Holistic Policy Evaluation - Economic, Social, Human and Environmental: The Value of Biodiversity

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Wealth of a Nation

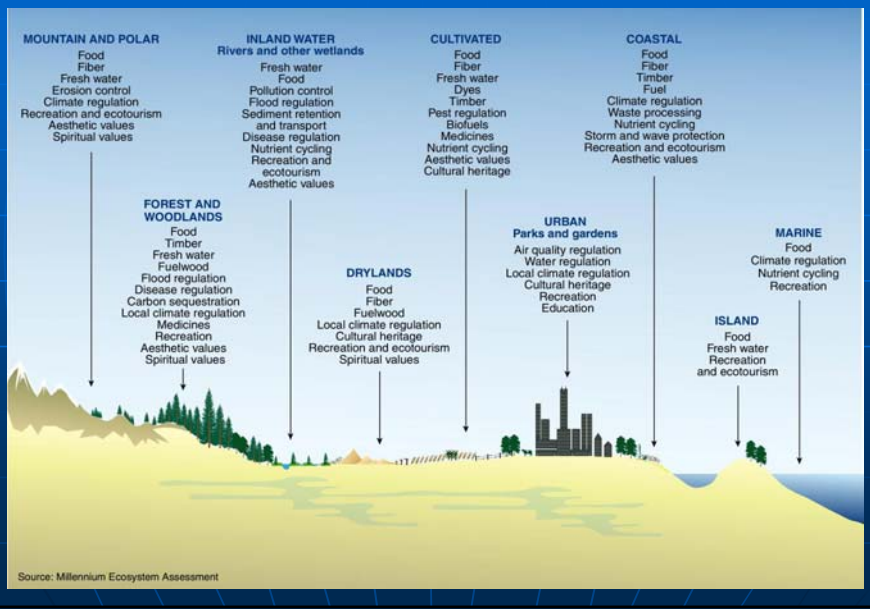
GDP is a limited concept

True wealth of a Nation needs to take into account:

- **Built capital**
- **Natural capital**
- **Human capital**
- **Social capital**

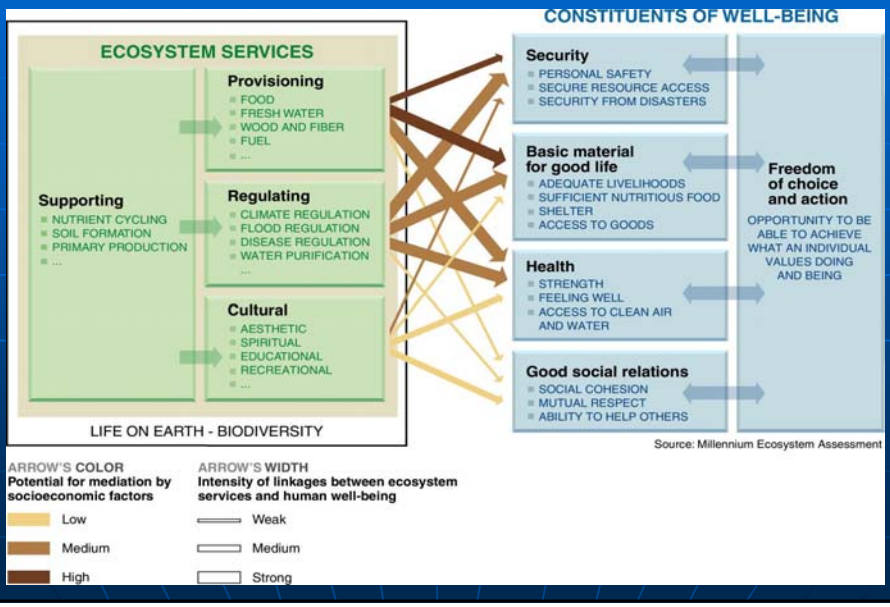
Any new policy or decision, e.g., how to mitigate or adapt to climate change, should evaluate the implications in terms of all four forms of capital

Ecosystem Services



Ecosystem Services result from the interactions among the plants, animals and microbes and their physical environment

