Assessing the Relationship of Climate Change, Forests, and Ecohydrology in Honduras

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Acknowledgments & Disclaimer

- This work was carried out for USAID-Honduras under the USAID African and Latin American Resilience to Climate Change (ARCC) Project, which ended last month

- The information presented here is the sole responsibility of the authors and does not necessarily reflect the views of USAID
- Our final report was approved was approved by USAID in December 2013 and is available online

VULNERABILITY AND RESILIENCE TO CLIMATE CHANGE IN SOUTHERN HONDURAS

DECEMBER 2013

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ARCC

African and Latin American
Resilience to Climate Change Project

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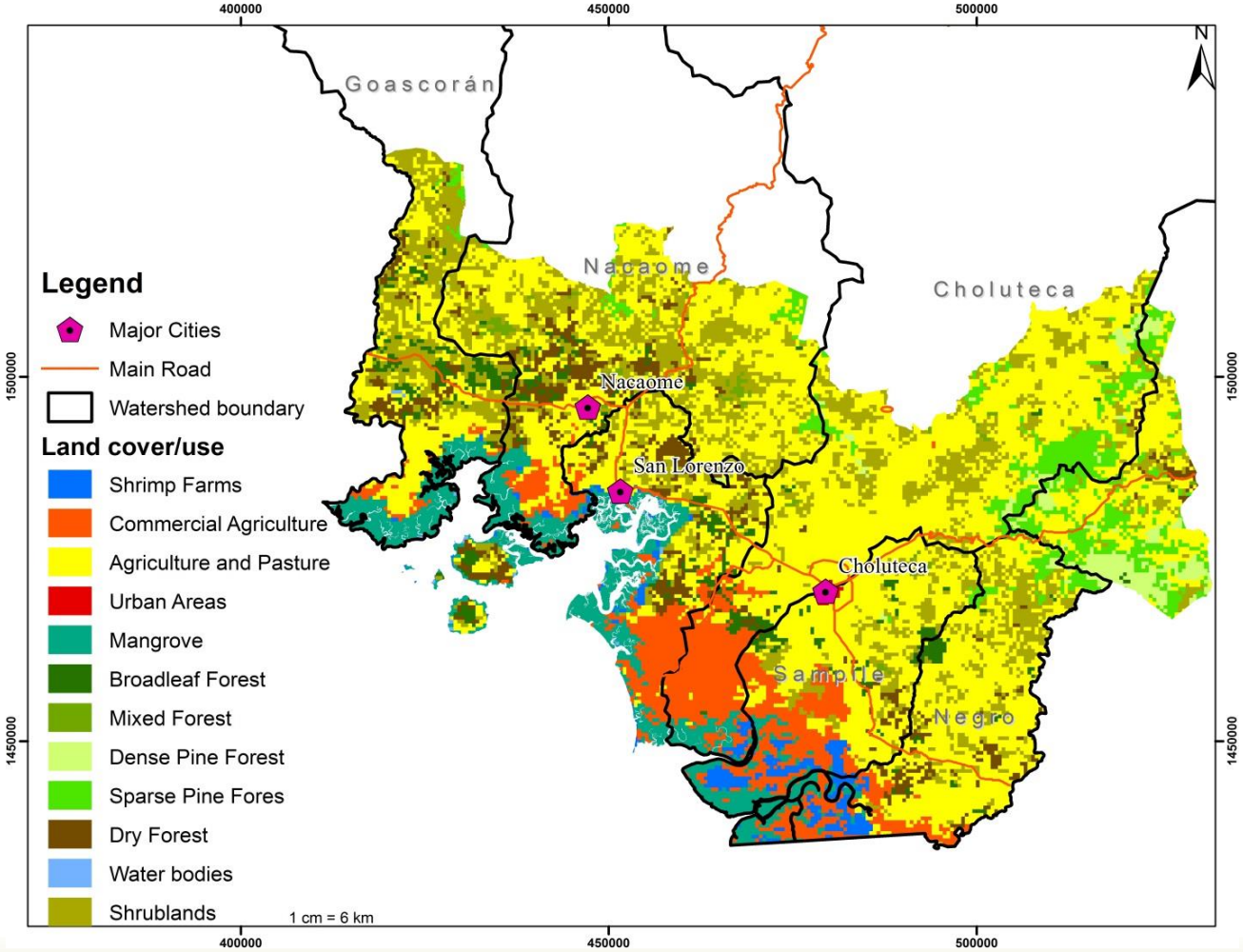
USAID
FROM THE AMERICAN PEOPLE

USAID Context: Climate Change & Ecosystem Services

- USAID's 2012 Climate Change and Development Strategy lists 10 "Guiding Principles", one of which is to "value ecosystem services."
- The strategy states that "Strategic investments in ecosystem services can mitigate the impacts of climate change."

