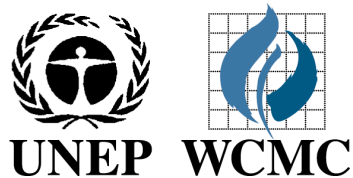


# Ecosystem services tools to help business: CEV, INVEST, ARIES

Proteus annual meeting, Stavanger 15th June

Jörn P W Scharlemann



# Assessing ecosystem services is emerging as a priority for businesses

- Multilateral organisations: release of TEEB reports; establishment of IPBES; IFC forthcoming re-issue of Performance Standard 6
- Governments are exploring new accounting & valuation methodologies
- Investor demand for more explicit performance & disclosure relating to ecosystem services
- Business engagement with ecosystem services through corporate policy, impact assessment & decision making
- Emerging opportunities in managing and restoring ecosystem services

# Need to value ecosystem services



## *Provisioning services*

Products or goods such as water, fish & timber.



## *Regulating services*

Ecosystem functions such as flood control & climate regulation.



## *Cultural services*

Non-material benefits such as recreational, aesthetic & spiritual benefits.



## *Supporting services*

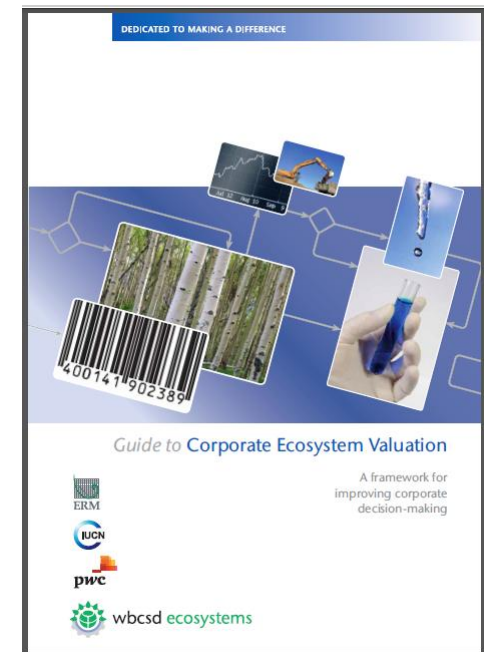
Fundamental processes such as nutrient cycling & photosynthesis that support the other three categories.

Source: Based on WRI materials.

# Corporate Ecosystem Valuation



- Process to make better-informed business decisions by explicitly valuing both ecosystem degradation and the benefits provided by ecosystem services.
- Road tested by 14 member companies
- Financial & societal values
- Direct, indirect, option & non-use values