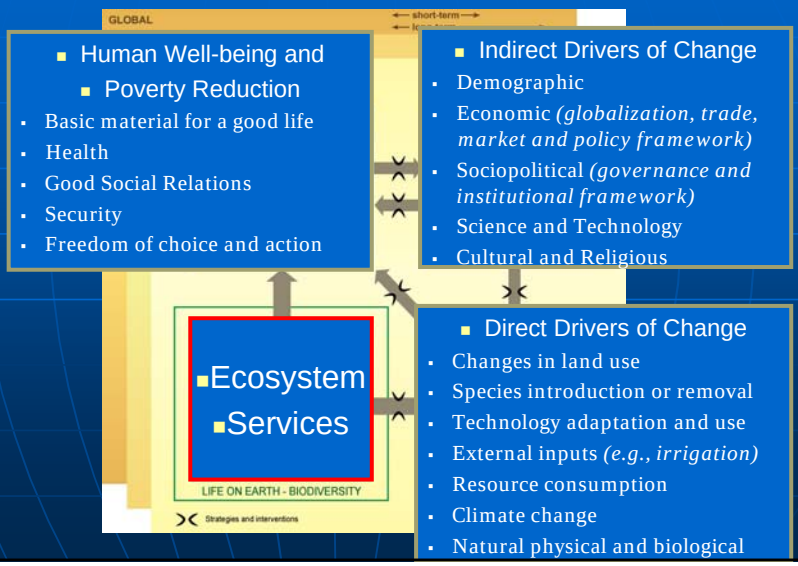
Consequences of Ecosystem Change for Human Well-being



UK National Ecosystem Assessment

- A UK-wide national ecosystem assessment addressing all sectors has been initiated covering England, Scotland, Wales and N. Ireland
- Three Elements
  - Current status and trends and links to human well-being
  - Scenarios of potential future changes out till 2050
  - Options for action to capture positive outcomes and avoid negative outcomes
- Co-chaired by Steve Albon and myself
  - Expert panel to guide and oversee the assessment
  - WCMC will act as an intelligent secretariat and provide a writing team to prepare the draft reports
  - Customer team , comprising of relevant stakeholders to ensure scope is appropriate
  - Client team of funders
- First element to be completed within one year, whole assessment to be completed within 2 years

Conceptual Framework



Overview of the impact pathway of a policy or decision

Sequential Steps

- **Decision / Policy →**
- **Impact on Ecosystem →**
- **Changes in Ecosystem Services →**
- **Impacts on human welfare →**
- **Economic Value of Changes in Ecosystem services**

Valuation of Ecosystem Services

- Ecosystem services contribute to economic welfare through contributions to the generation of income and wellbeing (e.g., provisioning of food and fiber), and through the prevention of damages that inflict costs on society (e.g., coral reefs and mangrove swamps protect coastal infrastructure)
- Valuation techniques are important to ensure that the true value of ecosystems and their services provided are taken into account (market and non-market) when estimating the impact of human-induced climate change on ecosystems, and when making decisions, e.g., on how to mitigate or adapt to climate change
- Methods for eliciting values should use a combination of economic and non-economic valuation methods
- Total Economic Value framework that takes into account both the use and non-use values individuals and society gain or lose from marginal changes in ecosystem services

Total Economic Value

Use Value

Actual/Planned Use Option Value

Direct and Indirect Use

Plus

Non-Use Value

For others Existence

Altruism and Bequest

Applying the Ecosystem Approach

Biodiversity & climate change

Biodiversity is connected to climate change

1. Climate change and biodiversity interact
2. Climate change adversely effect biodiversity at the genetic, species and ecosystem level
3. The biodiversity conservation sector itself needs to adapt
4. Biodiversity and ecosystems can contribute to adaptation to climate change
5. Some climate change adaptation strategies can have negative impacts on biodiversity
6. Ecosystem management can contribute to mitigating climate change
7. Some climate change mitigation strategies can have negative effects on biodiversity and ecosystems

8. Some mitigation strategies are also adaptation strategies

Climate change is already effecting biodiversity

- Changes in climate and carbon dioxide have already had observed impacts on species and ecosystems
- Approximately 10% of species assessed are projected to be at an increasing high risk of extinction for every 1°C rise in global mean temperature
- Wetlands, mangroves, coral reefs, arctic ecosystems and cloud forests are projected to be particularly vulnerable both directly (temperature and precipitation) and indirectly (pests and fires) to climate change , with the possibility of coral reefs and cloud forests ceasing to function within a few decades

