INTRODUCTION TO INVEST

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Free, open-source toolkit

Simple models

InVEST

integrated valuation of environmental services and tradeoffs

Relatively low data needs

Quantify, map and value the benefits provided by terrestrial, freshwater and marine systems

TYPES OF QUESTIONS InVEST CAN HELP ANSWER

Where would reforestation achieve the greatest downstream water quality benefits?

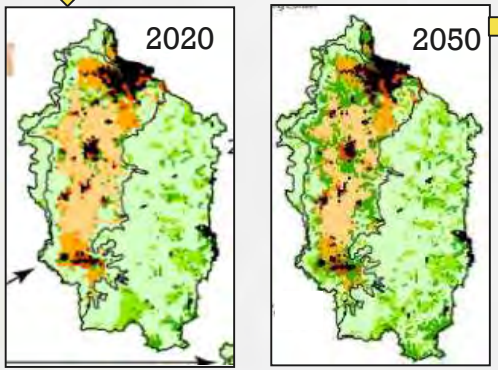
Which areas in a landscape provide the greatest carbon sequestration, habitat and tourism values?

Where should payments for environmental services be targeted to be most cost-effective?

INVEST WITHIN DECISION MAKING

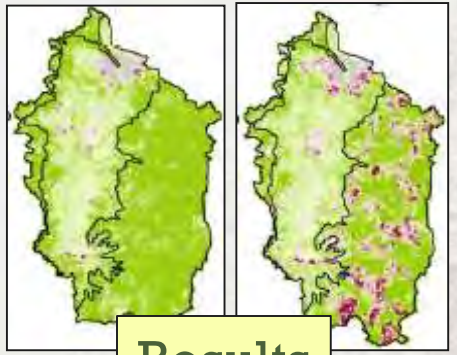
Stakeholders

Policy input

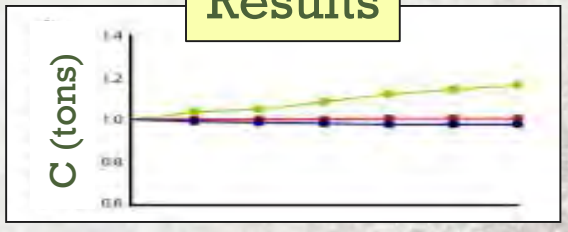


Scenarios

InVEST



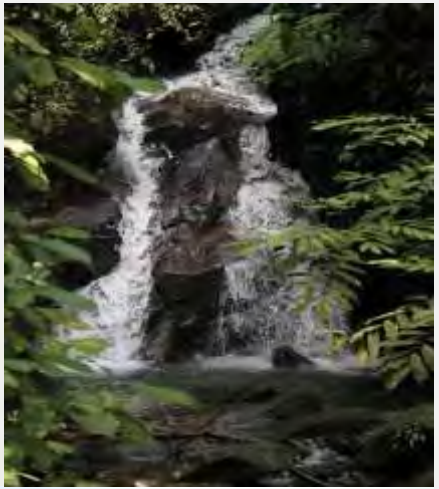
Results



Policy implementation

INVEST IS USED AROUND THE WORLD

Guiding development and investment in Sumatra



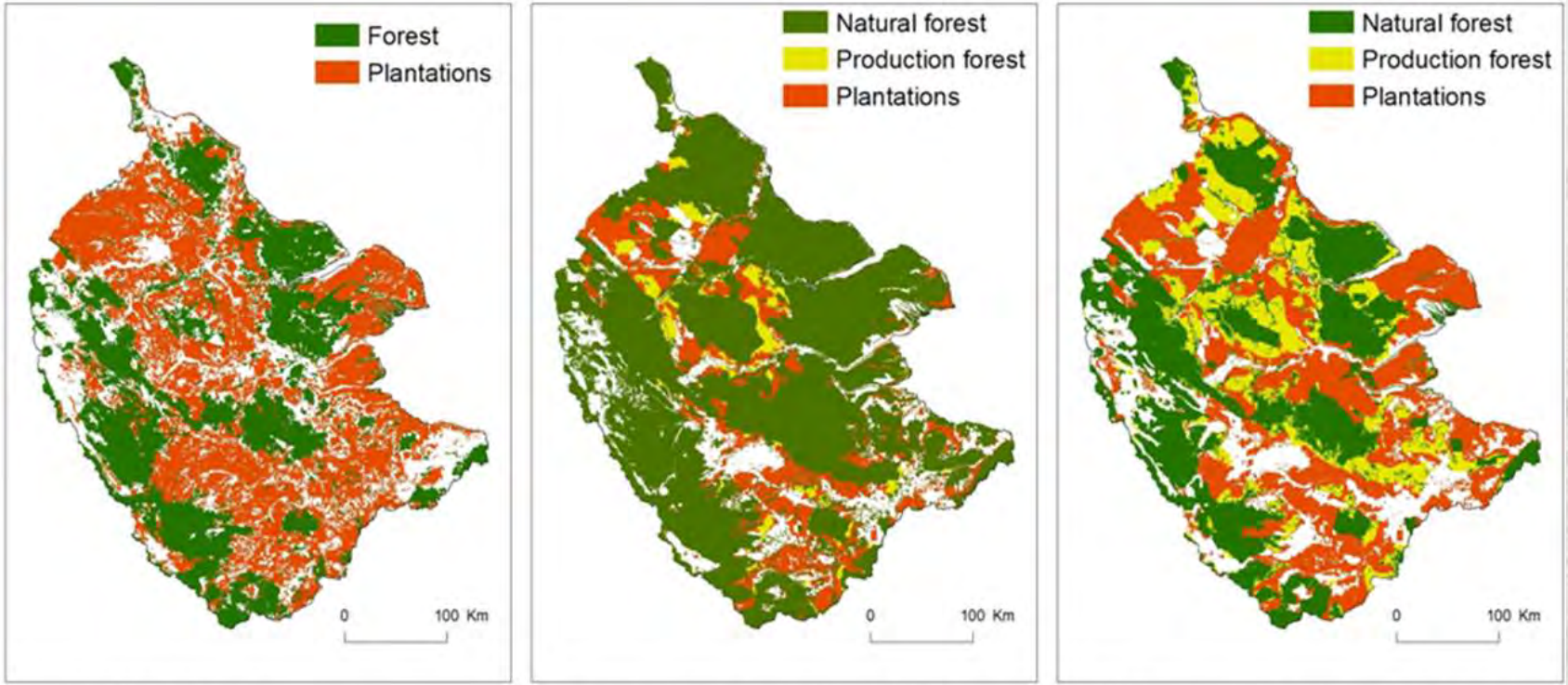
Policy questions:
How can sustainable spatial planning be implemented and financed?

Where are cost-effective investments in ecosystem services advisable/possible?

