

# H.P. MODELING DATA OVERVIEW

May 21, 2014

Stacie Wolny  
swolny@stanford.edu

# DATA SOURCES

## THANK YOU...

- Department of Environment, Science and Technology
- H.P. Forest Department
- State Council for Science, Technology & Environment
- Directorate of Energy
- AGiSAC
- Department of Irrigation and Public Health

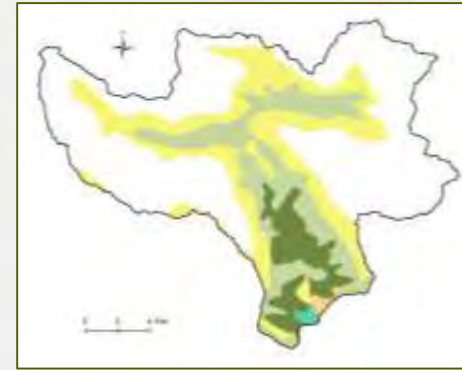
# RIOS DATA

## LAND USE / LAND COVER

- Soil and Land Use Survey of India
- 30m resolution

## MODEL COEFFICIENTS

- Based on LULC classes
- Values from literature search
- Root depth, sediment export, sediment retention, evapotranspiration



Land use / land cover classes

- Barren Rocky/ Stony Waste/ Sheet Rock
- Degraded Forest/Scrub Land
- Double Crop (K+R)
- Evergreen/Semigreen Forest
- Grass Land/Grazing Land
- Kharif
- Land with or without Scrub
- Plantation
- Snow Covered/ Glacial Area

# RIOS DATA

## ELEVATION

ASTER DEM, 30m resolution

Used to derive:

- Slope
- Streams
- Hydropower facility watersheds



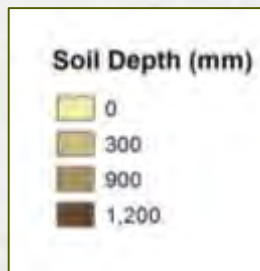
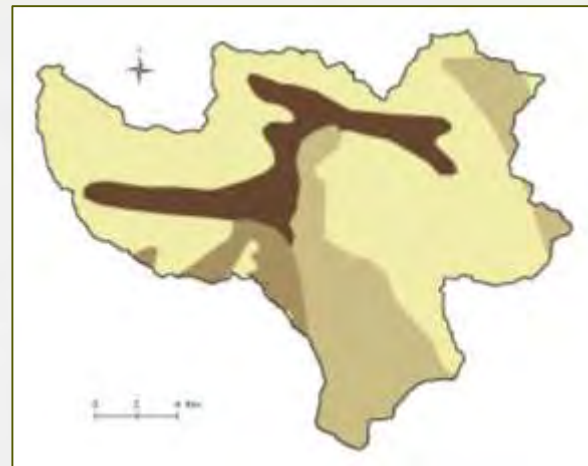
# RIOS DATA

## SOILS

Soil and Land Use Survey of India

Used to derive:

- Soil depth
- Texture
- Erodibility
- Available water content



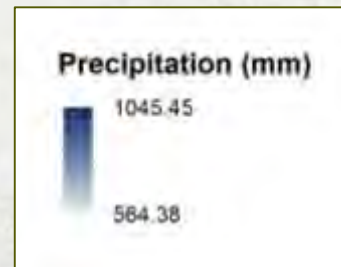
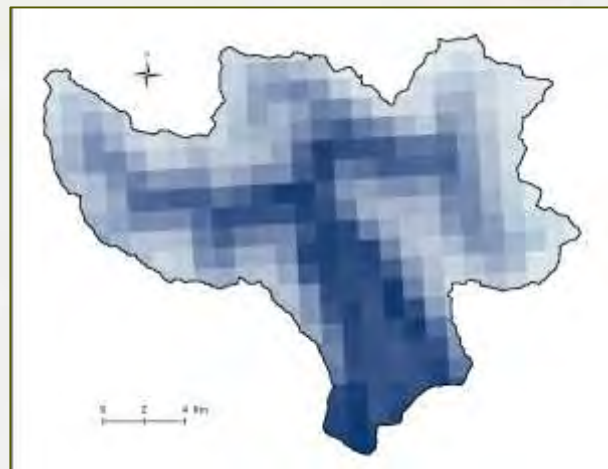


# RIOS DATA

## CLIMATE

Precipitation: WorldClim, 1km resolution

- Annual average
- Used to derive :
  - Rainfall erosivity
  - Potential evapotranspiration
  - Actual evapotranspiration



# RIOS DATA

## SOCIAL

### Beneficiaries

- Where do local people benefit from an improvement in service?
- Village locations and Department of Census population 2001



# **RIOS DATA**

## ACTIVITIES

Which activities to consider?

