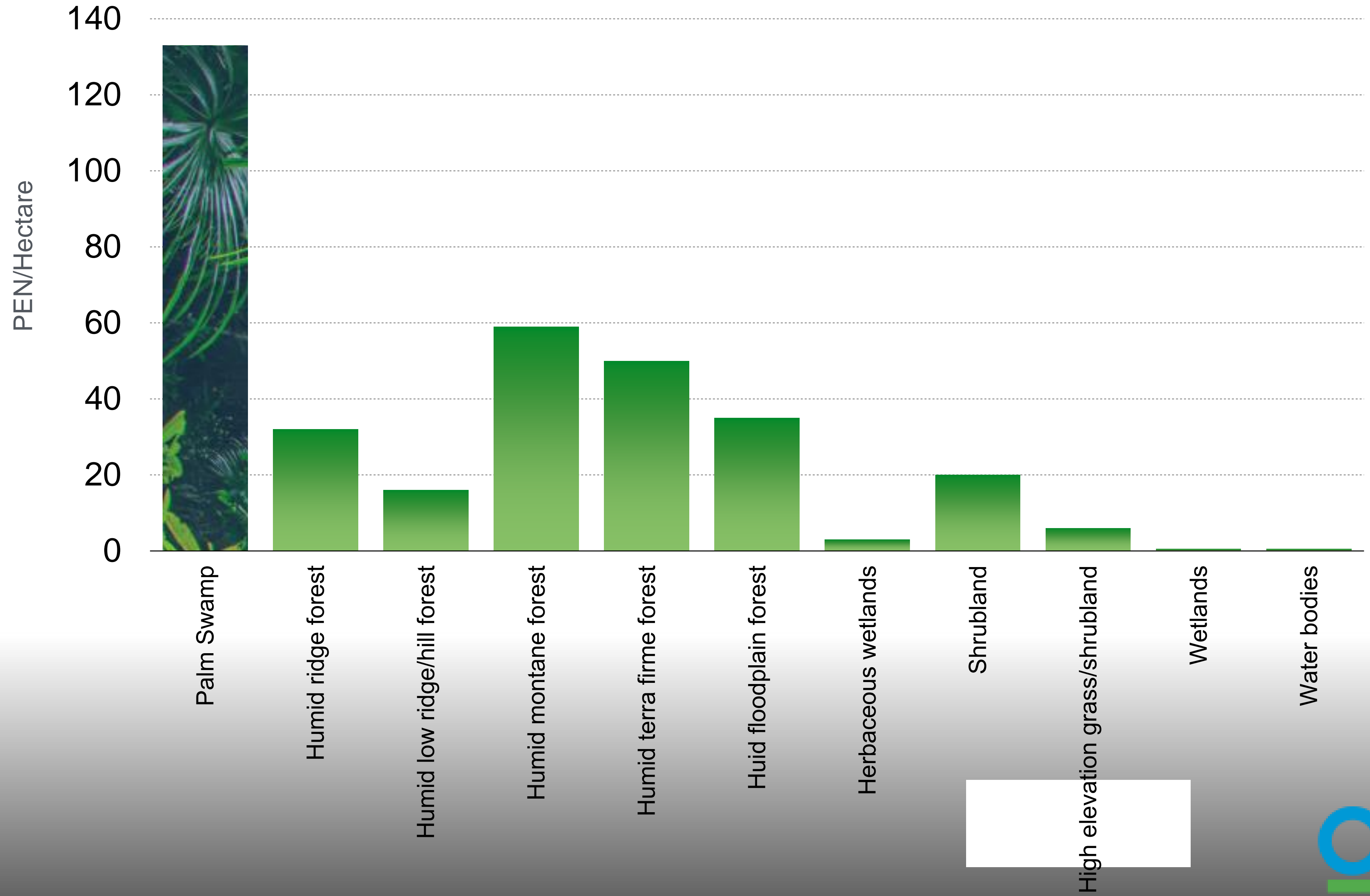
8TH OUT OF 32 SECTORS



AGUAJALE



HIGH VALUE ECOSYSTEMS



2011



POST ACCOUNT POLICY APPLICATIONS (PAPA)

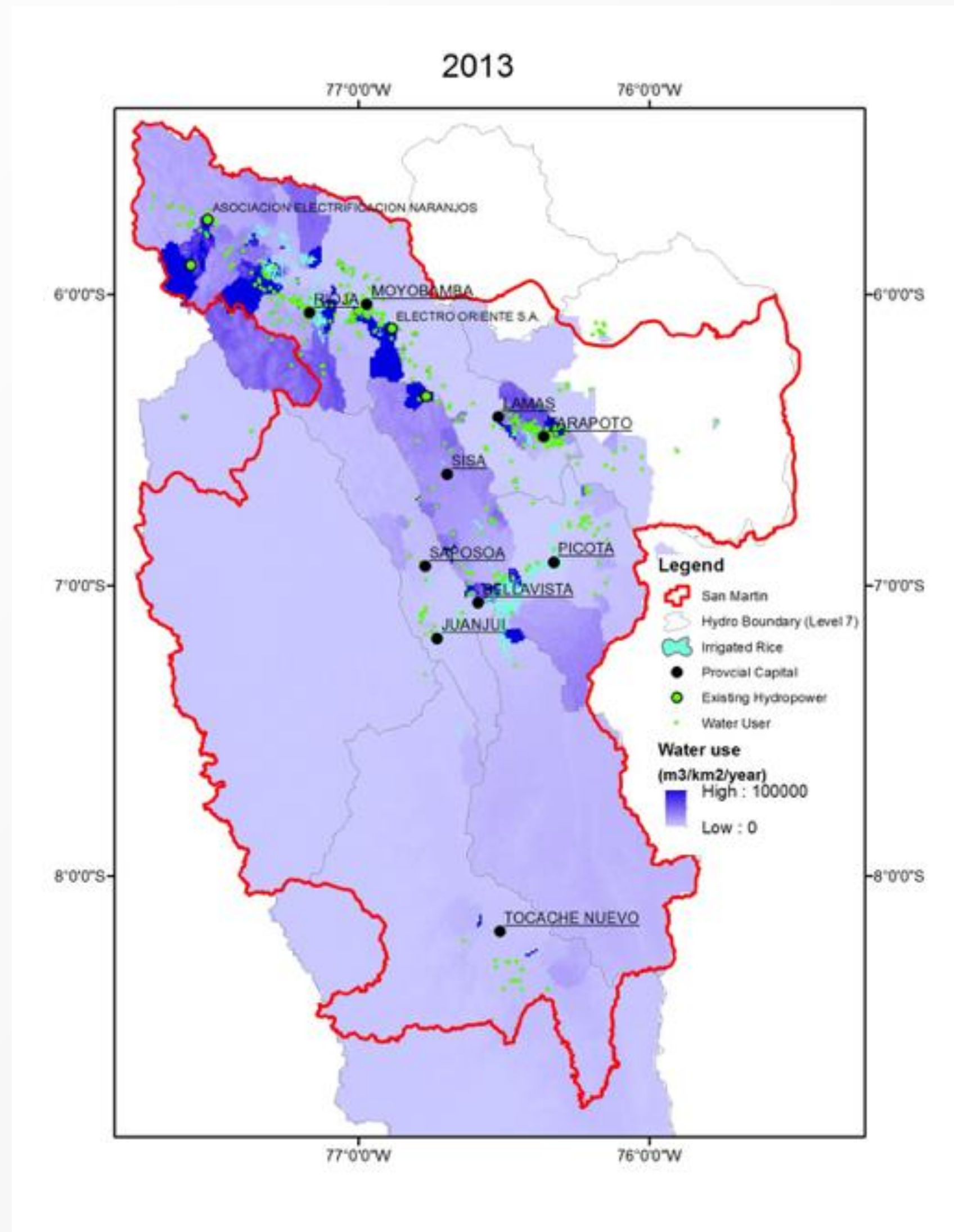
Developing indicators for land use planning, identification of critically important ecosystems, budget allocation and investments, development planning

