natural capital PROJECT

PROCESSING DATA:

PREPARING INPUTS AND INTERPRETING OUTPUTS

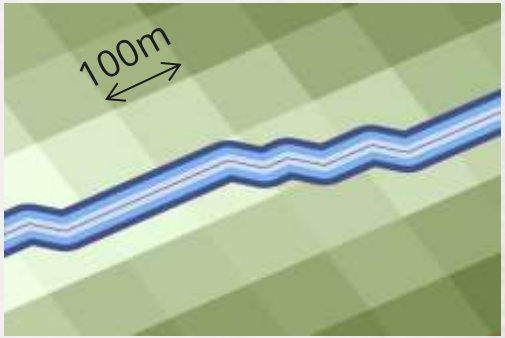
March 28, 2014

Stacie Wolny and Brad Eichelberger
swolny @ stanford.edu
beichelb @ stanford.edu

PREPARING INPUTS

SPATIAL INPUT LAYERS

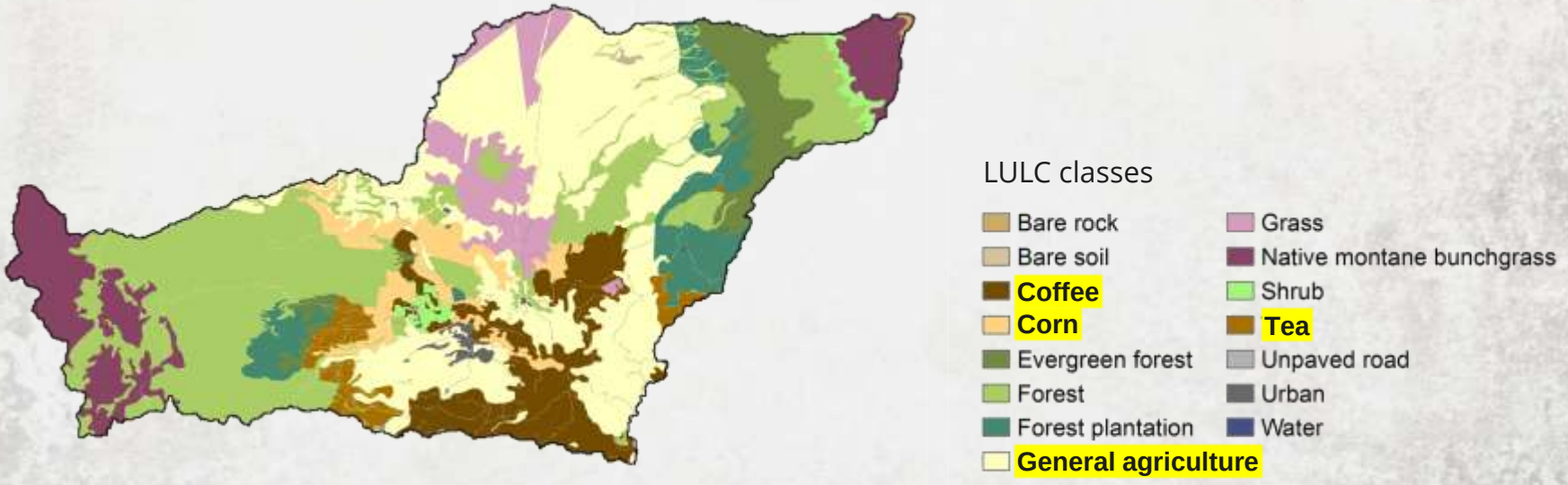
- Have all data in the same projected coordinate system
- Check the units
- Use an appropriate resolution for your goals
  - Overall detail needed
  - Interaction between layers
  - Speed/memory



