Millennium Ecosystem Assessment

Ecosystem Service Assessments: How to do them

Bob Scholes
Natural Resources and Environment,
CSIR, Pretoria
bscholes@csir.co.za

NBSAP workshop, Rustenberg February 2008

Millennium Ecosystem Assessment

Steps to an assessment

1. **Find a champion**
2. **Create an authorising environment**
    1. Including a governance mechanism
    2. Funding
3. **The *users* define the questions**
4. **Build an author team**
    1. Lead authors
    2. Authors
    3. Contributing authors
    4. Review editors

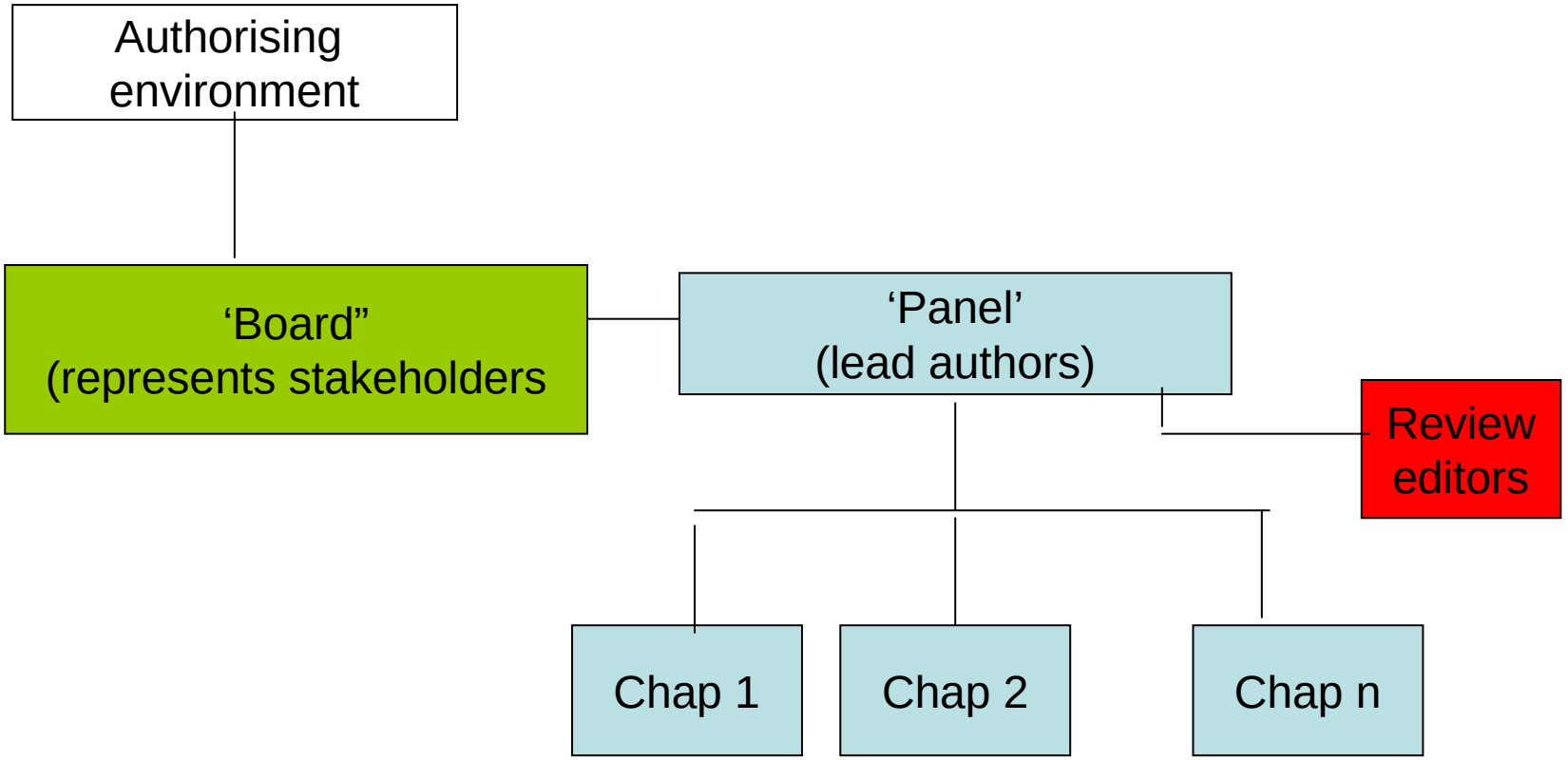
Millennium Ecosystem Assessment

Steps (continued)