Assessment Area: Southern Honduras, Gulf of Fonseca Basin

Land Cover & Land Use



Cloud Forest

Cloud Forest

Pine Forest

Broadleaf Forest

Dry Forest & Shrublands

Mangroves

Small-scale Agriculture & Pasture

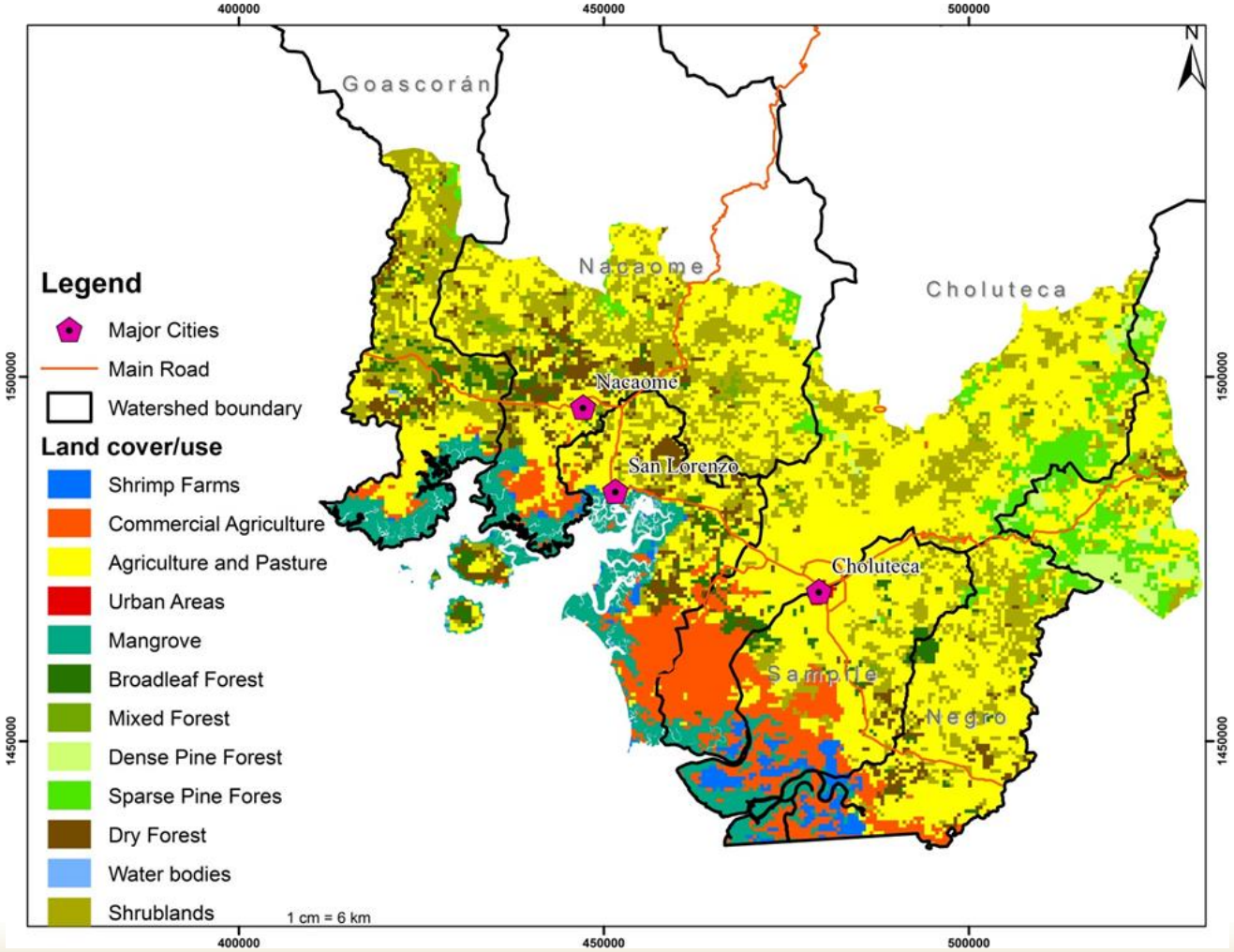
Small-scale Coffee

Commercial Agriculture -- Sugarcane

Commercial Agriculture -- Melons

Commercial Shrimp Aquaculture

Land Cover & Land Use



Ecosystem Services -- Ecohydrology

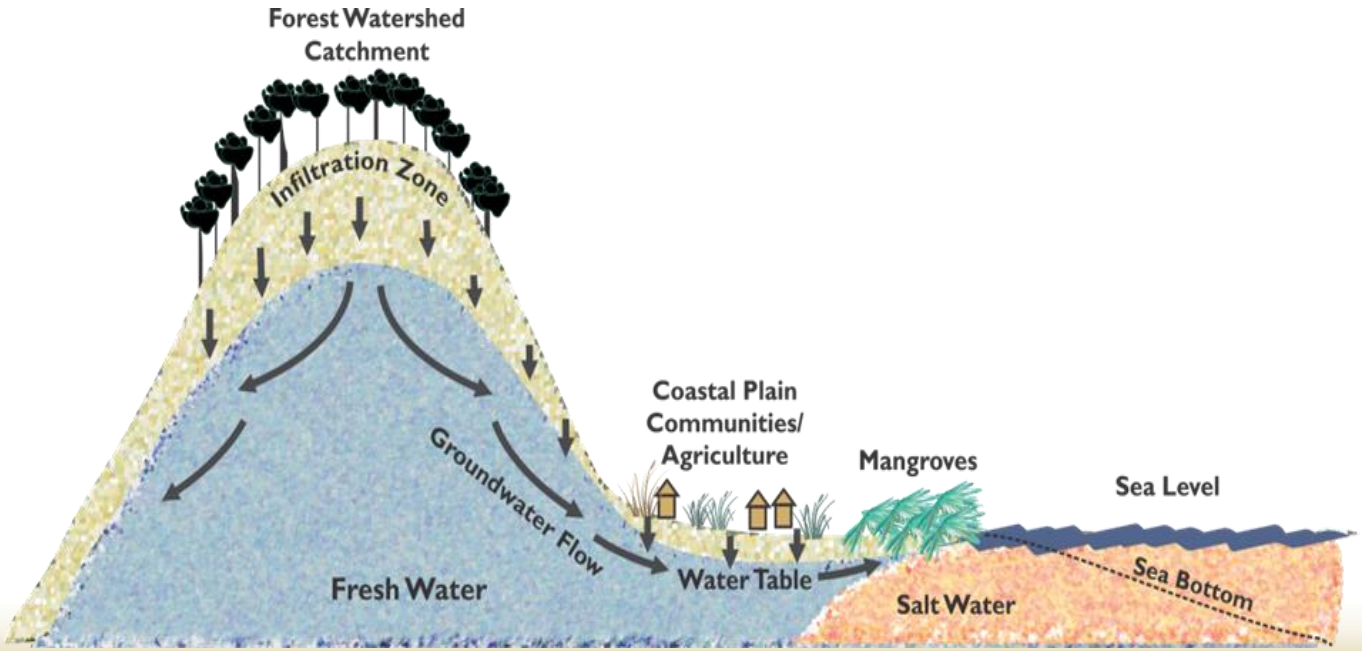
Sustainable and predictable flows of clean water are the key ecosystem service upon which every socio-economic group, and the economy of southern Honduras, depend.

Ecosystem Services -- Ecohydrology

Permanent land cover – of forests or other natural vegetation, or agroforestry farming systems – is critical to maintaining the ecohydrology of the region.

Forest Cover & Ecohydrology

Upland forests allow precipitation to infiltrate and recharge groundwater rather than run off, and groundwater flow stabilizes streamflow.



Forest Cover & Ecohydrology

Land Cover	Infiltration Rate
Primary Forest	>840 mm/hr
Coffee Plantation	89-109 mm/hr
Heavily-grazed Pasture	8-11 mm/hr

Source: Hanson *et al*., 2004. Effects of soil degradation and management practices on the surface water dynamics in the Talgua River Watershed in Honduras.

