Long Walk Towards Sustainable Development: A Stop over the Ecosystem Services Framework

Unai Pascual

18 November 2015, Barcelona
CREAF, la Societat Catalana de Biologia (SCB) & la Institució Catalana d’Història Natural (ICHN)
Introduction

1. Abridged historical view on the concept of sustainability

2. What is (& could become) the Ecosystem Services (ES) framework?

3. Take home message
Sustain..., what exactly?

- Literally: everything?
- **Ecological** basis of human life?
- Human basis of human life?
  - Economic notions of progress?
  - Social notions of dignity?
We all believe that sustainability is something really good.

The less you know about it the better it sounds

According to UNESCO:

- “...Every generation should leave water, air and soil resources as pure and unpolluted as when it came on earth”.
- “Each generation should leave undiminished all the species of animals it found existing on earth”.

Brundtland Report (80’s):

- “Sustainable development is development which meets the needs of the present without compromising the ability of future generations to meet their own needs”.

www.bc3research.org
Sustainability is a **vague concept**. Most agree about obligation to the future

There is no specific ethical requirement about whether we need to leave something **untouched**. → This implies **hard choices**:  

- what natural capital we **use up/disinvest** and which ones we **maintain/invest** in?  
- What are the environmental **tradeoffs** in such decisions?  
- What is the resulting **distribution of benefits and costs** in society?  
- …
1968: UNESCO
International Conference for Rational Use and Conservation of the Biosphere

1972: United Nations
Conference on the Human Environment (Stockholm, Sweden)

1987: UN World Commission on Environment and Development (WCED) (Brundtland Commission)

1987: "Our Common Future"


2002: Johannesburg (Rio+10)
2012: Rio+20

"Limits to Growth"

"Green Economy"


2012: Intergovernmental Platform on Biodiversity & Ecosystem Services (IPBES)
MA; "the benefits people obtain from ecosystems." 4 categories of ES — supporting, provisioning, regulating and cultural

IPBES: “The benefits (and occasionally losses or detriments) that people obtain from ecosystems”. 3 categories: provisioning, regulating and cultural.
The Millennium Ecosystem Assessment – The legacy
MA framework: Consequences of Ecosystem Change for Human Well-being

**ECOSYSTEM SERVICES**

- **Provisioning**
  - Food
  - Fresh water
  - Wood and fiber
  - Fuel
  - ...

- **Supporting**
  - Nutrient cycling
  - Soil formation
  - Primary production
  - ...

- **Regulating**
  - Climate regulation
  - Flood regulation
  - Disease regulation
  - Water purification
  - ...

- **Cultural**
  - Aesthetic
  - Spiritual
  - Educational
  - Recreational
  - ...

**CONSTITUENTS OF WELL-BEING**

- **Security**
  - Personal safety
  - Secure resource access
  - Security from disasters

- **Basic material for good life**
  - Adequate livelihoods
  - Sufficient nutritious food
  - Shelter
  - Access to goods

- **Freedom of choice and action**
  - Opportunity to be able to achieve what an individual values doing and being

- **Health**
  - Strength
  - Feeling well
  - Access to clean air and water

- **Good social relations**
  - Social cohesion
  - Mutual respect
  - Ability to help others

*Source: Millennium Ecosystem Assessment*
**Direct Drivers of Change**
- Changes in land use
- Species introduction or removal
- Technology adaptation and use
- External inputs (e.g., irrigation)
- Resource consumption
- Climate change
- Natural physical and biological drivers (e.g., volcanoes)

**Indirect Drivers of Change**
- Demographic
- Economic (globalization, trade, market and policy framework)
- Sociopolitical (governance and institutional framework)
- Science and Technology
- Cultural and Religious

**Human Well-being and Poverty Reduction**
- Basic material for a good life
- Health
- Good Social Relations
- Security
- Freedom of choice and action
Four Working Groups

<table>
<thead>
<tr>
<th>Condition and Trends</th>
<th>Scenarios</th>
<th>Responses</th>
</tr>
</thead>
</table>
| - What is the current condition and historical trends of ecosystems and their services?  
- What have been the consequences of changes in ecosystems for human well-being? | - Given plausible changes in primary drivers, what will be the consequences for ecosystems, their services, and human well-being? | - What can we do to enhance well-being and conserve ecosystems? |

**Sub-Global**
- All of the above, at regional, national, local scales
Millennium Ecosystem Assessment (MA)

Approved assessments
Associated assessments

Trade, poverty, and environment: sites in Chile, China, India, Madagascar, Mexico, South Africa, and Viet Nam
There are many sub-global assessments
1. Over the past 50 years, humans have changed ecosystems more rapidly and extensively than in any comparable period of time
2. There have been substantial net gains in economic development, at the cost of growing degradation of many ES
3. The degradation of ES could grow significantly worse during the first half of this century
4. This can be reversed by significantly changing policies, institutions and practices, that are not currently under way
### FINDING 1:

- Approx. 60% of ES are being degraded
- This causes significant harm to human well-being and a loss of wealth of a country

