Mainstreaming SEEA Experimental Ecosystem Accounting into policy

Dr. Salman Hussain

Structure of the Session

1. **What do we mean by '*policy mainstreaming*'?**
2. **What can *SEEA* bring to the table?**
3. **Implementation example:**
   - Agro-forestry study – national level
   - Video: TEEB in Bhutan, Philippines, Ecuador
4. **Country examples from participants**
5. **[Time permitting] Global perspective:**
   - TEEB at the Copenhagen Consensus
6. **Exercise:**
   - Step 1 in TEEB Approach - Recognizing, Demonstrating and Capturing values

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- ***Establishing an environment*** **such that change agents use the evidence and information provided by SEEA-EEA as an input to determining their behaviors, and in turn reducing impacts**

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Mainstreaming SEEA-EEA:

- ***Establishing an environment*** **such that change agents use the evidence and information provided by ~~SEEA-EEA~~ [other competing frameworks or tools] as an input to determining their behaviors, and in turn reducing impacts**

What does SEEA-EEA bring to the table?

1. **The only statistical framework that is endorsed by the UN Statistical Commission**
   - Same agencies (National Statistical Offices) that are charged with providing System of National Accounts (SNA) and GDP measures, i.e. *credibility*
   - Like the SNA, *continuity* of data collection
   - Transactions costs of establishing the mechanisms to collect the data for the first time versus *lower on-going costs* of continuing to do so year-on-year

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2. **Links to achieving global commitments**
   - Sustainable Development Goals
   - Aichi Biodiversity Targets

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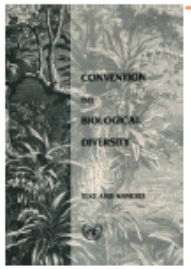
2. Links to achieving global commitments
   - Sustainable Development Goals
   - Aichi Biodiversity Targets
3. **A framework that can support *spatially-specific* decision-making**
   - The vast majority of economic/political choices have a spatial dimension

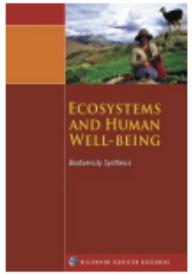
The economics and valuation component of SEEA-EEA

1. **UN Environment-TEEB are leading the *valuation* and policy-mainstreaming component of the EU-funded project**
   - Brazil, India, China, South Africa, Mexico

2. **Valuation is important in decision-making**
   - The vast majority of decisions linked to anthropogenic impacts have an economic component
   - This is *not* about commoditizing nature

TEEB initiative (2008-2012)





Ecol./Env. Economics literature

G8+5 Potsdam 2007

"Potsdam Initiative – Biological Diversity 2010"

The economic significance of the global loss of biological diversity….

Importance of recognising, demonstrating & responding to values of nature…

Interim Report

CBD COP 9 Bonn 2008

Climate Issues Update

Input to UNFCCC 2009

TEEB End User Reports Brussels 2009, London 2010

India, Brazil, Belgium, Japan & South Africa Sept. 2010

TEEB Synthesis

TEEB Books

BD COP 10 Nagoya, Oct 2010

- **CBD COP11 India**
- **National TEEB Work**
- **Sectoral TEEB Work**
- **Business Externalities Work**
- **Rio+20 Brazil**

Timelines - 2012 and SEEA

- The **SEEA Central Framework** was adopted as an international statistical standard by the UN Statistical Commission in 2012
- The **SEEA Experimental Ecosystem Accounting** complements the Central Framework and represents international efforts toward coherent ecosystem accounting

The TEEB Six Step Approach

STEP 1: Refine the objectives of a TEEB Country Study by specifying and agreeing on the key policy issues with stakeholders

STEP 2: Identify the most relevant ecosystem services

STEP 3: Define information needs and select appropriate methods

STEP 4: Assess and value ecosystem services

STEP 5: Identify and outline the pros and cons of policy options, including distributional impacts

STEP 6: Review, refine and report: Produce an answer to each of the questions

First Implementation example: Agro-forestry

Agro-forestry study

- Agroforestry is a practice involving the **deliberate integration of trees or shrubs in farming landscapes** involving crops or livestock in order to obtain benefits from the interactions between trees and/or shrubs the tree and crop or livestock component

- Global extent of agroforestry over **1 billion hectares of land**, supporting more than **900 million people**, mostly in the tropical and sub-tropical (Zomer et al. (2014)

Agro-forestry case studies

Selection criteria	Cocoa agroforestry Ghana	Coffee agroforestry Ethiopia	Ngitili system Tanzania
Trend of agroforestry system	Increased by about twice the area in the 1990s to about 1.6 million ha (FAOSTAT 2013)	Increased by 100% since the 1990s to about 520,000 ha (FAOSTAT 2013)	Increased from **600 ha in 1986 to >350000 ha in 2003** (Mlenge 2004)
Number of people benefiting from the system	Between 1.9 million (Coulombe & Wondon 2007) to 6 million people (Anthonio and Aikins, 2009) - 700,000 smallholder farmers (Kolavalli & Vigneri 2011)	**7 million to 15 million people** (Petit 2007); 95% of the coffee produced by smallholder farmers About 4.5 million smallholder farmers (Central Statistical Agency 2013)	No data available, but estimated about 1500 households employed in Shinyanga's formal and informal forestry sector, in which ngitili products play a major role
Contribution to national economy	18.9% of the agricultural GDP; 8.2% of the Ghana's GDP and 30% of total export earnings (GAIN, 2012)	**36% of national export income in 2006/07** (Ejigie 2005) *Approximately* 10% of national GDP (Economic Report on Africa 2013)	No data available but estimated to contribute approximately 0.43% of Shinyanga region's GDP

Agro-forestry: Credible Scenarios I

1. In Ethiopia, the rate of deforestation is estimated at **1-1.5% per year** (Teferi et al. 2013), mostly driven by smallholder coffee expansion (Davis et al. 2012)
2. Coffee profitability is very low in smallholder agroforestry systems in Ethiopia, mostly due to **volatility in global market prices**
3. Climatic predictions show that areas bio-climatically suitable for coffee production may **reduce by 65%** (Davis et al. 2012)

Agro-forestry: Credible Scenarios II

I. **Conversion to maize monocrop - drivers:**
   - Price volatility
   - Climate change
   - Allocation of land to investors for biofuel

II. **Conversion existing agroforestry coffee to heavy shade grown coffee – drivers:**
   - Ongoing Climate Resilience Green Growth Strategy the national REDD+ program
   - Certification programs and improvements in land tenure conditions

III. **Conversion and further expansion of heavy shade grown coffee – drivers:**
   - Contingent on success of scenario II

Agro-forestry: Modelling

The **WaterWorld model** was also used to model ecosystem services change

- freshwater provision and runoff
- increased water quality
- above ground carbon stock
- reduction of soil erosion

Agro-forestry valuation methods

Ecosystem Service	Agroforestry System			Valuation Method
	Cocoa	Coffee	Ngitili	
Provisioning				
Cash Crops	***	***	N/A	Market price[16]
Food Crops	***	***	***	Market price
Tree Crop Products	***	***	N/A	Market price
Medicines	*	*	***	Shadow price[17], replacement cost
Wild Food and all other NTFP	*	***	***	Shadow price
Timber and Poles	***	***	***	Market price
Energy (Wood fuel and Charcoal)	*	***	***	Market price, shadow price, replacement cost
Regulating and Supporting				
Soil and biomass C stocks	***	***	***	Market price, avoided cost
Erosion control	ND	***	ND	Contingent valuation, replacement cost
Soil fertility (Soil N also P and K where available)	**[18]	**	***	Replacement cost
Biological Pest Control	**	**	ND	Insufficient data for benefit transfer
Pollination	**	**	N/A	Insufficient data for benefit transfer
Biodiversity	**	**	**	Insufficient data for monetary valuation
Avian Diversity	**	**	**	Insufficient data for monetary valuation
Vegetative Diversity	**	**	**	Insufficient data for monetary valuation
Other mammalian diversity	**	ND	ND	Insufficient data for monetary valuation

*** Sufficient data for biophysical quantification and monetary valuation;
** Quantitative biophysical data available, but insufficient data for monetary valuation;
* Qualitative information available; ND No relevant data available; N/A No applicable

Agro-forestry valuation outcomes

Ecosystem service	Scenario 1: Converting to Maize monoculture (million $/y)	Scenario 2: Canopy cover ≥ 30% [due to REDD+ or certification incentive] (million $/y)	Scenario 3: Canopy cover ≥ 30% & expansion of agroforestry to all areas bar: (I) urban; (II) priority land use such as forests; and (III) wildlife reserves (million $/y)
Increase in system extent (ha)	-202,342	0	+286,852
Provisioning	**-38.4**	**No change**	**73.4**
Coffee	-115.9	No change	+143.9
Maize	+90.5	No change	-128.3
Other ES (fuel wood, honey)	**-13.0**	**No change**	**+57.9**
Carbon regulation	**-435**	**+292**	**+655**
Other regulating	**-19**	**+74.5**	**+54.3**
Water yield	-34.9	+58.6	+10.7
Soil erosion	+15.9	+15.9	+43.6

www.teebweb.org/agriculture-and-food/agroforestry

Agro-forestry: How could SEEA-EEA have helped?