Audience: District governments, investors

Partners: WWF-Indonesia, National and local Indonesian governments

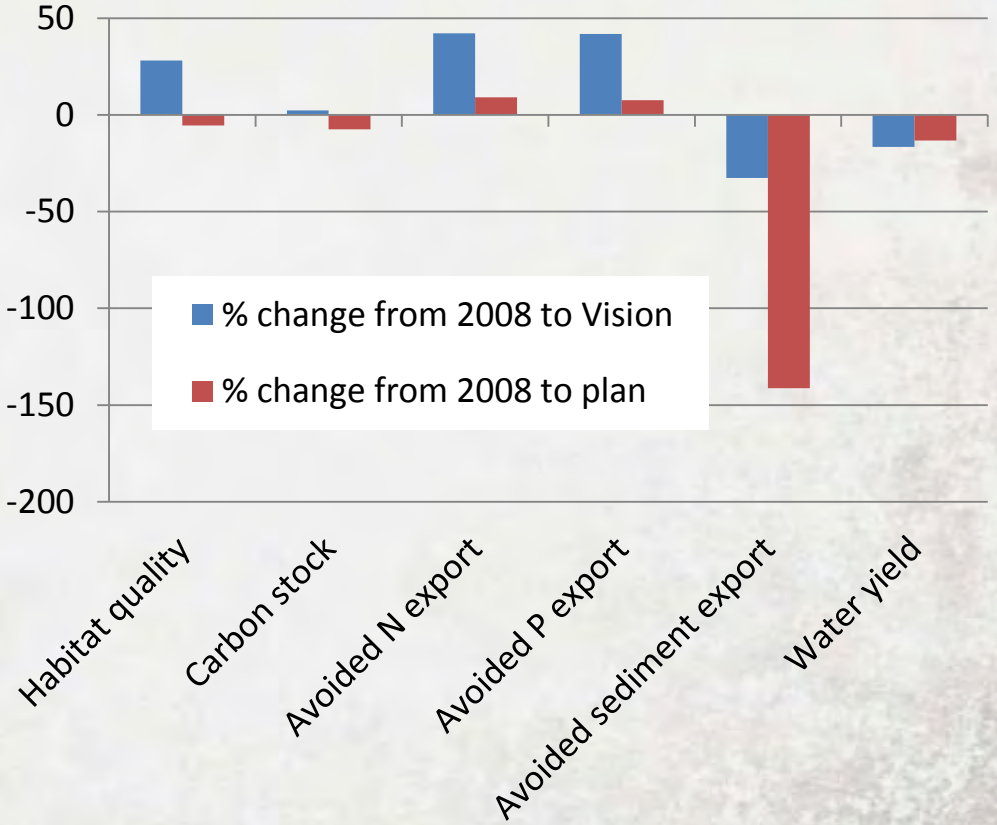
SCENARIOS



(a) 2008 land cover (b) Sumatra ecosystem Vision (c) Government spatial plan

Central Sumatra in 2008

CHANGE IN SERVICES



InVEST TOOLSET

Aquaculture

Fisheries

Coastal Protection

Coastal Vulnerability

Wave Energy

Offshore Wind Energy

Aesthetic Quality

Marine Water Quality

Recreation

Water Purification

Water Yield

Sediment Retention

Crop Pollination

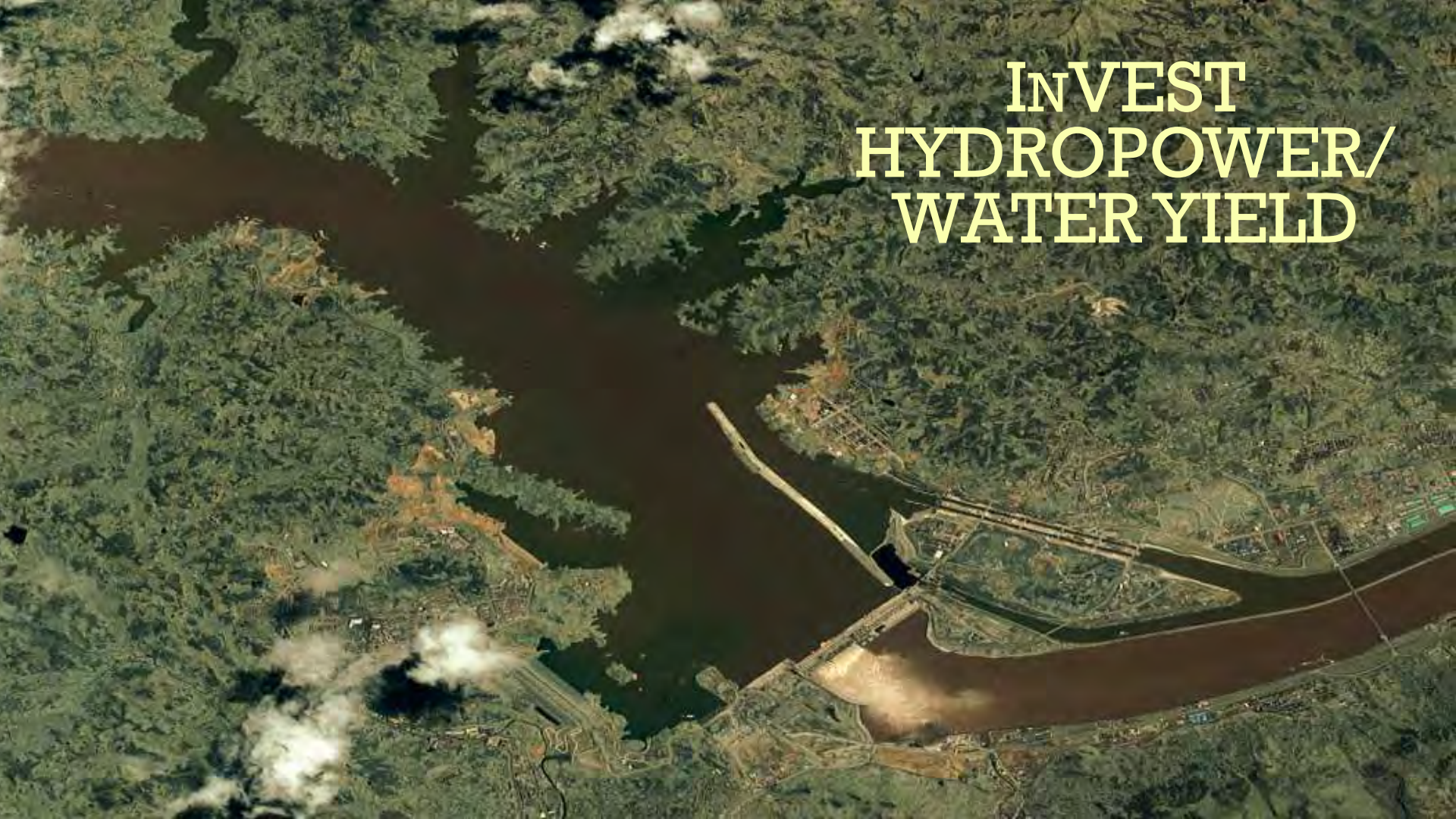
Carbon Sequestration

Timber Production

Habitat Risk

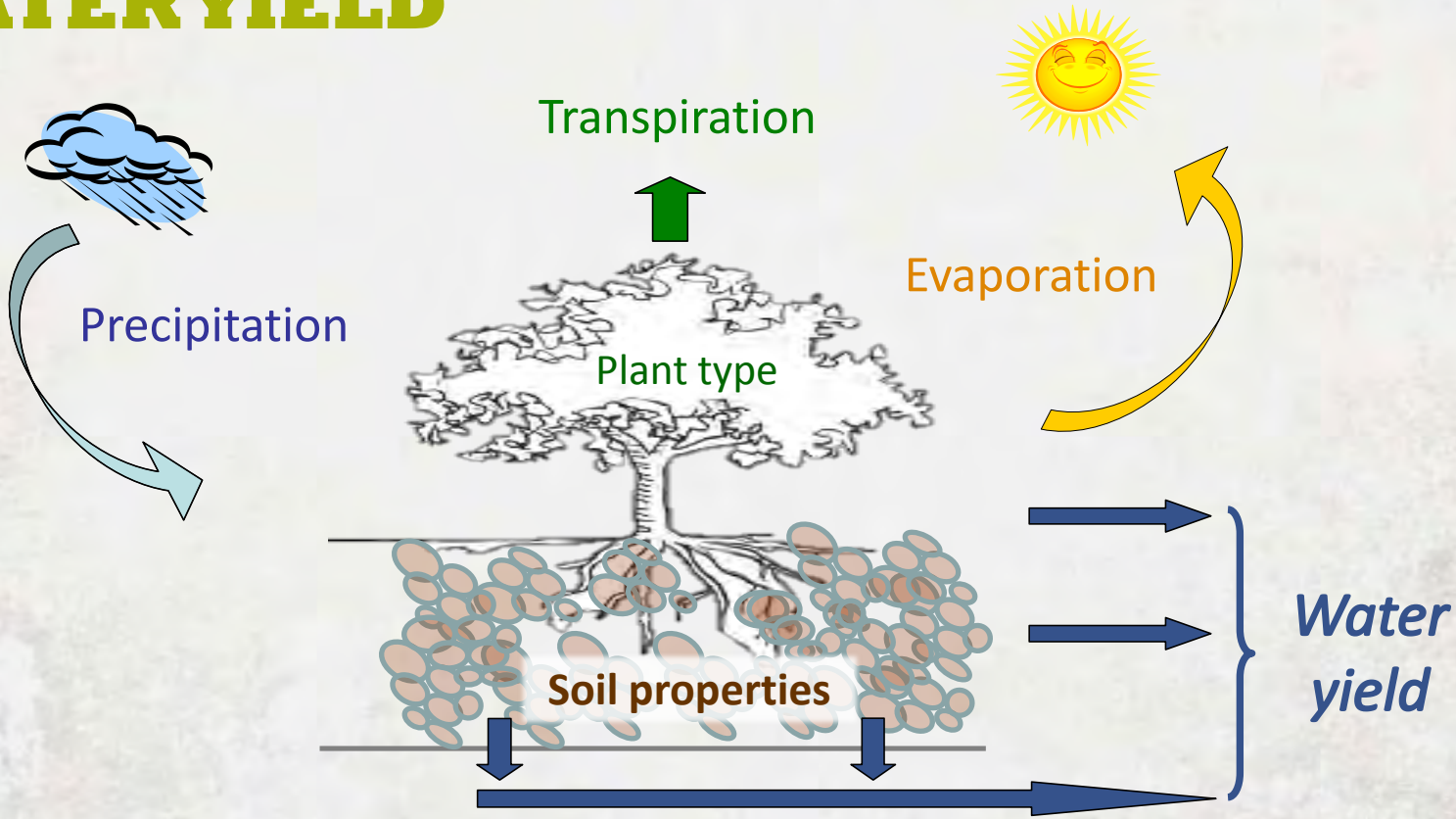
Habitat Quality

Overlap Analysis



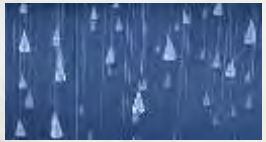
InVEST HYDROPOWER/ WATER YIELD

WATER YIELD



Water Yield = Precipitation – Evapotranspiration