- Ecosystem Benefits Index (EBI)
- Environmental Performance Index (EPI)
- Ecotourism, rice and palm swamp, hydroelectricity

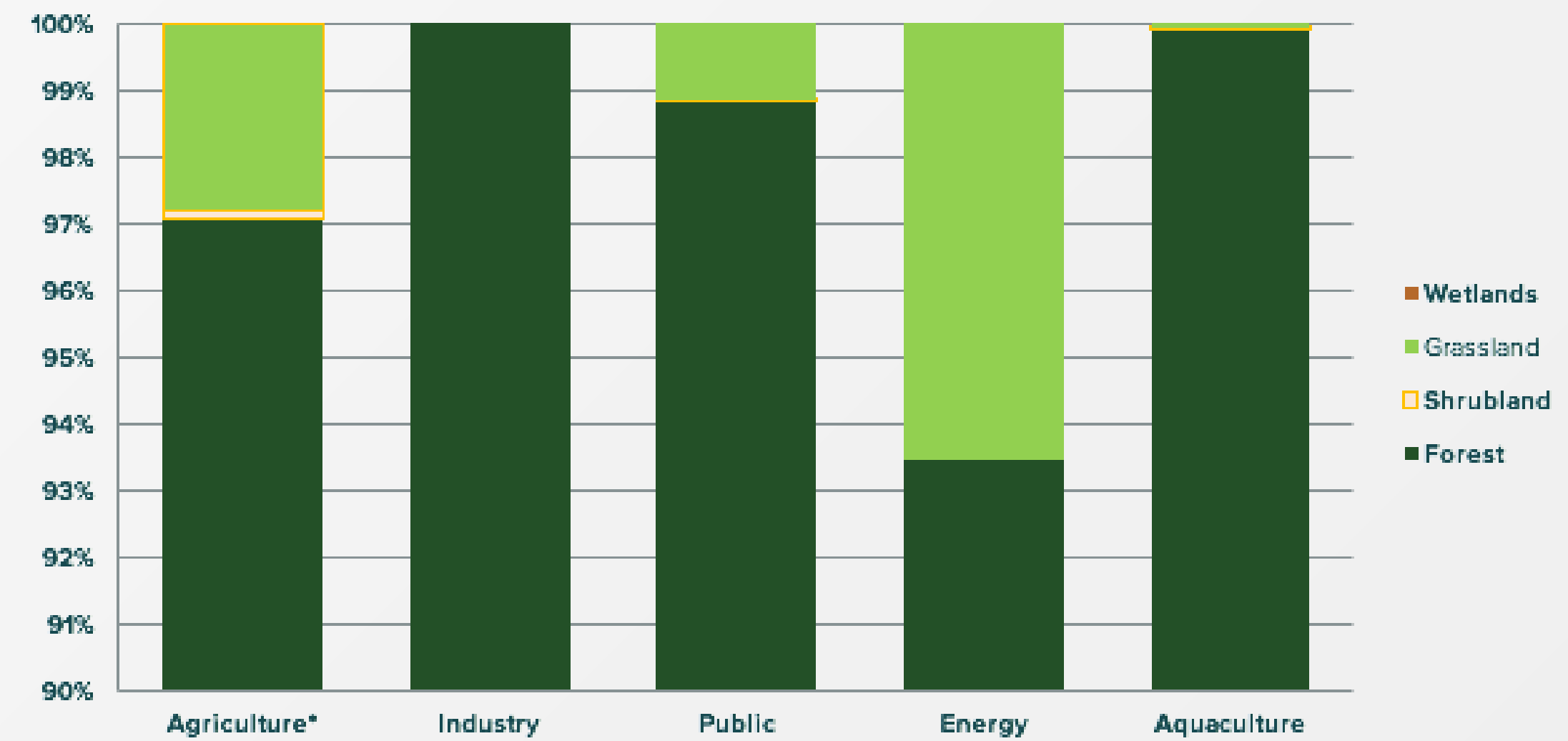
<http://goo.gl/cvtUeO>



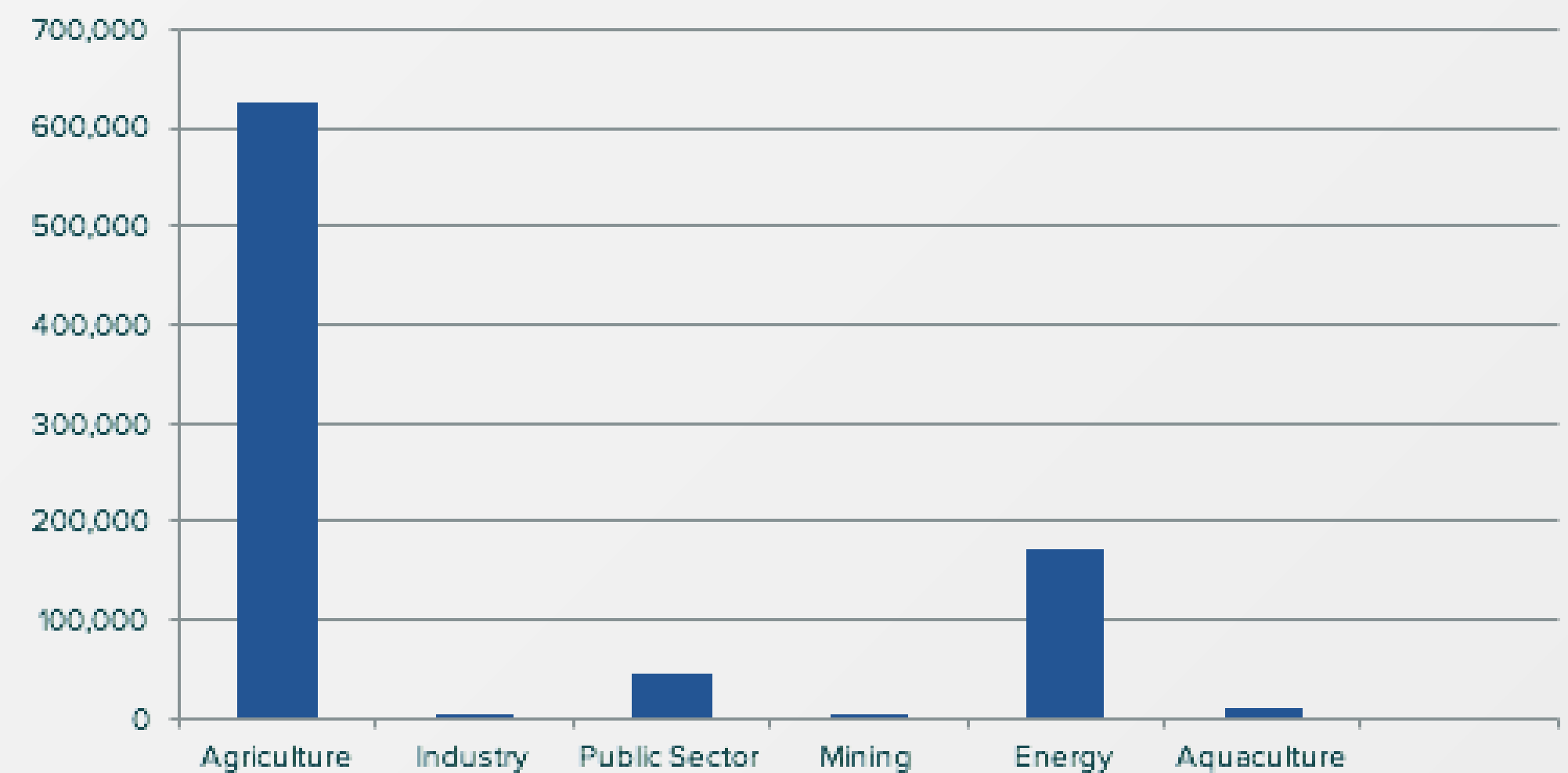
POST ACCOUNT INSIGHTS: FRESHWATER



Water Supply-Use San Martin, Peru, 2013



Water Use (T m3/year)



LIBERIA: DATA COLLECTION AND LIT REVIEW

- GIS and tabular data
- Land cover, population & socioeconomic data, biodiversity, human demand for water / other natural resources
- Still many gaps