Stream buffers ← or threat distance

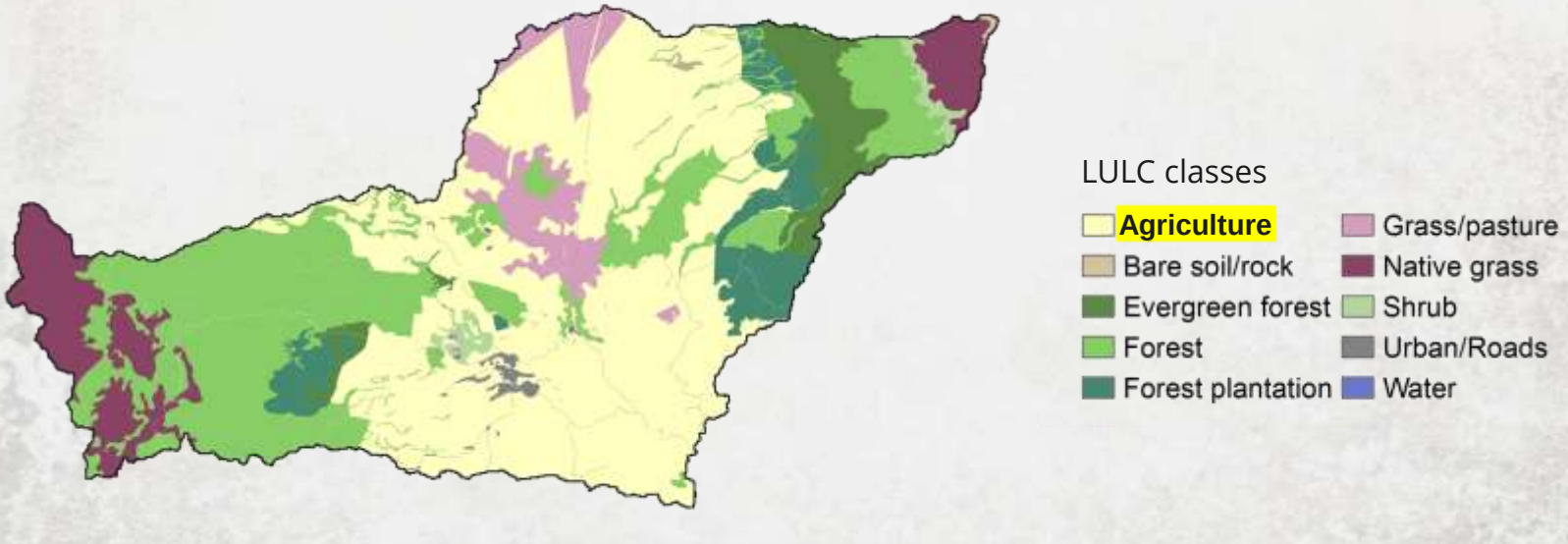
LAND USE

Choose an appropriate number/types of land cover classes



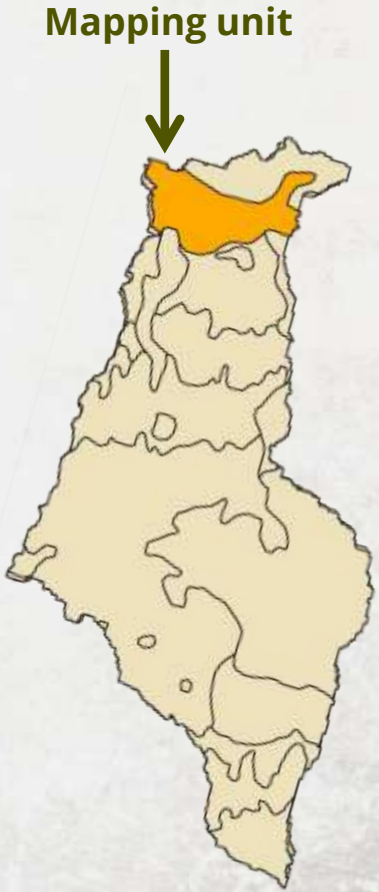
LAND USE

Choose an appropriate number/types of land cover classes



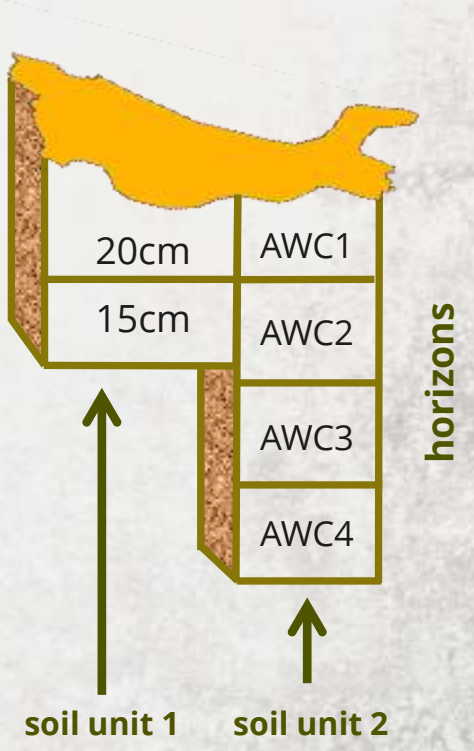
SOILS

- If in the U.S., try USDA Soil Data Viewer
- If working with other soil databases…



