Integrating Biophysical and Socioeconomic Model Outputs

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International Water Management Institute

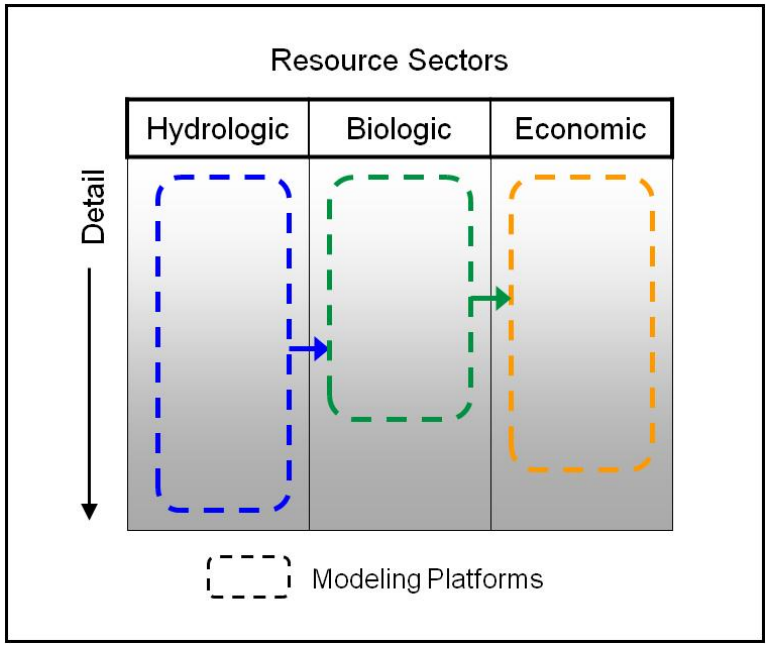
CGIAR Challenge Program on WATER & FOOD

Background

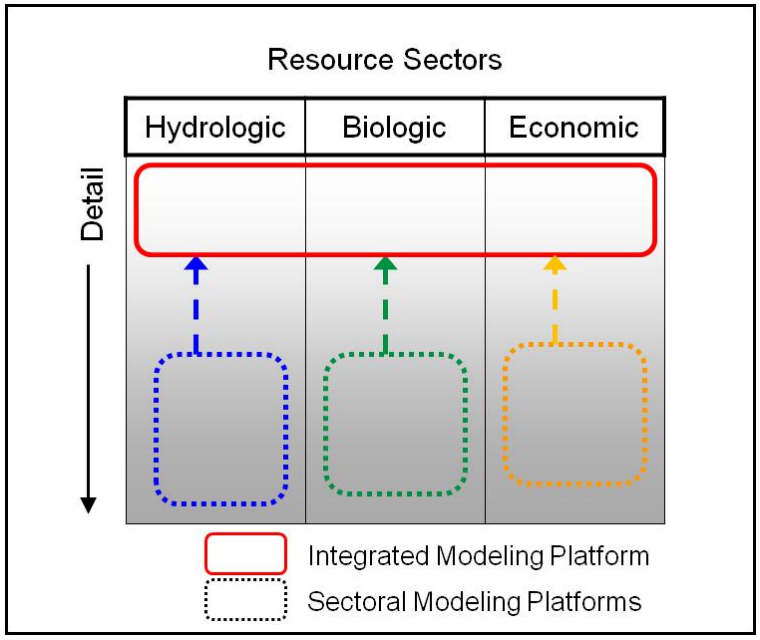
- Goal of Nile Basin Development Challenge Project 4 (N4) is to assess potential impacts- both biophysical and socioeconomic- at the basin scale resulting from implementation of Rainwater Management Strategies
- To assess impacts, need to link biophysical and socioeconomic processes
- Modeling has proceeded along disciplinary lines, and at differing scales:
  - Hydrologic: SWAT, APEX
  - Water resource management: WEAP
  - Economic: ECOSAUT
  - Crop: CropWat, AquaCrop
  - Livestock: ILRI livestock water productivity model
- This presentation: initial ideas on model integration