	A	B	C	D	E	F
1	File path	File name	Type	What is it? (Rachel's best guess)	Potentially useful for analyses:	SOURCE
2	M:\Metrics\Liberia01_Raw_data\Biodiversity	KbaMapGlobal_20150716_Liberia.shp	shp	KBAs from the global map (not the most up to date)		global KBA da
3	M:\Metrics\Liberia01_Raw_data\Biodiversity	LBR_KBA_GFWA_20160727.shp	shp	KBAs from CEPF 2015 Ecosystem Profile (latest)		Kellee Koenig
4	M:\Metrics\Liberia01_Raw_data\carto	LBR_Admin0_VMap0.shp	shp	Liberia country boundary (from global dataset)		Kellee Koenig
5	M:\Metrics\Liberia01_Raw_data\Census 2008\Census atlas\Atlas	(multiple)	shp	Census statistics, by district (large admin units), from the Censu	beneficiaries	LISGIS
6	M:\Metrics\Liberia01_Raw_data\Census 2008\Census atlas\2008 census atlas	2008 Census Atlas-Final-edited version IV 122	PDF	Census Atlas, PDF format (report with print maps) - population,	beneficiaries	LISGIS
7	M:\Metrics\Liberia01_Raw_data\Census 2008\Census atlas\Atlas	Location of Liberia	MXD	Map project for Census Atlas locator map (broken data path links)		LISGIS
8	M:\Metrics\Liberia01_Raw_data\Costing Nature	(multiple)	tif	Outputs from Costing Nature ecosystem services modeling tool (global data, Rachel's analysis)		Rachel Neuga
9	M:\Metrics\Liberia01_Raw_data\Fisheries	FISH PRICE LISTING2.xlsx	Excel	Fish price listing for a number of species	NCA of fisheries	Stefania Savo
10	M:\Metrics\Liberia01_Raw_data\Geology\Shapefiles&Tables	(multiple)	shp, poin	faults, dikes, fossil records (points), folds, lots of other geological features that I don't recognize...		LISGIS
11	M:\Metrics\Liberia01_Raw_data\Geology\Shapefiles&Tables	libMinLocL	shp	diamond mines (lines)	beneficiaries	LISGIS
12	M:\Metrics\Liberia01_Raw_data\Geology\Shapefiles&Tables	libMinLocP	points	mining locations (gold, hypersthene, lead, nickel, diamond, etc.)	beneficiaries	LISGIS
13	M:\Metrics\Liberia01_Raw_data\Geology\Shapefiles&Tables	libMinLocA	shp	diamond mines (polygons)	beneficiaries	LISGIS
14	M:\Metrics\Liberia01_Raw_data\Geology\Shapefiles&Tables	libgeoContactsArchive	Excel	Excel sheet with only a few rows		LISGIS
15	M:\Metrics\Liberia01_Raw_data\Geology\Shapefiles&Tables	libgeoDikesArchive	Excel			LISGIS
16	M:\Metrics\Liberia01_Raw_data\Geology\Shapefiles&Tables	libgeoMapUnitArchive	Excel	key to the Geology MapUnit polygon file??	(generally useful)	LISGIS
17	M:\Metrics\Liberia01_Raw_data\Geology\Shapefiles&Tables	libgeoMapUnitsA	shp	appear to be geological formations but limited attributes (see Ex	(generally useful)	LISGIS
18	M:\Metrics\Liberia01_Raw_data\Infrastructure\Liberia Electricity Transmission Network	Liberia Electricity Transmission Network.shp	polyline	electricity transmission lines (only a few)		Jim Valenza
19	M:\Metrics\Liberia01_Raw_data\Infrastructure\Liberia Power Plants	Liberia Power Plants.shp	points	point locations of powerplants, with names, status (PLN, OPR, OTHER), SUM_MW (production capacity?), type (hydro, thermal)		Jim Valenza
20	M:\Metrics\Liberia01_Raw_data\Infrastructure	LBR_Electrical_NGA_20160708.shp	points	three electrical stations (Bushrod Island Generating station, LEC substation, LEC Painesville)		Kellee Koenig
21	M:\Metrics\Liberia01_Raw_data\Infrastructure	LBR_NaturalResources_NGA_20160708.shp	points	point locations of mines (mostly iron, 2 gold, 1 chromium), and water wells		Kellee Koenig
22	M:\Metrics\Liberia01_Raw_data\Infrastructure	LBR_PowerPlants_NGA_20160708.shp	points	point locations of 4 power plants (Monrovia Gas Turbine Power Plant, Firestone Hydroelectric Power Plant, Mount Coffee Hydropow		Kellee Koenig
23	M:\Metrics\Liberia01_Raw_data\Landcover\Esri_LivingAtlas	LBR_Ecophysiographic_Land_Units_2015.tif	tif	ecophysiographic land units (artificial or urban area, hot wet mo	ecosystem extent	Kellee Koenig
24	M:\Metrics\Liberia01_Raw_data\Landcover\Esri_LivingAtlas	LBR_Forests_30m_BaseVue_2013.tif	tif	forests (deciduous, evergreen) 30m resolution from BaseVue 21	ecosystem extent	Kellee Koenig
25	M:\Metrics\Liberia01_Raw_data\Landcover\Esri_LivingAtlas	LBR_Land_Cover_30m_BaseVue_2013.tif	tif	landcover (deciduous forest, evergreen forest, shrub/scrub, gras	ecosystem extent	Kellee Koenig
26	M:\Metrics\Liberia01_Raw_data\Landcover\Geoville\Liberia_Landcover_Forest_Map_v	Liberia_LandCover_Forest_map.lyr	tif	Geoville landcover product (forest, mangrove, settlements, gras	ecosystem extent	Geoville
27	M:\Metrics\Liberia01_Raw_data\Landcover\Geoville\TRAINING	(multiple)		training data from Geoville (ask Max)		Geoville
28	M:\Metrics\Liberia01_Raw_data\Landcover\Landcover_2004	Land_cover_2004.shp	shp	land cover with 11 classes - 1 class differs from above landcover	ecosystem extent	LISGIS
29	M:\Metrics\Liberia01_Raw_data\Landcover\Metria-Geoville Landcover 2015 Data\Raste	srtm_mosaic_WGS84_UTM_29N_30m_res_n	img	elevation (?)	NTPF	Jim Valenza
30	M:\Metrics\Liberia01_Raw_data\Landcover\Metria-Geoville Landcover 2015 Data\Raste	srtm_mosaic_WGS84_UTM_29N_30m_res_n	img	slope as a percent	NTPF	Jim Valenza
31	M:\Metrics\Liberia01_Raw_data\Landcover\Metria-Geoville Landcover 2015 Data\Raste	srtm_mosaic_wgs84_utm_29n_30m_res_nn	tif	slope as a percent	NTPF	Jim Valenza
