

The Economic Case for Nature: A global Earth-economy model to assess development policy pathways

September 16, 1963

World Bank in partnership with
University of Minnesota and Purdue University



A photograph of a forest floor. Several tree trunks of varying thicknesses and bark textures are visible. The ground is covered with lush green vegetation, including various leafy plants and grasses. The lighting is soft, suggesting a shaded forest environment.

Is there an economic case for
conserving ecosystem services
and nature more generally?

Yes, there is!

The Economic Case for Nature



A global Earth-economy model
to assess development policy pathways



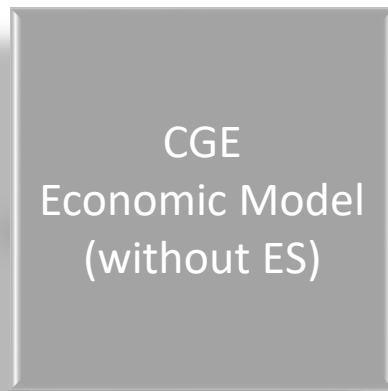
A novel approach: Integrating 4 ecosystem services in a global CGE

Policy changes

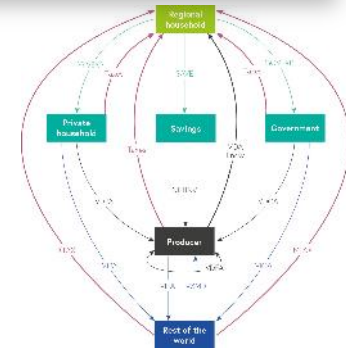
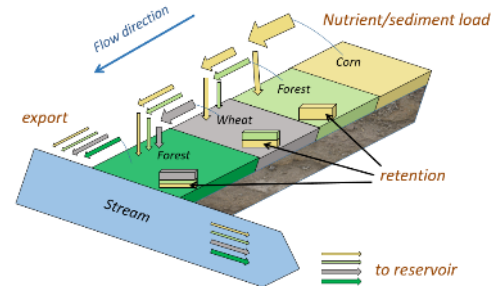
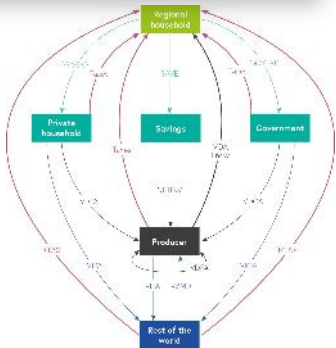
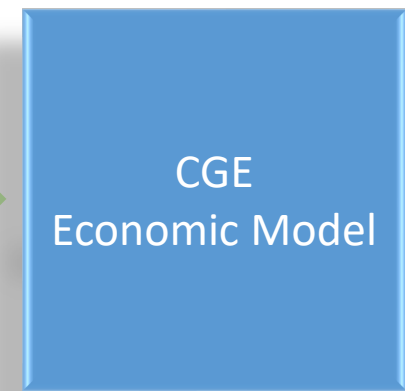
- Fiscal reform
- Expansion of PES
- Intensification of agriculture
- Trade policies