1. Researchers from ICRAF/WCMC used *whatever data were available to them*. A centralized repository of data in a standardized form (i.e. via SEEA-EEA) might have thus improved the modelling

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2. This is ultimately a policy decision on *ecosystem extent* (agro-forestry versus maize) and one that affects/is affected by *ecosystem condition* (canopy cover). The unit of account was changes in Ecosystem Services provisioning. This is the SEEA-EEA space…

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3. If NSOs were to be involved then that might change the *potential for policy uptake*, if they linked with other line Ministries

Agro-forestry: What is TEEB doing with the results?

1. Part of a wider roll-out of TEEBAgriFood implementation – one of circa 15 studies

STEP 6: Review, refine and report: Produce an answer to each of the questions

2. Inviting policy makers to a *TEEBAgriFood policy forum* in Nairobi, February 2019. Need to get the right people round the table/in the room.
3. Need to understand the needs of change agents and also those that have a vested interest to maintain the status quo/'*change blockers*'
4. For TEEBAgriFood, Environment Ministries not always aligned with Agriculture/Forestry/Planning/Finance Ministries: Need to *speak their language*

Valuation mainstreaming - how widespread?

Evidence on valuation affecting policy

1. Current presentation has focused on TEEB but many other initiatives, e.g. World Bank WAVES, UNDP BIOFIN, GIZ ValuES
2. To win funding, since it is a crowded space – we need to *show value added from applying SEEA-EEA*
3. TEEB: extensive (but dated) *library of case studies* showing that the application of valuation to land use/land cover choices has influenced policy uptake

The Economics of Ecosystems & Biodiversity

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Case studies

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These case studies prepared in collaboration with Helmholtz Centre for Environmental Research (UFZ) and GIST Advisory describe examples where a focus on ecosystem services and their economic significance helped decision makers to find more sustainable solutions for the management of ecosystems.

These case studies can be an informative reference for stakeholders who might be facing similar scenarios and are looking for examples of possible options.

Global | Africa | Asia | Central America | Europe | North America | Oceania | South America

1. A long term financial mechanism for conservation agreements in the Ecuadorian Chocó (2013)
2. Adaptive co-management for conservation of the Llancahue watershed in southern Chile (2013)
3. Agroecological Zoning, Brazil (2010)
4. Better fishery management could significantly increase economic returns, Argentina (2010)
5. Compensation scheme for upstream farmers in municipal protected area, Peru (2010)
6. Conserving forests through grants, Brazil (2010)
7. Cost-benefit analysis of road construction considering deforestation, Brazil (2011)
8. Financing conservation through ecological fiscal transfers Brazil (2010)
9. Inter-municipal cooperation in watershed conservation through the establishment of a regional water fund – FORAGUA – in Southern Ecuador, Ecuador (2012)
10. Payments and technical support for reforestation and soil conservation for watershed protection, Brazil (2010)
11. Reducing nutrient loads by providing soft loans, Fúquene Lake, Colombia (2012)
12. Subsidy for traditional rubber production, Brazil (2013)
13. The PES experience in Costa Rica, Colombia and Nicaragua (2013)
14. The Socio Bosque Programme for Rainforest and Paramo Conservation, Ecuador (2014)
15. Water fund for catchment management, Ecuador (2010)
16. Water Funds for conservation of ecosystem services in watersheds, Colombia (2010)

RESOURCES

- Guidance Manual for TEEB country studies
- Case studies
- Training Resource Material
- Glossary of terms
- Ecosystem Services
- Useful links

Latest Publications

TEEBAgriFood Interim Report

The Interim Report introduces the key questions, issues and arguments to be addressed by TEEBAgriFood.

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Evidence on valuation affecting policy

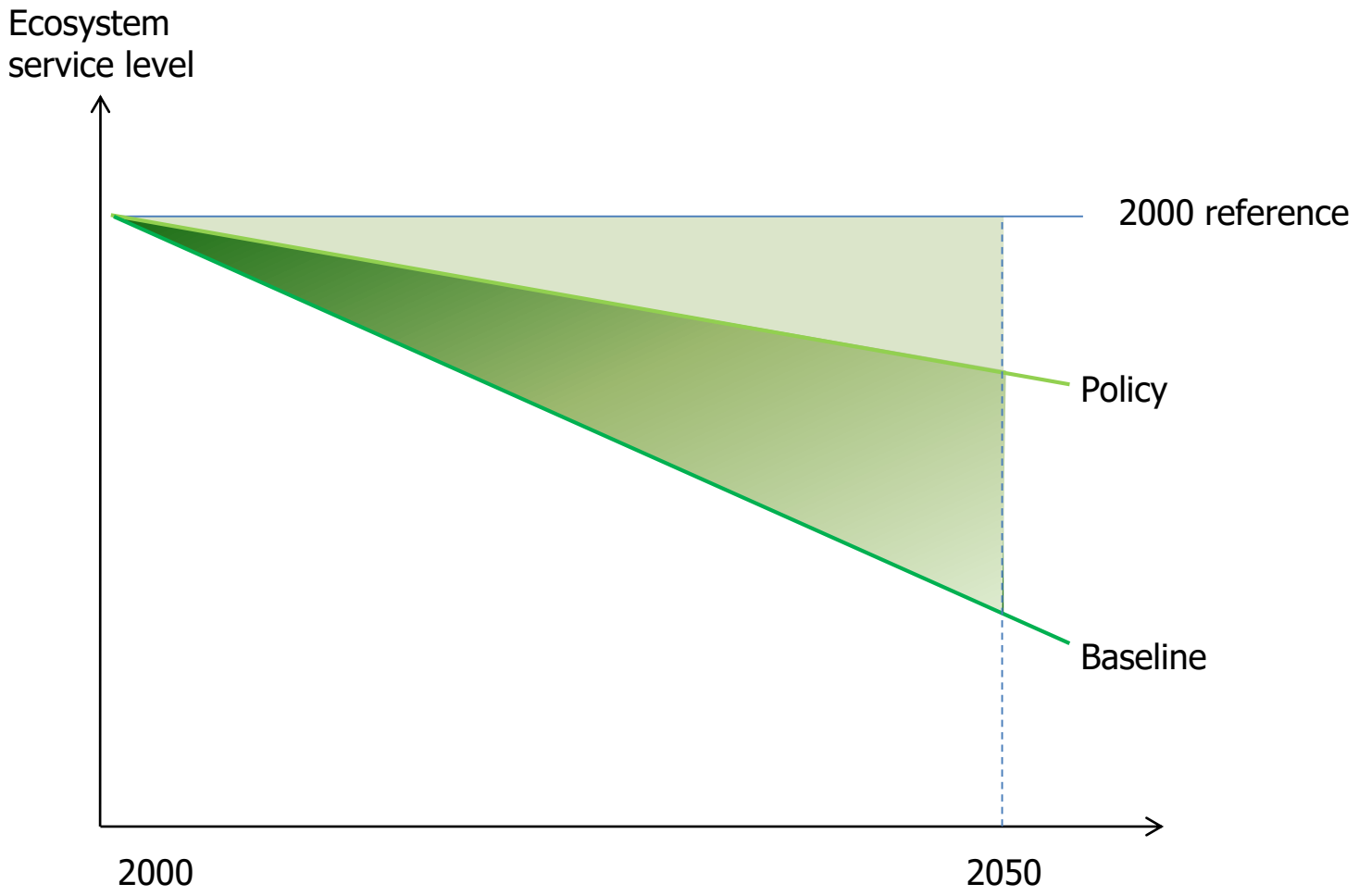
Video:
https://www.youtube.com/watch?list=PLC2gARKM6UvQJfsXCRLLMq3QpJQ45GKY_&time_continue=6&v=mRrGuLhtYuQ

Valuation mainstreaming - *Over to you* (country examples)

Valuation mainstreaming - *Is a global perspective possible/desirable?*

Evidence that valuation of biodiversity and ecosystem services *could* affect global policy