32	M:\Metrics\Liberia01_Raw_data\Landcover\Metria-Geoville Landcover 2015 Data\Raste	Liberia_landcover_forest_map_10m_v1.tif	tif	Geoville landcover product (duplicate I think)	ecosystem extent	Jim Valenza
33	M:\Metrics\Liberia01_Raw_data\Landcover\Metria-Geoville Landcover 2015 Data\Raste	LC82000562015357LGN00_stack_AOI_big.tif	tif	satellite imagery		Jim Valenza
34	M:\Metrics\Liberia01_Raw_data\Landcover\Metria-Geoville Landcover 2015 Data\Raste	LC82000562015357LGN00_stack_AOI_small.t	tif	satellite imagery		Jim Valenza
35	M:\Metrics\Liberia01_Raw_data\Landcover\Metria-Geoville Landcover 2015 Data\Raste	(multiple)	img	satellite imagery		Jim Valenza
36	M:\Metrics\Liberia01_Raw_data\Landcover\Metria-Geoville Landcover 2015 Data\Raste	S2A_20151226T202934_AOI_big.tif	tif	satellite imagery		Jim Valenza
37	M:\Metrics\Liberia01_Raw_data\Landcover\NGA	LBR_Ag_NGA_20160708.shp	points	farms and orchards		Kellee Koenig
38	M:\Metrics\Liberia01_Raw_data\Landcover\NGA	LBR_Physiography_NGA_20160708.shp	points	beaches, lagoons, lakes, islands, mountains, hills, ridges, points, ECOTOURISM?		Kellee Koenig
39	M:\Metrics\Liberia01_Raw_data\Landcover\	lbr_ci_00	raster	no idea		
40	M:\Metrics\Liberia01_Raw_data\LISGIS-Liberia\250 K	(multiple)	tif	appear to be print maps that have been georeferenced		
41	M:\Metrics\Liberia01_Raw_data\LISGIS-Liberia\LISGIS Data\gdb\Admint	county07_14	shp	administrative units, with attributes (population, male/female, households, area, density, etc.)		LISGIS
42	M:\Metrics\Liberia01_Raw_data\LISGIS-Liberia\LISGIS Data\gdb\Admint	district07_14	shp	administrative units, with attributes (population, male/female, households, area, density, etc.)		LISGIS
43	M:\Metrics\Liberia01_Raw_data\LISGIS-Liberia\LISGIS Data\gdb\Admint	clan07_14	shp	administrative units, with attributes (population, male/female, households, area, density, etc.)		LISGIS
44	M:\Metrics\Liberia01_Raw_data\LISGIS-Liberia\LISGIS Data\gdb\FDA	(multiple)	shp	??		LISGIS
45	M:\Metrics\Liberia01_Raw_data\LISGIS-Liberia\LISGIS Data\gdb\FDA	forest_concessions	shp	forest concessions, some attribute data (e.g. area, company, fee	timber	LISGIS
46	M:\Metrics\Liberia01_Raw_data\LISGIS-Liberia\LISGIS Data\gdb\FDA	Timber_Sale_Contract_3_utm	shp	timber sales, some attribute data (location, owner, forest type, a	timber	LISGIS
47	M:\Metrics\Liberia01_Raw_data\LISGIS-Liberia\LISGIS Data\gdb\Locality	lib_locality08	points	points with names, total, male, female, HH,	beneficiaries	LISGIS
48	M:\Metrics\Liberia01_Raw_data\LISGIS-Liberia\LISGIS Data\gdb\Plantation	plantations	points	points with various attributes (company name, can't tell what mo	timber	LISGIS
49	M:\Metrics\Liberia01_Raw_data\LISGIS-Liberia\LISGIS Data\gdb\Plantation	lib_landcover_frm	shp	land cover with 11 classes plus one unknown (RURAL, forest, wa	ecosystem extent?	LISGIS
50	M:\Metrics\Liberia01_Raw_data\LISGIS-Liberia	mpea_nimac_gis_vector	ACCESS	Access database with tables from most of the below GIS files, 11	(generally useful)	LISGIS
51	M:\Metrics\Liberia01_Raw_data\LISGIS-Liberia\mpea_nimac_gis_vector.mdb\administr	(multiple)	shp	Administrative units (polygons and lines, including international boundaries), limited attributes (names, areas)		LISGIS
52	M:\Metrics\Liberia01_Raw_data\LISGIS-Liberia\mpea_nimac_gis_vector.mdb\africa	(multiple)	shp	Africa boundaries, roads (outside Liberia), rivers (outside Liberia), elevation (including Liberia), lakes		LISGIS
53	M:\Metrics\Liberia01_Raw_data\LISGIS-Liberia\mpea_nimac_gis_vector.mdb\africa	elevation	shp	polygon format elevation file		LISGIS
54	M:\Metrics\Liberia01_Raw_data\LISGIS-Liberia\mpea_nimac_gis_vector.mdb\firestone	(multiple)	shp	data on firestone: boundary, camps, roads, villages		LISGIS
55	M:\Metrics\Liberia01_Raw_data\LISGIS-Liberia\mpea_nimac_gis_vector.mdb\harper	(multiple)	shp	data from the town of harper: airport, barren land, bridge, buildings, cemetary, ocean, river, road, sand, urban, vegetation (mangroves, ric		LISGIS
56	M:\Metrics\Liberia01_Raw_data\LISGIS-Liberia\mpea_nimac_gis_vector.mdb\hydrology	bay	points	points with bay names		LISGIS
57	M:\Metrics\Liberia01_Raw_data\LISGIS-Liberia\mpea_nimac_gis_vector.mdb\hydrology	river	shp	river network with attributes: river/stream, perennial/permanent, r	fresh water, non-timber forest products (accessibility)	LISGIS
58	M:\Metrics\Liberia01_Raw_data\LISGIS-Liberia\mpea_nimac_gis_vector.mdb\hydrology	sands	shp	polygon		LISGIS
59	M:\Metrics\Liberia01_Raw_data\LISGIS-Liberia\mpea_nimac_gis_vector.mdb\hydrology	other_point	points	points with features: ruin, pool, mt, rdge, hlls, isl, mt...		LISGIS
60	M:\Metrics\Liberia01_Raw_data\LISGIS-Liberia\mpea_nimac_gis_vector.mdb\hydrology	coasta	shp	polygons with attributes: island/water/foreshore		LISGIS
61	M:\Metrics\Liberia01_Raw_data\LISGIS-Liberia\mpea_nimac_gis_vector.mdb\hydrology	coastline	shp	coastline		LISGIS
62	M:\Metrics\Liberia01_Raw_data\LISGIS-Liberia\mpea_nimac_gis_vector.mdb\hydrology	dam	shp	polyline file with 9 dams/weirs	fresh water	LISGIS