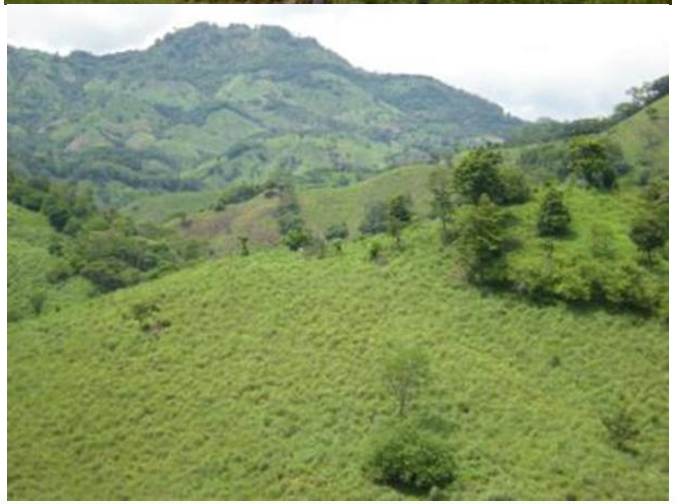
Forest Cover & Ecohydrology

Watershed	Permanent Land Cover (%)	Runoff (%)
Zapotillo	59%	31%
Capiro	39%	39%

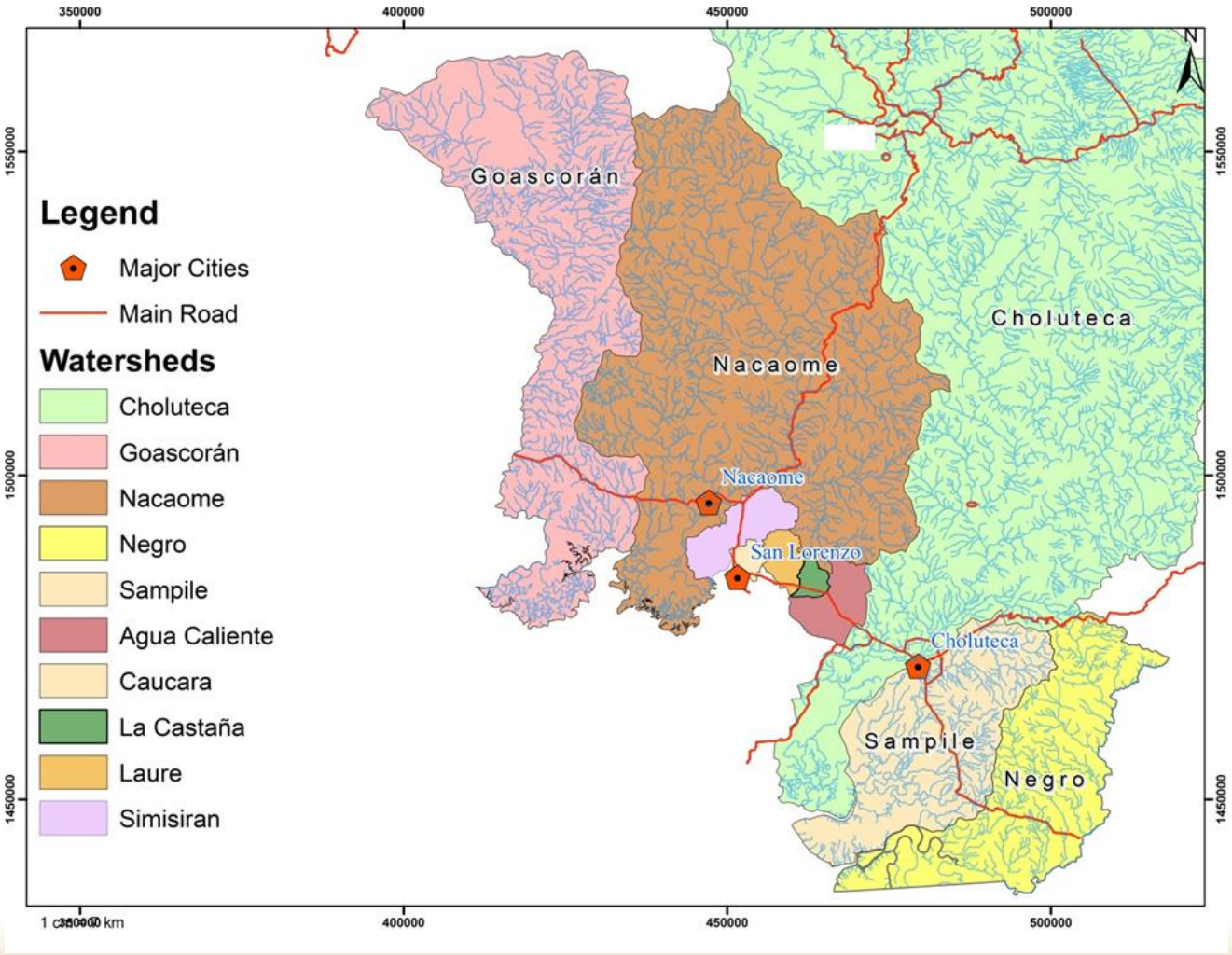
Source: Bonilla Portillo and Garay, 2013. Rainfall-runoff relationship and suspended sediment concentration in Capiro-Zapotillo micro-watersheds, Guinope, El Paraiso, Honduras.

Ecohydrology & Forest Cover

- The ratio of permanent land cover in a watershed is a measure of its vulnerability to the loss of ecohydrological services.
- We calculated this ratio for the five major watersheds of the Gulf of Fonseca.