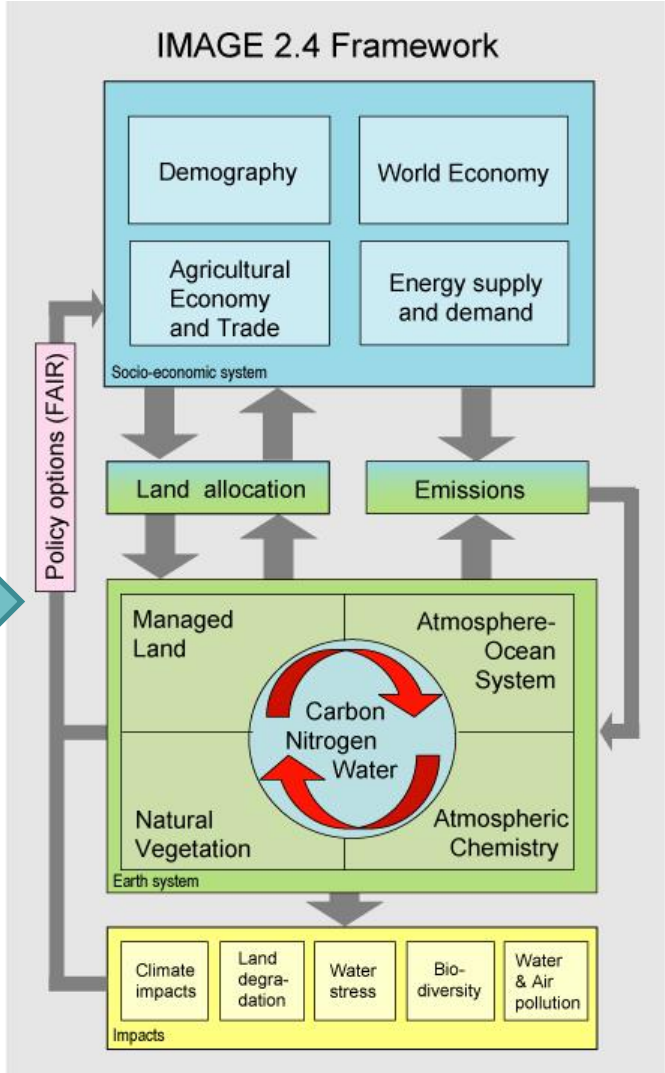
Policy	Policy change	Time scale
Agricultural productivity: closing the yield gap	40% crop and 20% livestock productivity increase (compared to 25% baseline)	2050
Post-harvest sector	Reduce post harvest losses from 30 to 15%	2050
Global agricultural trade	Full trade liberalisation from 2020	2050
Reduced impact logging	Replacement of conventional logging with RIL	2050
Protected areas	Expansion of protected areas from 14% of total land area to: 1.20% of each eco-region 2.50% of each eco-region	2030
Reduced emissions from deforestation and forest degradation (REDD)	Protect from agricultural expansion: 1.All dense forest and 2.All forest and woodlands	2030
Bio-energy	Increase from 0.5 to 4 million km^2 for biomass	2050
Global dietary patterns	1. Global transition to 'healthy diet' 2. Complete substitution of meat with plant protein	2050


Ecosystem
service level
2000 reference
Policy
Baseline
2000
2050

The Economics of Ecosystems & Biodiversity

Indirect Drivers (scenario)
- Population growth
- Economic growth

Policy response options
For example:
- Protected areas
- Agricultural yields



GLOBIO3

Environmental drivers
- Land use
- N deposition
- Infrastructure
- Fragmentation
- Climate change

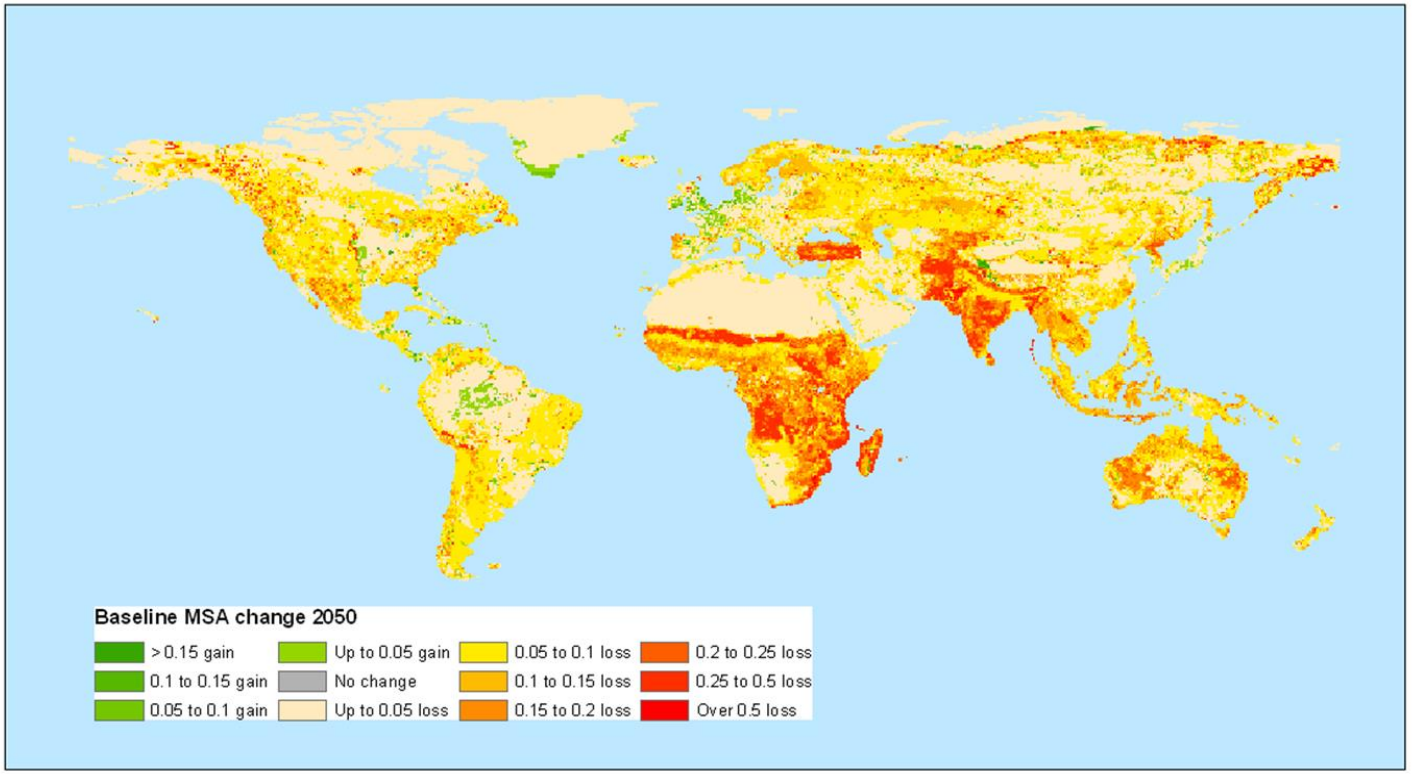
Cause-effect relationships

Biodiversity indicators
- MSA
- Ecosystem extent

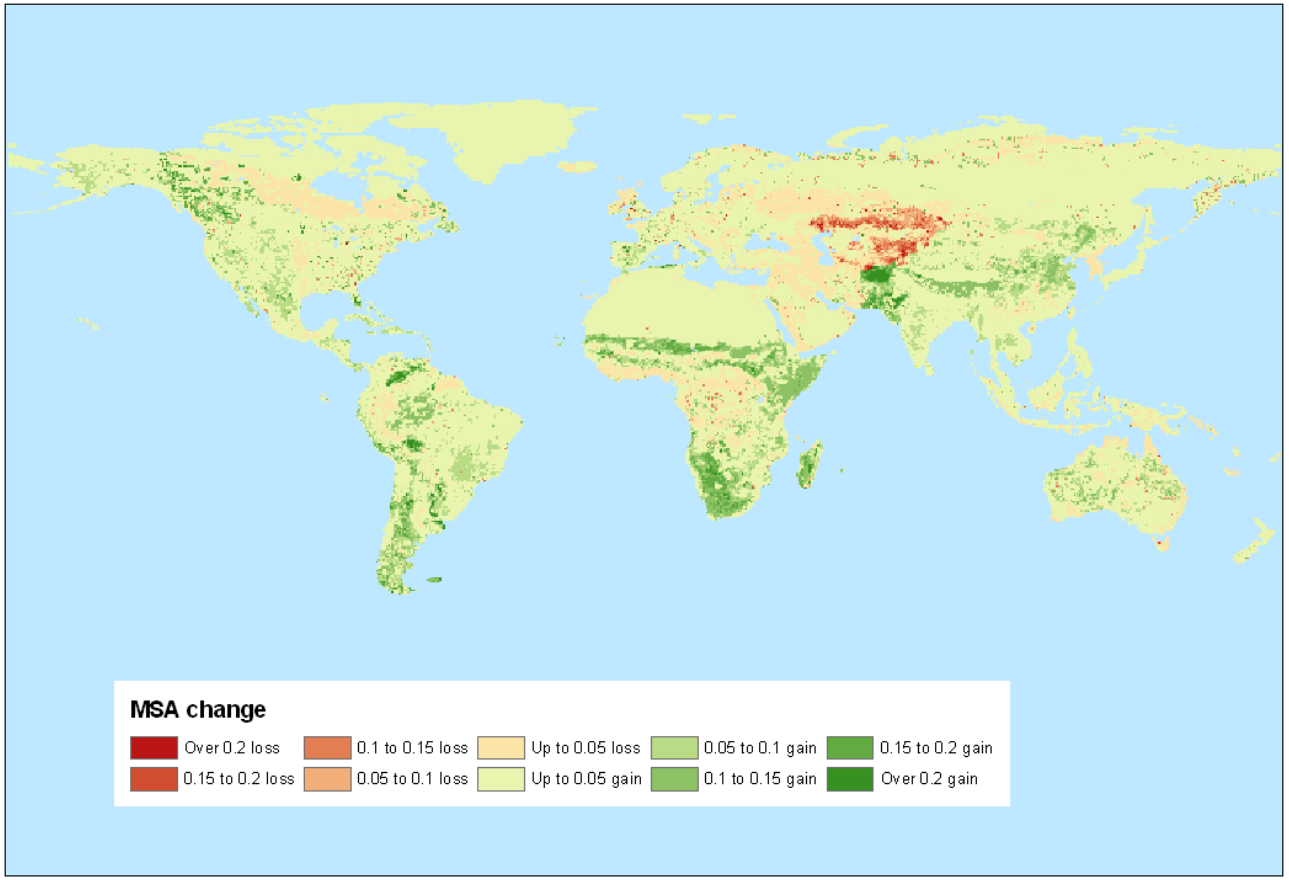
Baseline developed from OECD projections