1. *Pollination*
2. *Timber*
3. *Fisheries*
4. *Carbon*

- **GDP**
- **Welfare**
- **Factor use**

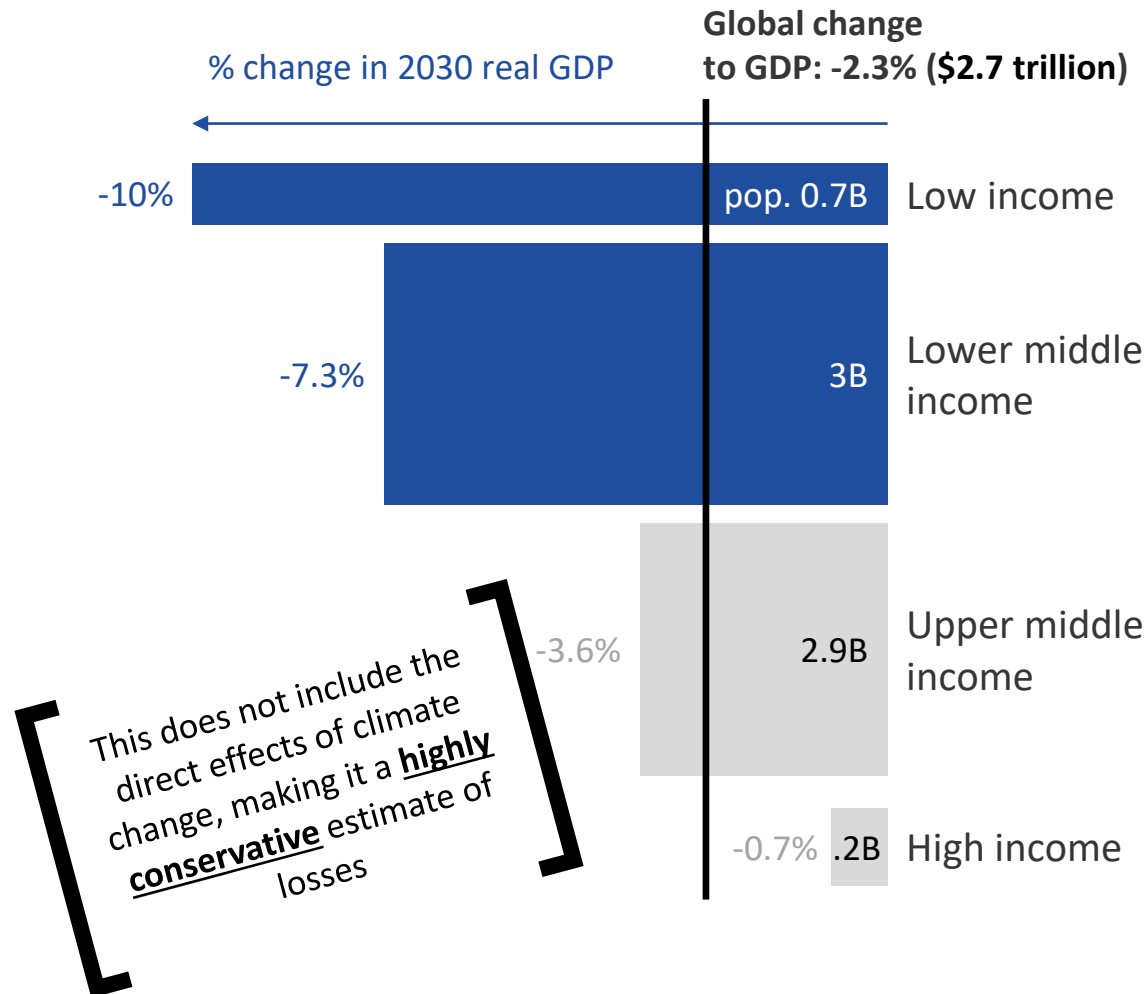


Change in land use



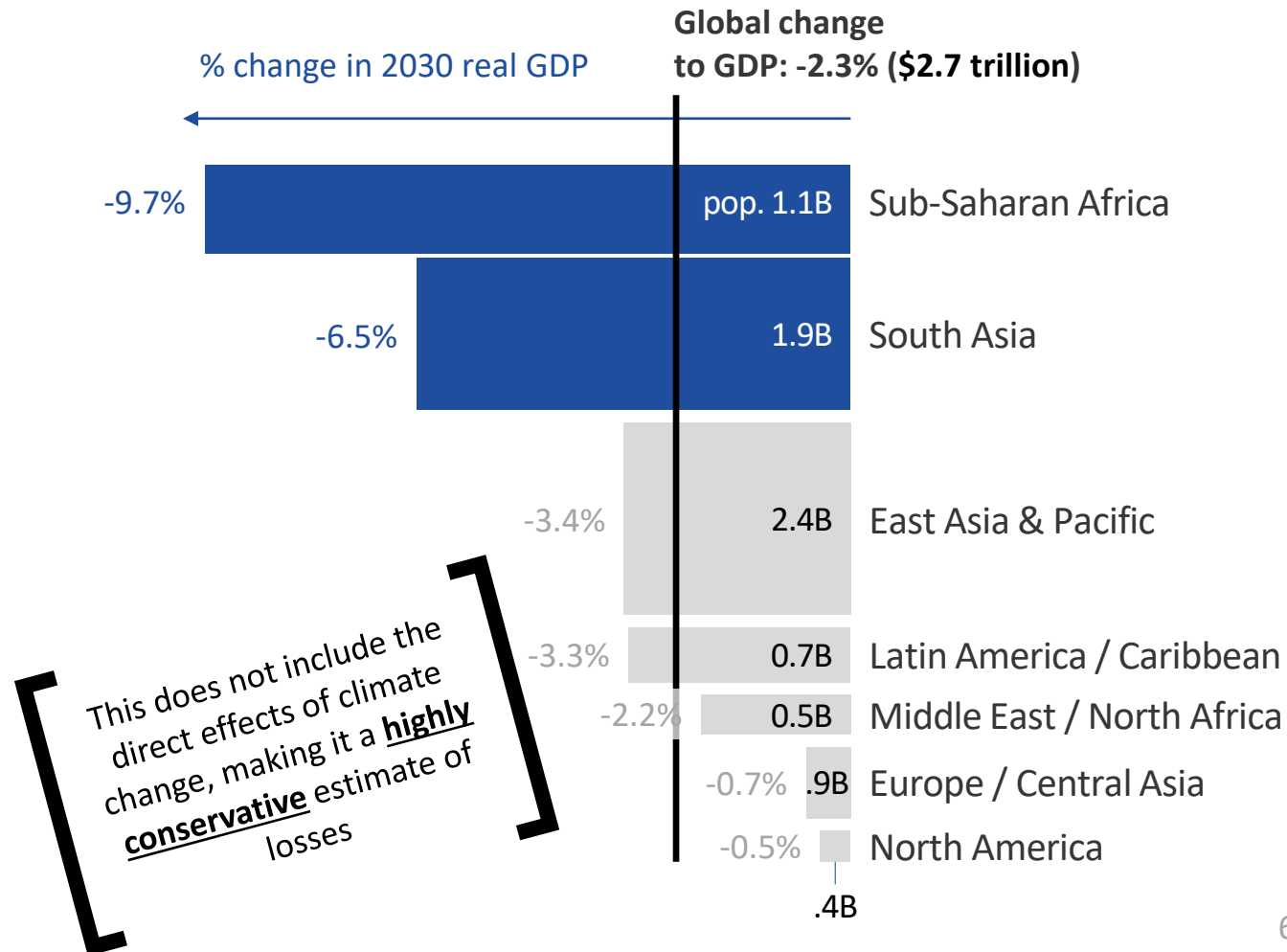
A partial collapse of ecosystem services would cost \$2.7 trillion, with higher impacts on poorer countries...

Difference in 2030 GDP under collapse scenario vs. baseline scenario, **by income group**



..and especially in Sub-Saharan Africa and South Asia

Difference in 2030 GDP under collapse scenario vs. baseline scenario, **by regions**

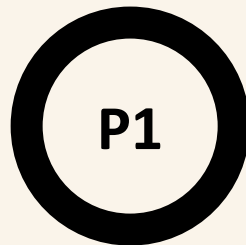


Win-win policies exist..