Watersheds of the Gulf of Fonseca

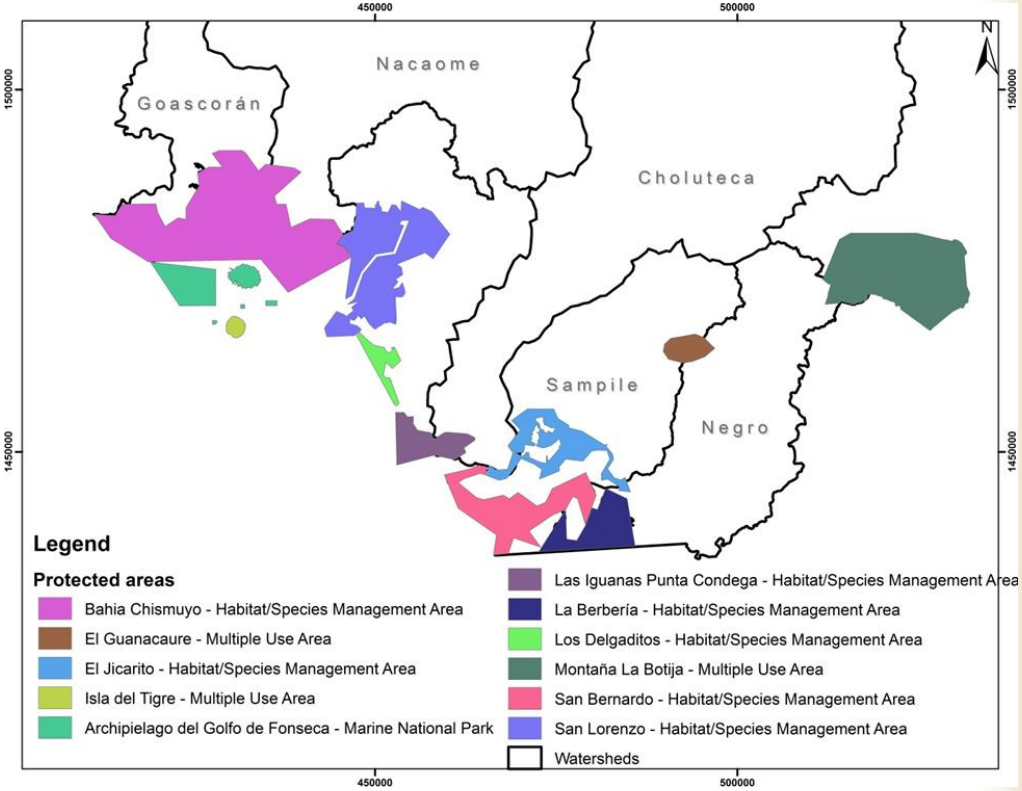


Permanent Land Cover Ratio for Major Watersheds

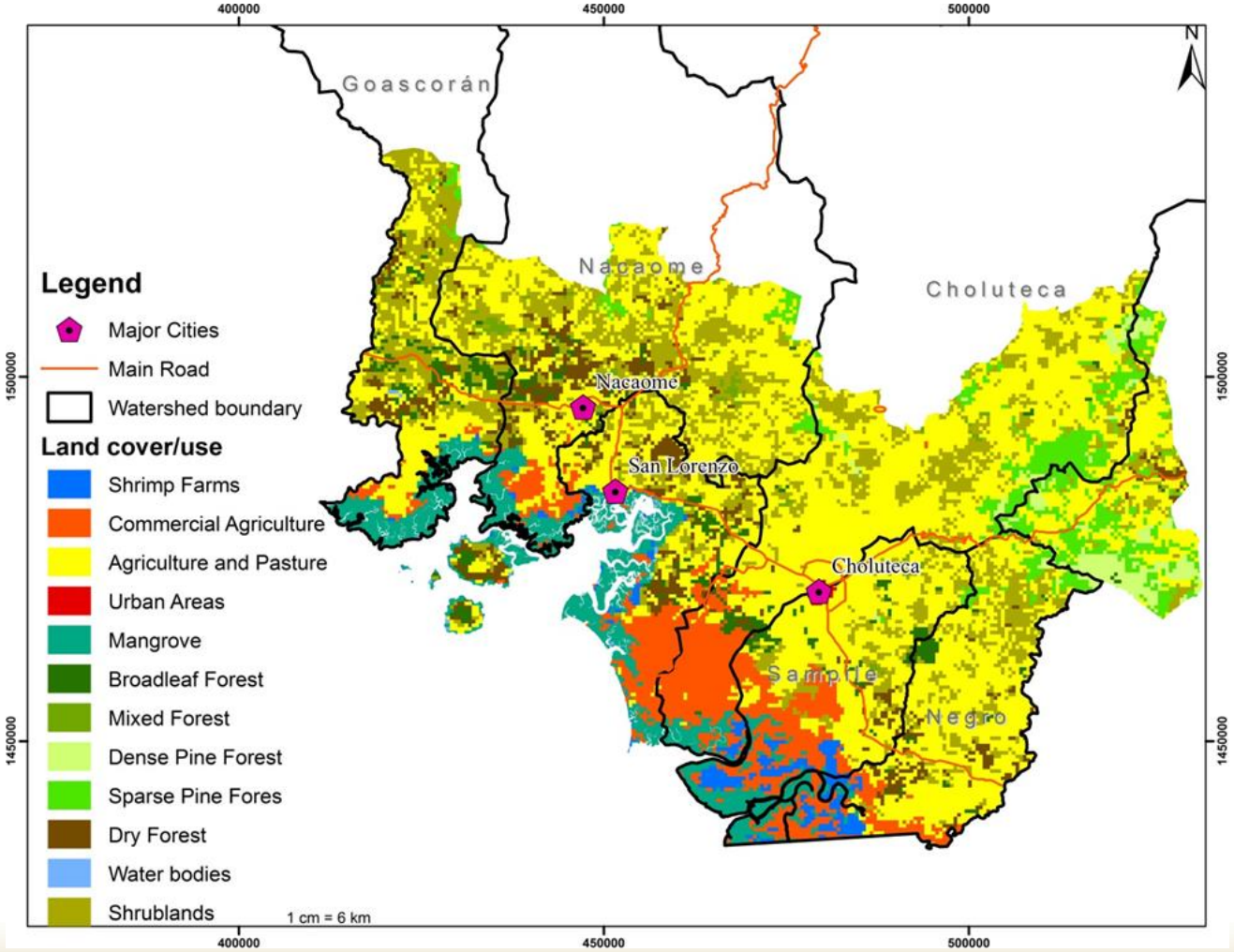
River/Watershed	Area (km^2)	Permanent Land Cover (km^2)	Permanent Land Cover Ratio
Choluteca	7109	2546	0.36
Goascoran	1666	465	0.28
Nacaome	2707	581	0.21
Negro	802	77	0.10
Sampile	738	52	0.07

Protected Areas Conserve Upland Forests & Mangroves

By maintaining permanent land cover they anchor the resilience of ecohydrological services in southern Honduras.