- *World population* grows from 6 to 9 billion
- Fourfold increase in *economic output* (~ 2.8% per annum)
- *Per capita incomes* grow particularly in BRIC countries
- *Agricultural productivity increases* at 1.8% per annum – does not keep pace with population or consumption patterns
- No change in *environmental or trade legislation*
- *Timber demand increases* with population and incomes
- *Global mean temperature* increases to 1.6ºC above pre-industrial level
- No change in *protected areas* (14%)

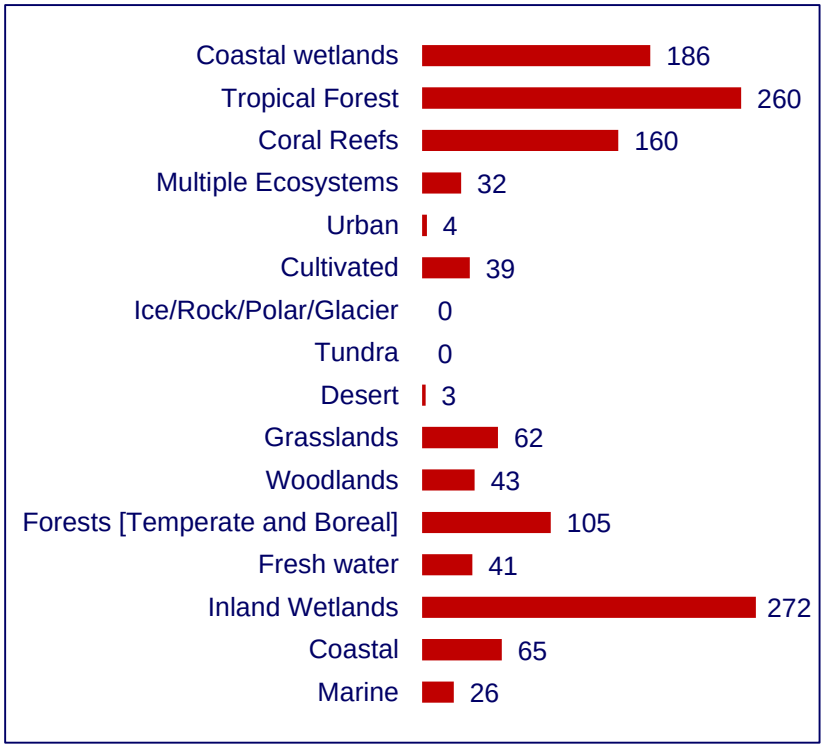
Biodiversity loss by 2050: The Business-As-Usual baseline scenario

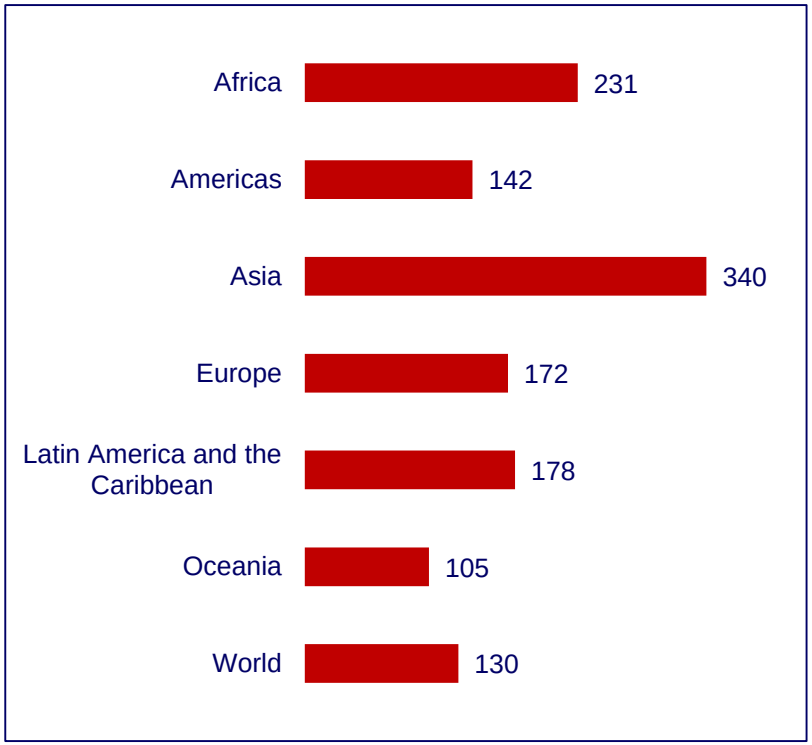


Reducing biodiversity loss in 2050 relative to BAU: Increased investment in Agricultural Productivity