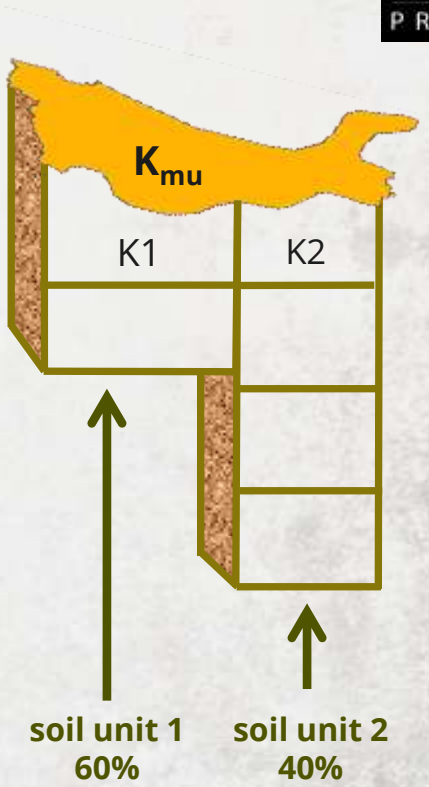
SOILS

- If in the U.S., try USDA Soil Data Viewer
- If working with other soil databases…
  - Soil depth: add up horizons or find max depth field
  - AWC: Sum of provided AWC values across horizons



SOILS

- If in the U.S., try USDA Soil Data Viewer
- If working with other soil databases…
  - Soil depth: add up horizons or find max depth field
  - AWC: Sum of provided AWC values across horizons
  - Erodibility: %sand/silt/clay/carbon in top horizon; use table to convert to K values
  - Mapping unit value = weighted average across soil units



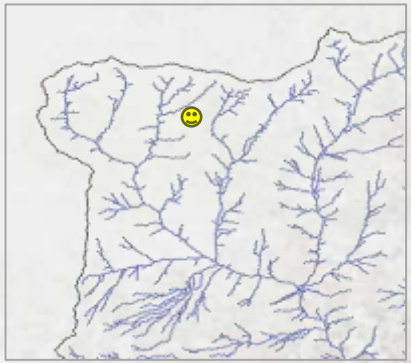
$K_{mu} = (K1*.6) + (K2*.4)$

TOPOGRAPHY/HYDROLOGY

- Preparing the DEM: Mosaic, fill holes, fill sinks, burn streams
- Verify watersheds and/or create with ArcHydro/ArcSWAT/AGWA/BASINS…
- Determine threshold flow accumulation

Threshold = 10,000

Threshold = 100



CLIMATE

- Precipitation from weather stations, gridded local or global data, climate change scenarios
- Average over 10+ years
- If weather stations:
  - Best to have full coverage
  - Test out interpolation methods
  - Adjust for elevation?
- Derive PET, AET, erosivity from same precip

INTERPRETING OUTPUTS

SCRUTINIZING RESULTS

- No areas of missing data
- Spatial pattern makes sense
- Model limitations – how do they affect your interpretation?
- Uncertainty in inputs
- Output values look like they're in the right ballpark…

CALIBRATION

Observed data (stream flow etc)

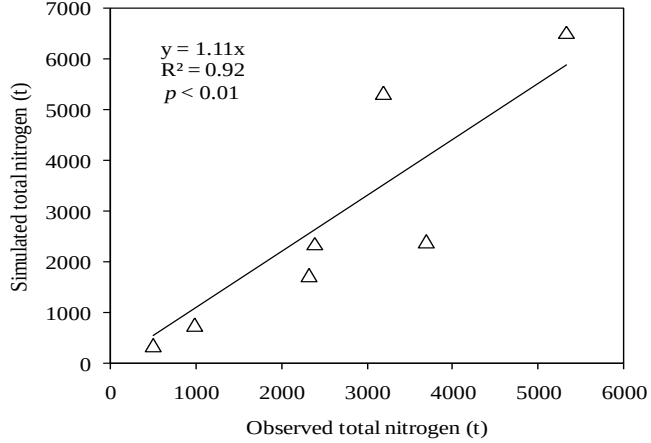
- Average over 10+ years
- Match units with InVEST outputs