4. **Zero draft (expanded outline)**
    1. Conceptual framework
    2. Chapter structure
    3. ‘within family’ review
5. **First draft**
    1. Expert review
6. **Second draft**
    1. Expert and stakeholder review
7. **Final draft**
    1. Sign-off by authorising environment
8. **Outreach and communication process**

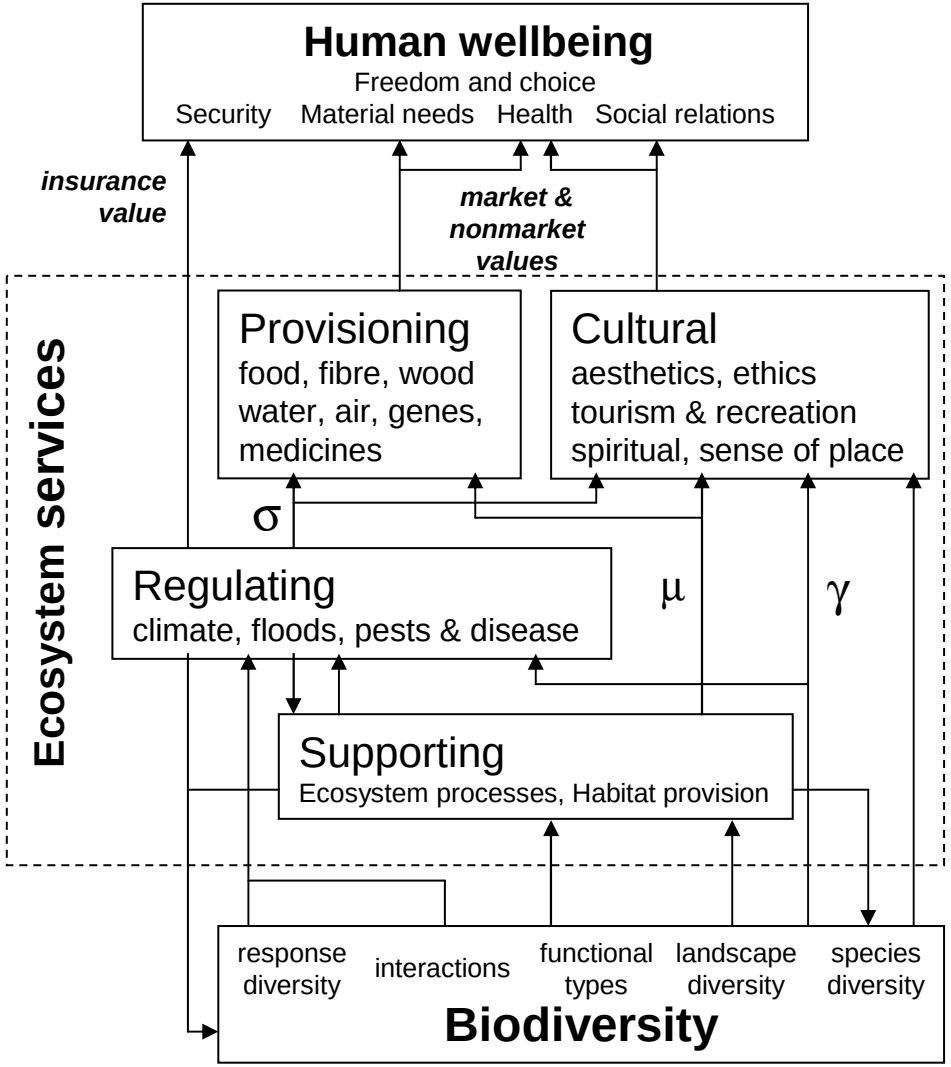
Millennium Ecosystem Assessment

Governance



Millennium Ecosystem Assessment

Where does biodiversity fit in?