MODEL INPUTS



Climate

Precipitation, Potential Evapotranspiration

Soils

Soil depth, Plant Available Water Content

Land Use/Land Cover

Root depth, Evapotranspiration coefficient

Watersheds

Main and sub-watersheds for point of interest

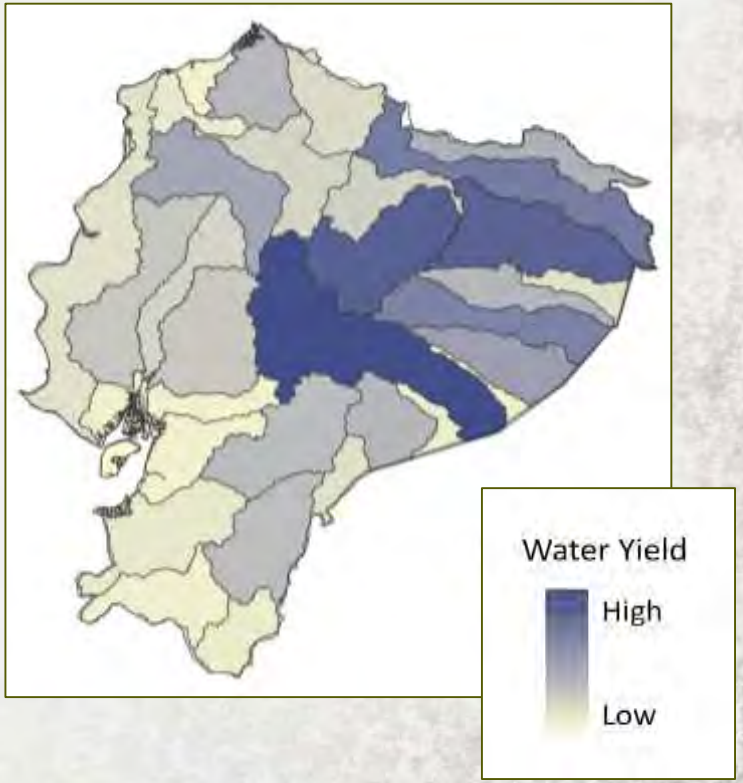
Water demand

Economic

Hydropower plant data, price of energy

MODEL OUTPUTS

- **Actual Evapotranspiration**
  mm/year
- **Water yield**
  mm/year
- **Water supply**
  m^3/year
- **Energy/value for hydropower**
  Kw/currency over timespan




InVEST
SEDIMENT
RETENTION

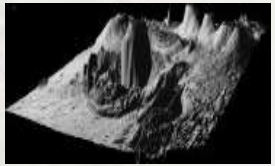
SEDIMENT RETENTION

- Based on the Universal Soil Loss Equation (USLE)
  - Includes geomorphology and climate
  - Potential erosion on a parcel
- Enhanced by hydraulic connectivity
  - What happens as the parcel's sediment moves downslope?
  - Influence of intervening landcover
- Sediment retention valued as ecosystem service

MODEL INPUTS

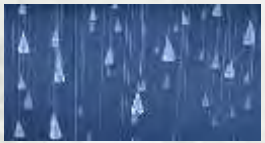
Land use/Land cover

Vegetation retention, land practice and management



Topography

Digital elevation model



Erosivity

Intensity of rainfall

Erodibility

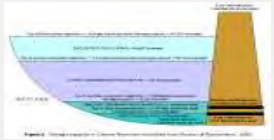
Soil detachment due to rainfall

Streams

Used to determine where sediment flows to

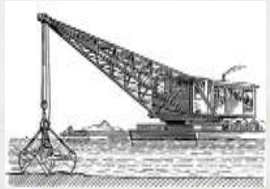
Watershed Areas

Catchments flowing into reservoirs



Reservoir Features

Dead volume, lifetime of reservoir, allowed load



Economic data

Reservoir dredging or water quality filtering costs

MODEL OUTPUTS

- **Potential soil loss (USLE)**
  tons/year
- **Sediment retained**
  tons/year
- **Sediment exported**
  tons/year
- **Value of sediment removal**
  For drinking water and/or dredging