Inputs (like climate):

- Average over same 10+ years
- Match time period with observed data

Do calibration before valuation

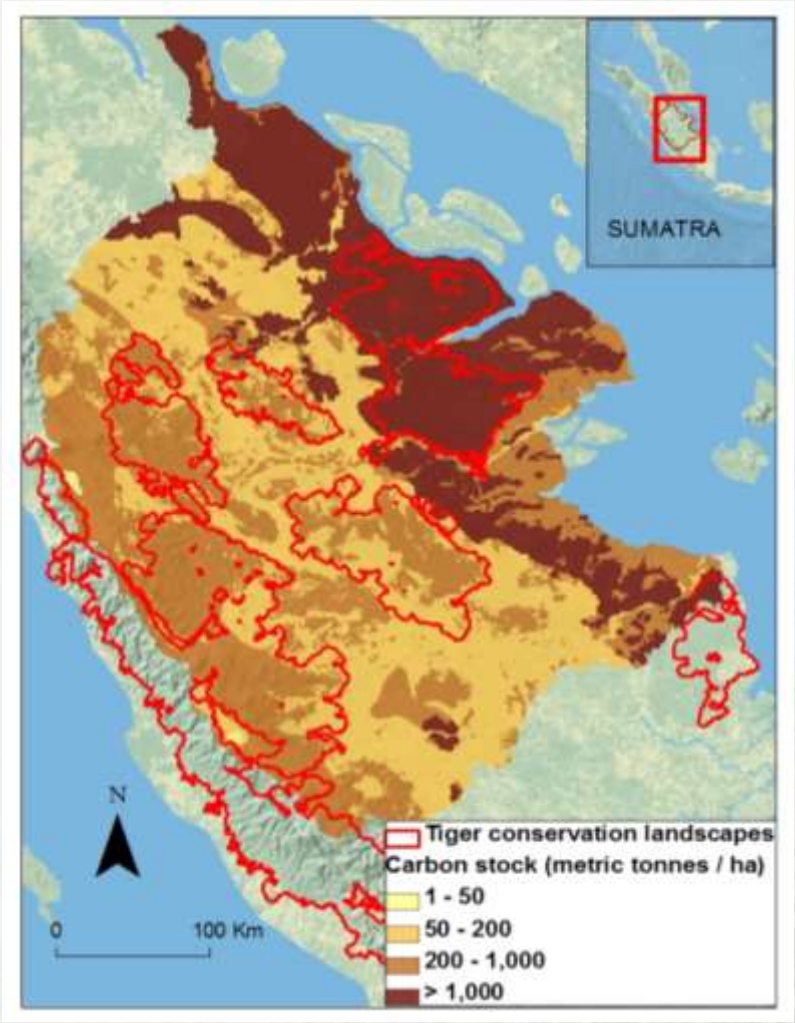
Nitrogen loading, Hainan, China



