

Linking monitoring and modeling to support conservation investments in Mexico.

Monitoring program of ecosystem services in Central Veracruz

NatCap Annual meeting 2015

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March 2015

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Participants:



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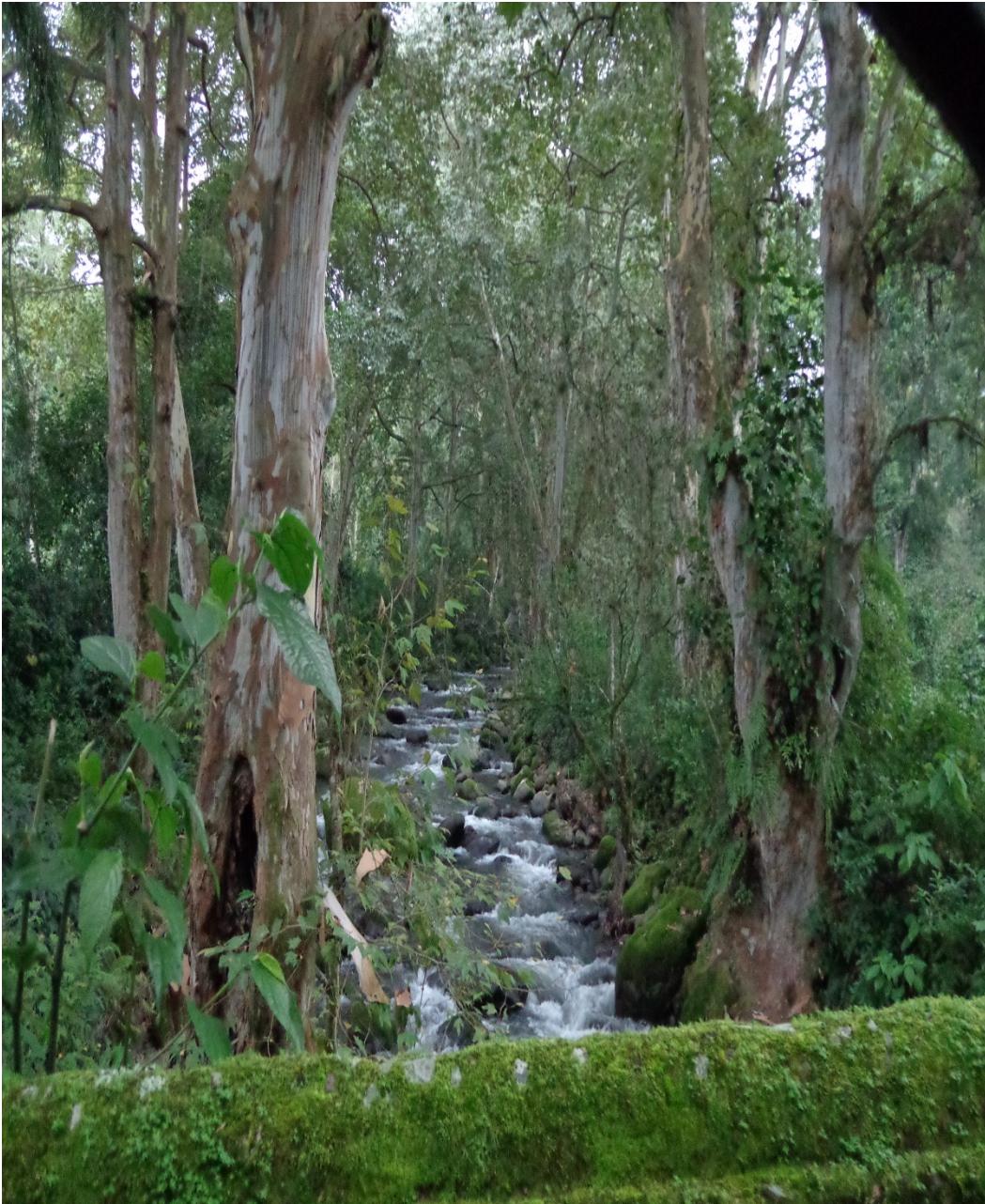
MSc. Víctor Castelazo