Millennium Ecosystem Assessment

Setting the scope

1. **Define the spatial footprint**
    1. Biogeography- use an ecosystem map
    2. Economics: trade linkages
    3. Political boundaries
2. **Define the temporal window**
    1. 'the relevant past to the forseeable future'
    2. About once a decade
    3. More than a decade in the future need scenarios
3. **Identify which services you will focus on**
    1. What does the authorising environment want?
    2. What can feasibly be done?

Millennium Ecosystem Assessment

Measuring Biodiversity

1. **There are dozens of ways to express biodiversity!**
2. **Not all are equally appropriate**
    1. Sensitivity and accuracy
    2. Relevance and ease of communication
    3. Practicality- is there data, what will it cost?
3. **The main problem is responsibly simplifying the information**
    1. Eg Biodiversity Intactness Index (BII)

Millennium Ecosystem Assessment

Desirable properties of indicators

Relevant to policy-making
Simple and easily understood
Broadly accepted
Scientifically credible
Quantitative
Normative (allowing comparison with a baseline and target)
Measurable in a sufficiently accurate way at an affordable cost
Responsive to changes at policy-relevant time and space scales
Useable for scenarios of future projections
Allow aggregation and disaggregation between ecosystem, national, and international scales
Useable in various composite indicators and for different purposes.

R Biggs, RJ Scholes, B Ten Brink and D Vačkář (in press) **Biodiversity Indicators In: Moldan, B., T. Hak, and P. Bourdeau (eds) *Sustainable Development: How to measure progress through Indicators*. Island Press, Washington**

Millennium Ecosystem Assessment

The Biodiversity Intactness Index

$$BII = \frac{\sum_i \sum_j \sum_k R_{ij} A_{jk} I_{ijk}}{\sum_i \sum_j \sum_k R_{ij} A_{jk}}$$

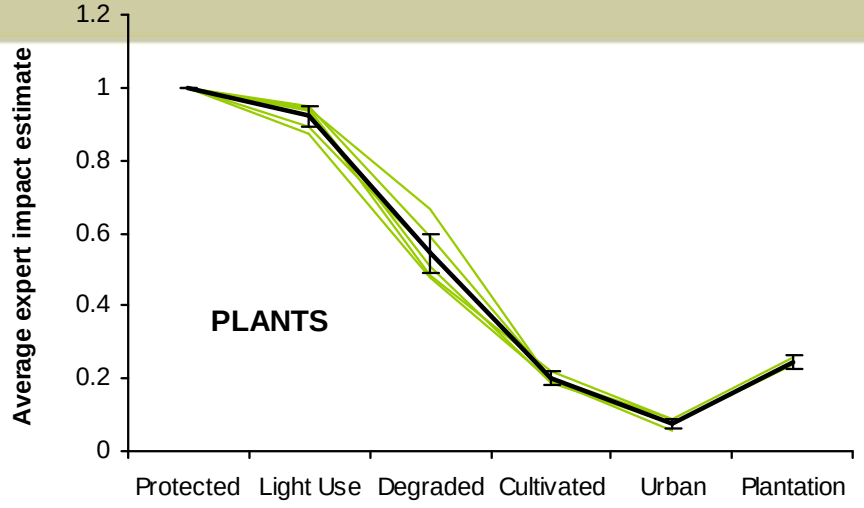
where

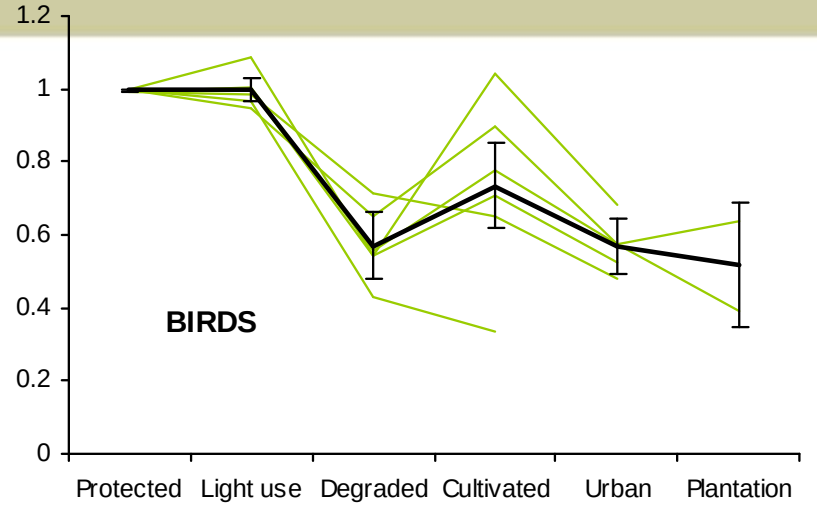
R_{ij} = Richness (number of species) of group *i* in ecosystem *j*
A_{jk} = Area of land use *k* in ecosystem *j*
I_{ijk} = population abundance of group i in ecosystem j under landuse k relative to a reference population size (that in a contemporary large protected area, or that assumed to have existed in some pre-disturbance time)