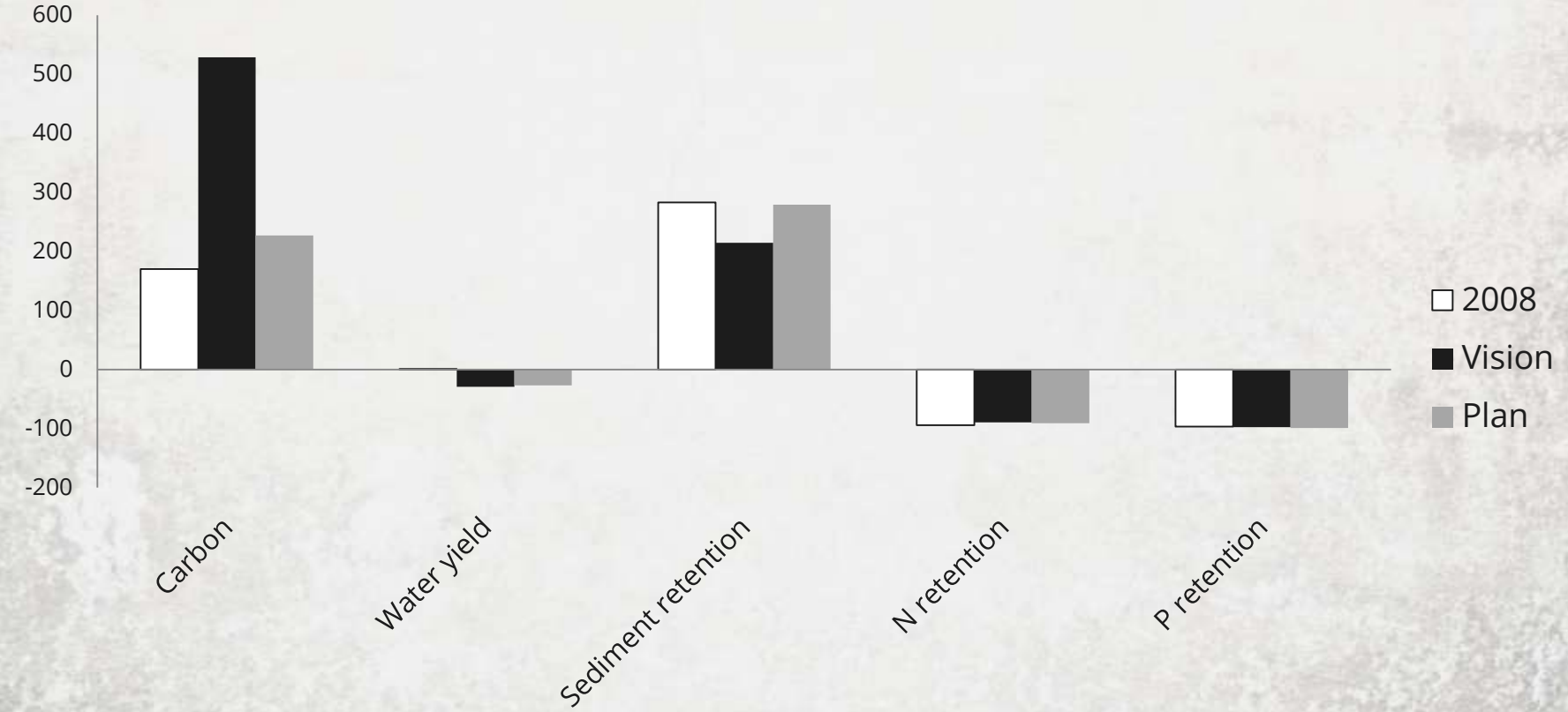
Validation examples (Brad)

OVERLAY WITH OTHER DATA

Carbon stock
+ tiger habitat



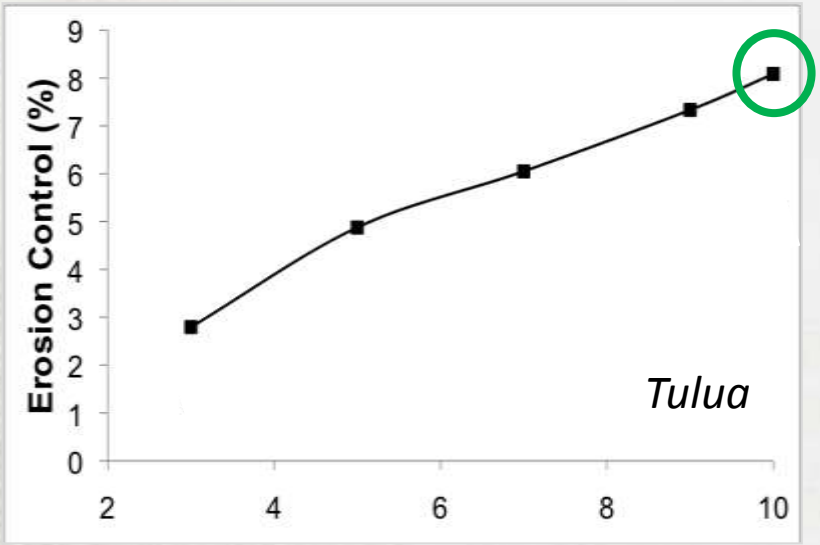
Services provided within tiger habitat versus outside