MSc. Claudia Gallardo Hernández

Main goals

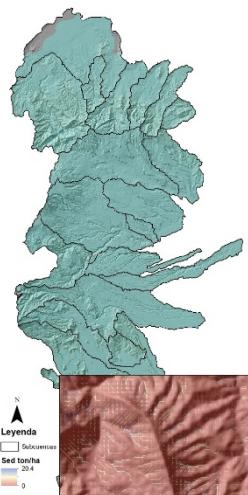
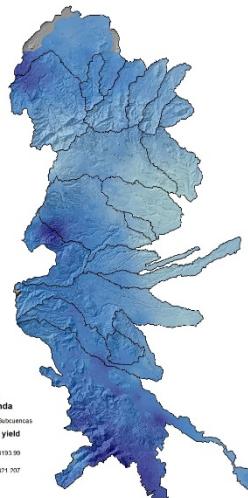
This Project seeks to:

- **Provide scientific evidence to evaluate and strengthen the PES programs that are currently active in the region.**
- Identify priority areas that provide multiple ecosystem services in a coffee dominated landscape.
- Establish a long term monitoring program of ecosystem services to evaluate the impact of different land uses on the spatial pattern and magnitude of service provision.
- Evaluate how spatial patterns in the provision of these services could be affected under scenarios of climate and LULC change.



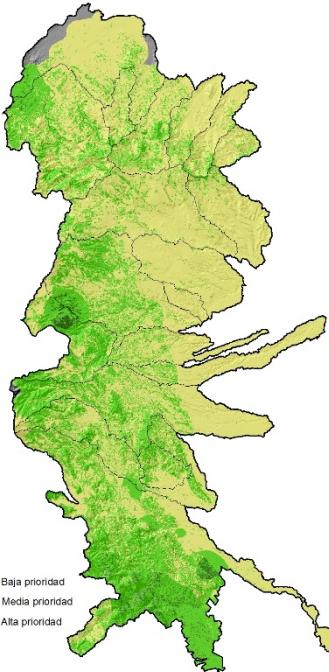
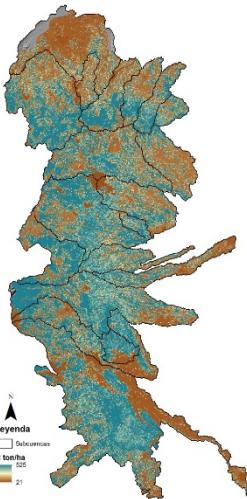
First step

**Mapping and prioritizing areas that provide
multiple ecosystem services**



Where are the ecosystem services being provided?