Basin-level BP/SE integration frameworks

Sectoral Linkage



Explicit Integration



To link and extrapolate BP and SE processes

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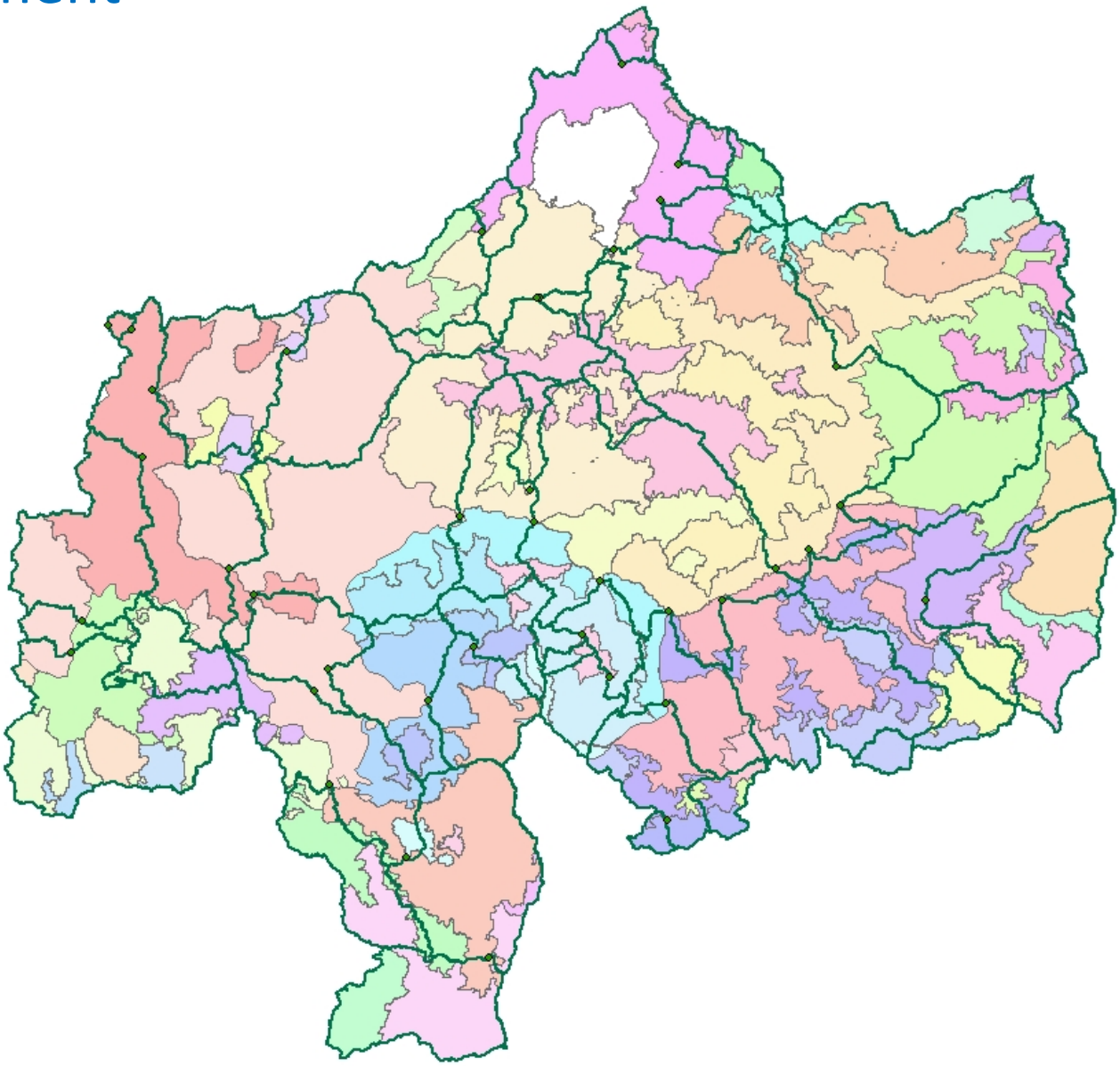
Resource Management Typology