Scholes, RJ and R Biggs (2005) A biodiversity intactness index *Nature* 434, 45-9

Millennium Ecosystem Assessment

Biodiversity Intactness

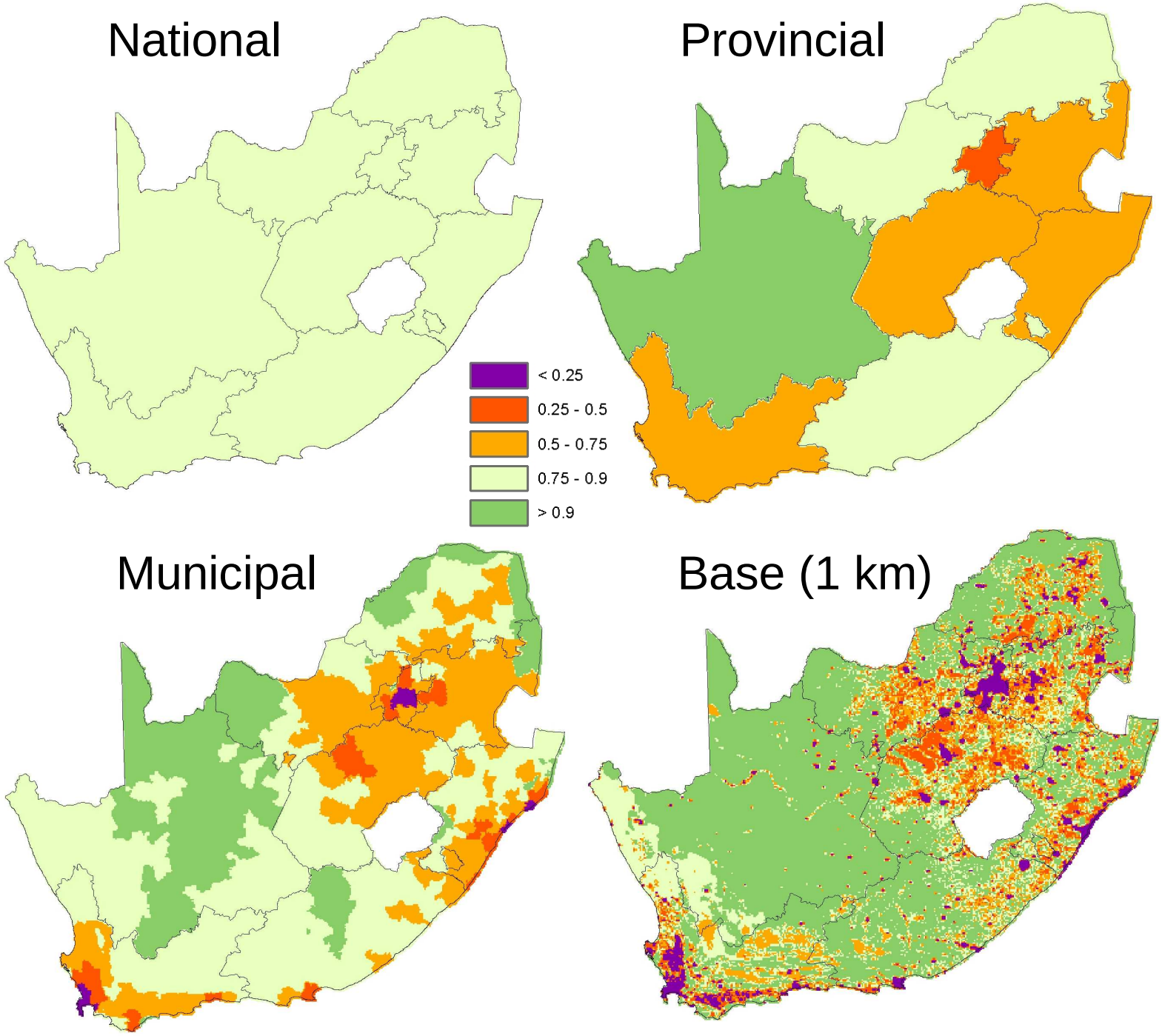




	Plants	Mammals	Birds	Reptiles	Amphibia	ALL TAXA
Forest	0.75	0.75	0.92	0.86	0.85	**0.78**
Savanna	0.86	0.73	0.96	0.89	0.96	**0.87**
Grassland	0.72	0.55	0.90	0.76	0.81	**0.74**
Shrubland	0.86	0.72	1.06	0.93	1.27	**0.89**
Fynbos	0.75	0.78	0.91	0.77	0.79	**0.76**
Wetland	0.91	0.83	0.94	0.92	0.95	**0.91**
All Biomes	**0.82**	**0.71**	**0.96**	**0.88**	**0.95**	**0.84**