Spatial Analysis
at the pixel level

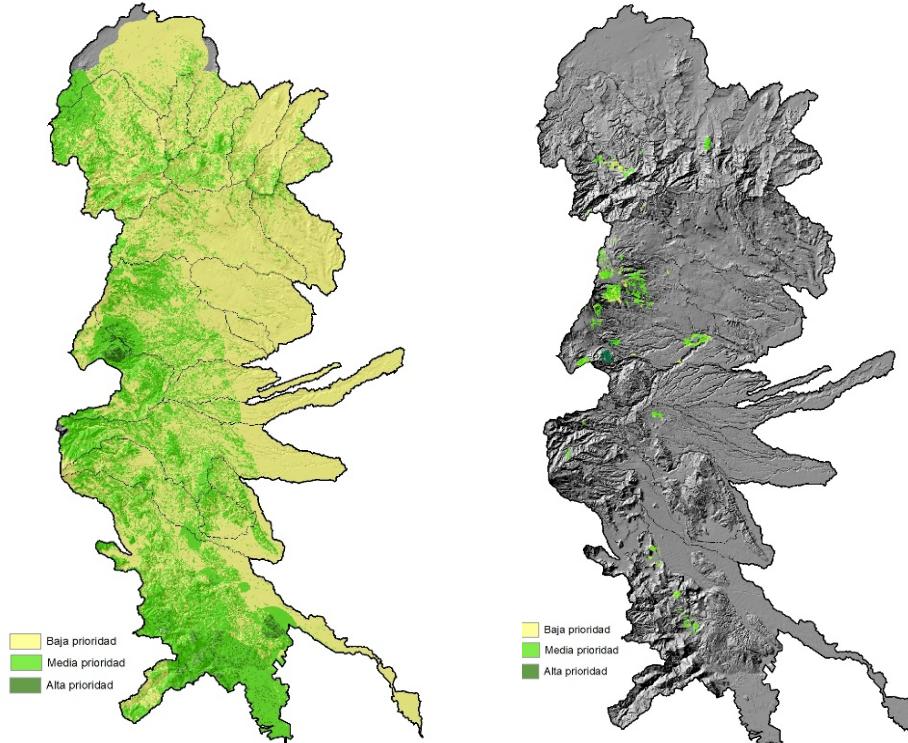


Identify indicators of
services provision and key
watersheds

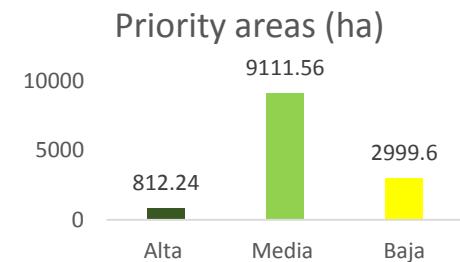
Priorization of areas
with greater importance
for services provision

Evaluation of the effectiveness of the Payment of Ecosystem Services Programs (PES) in Mexico

Are they paying in the right places?



The 40% of the territory has a high capacity to provide multiple ecosystem services



The goal is to provide information to the decision makers over the impact of their public policies

Second step

Monitoring Program

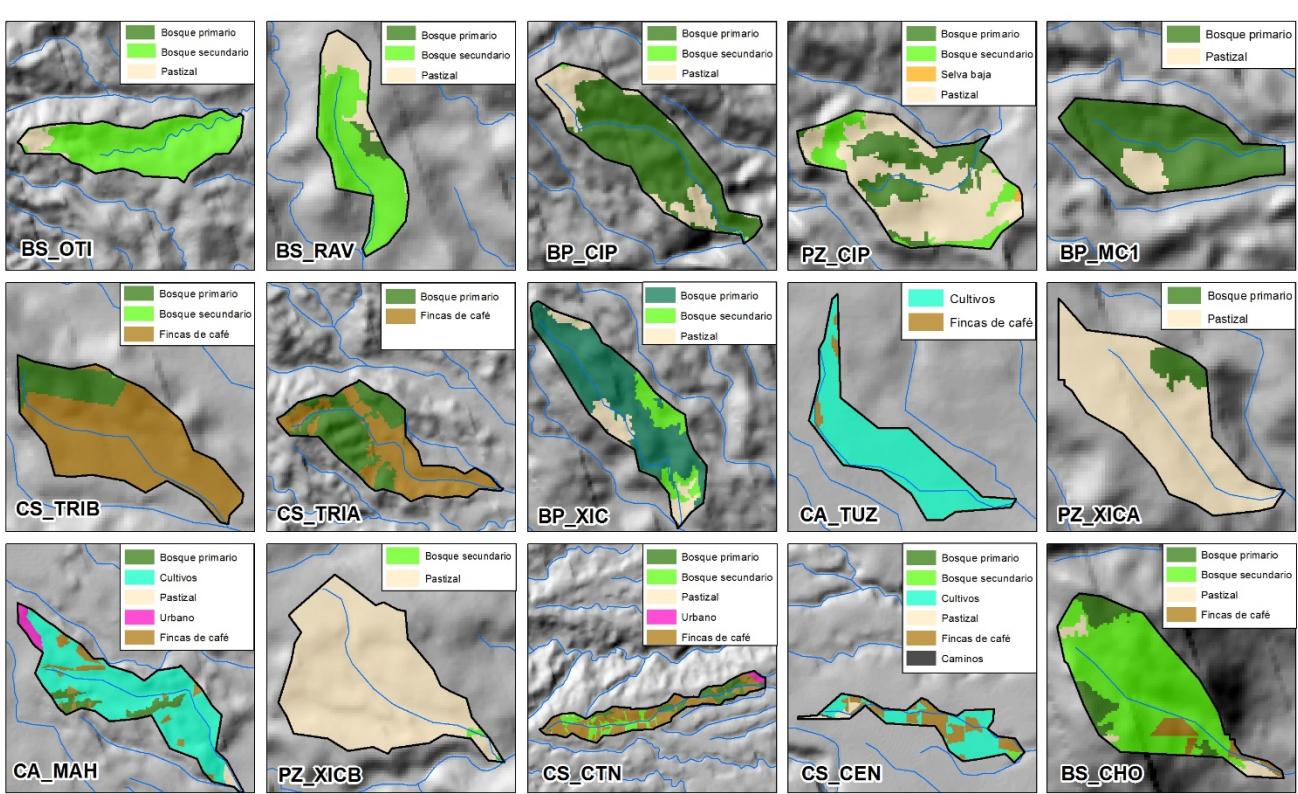
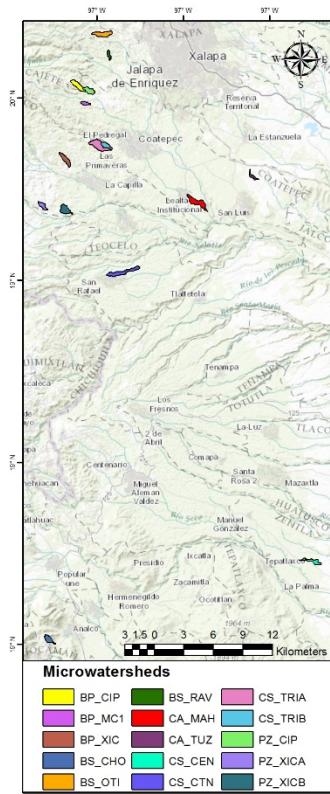
Second step: Site selection and establishment