Resource Management Typology

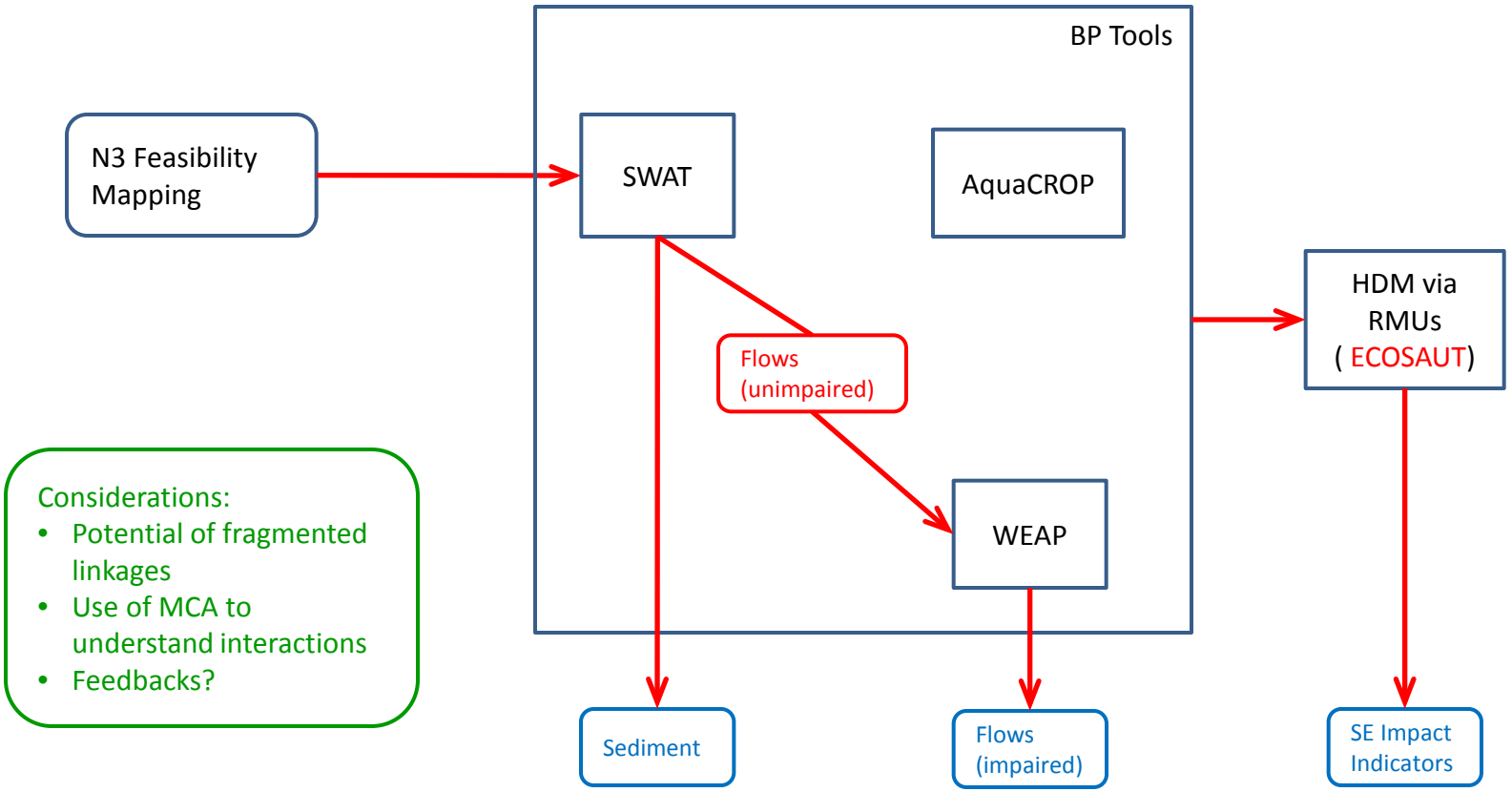
- Delineate population segment which manages BP resources in target catchment
- Partition population segment into RM units
  - Assumption: Economic decisions made at HH level
  - Livelihood Profiles suggest different HH production systems w/i Livelihood Zones
  - HH's can therefore be aggregated into RMUs based on BP and SE attribute similarities
  - Assumption: Access/benefit/cost is equitably distributed within RMU
- Water/Land "management" mapping- establish BP resource flows from/to RMUs

