

FUTURE DIRECTIONS: Natural Capital, Ecosystem Services and Forest Accounts

Adrian Vogl
Natural Capital Project

21 May, 2014

OUTLINE

1. Challenges and Limitations with RIOS/InVEST models
2. Model comparison
3. Proposed future work
4. Next steps
5. Technical and capacity needs

CHALLENGES & LIMITATIONS

- InVEST water yield model does not directly model glacial and snow melt
- Some sediment sources not physically represented in InVEST model
- Landscape based-activities undertaken at finer scale not captured

CHALLENGES & LIMITATIONS

- InVEST model produces long term annual average outputs
 - Time scale does not accurately reflect the impacts of sediment peaks and low flow periods on hydropower production and costs
 - Small decrease possible in annual water yield (based on InVEST results), but impacts on value for hydropower production based on seasonal availability of water and daily sediment loads
 - Water regulation could result in decreased annual mean, but increase in base flows during dry season
 - Limits ability to calibrate model in a way that would provide confidence in estimates of the seasonal impacts of forests and management

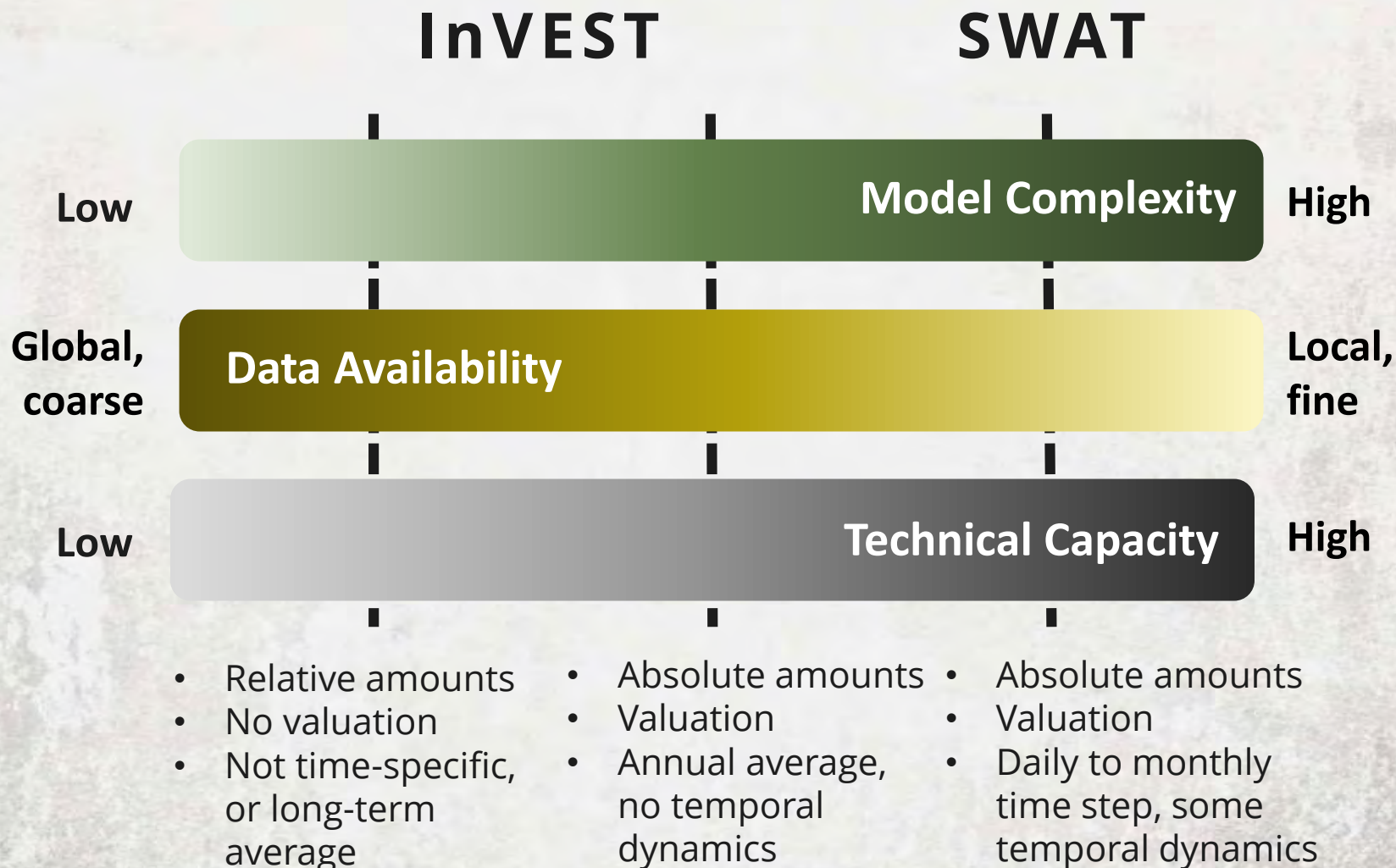
MODEL COMPARISON

SWAT vs. InVEST

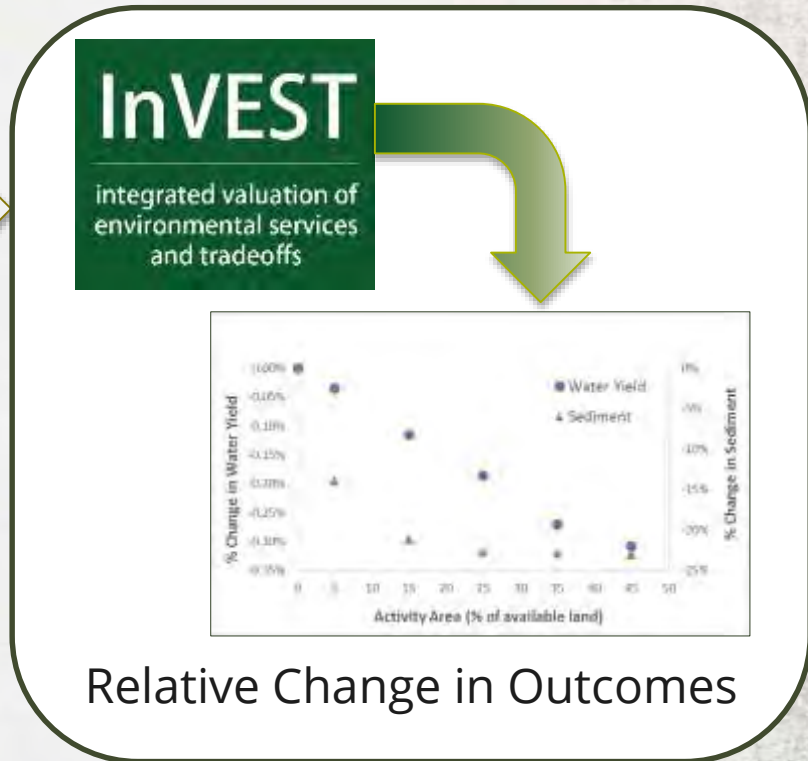
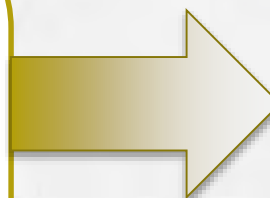
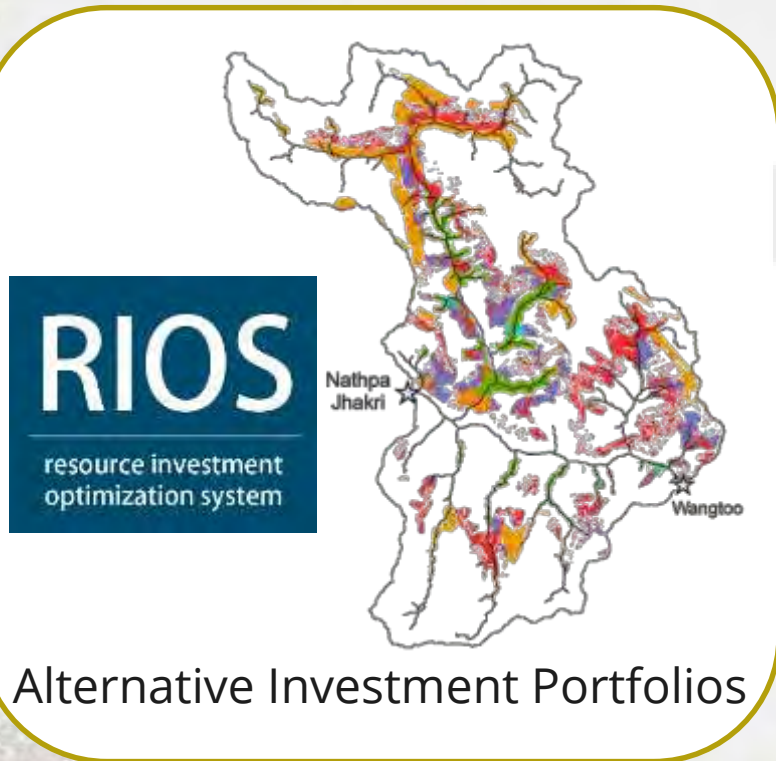
- Performed a detailed comparison of two hydrologic models for application to hydropower ecosystem services valuation in HP.