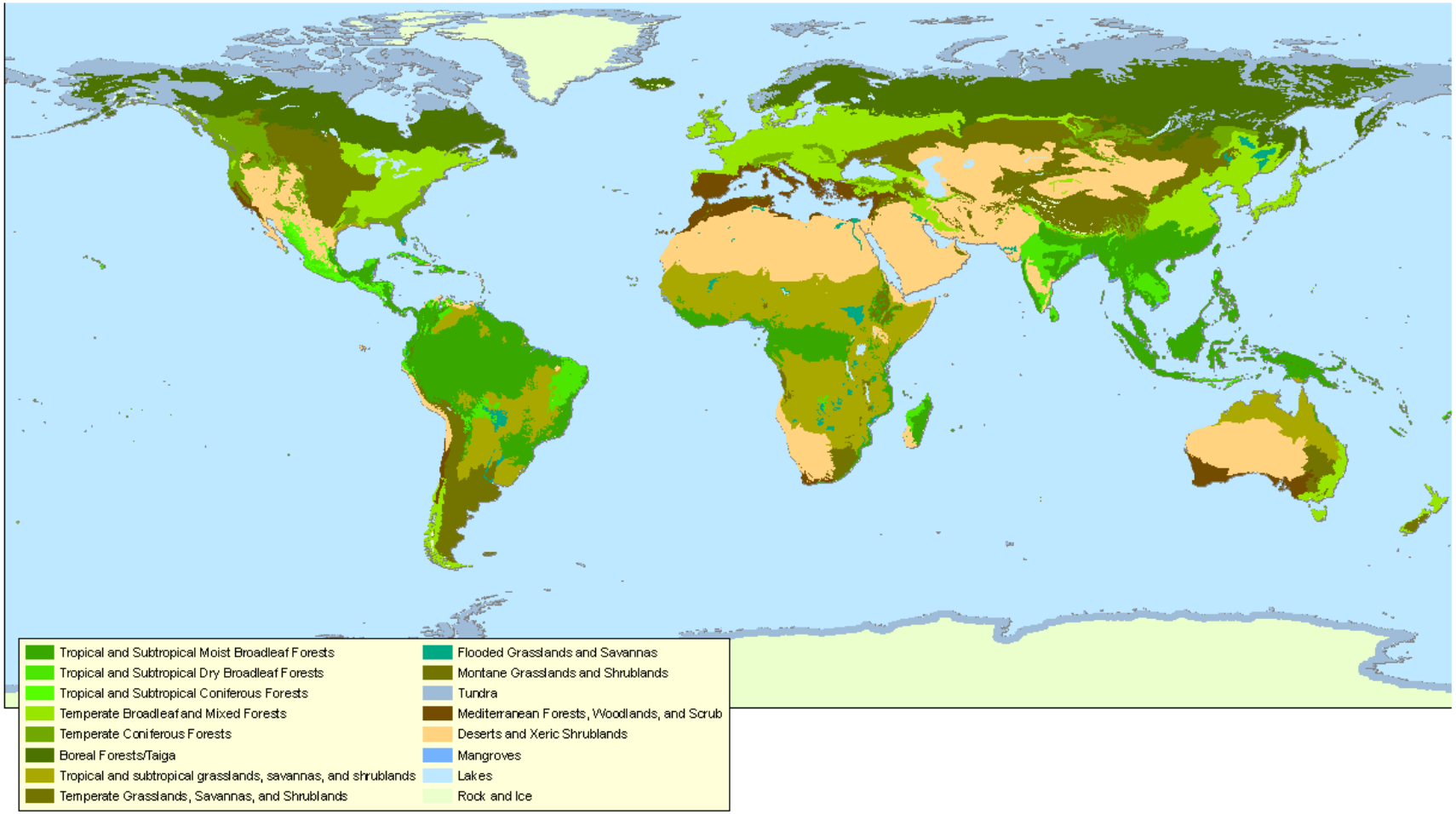


TEEB database 1298 individual value estimates

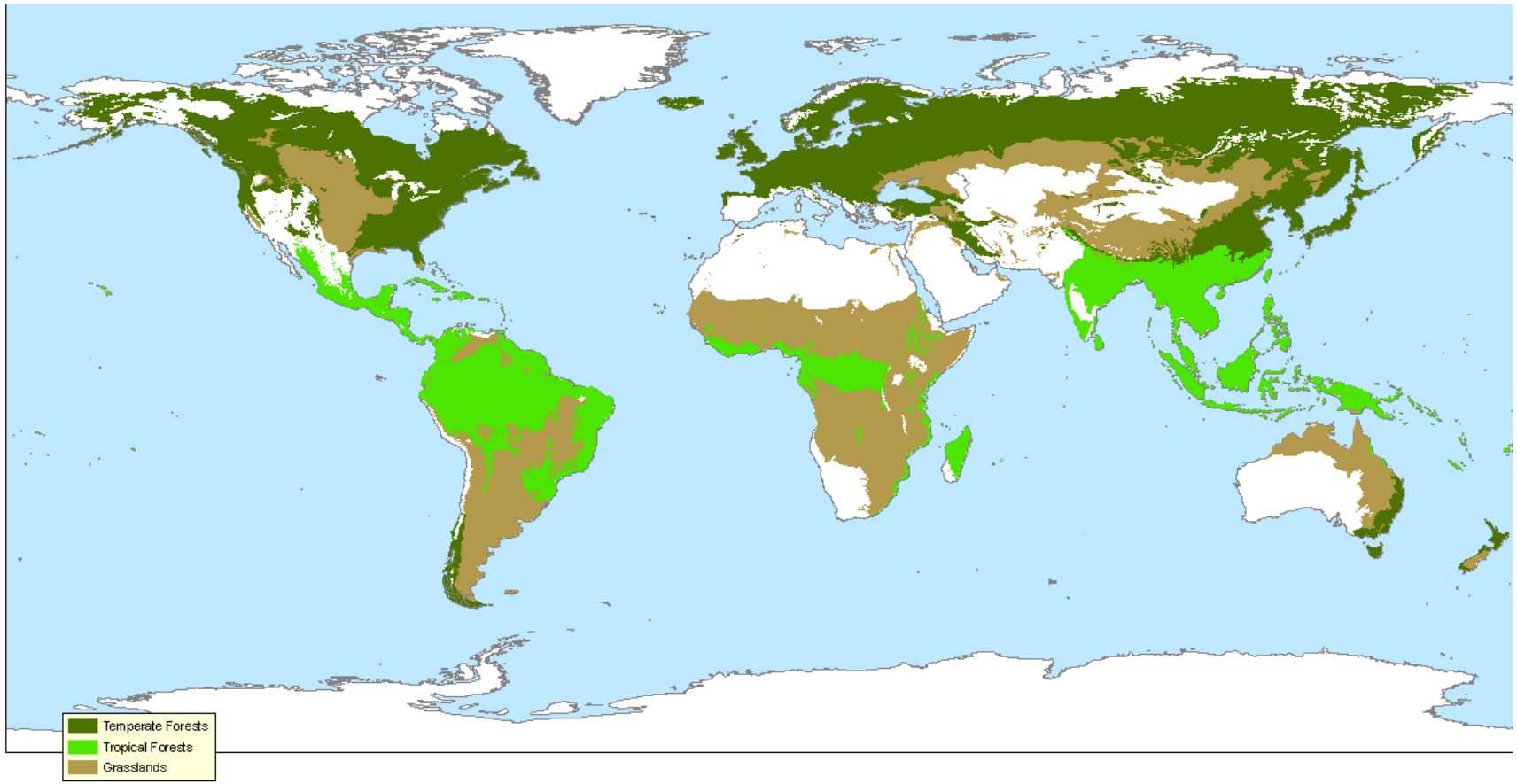




Global Biomes



Terrestrial Biomes



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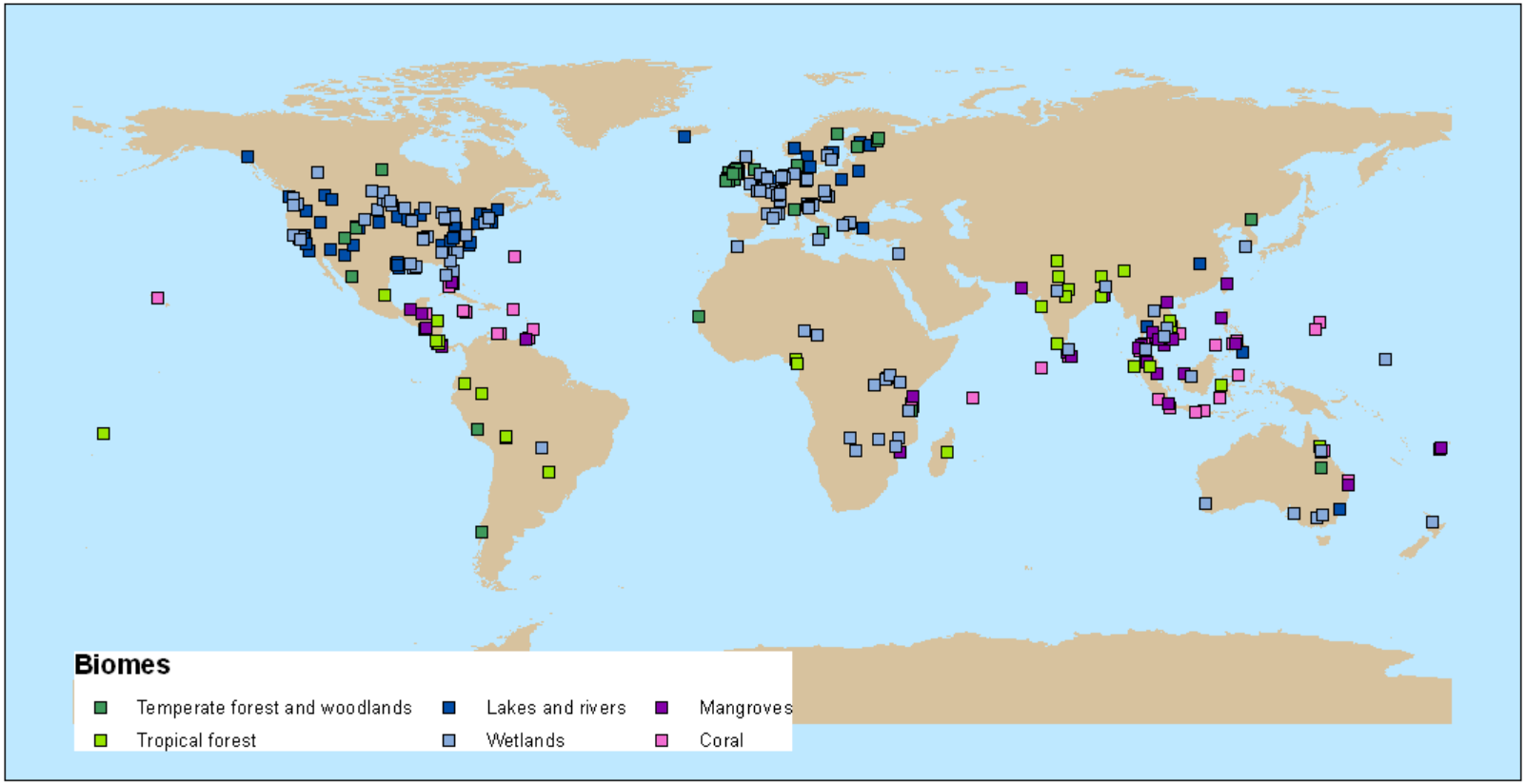
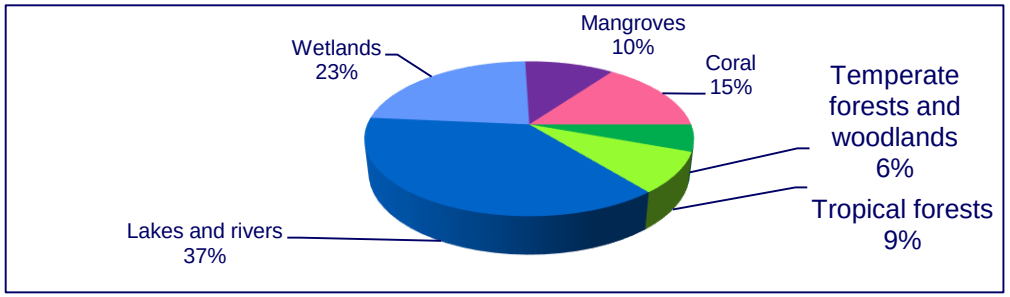