Primary selection criteria:

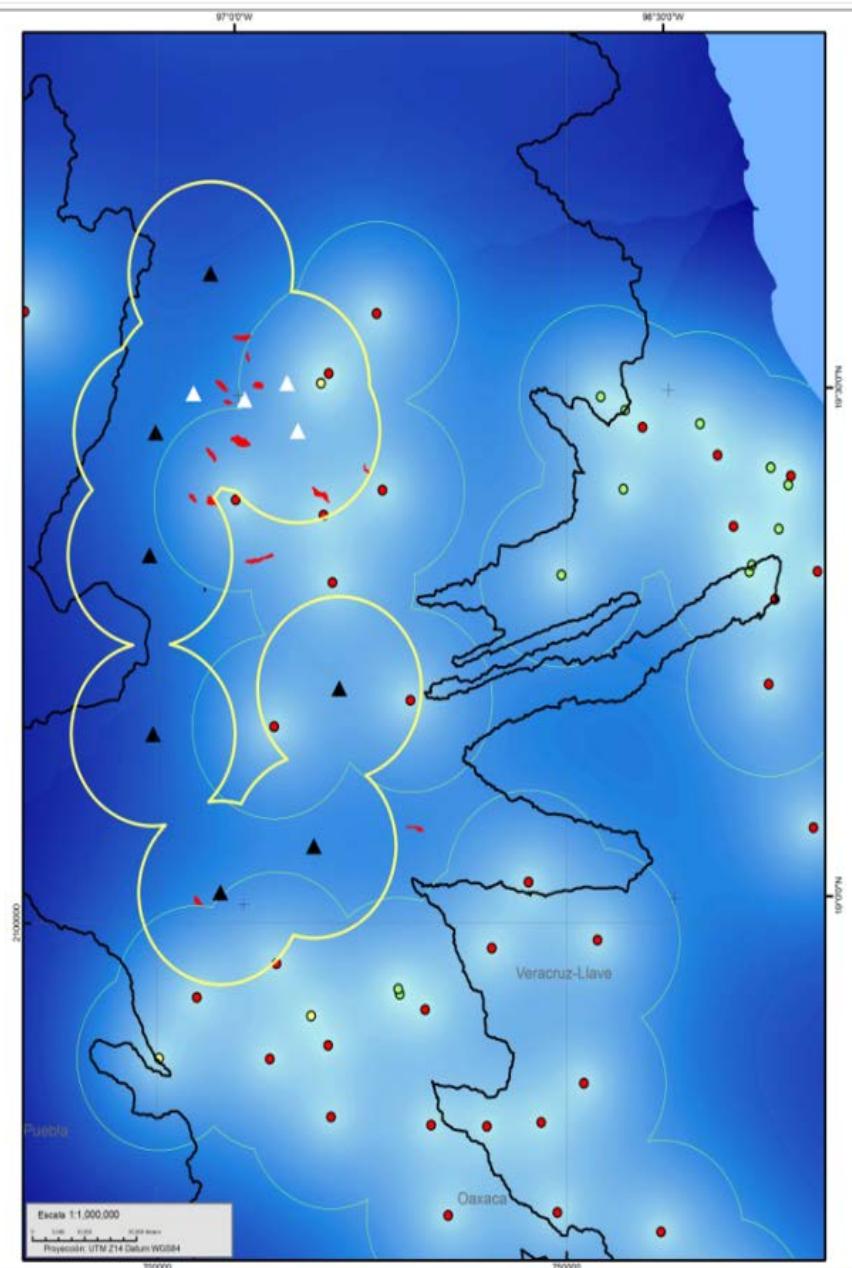
- Microwatersheds with first order streams
- Dominance of particular LULC was greater than 60%
- Similar soil types
- Altitud range of 700-1,700 above sea level