	SWAT	InVEST
Time step	Daily	Annual
Ability to calibrate/validate	High	Low
Model complexity/ physical processes represented	High	Low
Technical capacity required for model set-up, validation and analysis	High	Med
Input and calibration data required	High	Med
Number of parameters required	High	Low
Appropriate application in HP	Ecosystem service valuation	Relative change assessment

MODEL COMPARISON

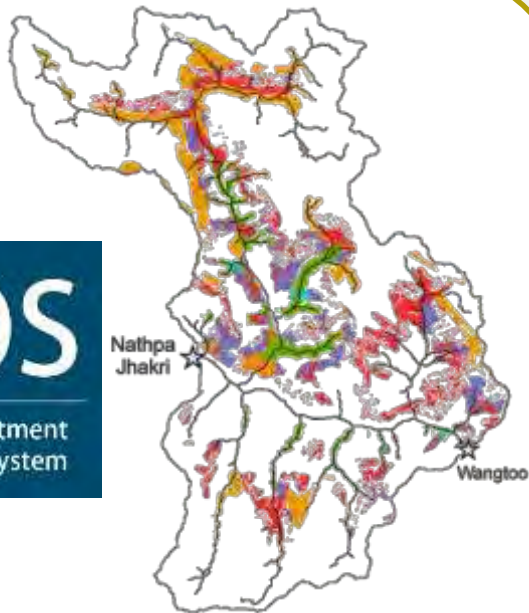


MODELING APPROACH - PHASE I



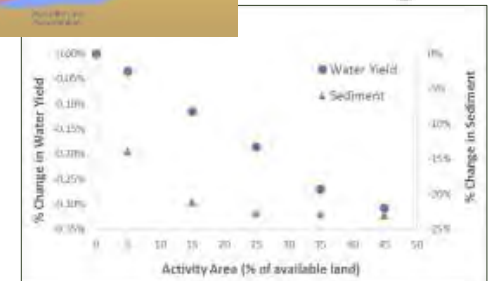
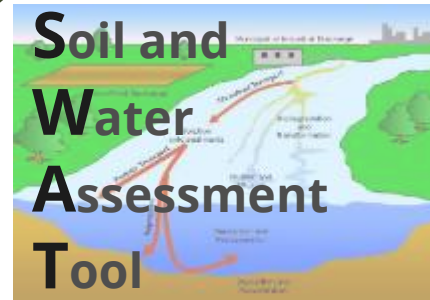
MODELING APPROACH - PHASE 2