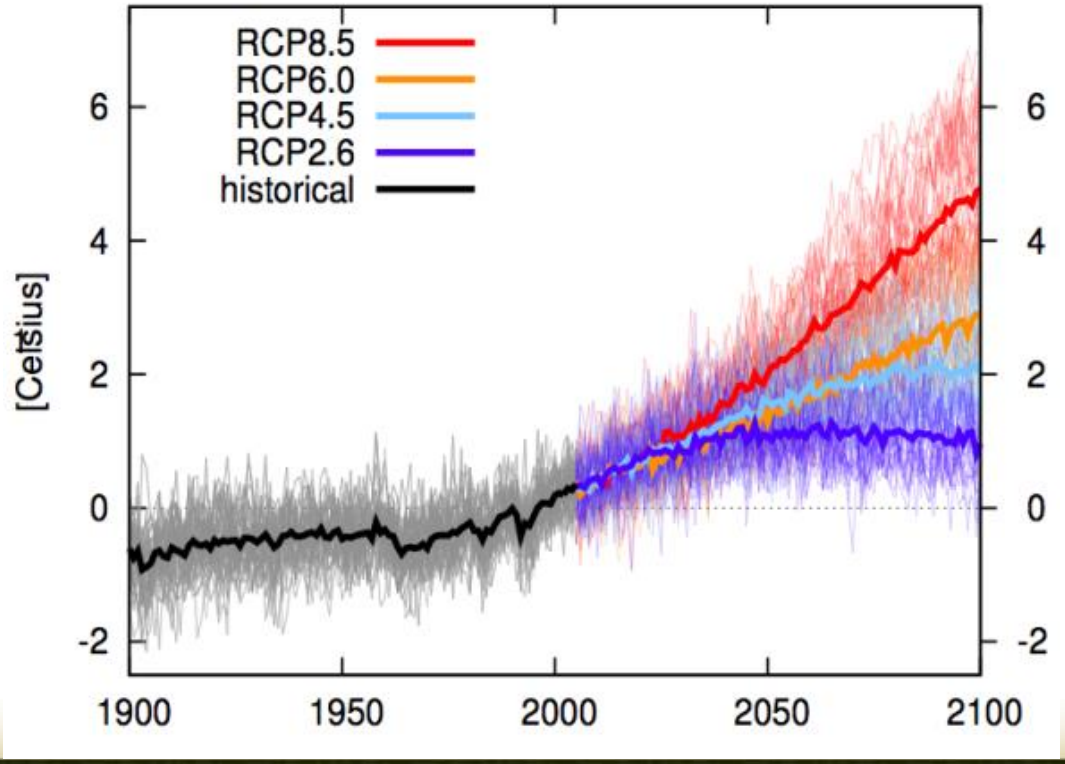
Land Cover & Land Use



Protected Areas Conserve Upland Forests & Mangroves

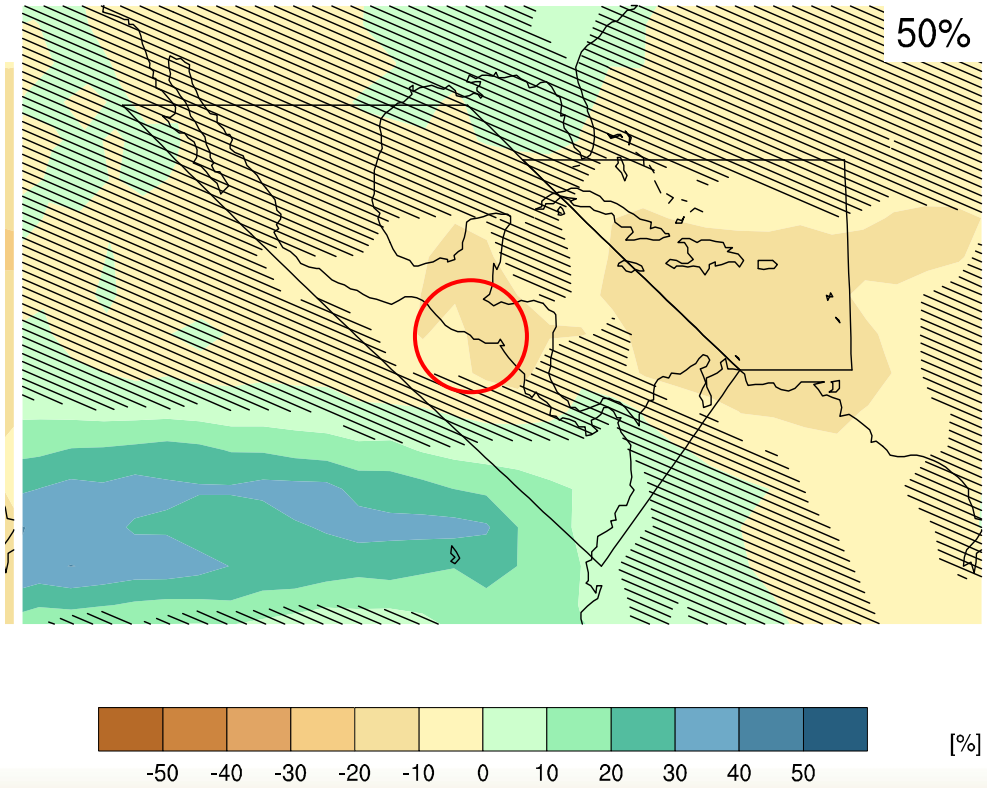
Climate Analysis Results

Temperature: IPCC models predict temperature increase of ~ 2º C by 2050

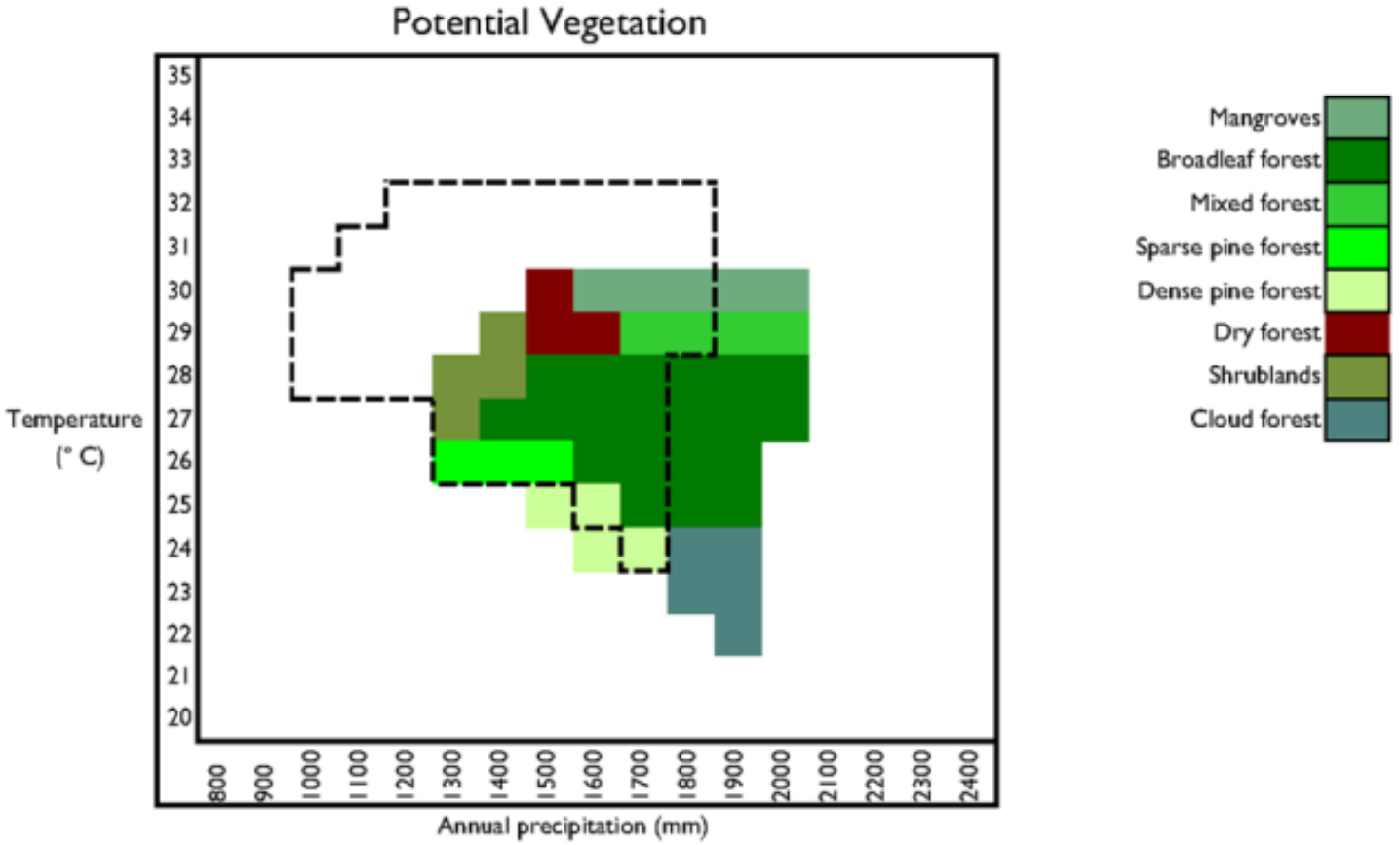


Climate Analysis Results

Precipitation: IPCC models predict precipitation decrease of ~ 10-20% by 2050