**Basic
policy options**



**Domestic forest
carbon payment**



**Decoupled support
to farmers**



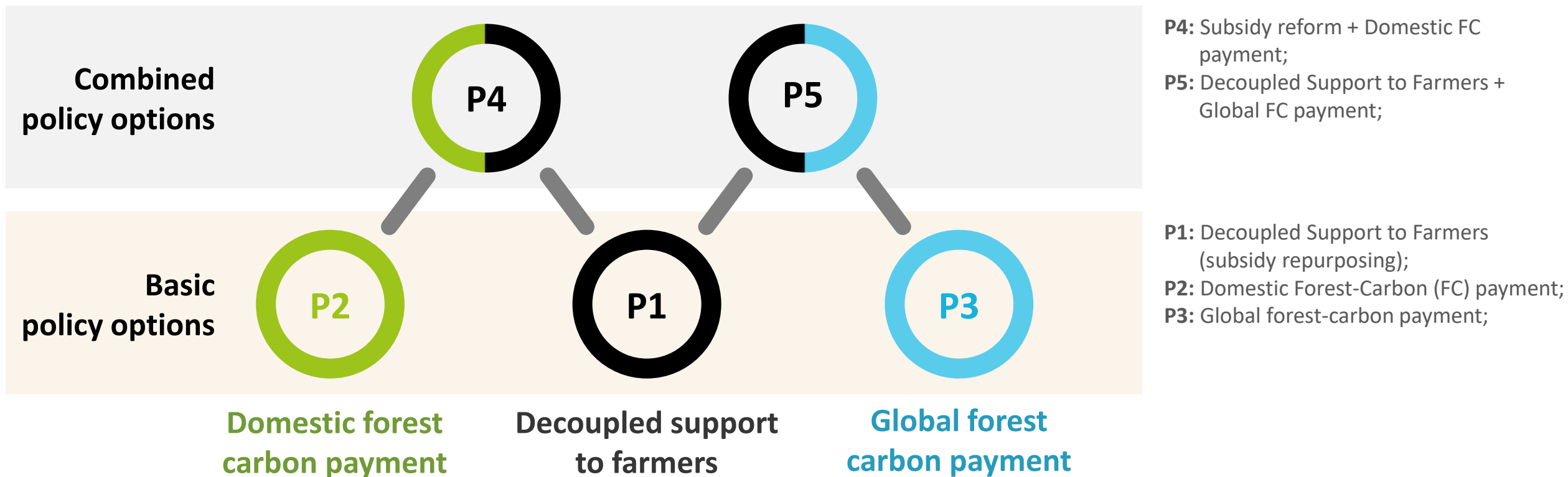
**Global forest
carbon payment**

P1: Decoupled Support to Farmers
(subsidy repurposing);