Peru

Good policy Umbrella

Good understanding of ESS

Decent data

Moving towards institutionalization

Liberia

Good policy Umbrella

Rudimentary understanding of ESS

No data

Building foundations



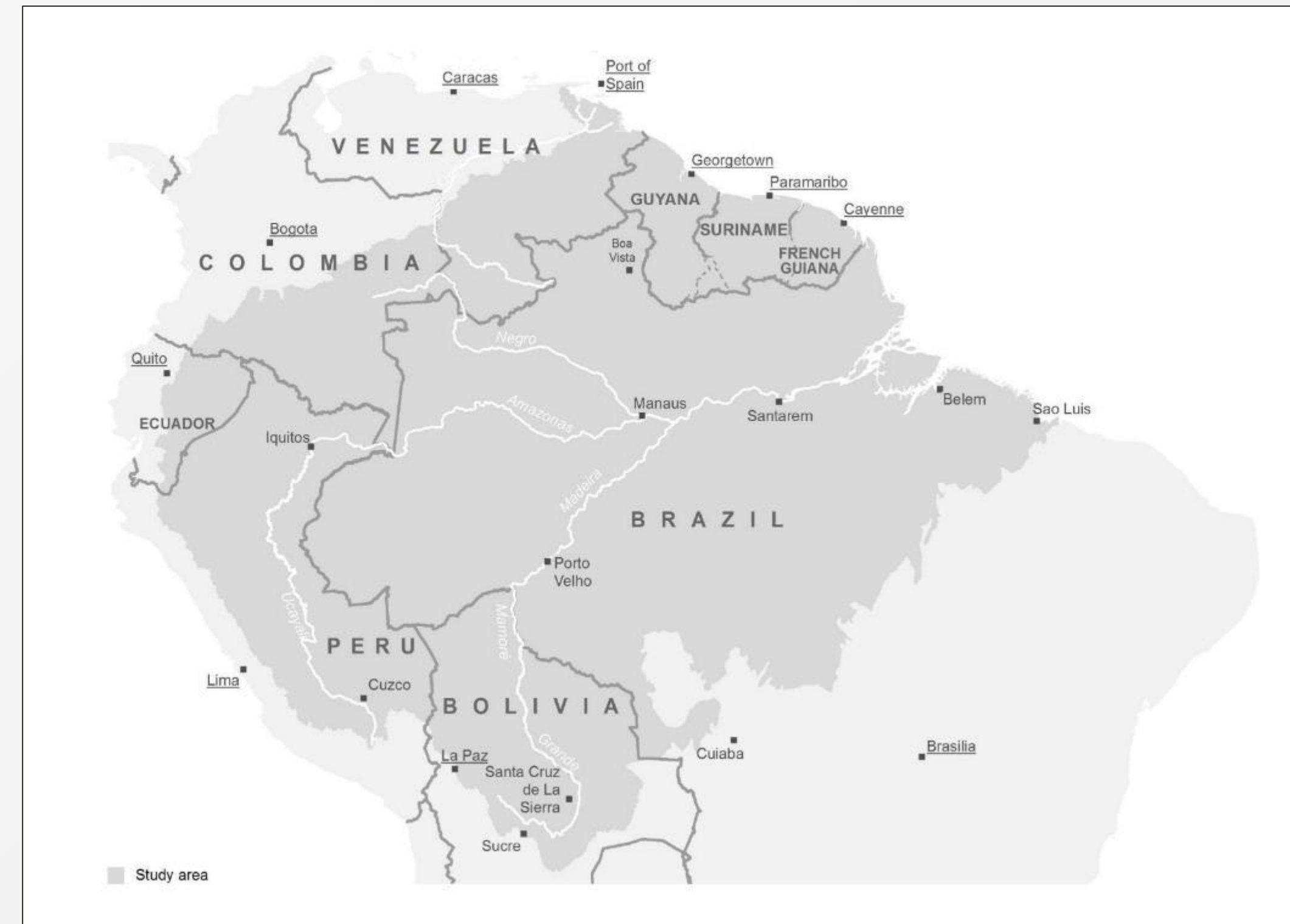
MENC: WHERE WE HAVE MAPPED



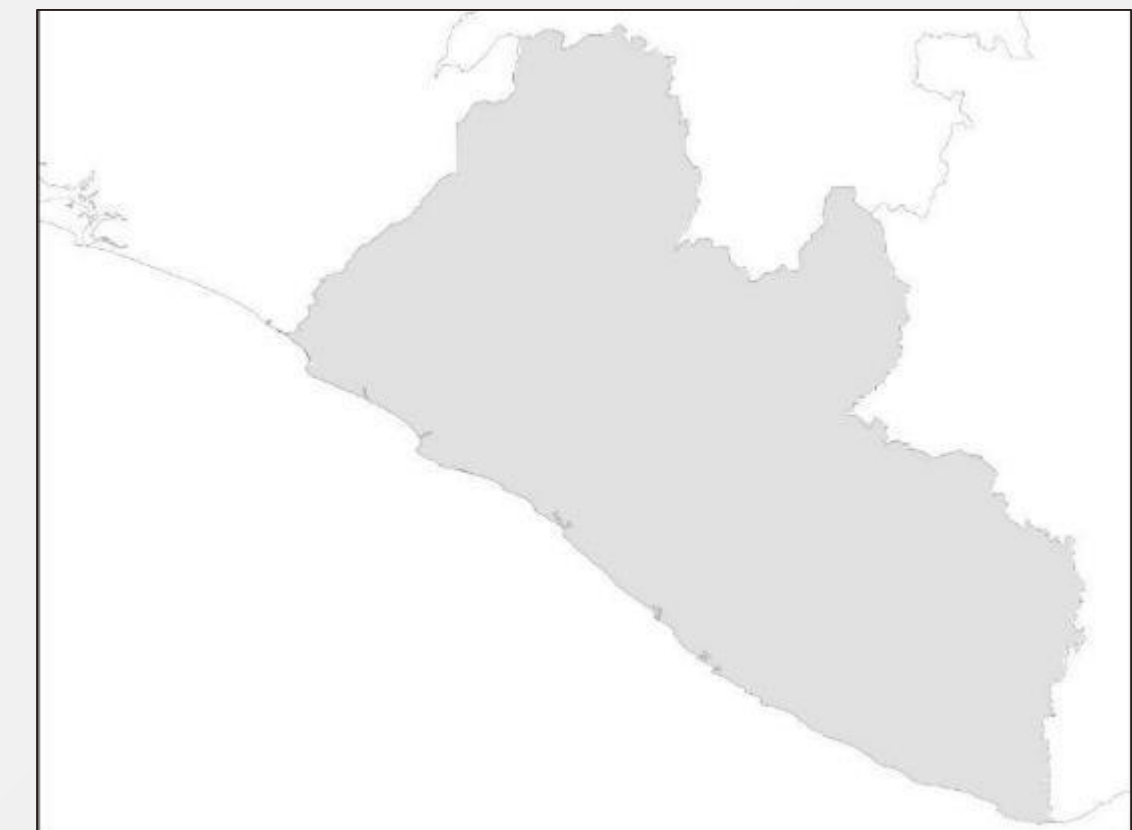
MADAGASCAR



CAMBODIA



AMAZONIA



LIBERIA (2016)



WHAT WE HAVE MAPPED

- **Biodiversity**
- **Climate mitigation**
- **Fresh water**
- **Non-timber forest products**
- **Fisheries**
- **Climate adaptation**
- **Nature tourism**