# CEV: Corporate Ecosystem Valuation

1. Screening: Do you need to undertake a CEV?
2. Methodology: How to conduct a CEV



# Ecosystem service tools



Landscape-level  
Spatially-explicit analyses & simulations

# Mapping ecosystem services

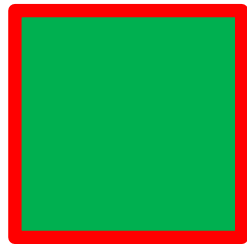
Areas of service provision



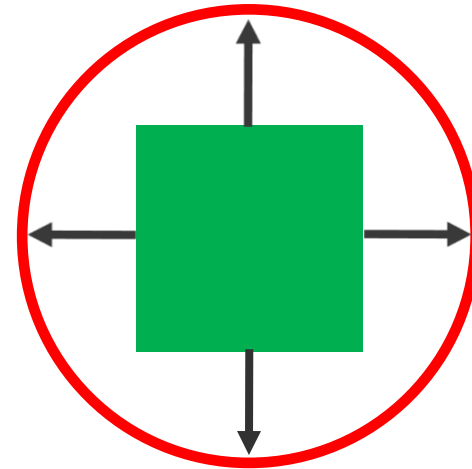
Trajectories of flow

Areas of benefit

# Mapping ecosystem services



e.g.  
Soil formation  
Raw materials

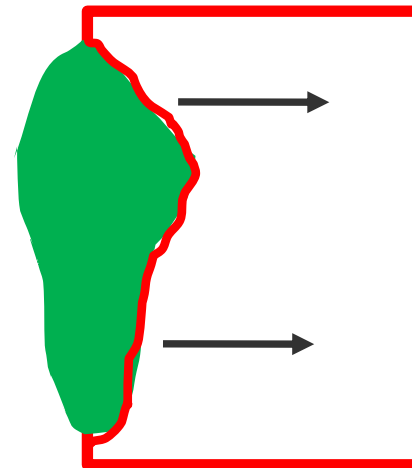
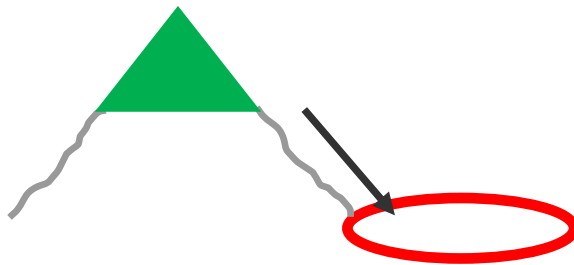


e.g.  
Pollination  
Carbon  
sequestration

Areas of service provision

Trajectories of flow

Areas of benefit



e.g.  
Water regulation  
Coastal protection

# InVEST: Integrated Valuation of Ecosystem Services and Tradeoffs



WOODS INSTITUTE  
FOR THE ENVIRONMENT  
STANFORD UNIVERSITY



The Nature  
Conservancy



INSTITUTE ON THE  
ENVIRONMENT  
UNIVERSITY OF MINNESOTA  
Driven to Discover™

- Family of tools to map & value the goods and services from nature which are essential for sustaining and fulfilling human life
- Spatially explicit & multiple scales: local-global
- Inputs: data on land use/land cover change and process based models. Tiered approach.
- Outputs: supply of service, demand, economic value
- Freely available, ESRI ArcGIS toolbox

# Ecosystem service models in InVEST

## 2.1

### Terrestrial

- Biodiversity & habitat quality
- Carbon storage & sequestration
- Reservoir hydropower production
- Water purification
- Sediment retention
- Managed timber production
- Crop pollination

### Marine

- Wave energy
- Coastal vulnerability
- Marine fish aquaculture
- Aesthetic quality
- Fisheries
- Recreation & tourism
- Habitat risk assessment

# ARIES: ARtificial Intelligence for Ecosystem Services



- “intelligent modelling platform, ... Incorporates existing ecological process models without assistance from user”
- Spatially explicit & scale: local-national
- Inputs: data, artificial intelligence models. Bayesian models.
- Outputs: probabilistic flows, uncertainty .
- Currently unavailable, internet platform

# Ecosystem service models in ARIES

## Terrestrial

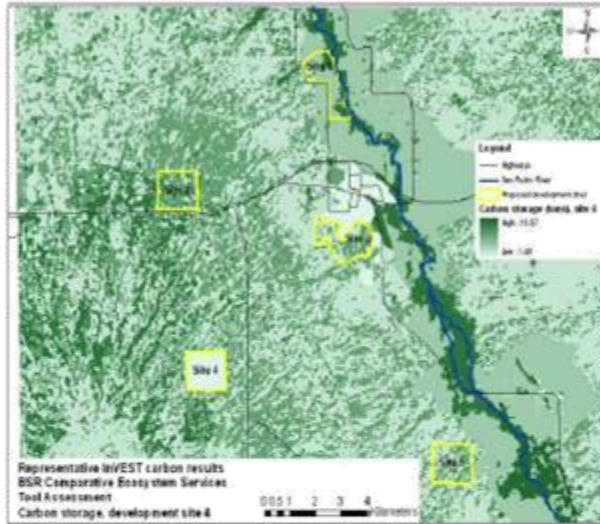
- Carbon storage & sequestration
- Aesthetic proximity
- Aesthetic viewsheds
- Sediment regulation
- Flood regulation
- Water supply
- Recreation
- Nutrient regulation