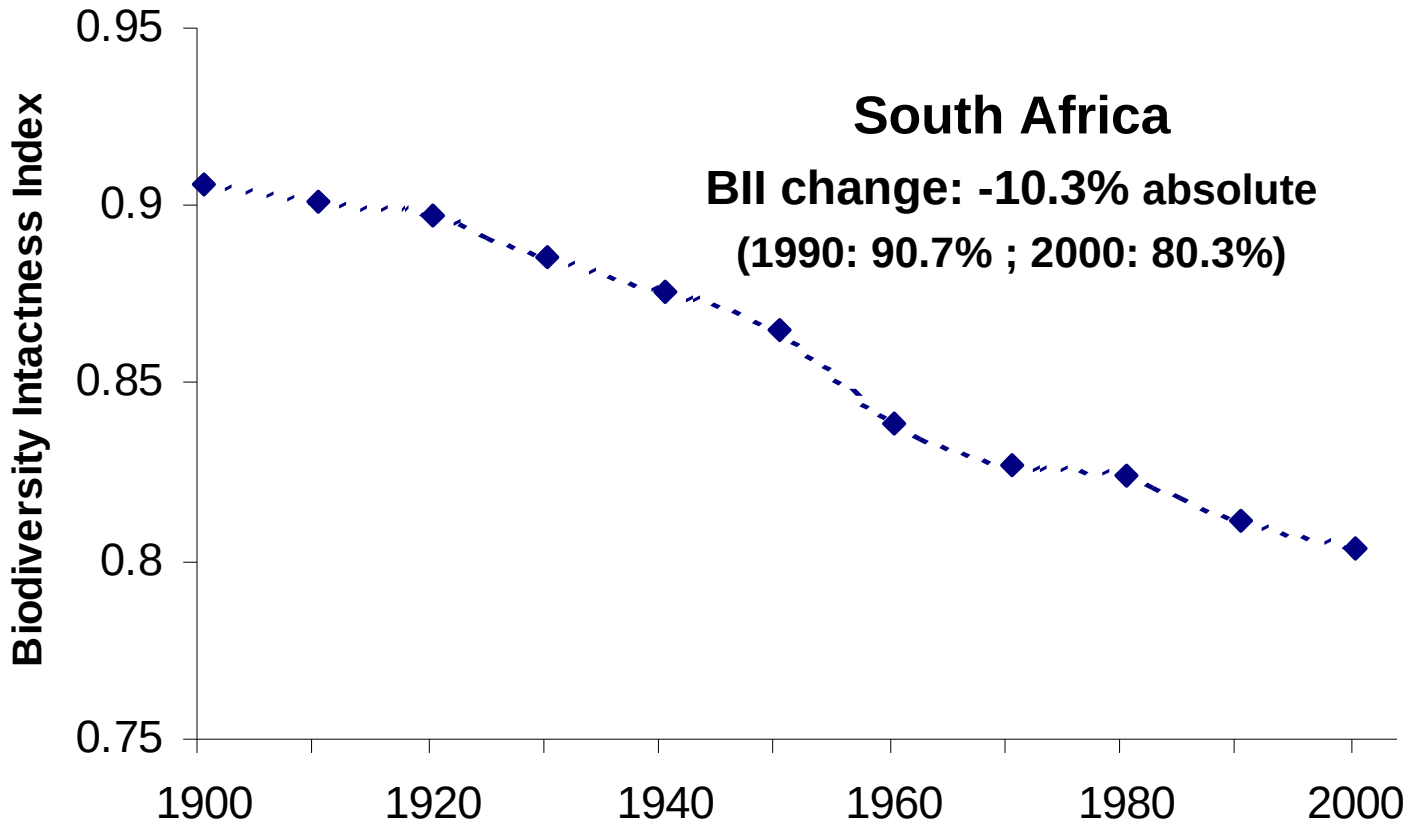
Millennium Ecosystem Assessment

It works at all scales



