Sustaining Environmental Capital:

Protecting Society and the Economy

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Grand Challenge

Maintaining ecosystems to assure the continued flow of ecosystem services, while also meeting society's demands for those services

We need to view ecosystems comprehensively if we are to sustain the ecosystems that sustain us

Outline of the Report

- **Introduction:** Environmental Capital, Biodiversity, and Human Well-being

- **Making Better Use of Existing Knowledge**

- **Generating New Essential Knowledge**

- **Expanding the Use of Informatics**

Environmental Capital, Biodiversity, and Human Well-being

Human well-being rests equally on

- Economic Capital
- Socio-political Capital
- Environmental Capital

Challenges for Ecosystems

- Overexploitation

- Pollution

- Habitat conversion (land use change)

- Invasive species

- Climate change

Ecosystems Provide Essential Services

- **Provisioning** Services – examples:
  - Production of food, fibers, and fuel
  - Soil formation and renewal
  - Pollination of crops
  - Aesthetic and recreational
  - Genetic library of species

- **Regulating** Services – examples:
  - Control of disease emergence
  - Flood mitigation
  - Composition of air
  - Conditioning of climate

Ecosystem Degradation Reduces Services (and is costly)

- **Example:** Deforestation
  - Decreased availability of clean, fresh water
  - Increased damage from wildfires
  - Spread of emergent diseases

- **Example:** Damaged coastal swamps:
  - Increased damage from hurricanes
  - Decline of global ocean fish catch
  - Decline in bird populations

Making Better Use of Existing Knowledge

Chapter II: **Direct Effects of Ecosystem Change on Human Health**

Chapter III: **Ecosystem Assessments for Predicting and Adapting to Change**

Chapter IV: **International Aspects of Assessments**

Chapter V: **Increasing the Effectiveness of Conservation Investments**

President's Council of Advisors on Science and Technology
Working Group on Biodiversity Preservation and Ecosystem Sustainability

Making Better Use of Existing Knowledge: Recommendations

- Incorporate human health when considering ecosystem change:

  - Call for a National Academy of Sciences study on the relationship of biodiversity and human health,

  - Issue guidance for including health impacts of ecosystem change in the NEPA process (CEQ), and

  - Coordinate agency and international data-sharing on health-ecosystem interactions.

Making Better Use of Existing Knowledge: Recommendations

- Assess ecosystems regularly:

  - Establish, by Executive Order, an ongoing Quadrennial EcoSystems Trends (QuEST) Assessment

  - Enforce, for biodiversity and ecosystem services data, Open Government requirements, and

  - Create a compendium of best assessment practices.

Making Better Use of Existing Knowledge: Recommendations

- Support development of IPBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services):

  - Engage with GEO-BON, GOOS, and GBIF to implement informatics developments, and

  - Integrate and refocus international global sustainability research.

Making Better Use of Existing Knowledge: Recommendations

- Use funds already allocated for conservation and ecosystem services cost-effectively.

Generating New Essential Knowledge

Chapter VI: **Learning More: Biodiversity and Other Ecosystem Attributes**

Chapter VII: **Learning More: Valuation of Ecosystem Services**

Generating Essential
New Knowledge: Recommendations

- Coordinate research on predictive models of environmental change (multiple agencies), and

- Develop ways to incorporate socio-economic data into ecological models and decision-support tools.

Generating Essential
New Knowledge: Recommendations

- Identify and develop means to fill data gaps among ecological monitoring systems, making all data available, and

- Develop a strategy for gaining knowledge of key species groups.

Generating Essential
New Knowledge: Recommendations

- Expand current research on ecosystem services valuation to generate knowledge about impacts of human activities on ecosystem services from both public and private lands and coastlines, and

- Consider ways that this new knowledge can be applied, to help sustain ecosystems.

Expanding the Use of Informatics: Recommendations

- Establish EcoINFORMA – Ecoinformatics-based Facilitation of Open Resources and Machine Accessibility – which would

  - Coordinate development of standards for open data- and metadata sharing, interoperability, and other informatics capabilities, and

  - Seek out partners in the private and academic sectors to develop innovative tools.

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