Capacity in the Context of SEEA Experimental Ecosystem Accounting

Lars Hein; inputs from Bram Edens, Carl Obst, Ken Bagstad, Roy Remme, Rixt de Jong

Wageningen University

Contents of the presentation

- Understanding ecosystem assets
- Four related concepts: flow, capacity, potential supply, capability
- Examples
- Conclusion

Analysing ecosystem assets in physical terms

- SEEA Framework: Ecosystem asset, in physical terms, is defined in terms of extent and condition – which determine – together with its use – the supply of ecosystem services
- But how to relate extent and condition to ecosystem services supply ?
- -> “capacity” of the ecosystem to supply services, over time
- But what is capacity ?

What is capacity?

- *Capacity = The ability of the ecosystem to generate an ecosystem service under current ecosystem conditions and uses at the highest yield or use level that does not negatively affect the future supply of the same or other ecosystem services from that ecosystem.'*
- 'Current ecosystem conditions' means that the capacity is measured for the ecosystem 'as it is,' *i.e.,* irrespective of the possibility that sustainable use at a higher extraction rate may be possible.
- 'Under current uses' means that capacity considers the type of use or management regime currently in place for the ecosystem (which would also reflect a specific basket of ecosystem services).

Is capacity sufficient to describe assets ?

We propose four concepts

- Ecosystem Service Flow: $f(E,C_t,M_t)$ |D
- Ecosystem Capacity: $f(E,C_t,M_t)$ |D, S
- Potential Supply $f(E,C_t,M_t)$ | S
- Ecosystem Capability: $f(E,C_o,M_o)$ |D, S

With

- E=Extent
- C=Condition
- M=Management
- S=Sustainability
- D=Demand

(M_t, C_t=under present ecosystem management & condition; M_o, C_o=under optimal management and associated condition; | = conditional to (the presence of))

Why do we need the concept of capacity? (2)

- Because changes in capacity indicate ecosystem degradation.

- Ecosystem degradation can be analysed based on
  1. Changes in the NPV of the expected flow of ecosystem services
  2. Changes in the **capacity** of ecosystems to generate ecosystem services

Conclusions (1)

- For details: see paper (forthcoming in Plos One?)
- Assets can in theory (and in practice!) be quantified in different ways, both in physical and monetary units
  - Actual flow of services
  - Sustainable flow of services
  - Potential flow of services (physical units only)
  - Flow of services under different management (relevant for management not necessarily for accounting)
- All of the above are based upon ecosystem extent and condition (and hence the thinking is aligned with the 2012 SEEA framework)

Conclusions (2)

- The above has implications for different ways in which we can assess ecosystem degradation
- This can be seen as:
  - A decline in extent and/or condition (but how to aggregate?)
  - A decline in expected flow of services
  - A decline in the sustainable flow of services
  - A decline in the potential supply of services
  - Even as a decline in capability to generate services
- It is likely that all four are relevant for natural resources management depending upon the context and questions asked
- The link to depletion and degradation and repercussions for accounting needs some further work.