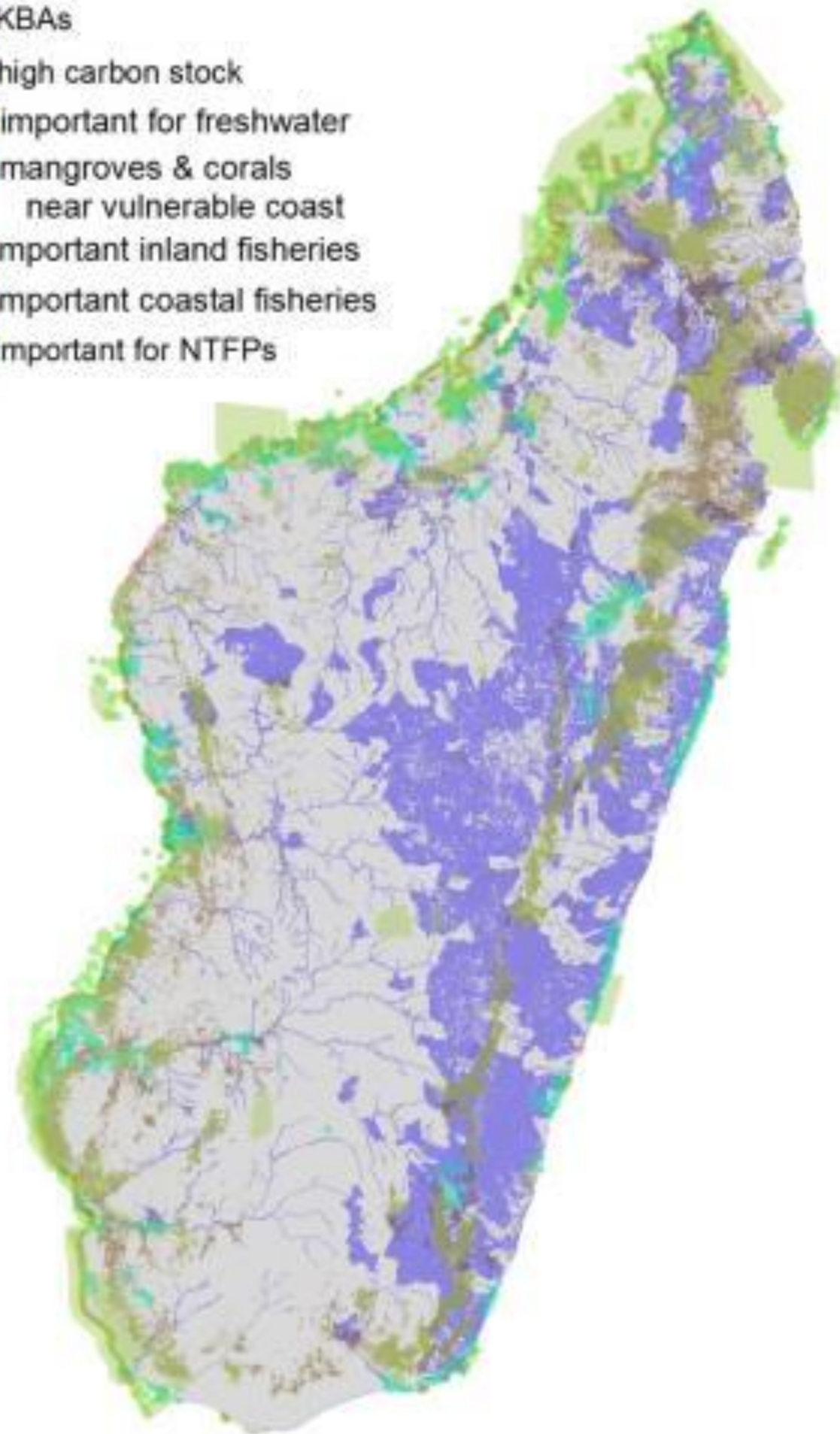
ALL NATURAL CAPITAL

All natural capital

Combined

Protected areas

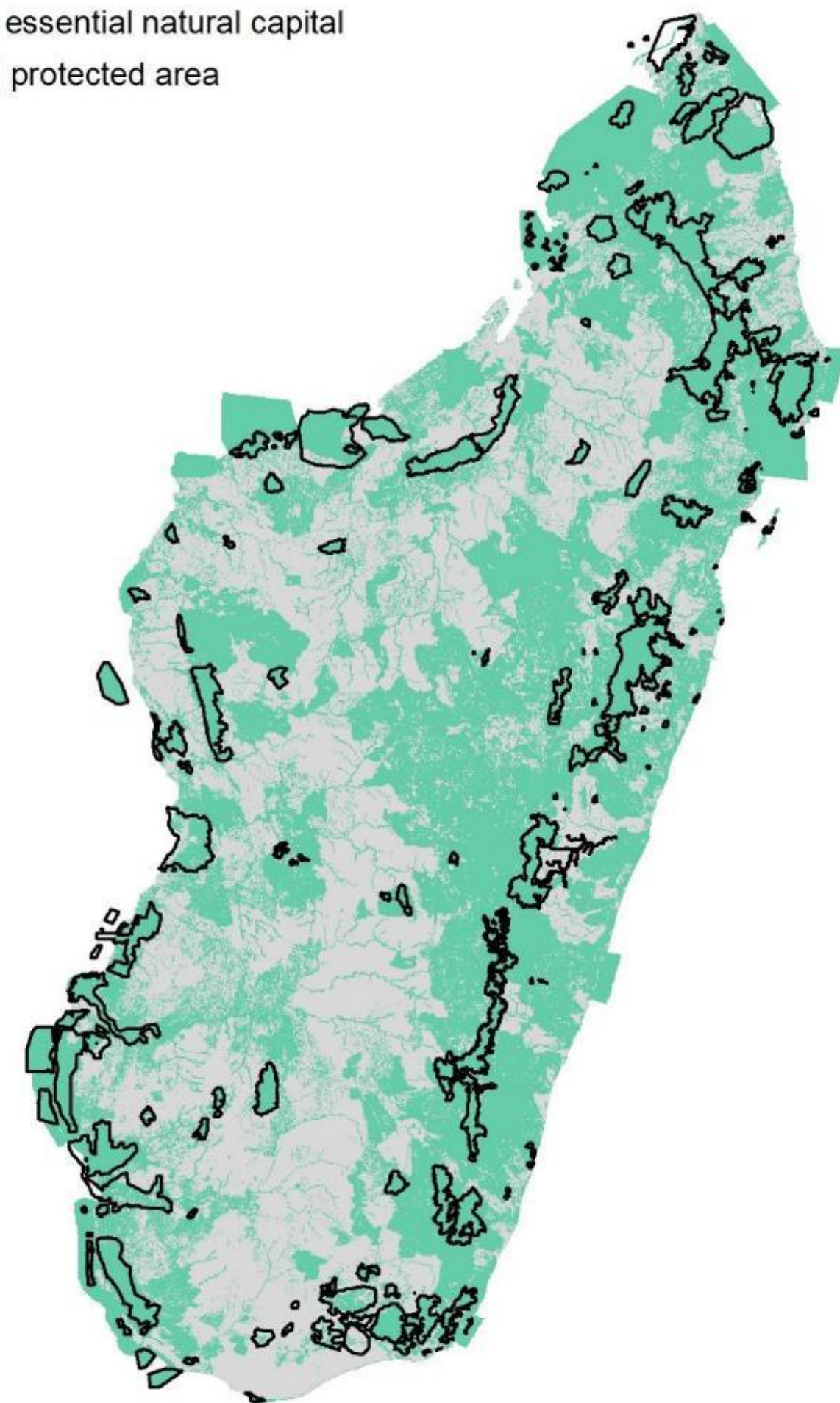
- KBAs
- high carbon stock
- important for freshwater