- Energy plantation – Provide fuel supply
- Enrichment – Rehabilitate degraded forests
- Fodder development – Improve grazing lands
- Contour trenching – Improve soil and water conservation
- Live hedge fencing – Retain sediment
- Protection – Prevent forest degradation



# WHERE ARE ACTIVITIES FEASIBLE?

Land use / Land cover	Energy plantation	Enrich- ment	Fodder develop- ment	Contour trenching	Live hedge fencing	Protection
Evergreen/ Semigreen Forest						✓
<b>Degraded Forest/ Scrub Land</b>	✓	✓		✓	✓	
<b>Land with or without Scrub</b>	✓		✓	✓	✓	
Plantation						
Kharif						
Double Crop (K+R)						
Grass Land/ Grazing Land			✓			
Gullied or Ravinous Land						
Barren Rocky/Stony Waste/Sheet Rock						
Snow Covered/Glacial						

## Additional restrictions:

- Contour trenching  
< 65% slope
- Live hedge fencing  
< 30% slope

# RIOS DATA

## BUDGETS

How much do activities cost?

- Values from CAT Plan for the Satluj basin

Activity	Cost (Rs/ha)
Energy plantation	138,000
Enrichment	35,000
Fodder development	27,000
Contour trenching	90
Live hedge fencing	960
Protection	(1)

# RIOS DATA

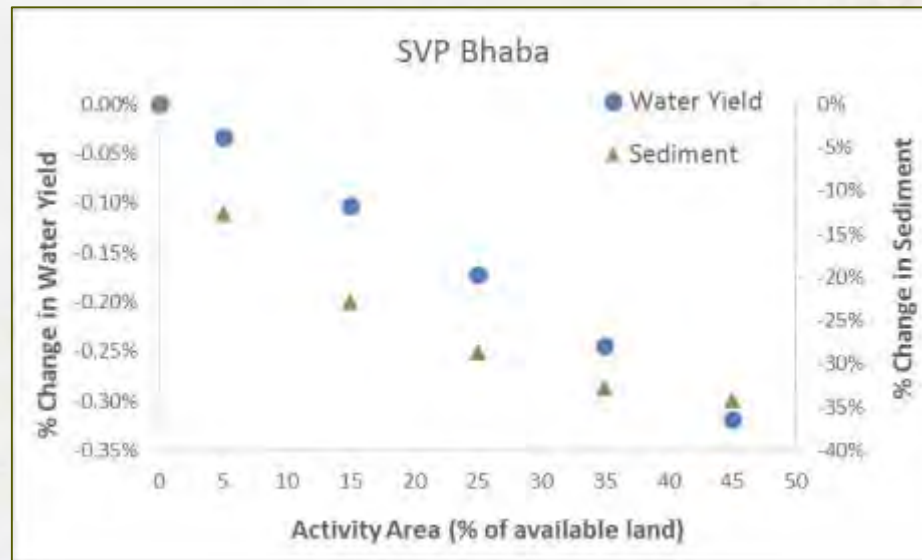
## BUDGETS

How much is to be spent?

- Estimates per activity, per watershed
- Based on amount of available area for each activity
- Budget levels:  
5% / **15%** / 25% / 35% / 45%  
of area considered

Activity

$$\text{Budget} = (\text{Total LULC area}) * (\text{cost}) * (\text{budget level})$$



# RIOS DATA

## HYDROPOWER FACILITIES

- Station locations
- Observed stream flow and sediment concentration
  - Used for model validation
  - Have for all but Chaba
- Facility information: Operating costs, turbine efficiency, remaining life of facility, number of shutdown days...
  - To be used for economic valuation