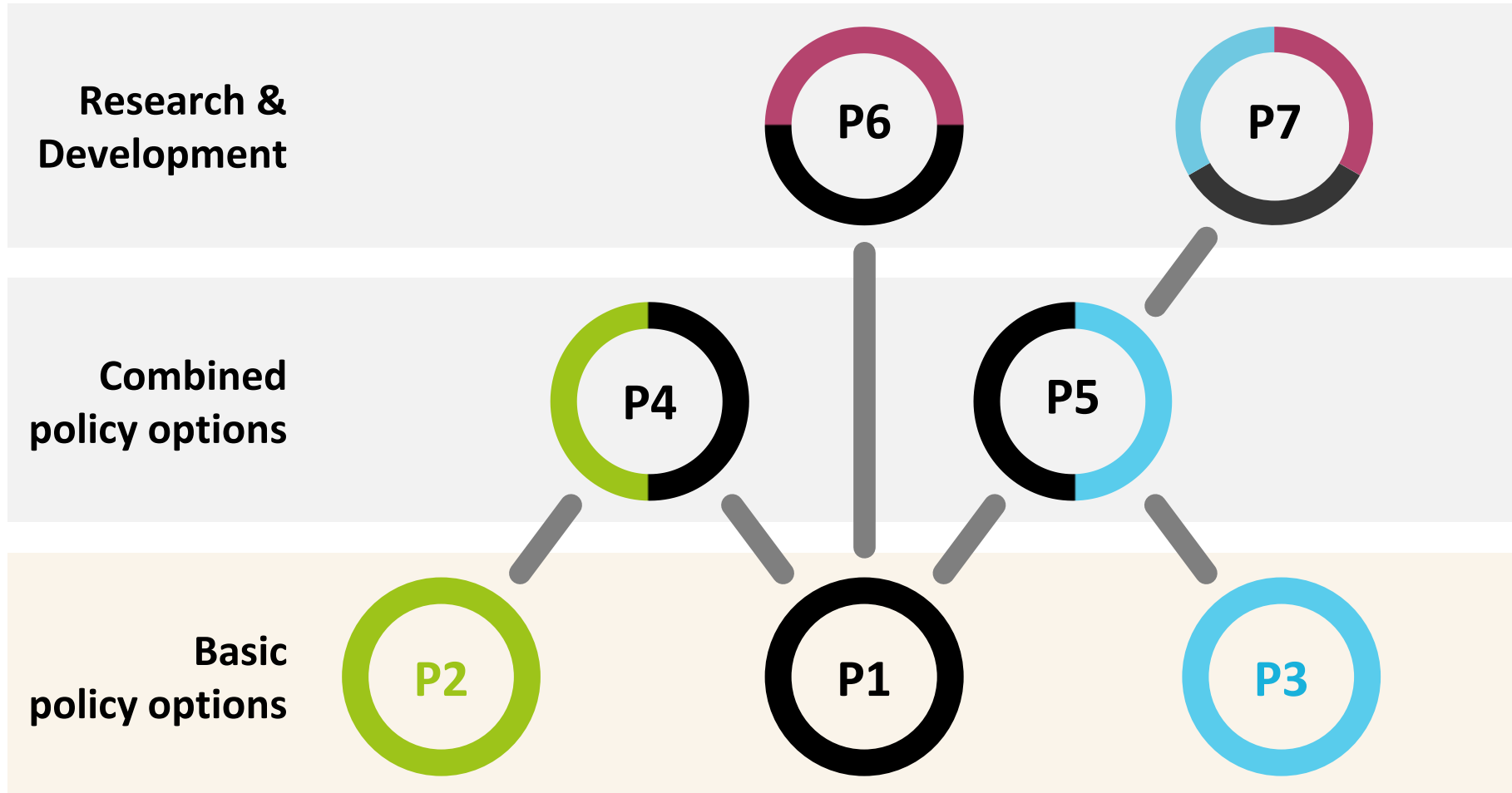
P2: Domestic Forest-Carbon (FC) payment;

P3: Global forest-carbon payment;

..and are especially effective when combined



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Domestic forest
carbon payment

Decoupled support
to farmers

Global forest
carbon payment

P6: Decoupled Support to Farmers + agricultural R&D;

P7: Decoupled Support to Farmers + agricultural R&D + Global FC payment

P4: Subsidy reform + Domestic FC payment;

P5: Decoupled Support to Farmers + Global FC payment;

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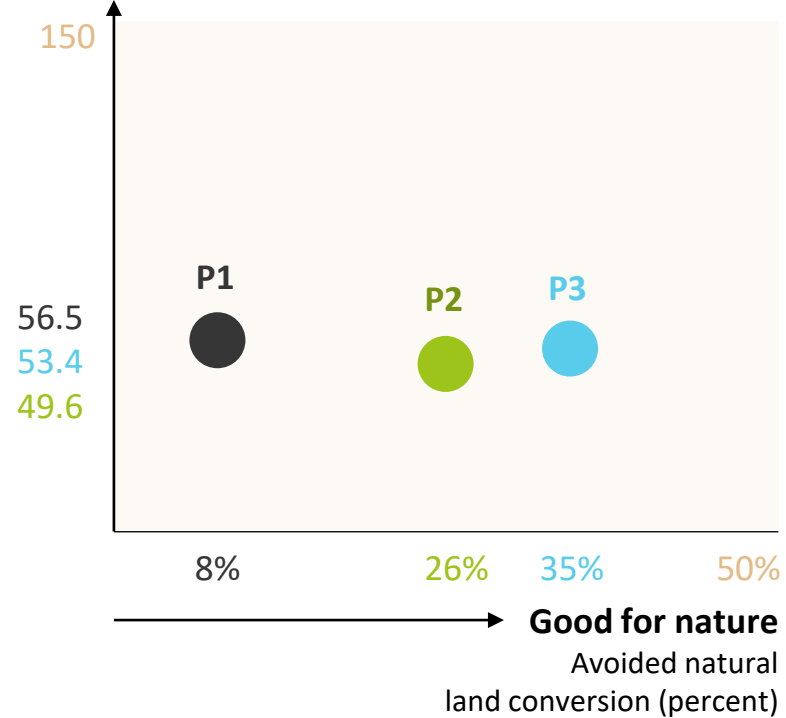
P3: Global forest-carbon payment;