- mangroves & corals near vulnerable coast
- important inland fisheries
- important coastal fisheries
- important for NTFPs



- important natural capital



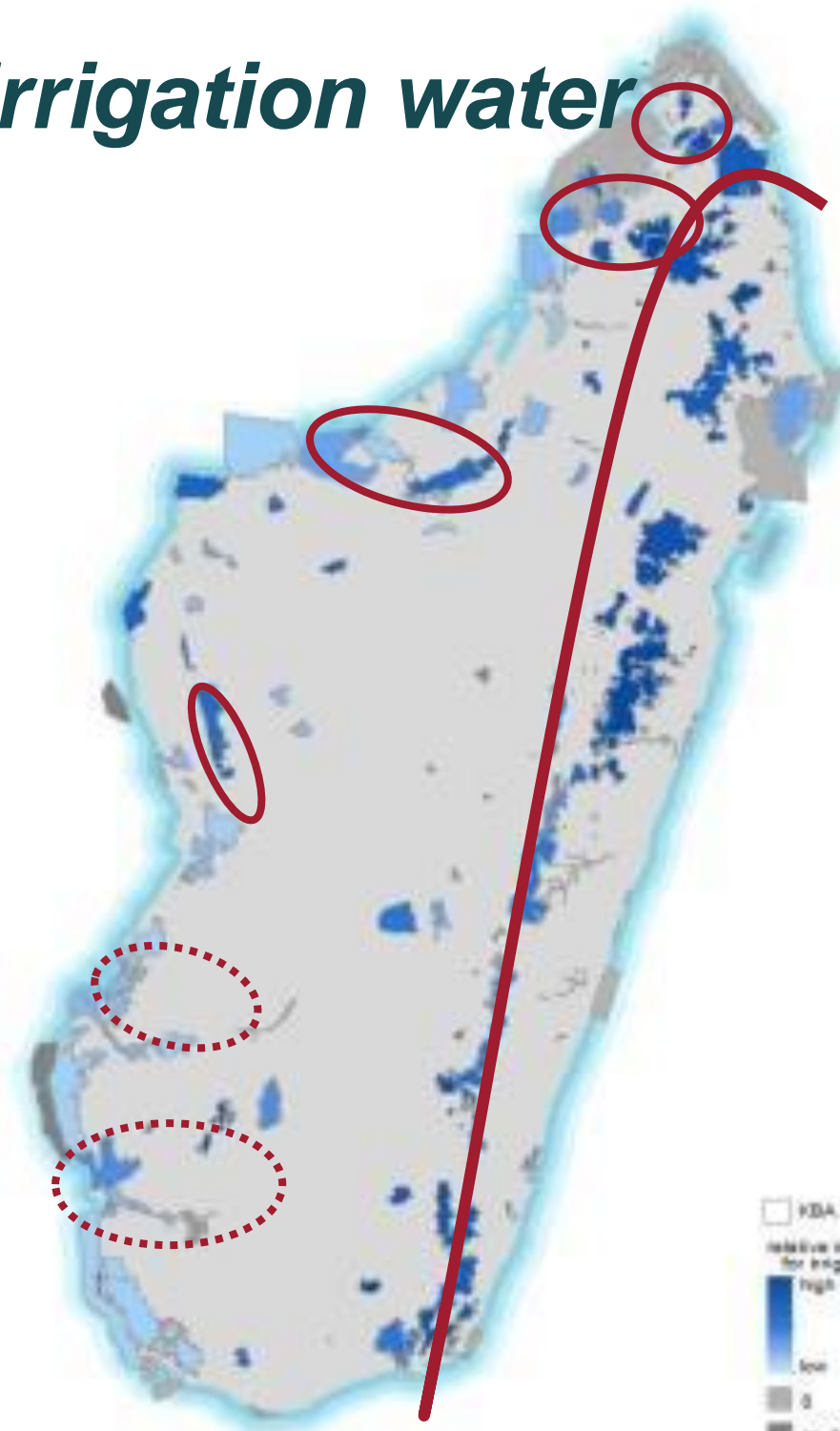
- essential natural capital
- protected area