#### Provisioning Services

<table>
<thead>
<tr>
<th>Service</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food</td>
<td></td>
</tr>
<tr>
<td>Crops</td>
<td>✓</td>
</tr>
<tr>
<td>Livestock</td>
<td>✓</td>
</tr>
<tr>
<td>Capture fisheries</td>
<td>✅</td>
</tr>
<tr>
<td>Aquaculture</td>
<td>✓</td>
</tr>
<tr>
<td>Wild foods</td>
<td>✅</td>
</tr>
<tr>
<td>Fiber</td>
<td></td>
</tr>
<tr>
<td>Timber</td>
<td>+/-</td>
</tr>
<tr>
<td>Cotton, silk</td>
<td>+/-</td>
</tr>
<tr>
<td>Wood fuel</td>
<td>✅</td>
</tr>
<tr>
<td>Genetic resources</td>
<td>✅</td>
</tr>
<tr>
<td>Biochemicals, medicines</td>
<td>✅</td>
</tr>
<tr>
<td>Fresh water</td>
<td>✅</td>
</tr>
</tbody>
</table>

#### Regulating Services

<table>
<thead>
<tr>
<th>Service</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air quality regulation</td>
<td>✓</td>
</tr>
<tr>
<td>Climate regulation – global</td>
<td>✓</td>
</tr>
<tr>
<td>Climate regulation – regional and local</td>
<td>✓</td>
</tr>
<tr>
<td>Water regulation</td>
<td>+/-</td>
</tr>
<tr>
<td>Erosion regulation</td>
<td>✓</td>
</tr>
<tr>
<td>Water purification and waste treatment</td>
<td>✅</td>
</tr>
<tr>
<td>Disease regulation</td>
<td>+/-</td>
</tr>
<tr>
<td>Pest regulation</td>
<td>✅</td>
</tr>
<tr>
<td>Pollination</td>
<td>✅</td>
</tr>
<tr>
<td>Natural hazard regulation</td>
<td>✅</td>
</tr>
</tbody>
</table>

#### Cultural Services

<table>
<thead>
<tr>
<th>Service</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spiritual and religious values</td>
<td>✅</td>
</tr>
<tr>
<td>Aesthetic values</td>
<td>✅</td>
</tr>
<tr>
<td>Recreation and ecotourism</td>
<td>+/-</td>
</tr>
</tbody>
</table>
Degradation of ecosystem services often causes significant harm to human well-being

- Degradation tends to lead to the loss of non-marketed benefits from ecosystems.
- The economic value of these benefits is often high and sometimes higher than the marketed benefits.

*Timber and fuelwood generally accounted for less than a third of total economic value of forests in eight Mediterranean countries.*
UK National Ecosystem Assessment, MAES, etc

Consistent with MAES framework and CICES classification

Ecosystem processes | Ecosystem services | Products | Measures of value
---|---|---|---
Weathering | Crops, livestock, fish | Food | €
Primary production | Water availability | Timber | €
Decomposition | Trees | Water quality | €
Soil formation | Peat | Energy | €
Nutrient cycling | Waste breakdown | Equable climate | €
Water cycling | Detoxification | Pollution control | €
Climate regulation | Purified water | Flood control | €
Pollination | Meaningful places | Nature viewing | €
 | Species diversity | Recreation | €

Wellbeing

Consistent with MAES framework and CICES classification

Policy impacts: Converting forest to farmland
Policy impacts: Converting farmland to forestry
Adjust for inputs of other capital to reveal the net value of ecosystem service inputs

Adapted from Bateman et al. (2011), Mace et al. (2011) and UK NEA (2011)
IPBES conceptual framework. (MA v2)

- **Multiple notions** of ES
- **Supporting services** embedded under biodiversity
- **Co-production** of ES
- **Institutions** at the core
- **Values**: Anthropocentric (instrumental & relational) vs. intrinsic values
Current Opinion in Environmental Sustainability

Volume 14, June 2015, Pages 76-85
Open Issue

Linking biodiversity, ecosystem services, and human well-being: three challenges for designing research for sustainability


Available online 22 April 2015

Choose an option to locate/access this article:
1. How are ecosystem services co-produced by social-ecological systems?

The production of ES is a result of the interplay between social and ecological processes.

We need to understand how their combinations affect the resilience and sustainability of the provision of ES.
2. Who benefits from the provision of ecosystem services?

We need better understanding about the diversity of stakeholders, their motivations, and preferences for ES in order to identify potential social conflicts and inequities arising from the access to specific ES by different individuals and groups.
What are the best practices for the governance of ecosystem services?

We need to understand how governance structures can enhance more equitable and efficient flows of ES by transforming existing institutions into fundamentally new systems of governance.
Some critics to IPBES and ES in general: “Predominantly science-based understanding of biodiversity, with ecosystem services taking centre stage. This focus reduces biodiversity to an object of exploitation and runs the risk of bringing it even further into a system of market exchange” (literally taken from Wikipedia).
Need to treat power dynamics: Where the social sciences meet the natural sciences
Scientific explosion

Mulder et al 2015

www.bc3research.org
A Decalogue of “ES take home messages”

1. The ES framework is rapidly evolving & the ES community is growing exponentially & programmes and initiatives are mushrooming, e.g., IPBES, Future Earth, ESP, etc.
2. Ecosystem governance models will likely rely more and more on ES
3. Beware with win-win solutions: synergies may exist but they are evasive
4. Co-production of ES ought to be accounted for
5. Sustainability requires looking at impacts (beyond benefits) across scales
6. Distributional aspects of benefits and costs ought to be key components
7. A transformational ES framework should treat social power dynamics
8. Local, regional, national and supra-national assessments need to account for cross-scaling effects
9. ES frameworks should allow for transdisciplinarity allowing for different knowledge systems to contribute towards it
10. The ES approach should not crowd out other ways of understanding human-nature relationships
eskerrik asko