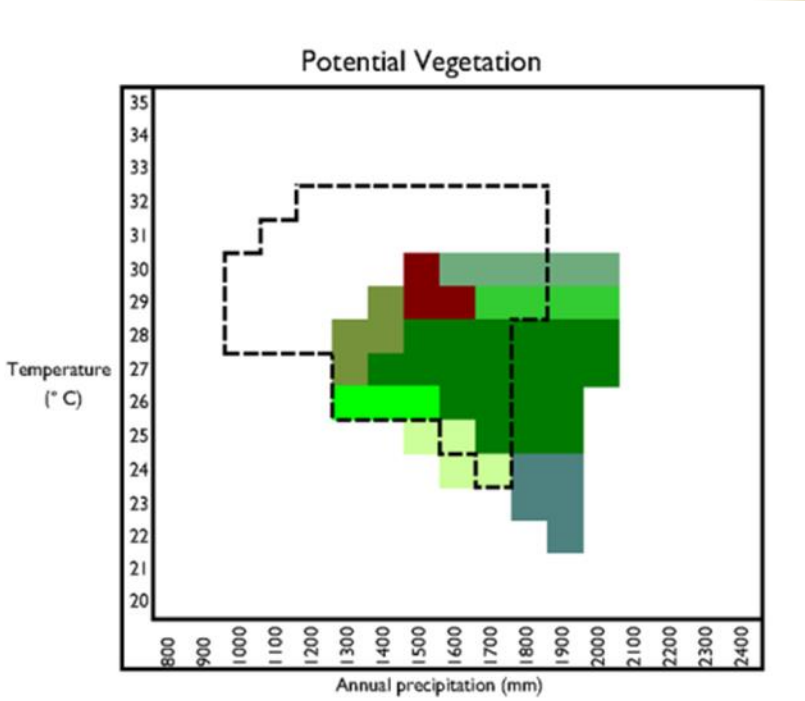


Potential Effects of Climate Change on Ecosystems



Potential Effects of Climate Change on Ecosystems

- Areas with a climate suitable for wetter forest types (e.g., cloud forest, broadleaf forest, dense pine forest) would decrease by almost 50%.
- This would be a significant ecological change that would affect ecohydrological services.