RIOS
resource investment
optimization system



Alternative Investment Portfolios

Forest Cover & Management
Scenarios



**Avoided Cost (Value of
Ecosystem Services)**

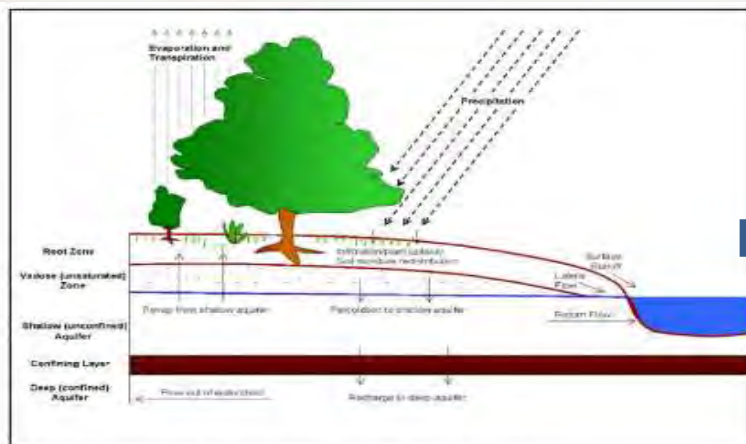


Figure 0.3: Schematic representation of the hydrologic cycle.