## Marine

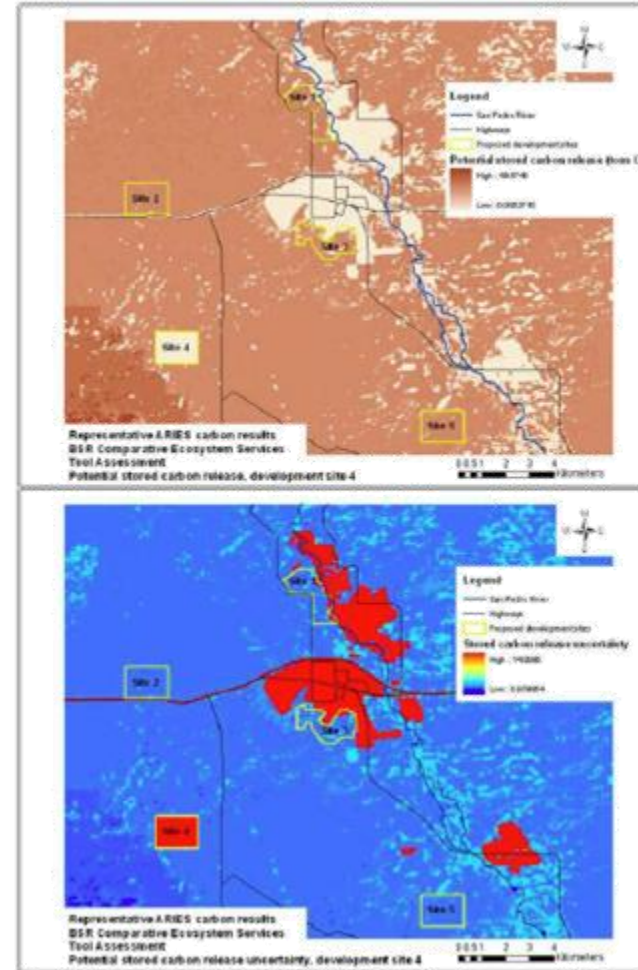
- Coastal flood regulation
- Subsistence fisheries

# Comparison of tools

**InVEST**  
Carbon Sequestration and Storage



**ARIES**  
Atmospheric Carbon Sources and Uncertainty



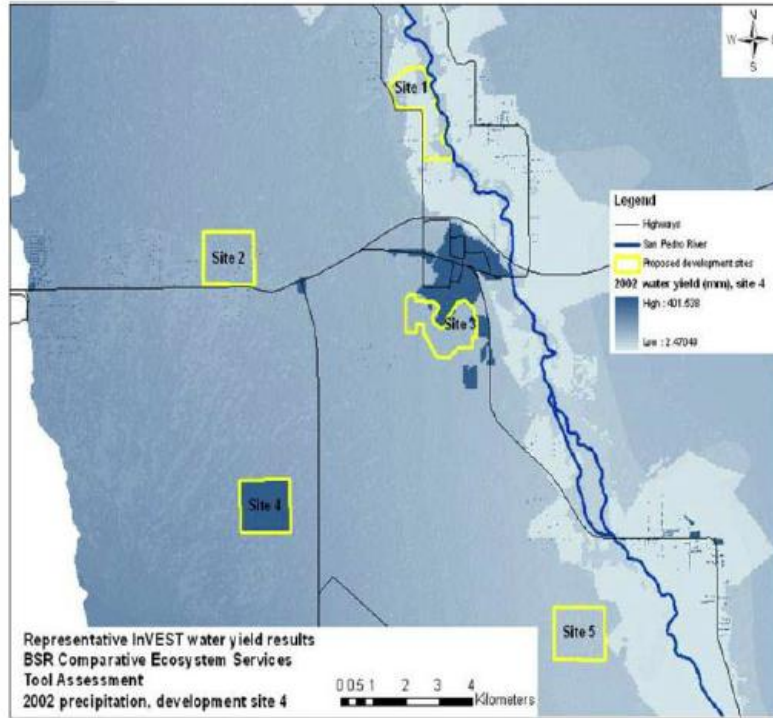
San Pedro watershed, Arizona, USA

BSR (2011) New business decision-making aids in an era of complexity, scrutiny, and uncertainty