Projected changes in biodiversity and ecosystem services can have significant adverse economic effects

Planned adaptation: ecosystems

- Protected area systems
  - Extent and location issues, e.g., moveable PAs, especially MPAs
- Protected area management
  - Fire management and alien invasives
- Functional connectivity
  - Management of the wider landscape, not just corridors

Planned adaptation: species

- In situ adaptation measures
- Human-aided translocation
- Ex situ measures: captive breeding and germplasm banks

Biodiversity based adaptation

- Biodiversity-based adaptation (including restoration of degraded ecosystems, e.g., wetlands) improves the capacity of ecosystems to deliver ecosystem services, benefiting the poor who are often most directly dependent on ecosystem goods and services
- Biodiversity based adaptation is often more accessible and affordable to the poor than structural adaptation
- Biodiversity-based adaptation options are available in nearly all sectors, in particular coastal, water, agriculture, forestry,

Coastal adaptation

- Resilient coastal ecosystems (mangroves, coral reefs, sand dunes and salt marsh) can play a significant role in adaptation while continuing to deliver other goods and services
  - Can act as a buffer against extreme events
  - Integrate with 'hard defence' measures

Water adaptation

- Can contribute to both water stress and flooding:
  - Natural freshwater systems can provide water regulation services in face of climate change
  - Reducing degradation of watersheds can be important
  - Maintaining wetlands and floodplains can be important for flood control
  - Integration with structural/technological measures

Converting an ecosystem means losing some services and gaining others – e.g., A mangrove ecosystem:

▪housing

▪shrimp

▪Provides nursery and adult habitat ,
▪Seafood, fuelwood, & timber;
▪traps sediment; detoxifies pollutants;
▪protects coastline from erosion & disaster

▪crops

Many ecosystem services are quite valuable, but are not priced

Example: Catskill Watershed, NY

water purification
one ecosystem service

$1 billion
vs
$8 - 10 billion

Climate change adaptation strategies: negative impacts on biodiversity

- 'Hard'defences to prevent coastal flooding can have negative effects on biodiversity (prevent inland migration of vegetation, salt marshes, alter patterns of sedimentation..) and can collapse (e.g., New Orleans
- Hard structures for river flood defence systems can adversely effect biodiversity and can fail
- Some agricultural adaptation strategies
  - Draining wetlands to increase production
  - Increased use of irrigation and pesticides

Biodiversity and climate change mitigation through LULUCF

- Forests are rich in biodiversity and provide a wide range of ecosystems services, including above and below ground carbon storage: Therefore we need to:
  - Conserve existing forests
  - Reduce deforestation and forest degradation through the sustainable management of forests and through forest restoration (afforestation)
  - Non-forest land-management activities (e.g., conservation tillage and other means of sustainable cropland management, sustainable livestock management, agro-forestry systems, maintenance of natural water sources, and restoration of peat-lands and other wetlands

Biodiversity and climate change mitigation through renewable energy technologies

- Renewable energy sources, including onshore and offshore wind, solar, tidal, wave, geothermal, biomass and hydropower and nuclear, can have a range of potential implications for biodiversity and ecosystem services

Change the economic background to decision-making to implement ecosystem-based activities

- Make sure the value of all ecosystem services, not just those bought and sold in the market, are taken into account when making decisions
- Remove subsidies to agriculture, fisheries, and energy
- Payments to landowners in return for managing their lands in ways that protect and enhance ecosystem services
- Appropriate pricing policies for natural resources, e.g., water
- Apply fees, taxes, levees and tariffs to discourage activities that degrade biodiversity and ecosystem services
- Establish market mechanisms to reduce nutrient releases and carbon emissions in the most cost-effective way

Non-financial incentives to implement ecosystem-based activities

- Laws and regulations
- Promote individual and community property or land rights
- Improve access rights and restrictions
- New governance structures to improve policy, planning, and management
  - Integrate decision-making between different departments and sectors, as well as international institutions
  - Include sound management of ecosystem services in all planning decisions
- Develop and use environment-friendly technologies
- Influence individual behavior

The Bottom Line

- We are spending Earth's natural capital, putting such strain on the natural functions of Earth that the ability of the planet's ecosystems to sustain future generations can no longer be taken for granted
- The future really is in our hands. We can reverse the degradation of many ecosystem services over the next 50 years, but many changes in policy and practice will be required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