Millennium Ecosystem Assessment

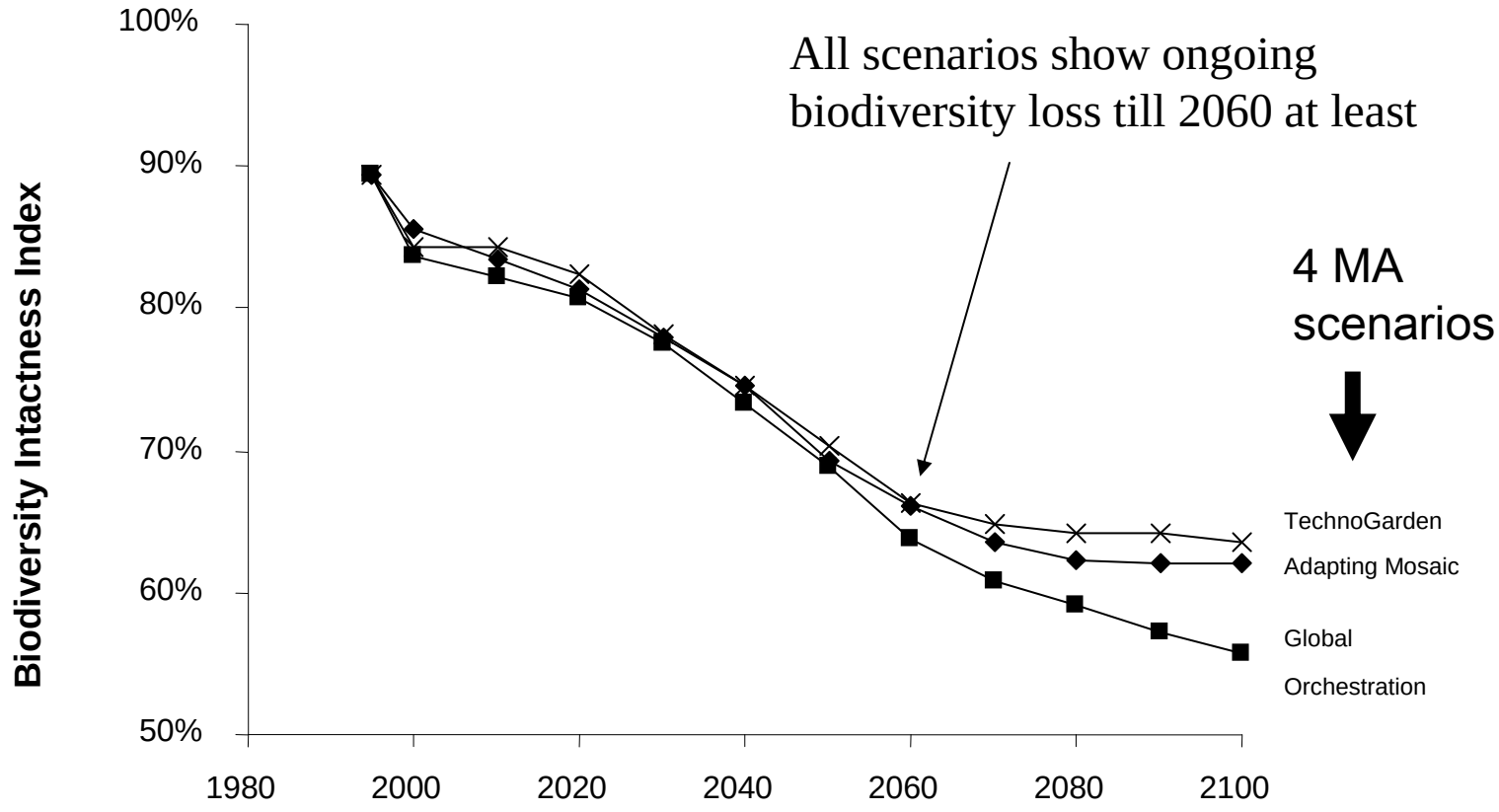
BII changes in the 20th century in South Africa