# Comparison of tools

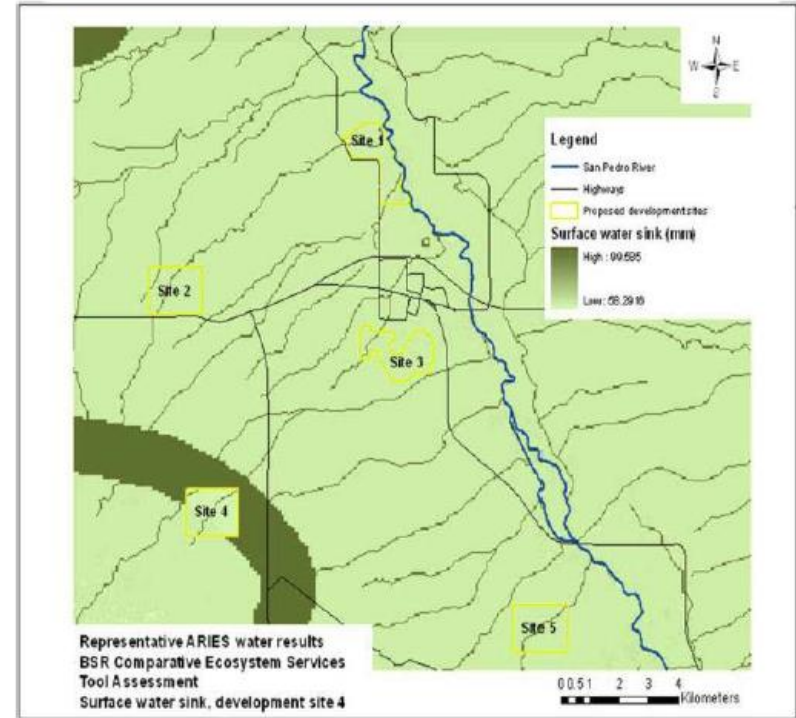
## InVEST

Water Yield (millimeters per year, dry year or wet year)



## ARIES

Surface Water Sink (millimeters per year, dry year or wet year)



San Pedro watershed, Arizon, USA

BSR (2011) New business decision-making aids in an era of complexity, scrutiny, and uncertainty

# Comparison of tools

- Difficult to compare: different definitions of ecosystem services
- Time required for application: 160-300 hrs senior technical expert to parameterise
- Unclear how to integrate multiple ecosystem services

# Tools summary

- Various tools, data models & GIS approaches being developed
- Require input of site specific information
- Often use aggregated or average information take from other sites and context
- Still in developmental stage, rely on doubtful data, often difficult and inflexible to use
- Interactions and aggregation of individual ecosystem services unclear
- All models ignore dynamics
- Treat with great caution

# Conclusions

- Business today need to consider impacts and opportunities in relation to multiple parameters, in particular ecosystem services
- Ecosystem service concepts and tools will continue to mature
- Arena likely to become crowded and confusing as more tools are being developed
- Standardization of definitions, values and valuation techniques
- More robust and user-friendly valuation tools needed

# Links

Corporate Ecosystem Valuation

[www.wbcsd.org/web/cev.htm](http://www.wbcsd.org/web/cev.htm)

InVEST

[www.naturalcapitalproject.org](http://www.naturalcapitalproject.org)

ARIES

[www.ariesonline.org](http://www.ariesonline.org)