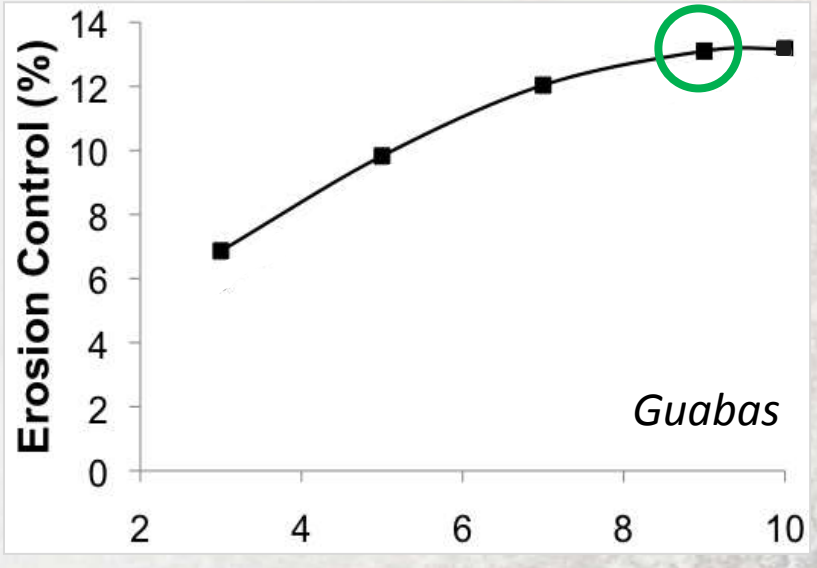
COMPARE CHANGE

Percent change can be very useful…

Return on Investment



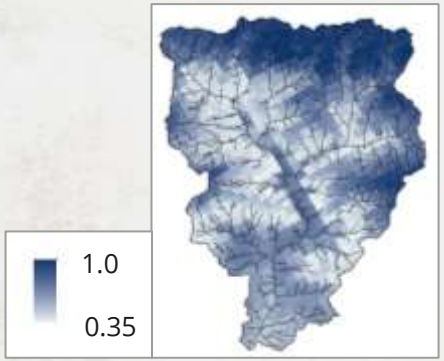
Total budget (US$ millions)



Total budget (US$ millions)

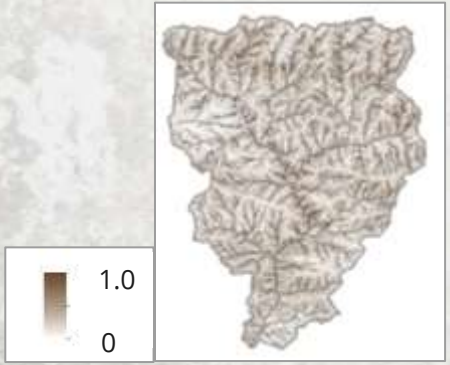
RANK ACROSS MULTIPLE SERVICES

Biodiversity



x 1

Carbon

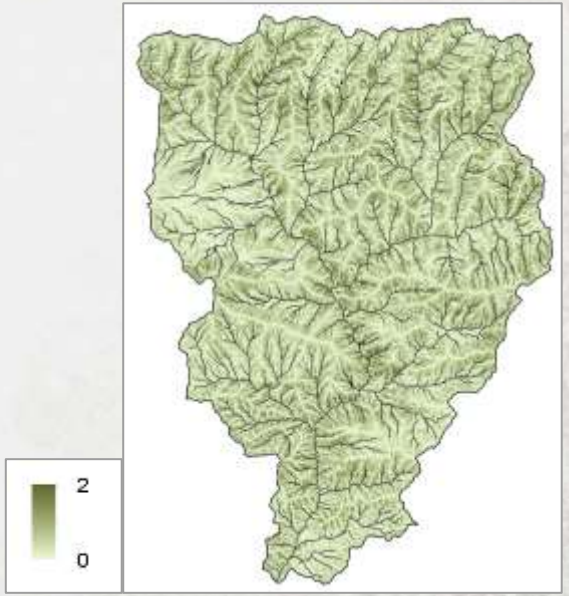


x 2

\+

=

Total Relative ES provision



AGGREGATING RESULTS

- Can aggregate within countries, administrative zones, land cover classes…
- Do the results cover the whole area of interest?