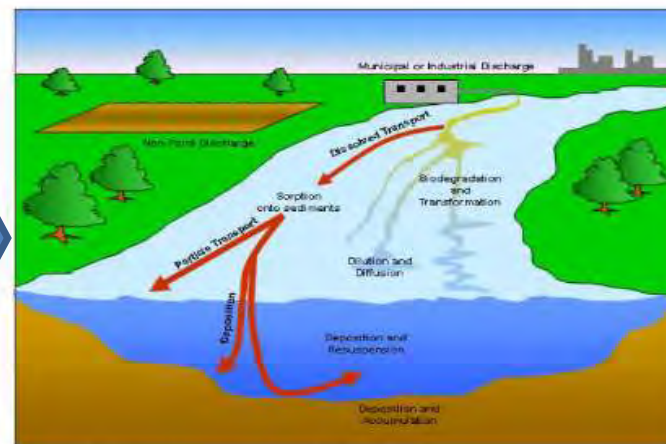
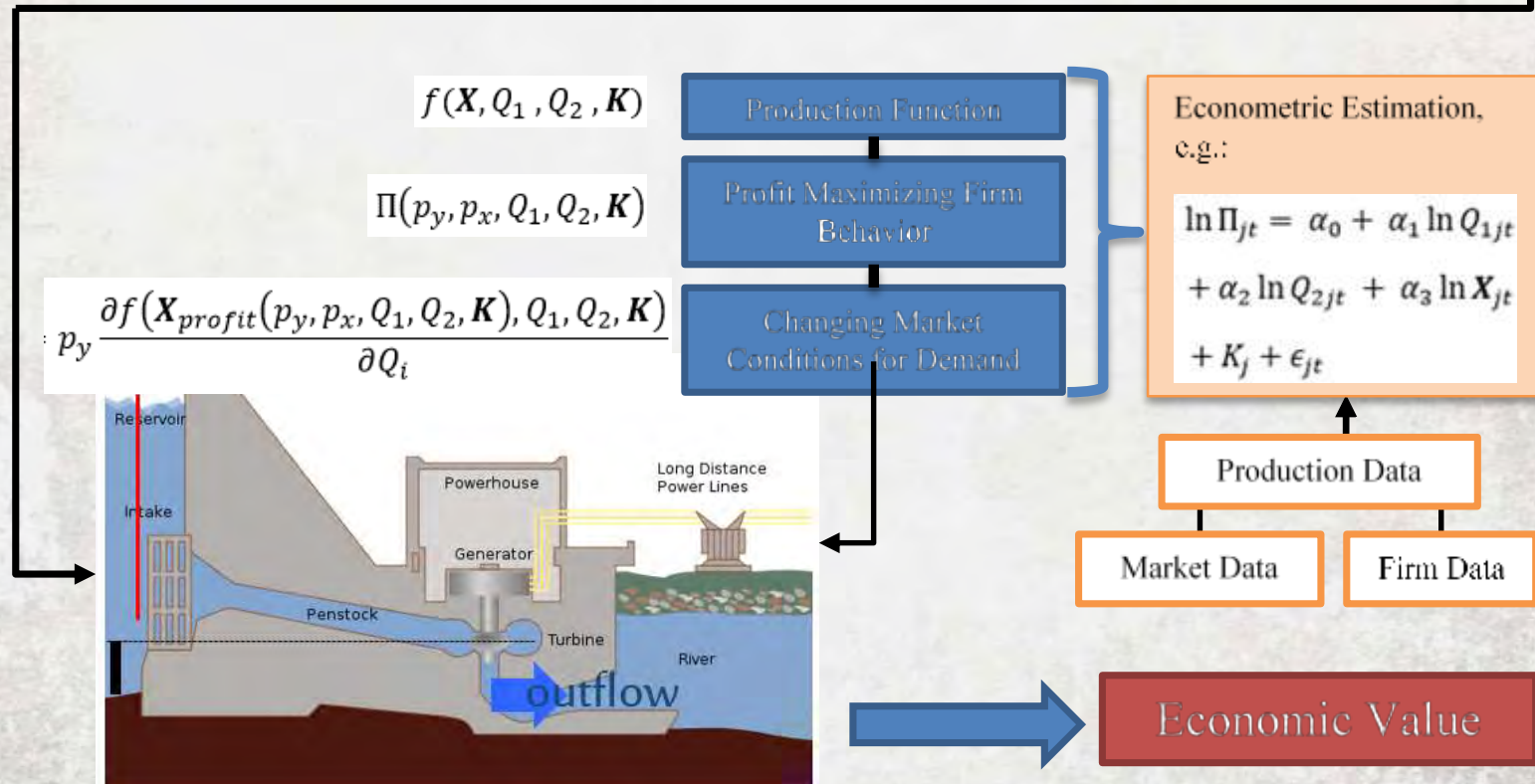


Figure 0.9: In-stream processes modeled by SWAT



NEXT STEPS

- Improve data and better align with CAT Planning inputs
- Estimate economic impacts of changes in land cover and management.
 - Calibrate and validate SWAT model for selected study area(s) within HP
 - Parameterize econometric model and validate with observed hydrologic and cost data
 - Develop scenarios of land management to provide basis for natural capital accounting study
 - Apply econometric model to assess change in hydropower value from management scenarios

NEXT STEPS

- Synthesize results and develop recommendations for
 - Application of findings to PES scheme for ecosystem services to support Hydropower
 - Scaling the methodology to a state-wide forest accounting scheme
- Build capacity throughout the above process
 - Technical capacity for modeling policy options and impacts on hydropower
 - Recommendations for translating economics approach to policy

TECHNICAL/ CAPACITY NEEDS

- Availability and accessibility of high quality data on
 - Land cover and management
 - Soils
 - Precipitation (rain/snow) in high altitude/glacial areas
 - Stream flows and sediment for some watersheds

- Connecting scientific capacity in the fields of hydrologic modeling and GIS with those who will be performing analyses to inform policy
 - Particularly if a more complex modeling approach is required
 - Develop working groups to connect technical capacity with policy needs

TECHNICAL/ CAPACITY NEEDS

Open Discussion