R. Biggs and R.J. Scholes (in press) Historical changes in natural capital in South Africa: An approach using changes in biodiversity In: *Restoring Natural Capital* S.J. Milton and J. Aronson (eds) Island Press: Washington, D.C.

Millennium Ecosystem Assessment

Biodiversity intactness out to 2100 Southern hemisphere Africa



See Biggs et al in Global Environmental Change 2008

Millennium Ecosystem Assessment

Quantifying services

Hybrid of observations and models

- **Confidence limits (qualitative or quantitative)**

Be aware of the difference between stocks and flows

- **Stock = amount of underlying resource per unit area**
- **Flow = yield per unit area per unit of time**

Use a range of techniques (market values, substitution values, shadow pricing, willingness to pay etc) to get value

Millennium Ecosystem Assessment

Supply and demand

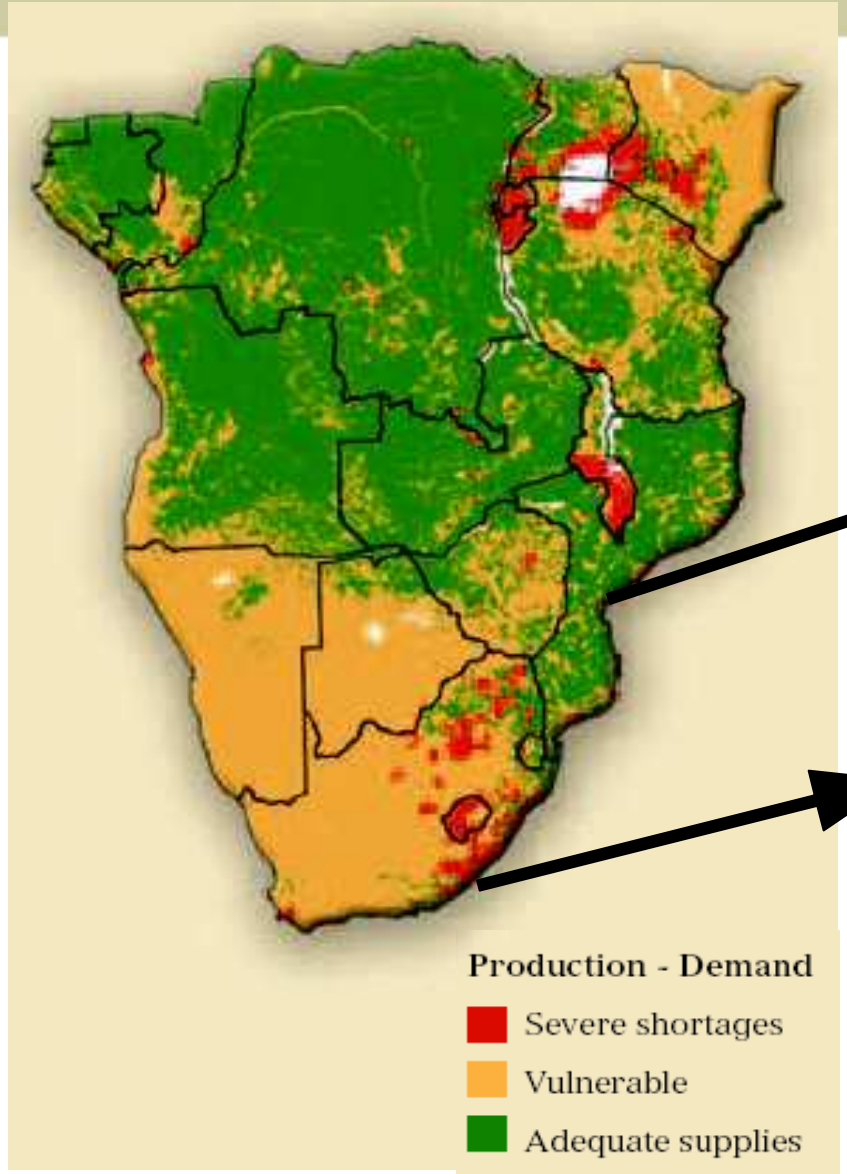
Demand can also be calculated using models and observations