Serviceshed: *A specific area that provides a service to a group of people*

- Hydrology: watershed
- Pollination: foraging range
- Recreation: travel distance

If servicesheds overlap, total service > supply

TERRESTRIAL HELPER TOOLS

- Calculate change between scenarios
- Prepare the DEM
- Create servicesheds
- Multi-service landscape ranking

CALCULATE CHANGE

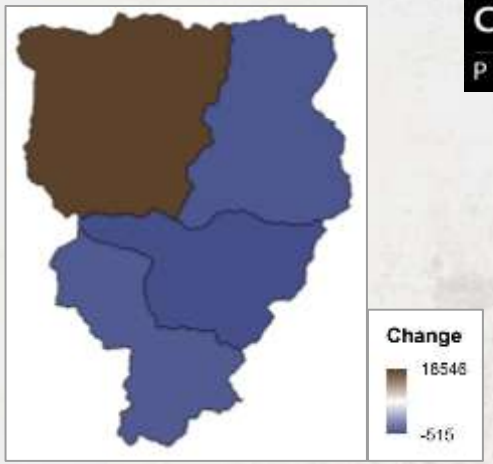
- Absolute and percent change
- For pixel, subwatershed and watershed data
- Aggregate by area of interest
- Split raster results into < 0 and >= 0

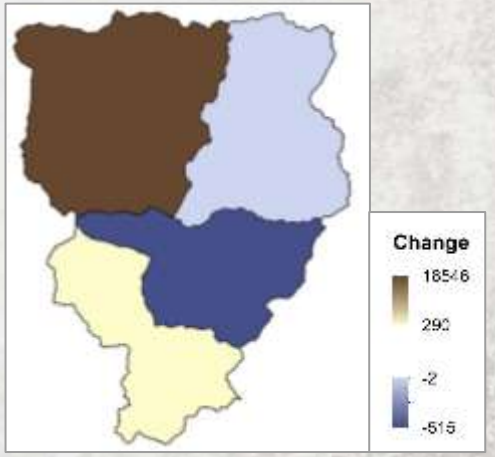
Inputs:

- 2 scenarios
- Subwatersheds
- Area of interest

Outputs:

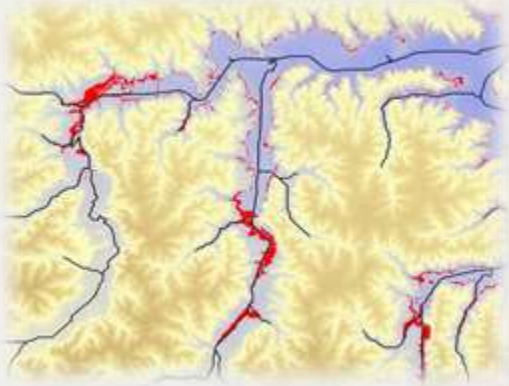
- Change rasters (pixel/subwatersheds)
- Change tables (watersheds/subwatersheds/AOI)
- Split rasters





PREPARE THE DEM

- Fills holes (missing data)
- Burns streams
- Fills sinks



Inputs:

- DEM
- Streams / depth

Output:

- Processed DEM

CREATE SERVICESHEDS

Uses Arc Hydro to create watersheds/servicesheds

Inputs:

- DEM
- Outlets
- Stream threshold

Outputs:

- Stream raster/shapefile
- Servicesheds shapefile

MULTI-SERVICE RANK

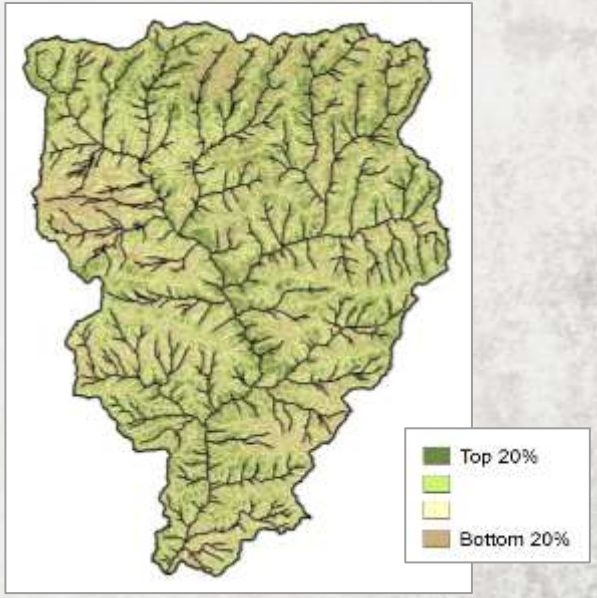
- Ranks landscape across multiple services
- Groups results by a given percent
  - By distribution and/or area

Inputs:

- Service output maps
- Weight per service
- Grouping percent

Outputs:

- Ranked landscape raster
- Grouped ranking shapefile(s)



QUESTIONS?

Stacie Wolny and Brad Eichelberger
swolny @ stanford.edu
beichelb @ stanford.edu