Secondary criteria:

- Sampling points located <1km from the nearest road
- Standardized size of > 10 ha < 150 ha
- Free of points sources of pollution
- Level of interest by the land owners



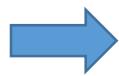
Weather station network



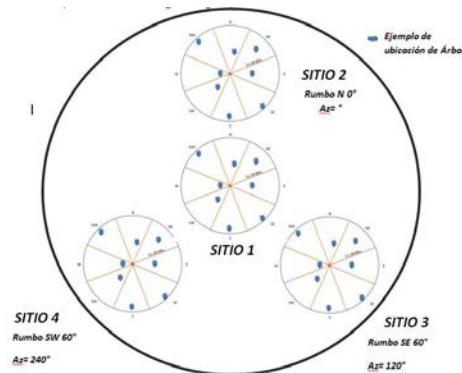
Data collection

Carbon storage and sequestration

Biomass quantification



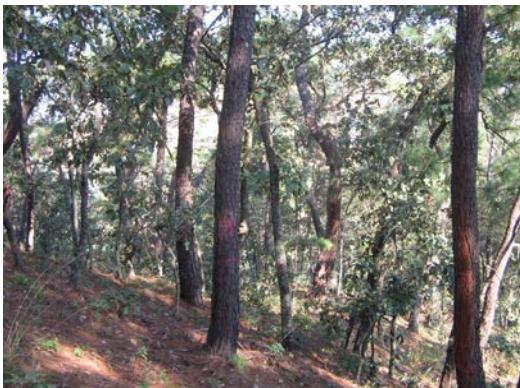
Sampling scheme



Hemispheric pictures



Dasometric measures



Dendrochronological analysis



Soil and litter sampling



Data collection

Water yield

Monthly baseflow monitoring



Infiltration monitoring (hydraulic conductivity)



Sampling of soil hydraulic properties



Meteorological data collection (15 minutes intervals)



Estimating water discharge Based on water level of the streams



Sediment and nutrient retention

Sampling during peak flows and base flows



Sampling with collection tower and self-sealing sampling bottles



Sampling The quantification of levels of nitrates and orthophosphates in stream water samples will be performed using the brucine sulfate/brucine technique from the AOAC (1990), and the APHA-AWWA-WEF (2012) standard method for water and wastewater ascorbic acid technique, respectively.