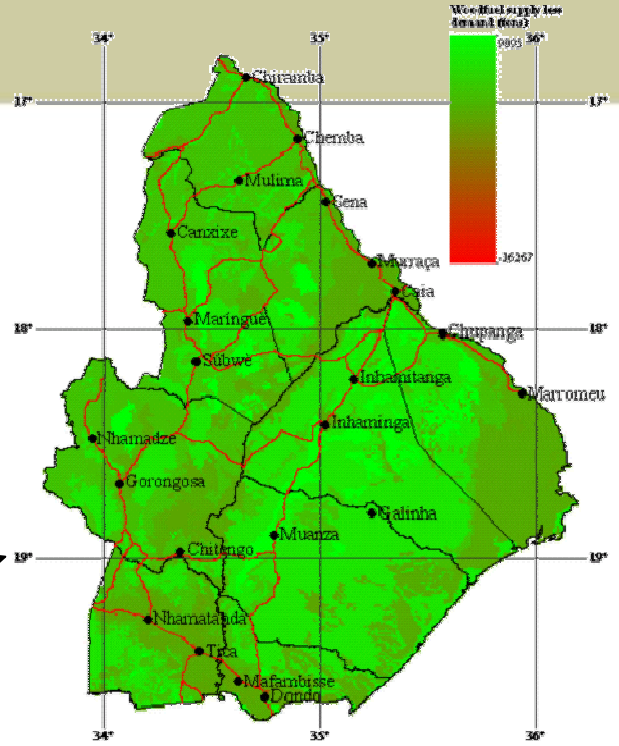
Demand = population * use per capita

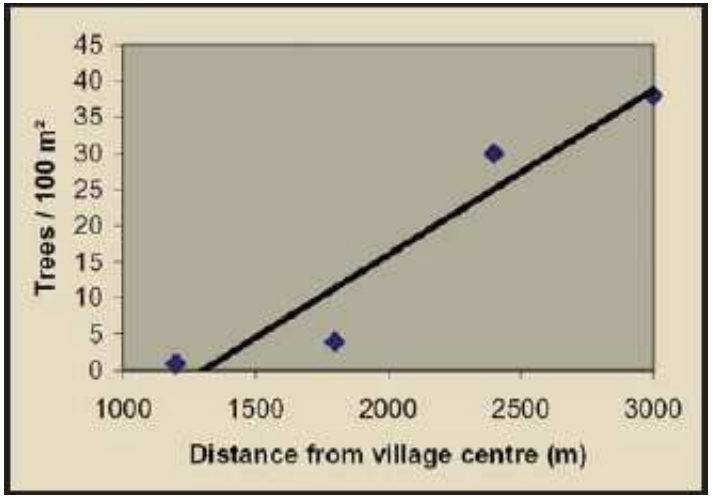
Indicator = Supply-Demand (not supply/demand)

Millennium Ecosystem Assessment

Fuelwood supply less demand







Millennium Ecosystem Assessment

Products

1. **Assessment report**
    1. Summary for policymakers (5-20 pages)
        1. *One per key stakeholder group*
    2. Underlying reports
    3. Availability on the web
2. **Data resources**
    1. Databases, maps, review comments
3. **Media materials**
    1. Powerpoints and brochures
    2. Print
    3. Radio and podcasts
    4. Television
    5. Websits