Additional spatial data within 10, 20 and 50 km radii of each site

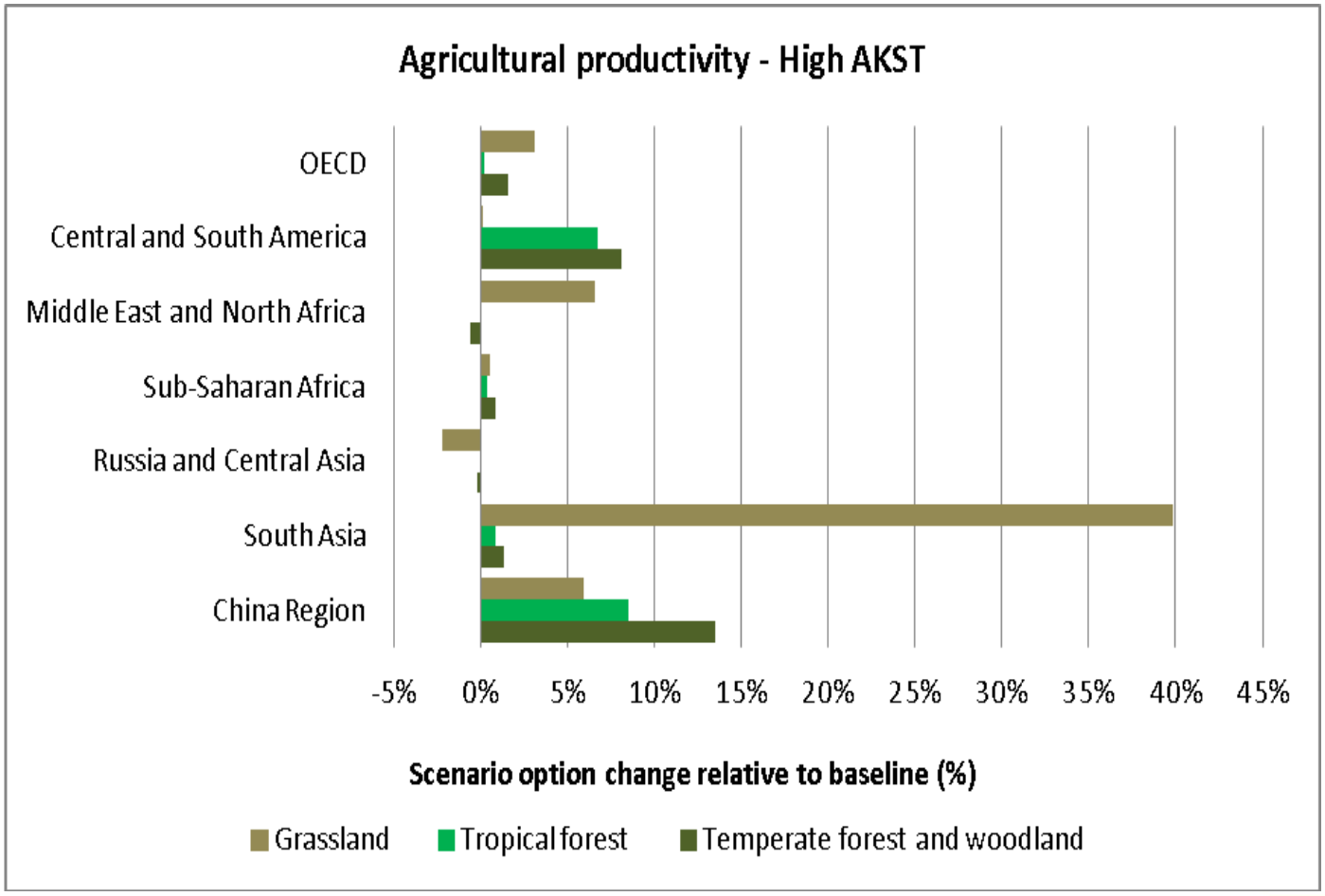
- Area (ha) of forest, lakes and rivers, mangrove, wetland, grassland, coral reef
- Population density (person/km2)
- Gross cell product (2005$US) – measure of economic output
- Urban area (ha)
- Roads (km)
- Net primary product (gC/m2/yr)
- Human appropriation of NPP (gC/m2/yr)
- Accessibility index - travel time to urban centres

Forest value functions

Temperate forest			
Variable	Beta	Std. Error	Sig.
Constant	28.627	6.124	0.000
Natural log of the study site area	-0.420	0.076	0.000
Natural log of Gross Cell Product within 50km radius	0.247	0.150	0.104
Natural log of urban area within 50km radius of study site	0.245	0.143	0.092
Natural log of human appropriation of NPP within 50km radius of study site	-1.610	0.417	0.000
N	69		
Adjusted R^2	0.348		

Tropical forest			
Variable	Beta	Std. Error	Sig.
Constant	12.960	4.071	0.002
Natural log of the study site area	-0.230	0.070	0.001
Natural log of Gross Cell Product within 50km radius	0.402	0.173	0.022
Natural log of urban area within 50km radius of study site	0.424	0.121	0.001
Natural log of human appropriation of NPP within 50km radius of study site	-0.394	0.292	0.181
Natural log of area of forest within 50km radius of study site	-0.336	0.202	0.100
Natural log of length of roads within 50km radius of study site	-0.204	0.131	0.124
N	102		
Adjusted R^2	0.392		

Change in biomes relative to BAU: Investment in agricultural productivity

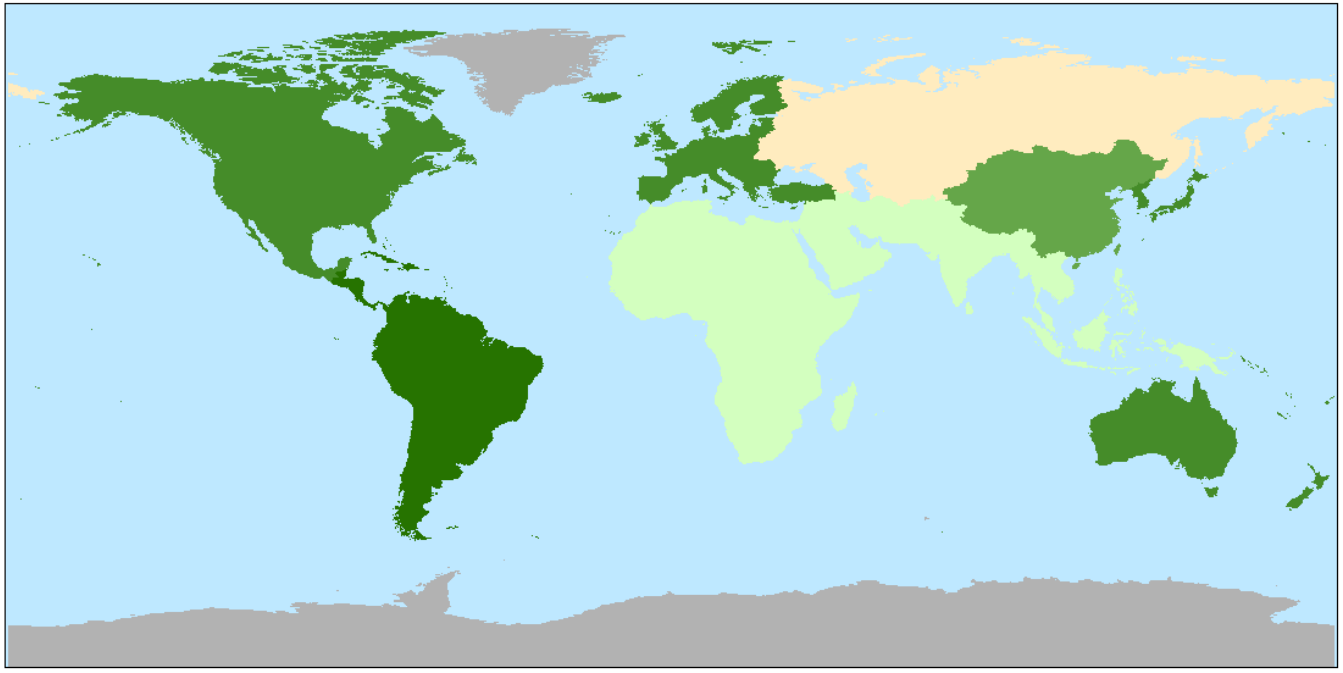


Results by biome/Image region: Investment in AKST

	Grassland			Temperate Forest			Tropical Forest		
	Change in area ('000 km^2)	Mean per ha value (US$ 2007)	Annual value (bn US$ 2007)	Change in area ('000 km^2)	Mean per ha value (US$ 2007)	Annual value (bn US$ 2007)	Change in area ('000 km^2)	Mean per ha value (US$ 2007)	Annual value (bn US$ 2007)
OECD	418.4	645.0	19.7	181.1	23,389.1	28.8	1.9	9,916.5	0.6
Central and South America	4.7	253.3	0.1	57.0	19,630.4	21.2	415.7	8,161.4	41.9
Middle East and North Africa	64.6	325.0	1.7	-0.4	18,264.7	-0.2			
Sub-Saharan Africa	35.2	63.6	0.2	2.4	9,033.3	0.2	21.1	3,897.4	0.8
Russia and Central Asia	-198.2	351.2	-4.1	-15.4	20,198.6	-2.1			
South Asia	461.1	146.1	4.3	5.5	10,886.6	1.5	20.7	7,376.6	3.2
China Region	81.5	232.2	1.5	210.0	17,515.3	40.2	8.0	8,370.8	1.7
Total	**867.3**		**23.4**	**440.3**		**89.6**	**467.6**		**48.3**