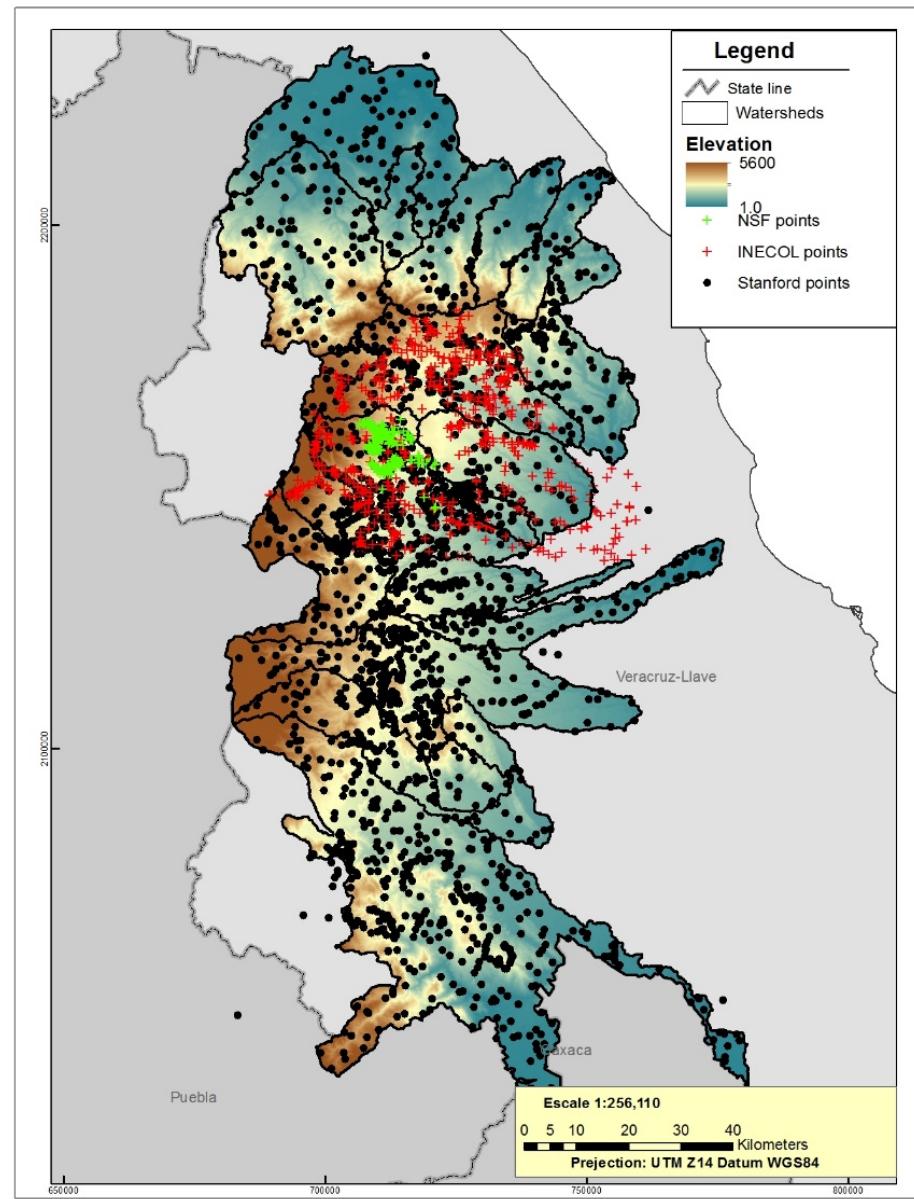
Estimation water level of the streams



Improving land-use maps

Categories	
Pine forest	Shade coffee
Oak forest	Agriculture
Pine-Oak forest	Sugar cane
Cloud forest	Grasslands
Selva Baj	Pradera de alta montaña
Tropical evergreen forest	Bare soil
Bosque de Oyamel	Roads
Water bodies	Agroecosystems
Clouds/shades	Urban

- 3,554 Ground training and verification points were collected.
- All available Rapid Eye images for 2011, 2012, 2013 and 2014 were collected.
- We are using LIDAR models to improve our DEM to distinguish coffee farms with different types of management using hemispherical photographs and leaf area index



Next step:

Model validation and recommendation

Validations of models using field data to:

Provide information to decision makers in how to maximize the use of economic resources for the management and conservation of ecosystems.

Fill gaps in the knowledge of the spatial patterns that determine the provision of services.

Analyze the effects of the different land uses on the service provision.

Analyze the vulnerability of ecosystem services provision to land use and climate change.

Understand how does changing from a regional scale to a local scale affects the understanding of ecosystem services provision and the identification of priority areas





Thanks for listening!

Comment and suggestions welcome:

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