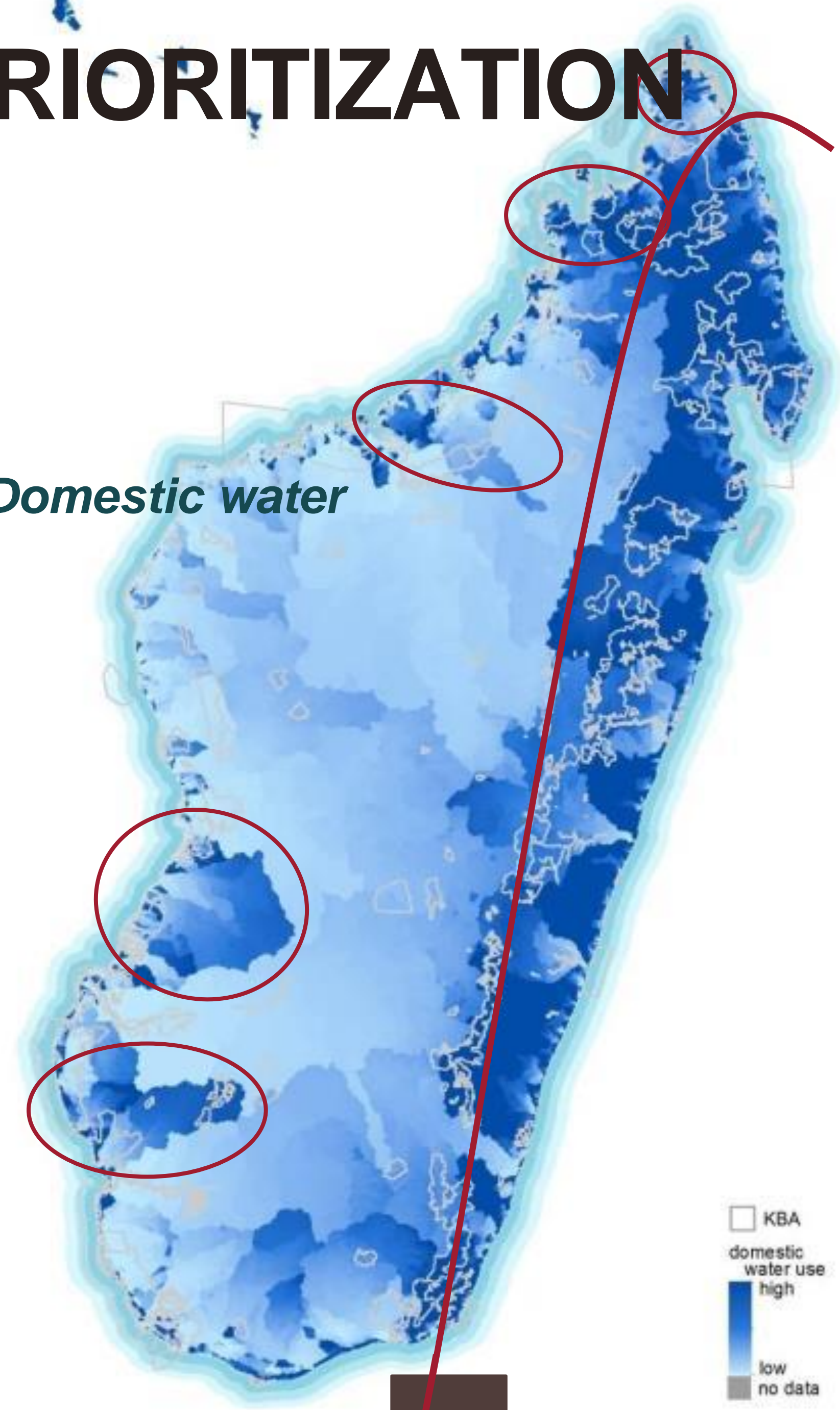
APPLICATIONS: PRIORITIZATION

CRITICAL ECOSYSTEM
PARTNERSHIP FUND

Irrigation water









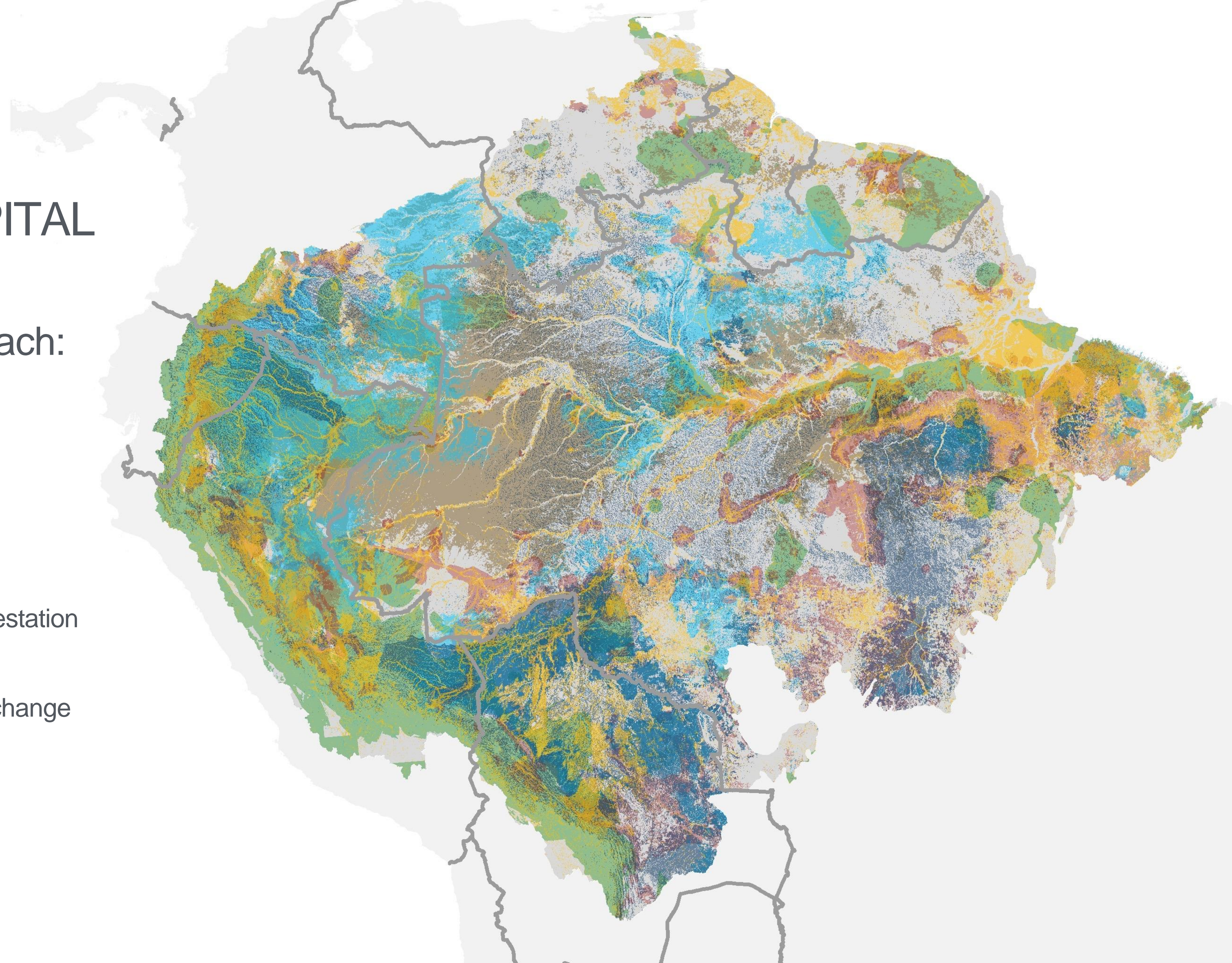
Domestic water



ALL NATURAL CAPITAL

Threshold-based approach:
Top 20% of pixels

-  Biodiversity
-  Forest carbon stock
-  Fresh water
-  Potential emissions from deforestation
-  Non-timber forest products
-  Flow regulation under climate change



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ALA

AAA

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Carl Obst

Alessandra Alfieri



CLARK LABS



Geospatial software for monitoring and modeling the Earth system



THANK YOU

djuhn@conservation.org

Peru Ecosystem Accounts: <http://goo.gl/cvtUeO>