Resource Management Typology

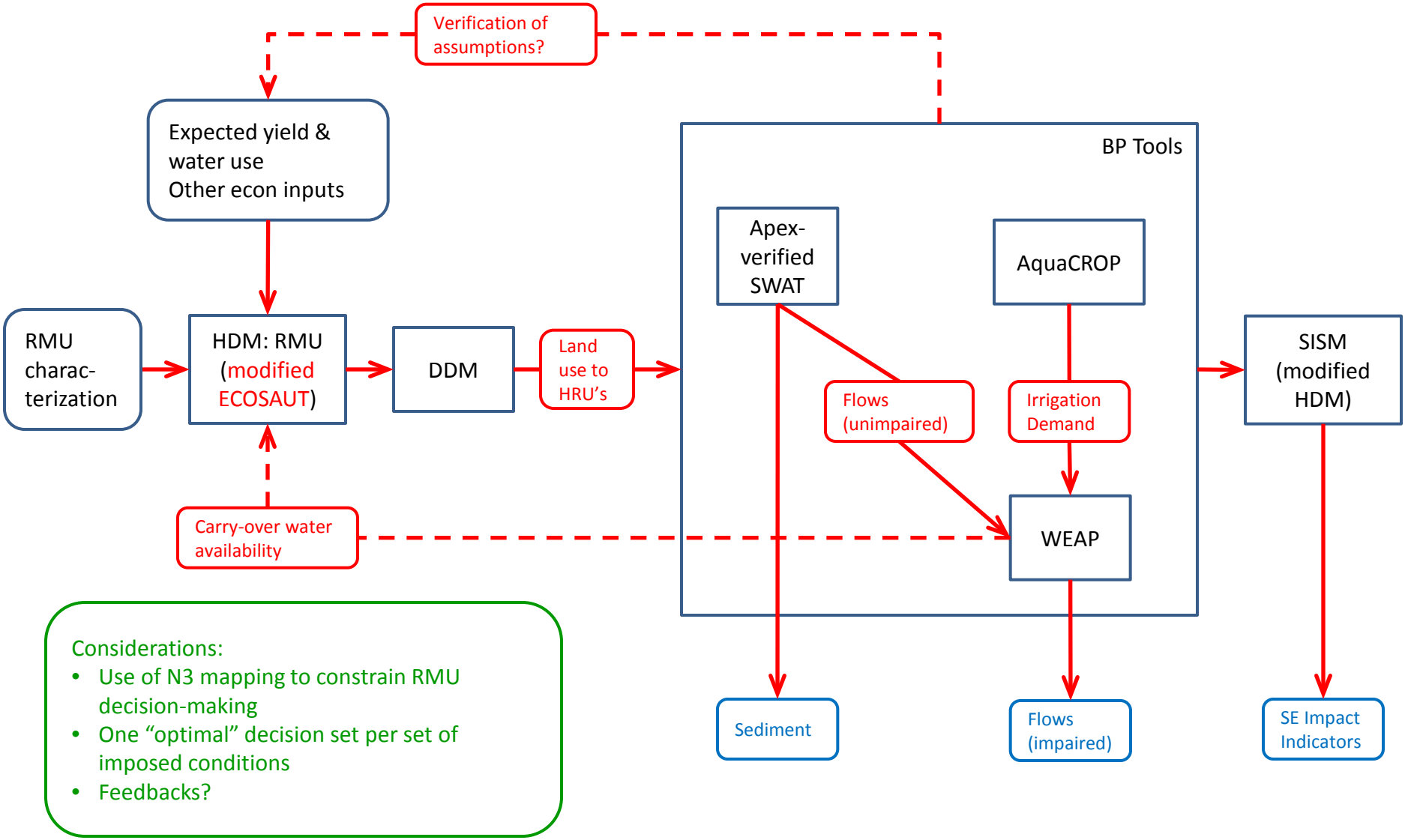
- FEWSNET/LIU Livelihood Zones/Profiles: natural RMU definitions
- Ethiopian Rural Economic Atlas: population/HH distributions
- Full spatial / economic coverage: satisfies need for extrapolation



Sectoral Linkage Approach: BP-initiated



Sectoral Linkage Approach: SE initiated



Considerations:

- Use of N3 mapping to constrain RMU decision-making
- One "optimal" decision set per set of imposed conditions
- Feedbacks?

Explicit Integration Approach

N3 Feasibility Mapping

Apex-verified SWAT

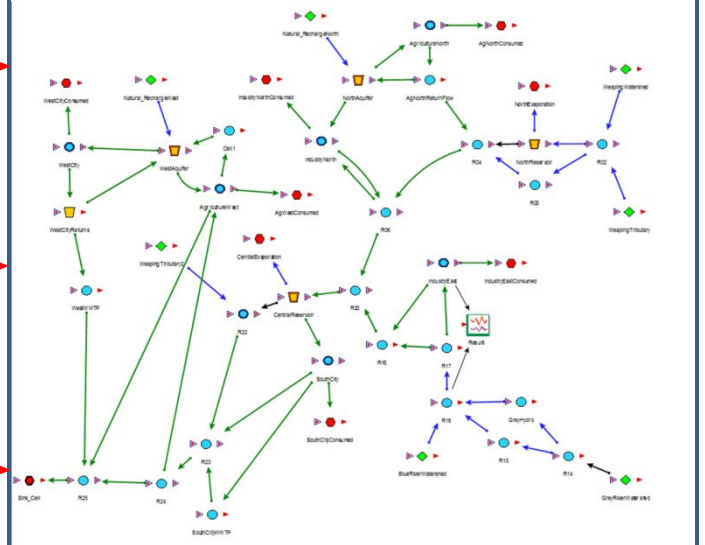
Flow/sediment response module characterization (subcatchment)

RMU charac-terization

AquaCROP

Crop response / irrigation demand module characterization

Systems Dynamics integrated model



Sediment

Flows

SE Impact Indicators

Considerations:

- Feedbacks embedded; addresses fragmented linkages
- Potential to assess many scenarios, uncertainty
- Depends upon effective modules