Conclusions

Communities and municipalities of the region, and also the large private-sector commercial agro-industries (shrimp, melons, sugarcane), are all heavily dependent on ecosystem services, especially water.

Conclusions

All current livelihoods – from subsistence to agro-industrial – are vulnerable to climate change because it will affect ecosystems, and the services they provide.

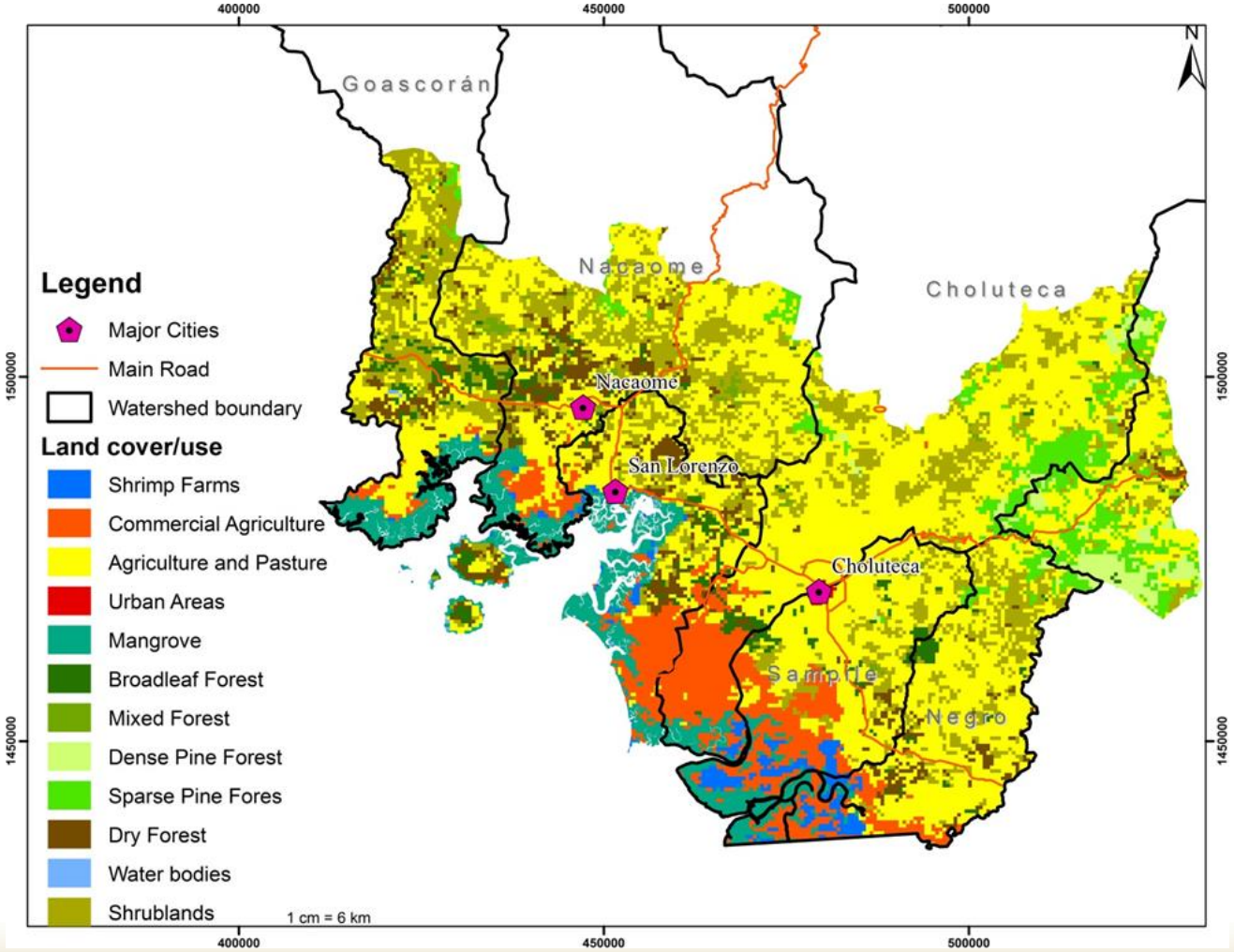
Conclusions

An integrated, ecosystem-based approach to climate change adaptation is a necessary component of ***any*** effective strategy for food and livelihood security, and for economic growth, in southern Honduras.

Conclusions

Climate change adaptation in southern Honduras will require watershed- and landscape-scale forest protection and restoration.

Land Cover & Land Use



Conclusions

Commercial agro-industries are aware of how dependent they are on ecohydrological services and expressed an interest in developing compensation mechanisms that would help protect and restore upper watersheds.

Let's Take Care of the Forests!


Thank You!
Questions & Comments?