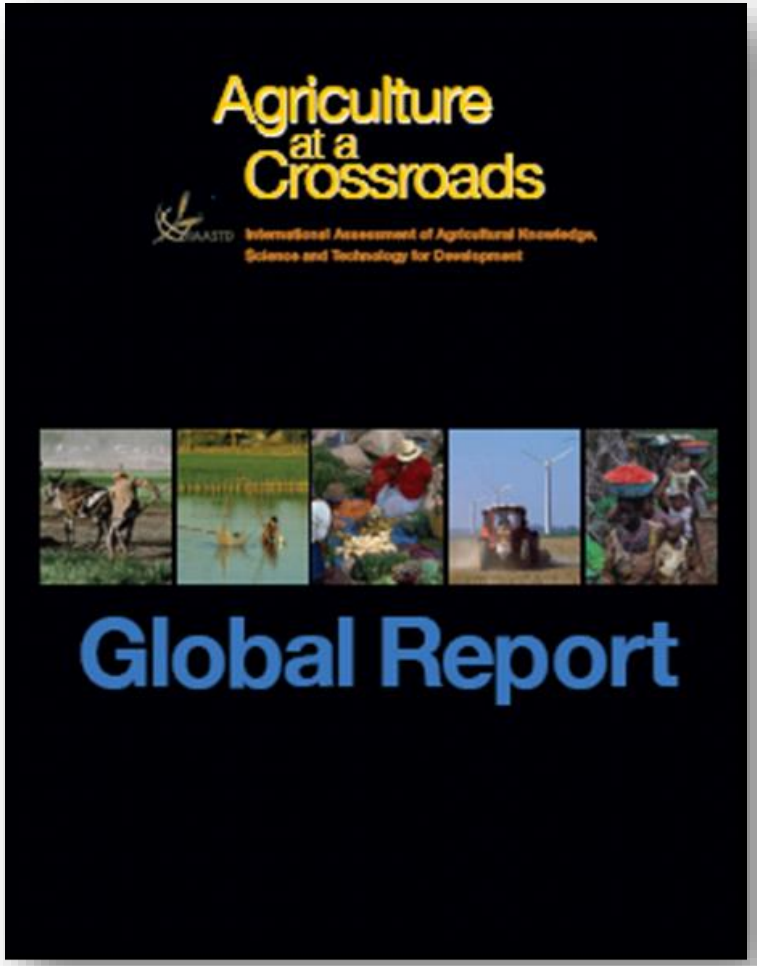
Economic value change: Investment in AKST

Agricultural Productivity - High AKST

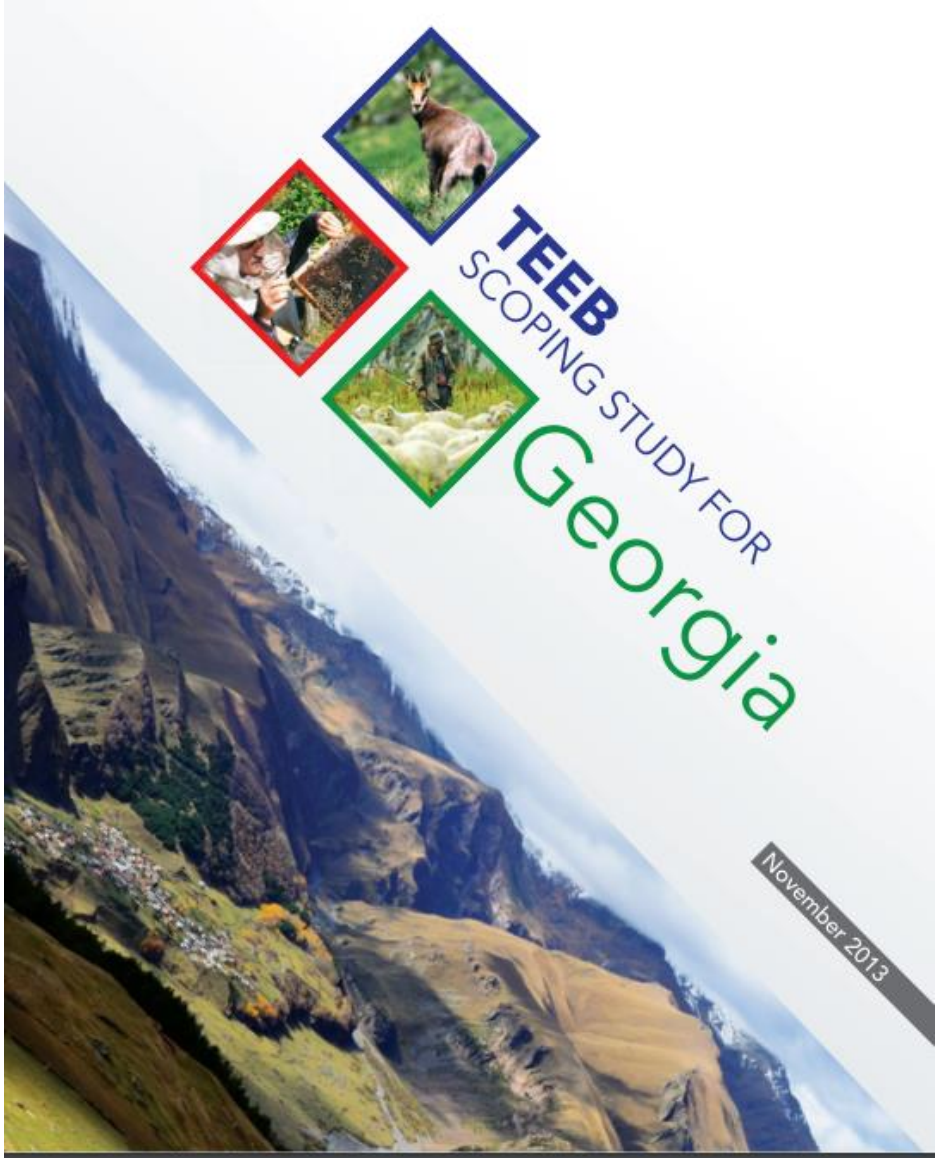


An economic appraisal of the AKST Option

- Aggregate benefits (excluding Carbon) 2000 to 2050 = **$2964 bn** at 1% discount rate
- Aggregate cost (IIST, 2009) 2000 to 2050 = **$568 bn**
- B/C ratio without Carbon benefits= **5.2**
- Carbon benefits = **$6343 bn**
- B/C ratio including carbon = **16.4**



Valuation mainstreaming - *Breakout groups*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November 2013

The Economics of Ecosystems & Biodiversity

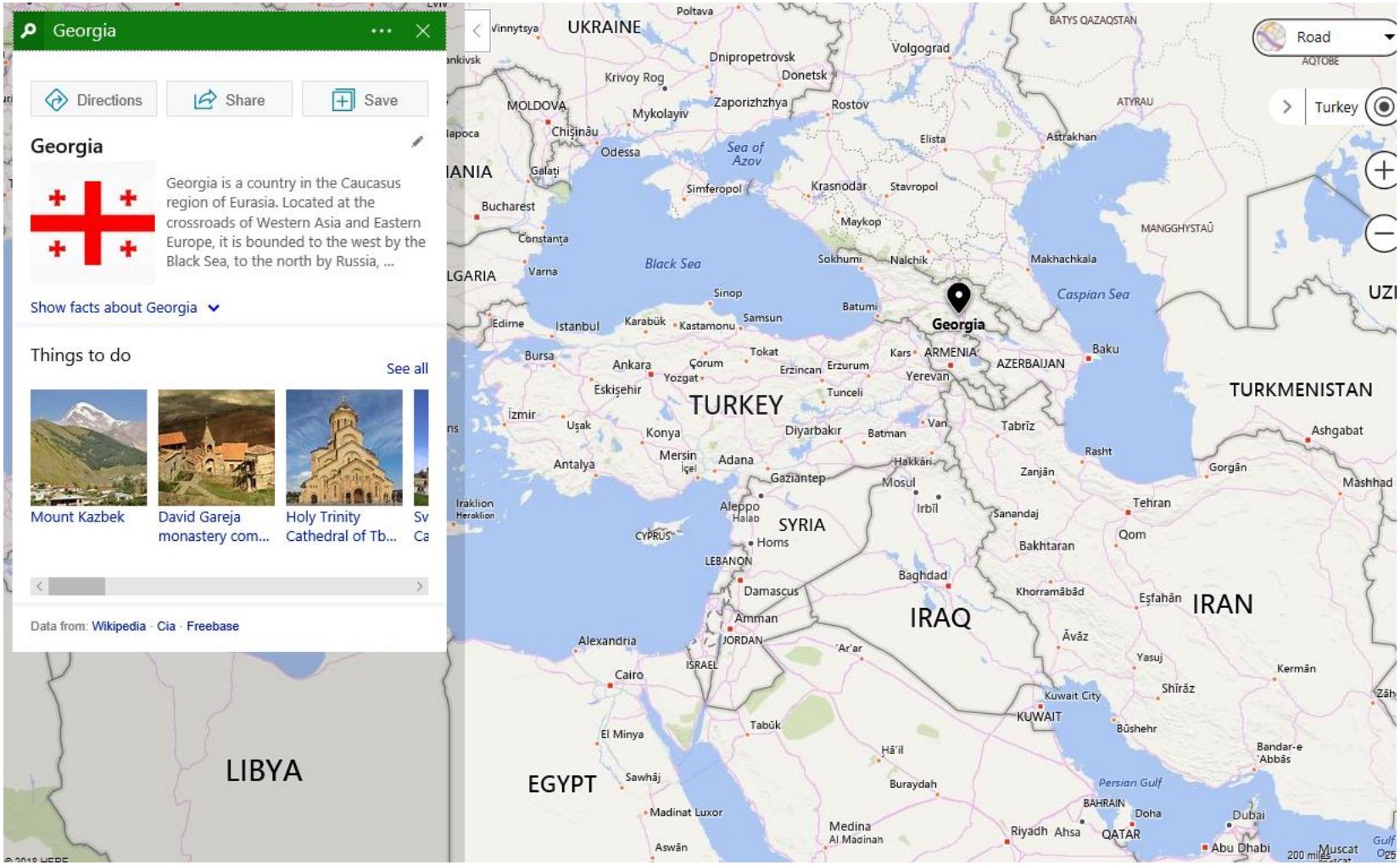

Table 2 - Summary of ecosystem service change for the hydropower sector

Main service-types	Impact on ESS				Description
	BAU		SEM		
PROVISIONING SERVICES					
Food (e.g. fish, game, fruit)	↓		↑		BAU ↓ (i) Certain fish populations reduced due to habitat depletion, degradation and fragmentation; (ii) agricultural lands are flooded; (iii) habitat and migratory routes of game species lost SEM ↑ (i) It is still possible to have a healthy fish stock in a regulated river system if appropriate mitigation measures are implemented, e.g. special side channels or structures are built to help the fish continue upstream; in the case of derivation-type HPPs more than 10% of average annual flow are left in the rivers; (ii) Reservoirs are used for fishery and aqu aculture development
Water (e.g. for drinking, irrigation, cooling)	↓	↑	↑		BAU ↓ (i) Altered water flow results in unavailability of water for alternative uses downstream; (ii) water quality is altered downstream of the dam making water unsafe for drinking BAU ↑ Water stored in reservoirs implies higher water available in dry seasons SEM ↑ More water is available for other uses downstream as dams are managed sustainably
Raw Materials (e.g. fibre, timber, fuel wood, fodder, fertilizer)	↓		↓	↑	BAU ↓ High level of forestry loss due to flooding and encroachment SEM ↓ Medium/low level of forestry loss due to flooding and encroachment SEM ↑ Forests are protected in compensatory PAs
Genetic resources (e.g. for crop-improvement and medicinal purposes)	↓		↓	↑	BAU ↓ High level of loss in genetic resources due to flooding and encroachment SEM ↓ Medium/low level of loss in genetic resources SEM ↑ Genetic resources are protected in compensatory PAs and conservation centres (botanical gardens; gene pool reserves
Medicinal resources (e.g. biochemical products, models & test-organisms)	↓		↓	↑	BAU ↓ Medicinal resources are lost due to flooding and encroachment SEM ↓ Loss of medicinal resources but at a moderate/low level due to lower levels of flooding and encroachment SEM ↑ Medicinal resources are protected in compensatory PAs and conservation centres (botanical gardens, gene pool reserves)
Ornamental resources (e.g. artisan work, decorative plants, pet animals, fashion)	↓		↓	↑	BAU ↓ Ornamental resources are lost due to high levels of flooding and encroachment SEM ↓ Less loss owing to lower levels of flooding and encroachment SEM ↑ Ornamental resources are protected in compensatory PAs and conservation centres
REGULATING SERVICES					
Climate regulation (incl. C-sequestration, influence of veg. on rainfall, etc.)	↓		↓		BAU ↓ (i) Large amounts of carbon that are stored in trees and plants are released when the water reservoirs are filled with water for the first time leading to rot. This leads to the build-up and release of methane, a potent greenhouse gas (ii) Local climate altered due to higher evaporation. SEM ↑ (i) Moderate/low build-up and release of methane, a potent greenhouse gas (ii) Local climate altered but to a lesser extent
Moderation of extreme events (e.g. storm protection and flood prevention)	↓	↑	↑		BAU ↑ Dams used for storm and flood prevention BAU ↓ Some dams withhold water and then release it all at once, causing the river downstream to suddenly flood. This action can disrupt plant and wildlife habitats SEM ↑ Dams are managed sustainably for storm and flood prevention

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Main service-types	Impact on ESS			Description
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Regulation of water flows (e.g. natural drainage, irrigation and drought prevention)	↓	↑		BAU ↓ Major downriver hydrological changes destroy riparian ecosystems dependent on periodic natural flooding, exacerbate water pollution during low-flow SEM ↑ (i) Dams are managed sustainably regulating water flow as appropriate to reduce environmental impact (ii) Ecosystems are protected in compensatory PAs
Waste treatment (esp. water purification)	↓	↓		BAU ↓ Damming of rivers cause water quality deterioration, due to the reduced oxygenation and dilution of pollutants by relatively stagnant reservoirs SEM ↓ Less large scale damming of rivers and thus lower water quality deterioration
Erosion prevention	↓	↓		BAU ↓ Reduced sediment and nutrient loads downriver of dams increase river-edge and coastal erosion and damage the biological and economic productivity of rivers and estuaries SEM ↓ Reduced sediment and nutrient loads downriver of dams, but to a lesser extent than BAU
Maintenance of soil fertility (incl. soil formation)	↓	↓		BAU ↓ Fertile soil is lost due to flooding and encroachment SEM ↓ Fertile soil is lost but to a lesser extent compared to BAU
HABITAT SERVICES				
Maintenance of life cycles of migratory species (incl. nursery service)	↓	↓	↑	BAU ↓ (i) Terrestrial natural habitats lost to flooding and encroachment; wildlife nourishment areas and travel routes are affected (ii) Power lines affect the bird population, either through collision or by short circuit due to contact SEM ↓ (i) Terrestrial natural habitats and wildlife nourishment areas, travel routes affected but each to lesser extent than BAU (ii) Power lines affect the bird population but to a lesser extent than BAU SEM ↑ Compensatory PAs provide sustainable habitat to flora and fauna
Maintenance of genetic diversity (esp. gene pool protection)	↓	↓	↑	BAU ↓ Flooding areas for dams and encroachment reduce flora and fauna and, respectively, gene pool. SEM ↓ Flooding but to a lesser extent than BAU SEM ↑ Compensatory PAs provide sustainable habitat to flora and fauna
CULTURAL SERVICES				
Aesthetics	↓	↑		BAU ↓ Ecosystems with valuable aesthetic information is lost due to flooding or affected by construction works SEM ↑ Compensatory PAs provide more valuable or equal aesthetic information to that lost (if at all) by small-scale HPPs
Opportunities for recreation & tourism	↓	↓	↑	BAU ↓ Damming of large areas reduces public access to certain areas, and thereby affects outdoor recreation opportunities SEM ↓ Some reduced public access, but lesser impact compared with BAU SEM ↑ (i) Reservoirs are used for recreation & tourism (ii) Compensatory PAs provide opportunities for recreation & tourism
Inspiration for culture, art and design	↓	=		BAU ↓ Cultural heritage, including archaeological, historical, paleontological, and religious sites and objects are inundated by reservoirs or destroyed by construction activities SEM = Sites with significant cultural heritage are not subject to damming

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	BAU	SEM		
Spiritual experience	↓	↓	↑	BAU ↓ Ecosystems are flooded or affected by construction activities reducing opportunities for spiritual experience SEM ↓ Ecosystems are flooded but to a lesser degree SEM ↑ (i) Compensatory PAs provide opportunities for spiritual experience (ii) Proper application of EIA process avoids flooding of important sites

Exercise

- In groups, select one example of a policy that is likely to impact on biodiversity and ecosystem services
- Decide for this policy which of the Ecosystem Services are likely to be most important
  - How much is the ecosystem service going to be impacted on?
  - How important is that ecosystem service to the livelihoods of people in the country?
- For these selected ecosystem services, discuss whether the provisioning of the ecosystem service would *go up*, *go down* or *stay the same*
  - comparing BAU with policy-on

Thank You!

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