Policies can be both nature- and economy smart

Basic policy options

Good for the economy

Change in real GDP rel. to BAU
(billion US\$)



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P2: Domestic forest-carbon (FC) payment;

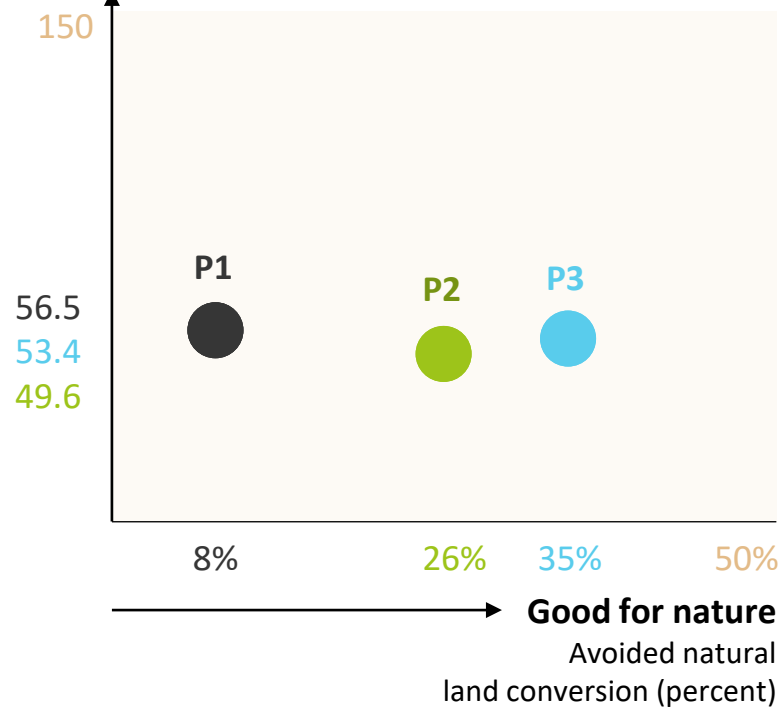
P3: Global FC payment

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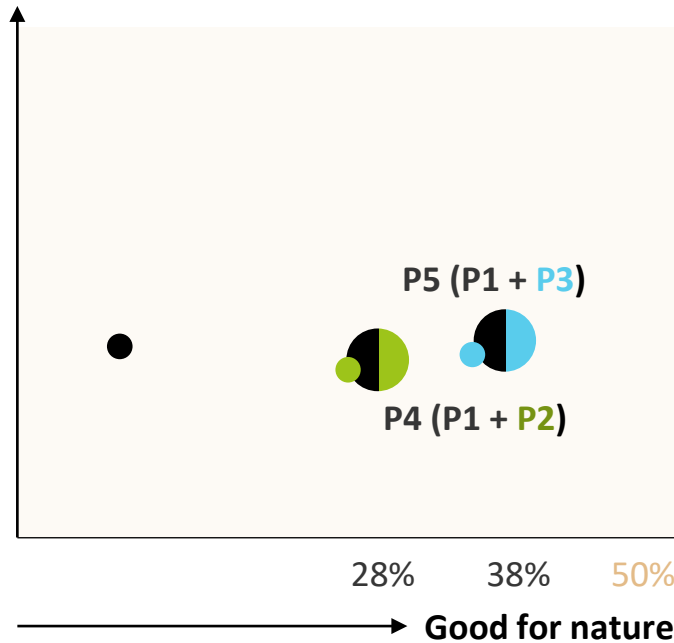


P1: Decoupled Support to Farmers;
P2: Domestic forest-carbon (FC) payment;
P3: Global FC payment

Combined policy options

Adding forest carbon payment schemes improves the policy

Good for the economy



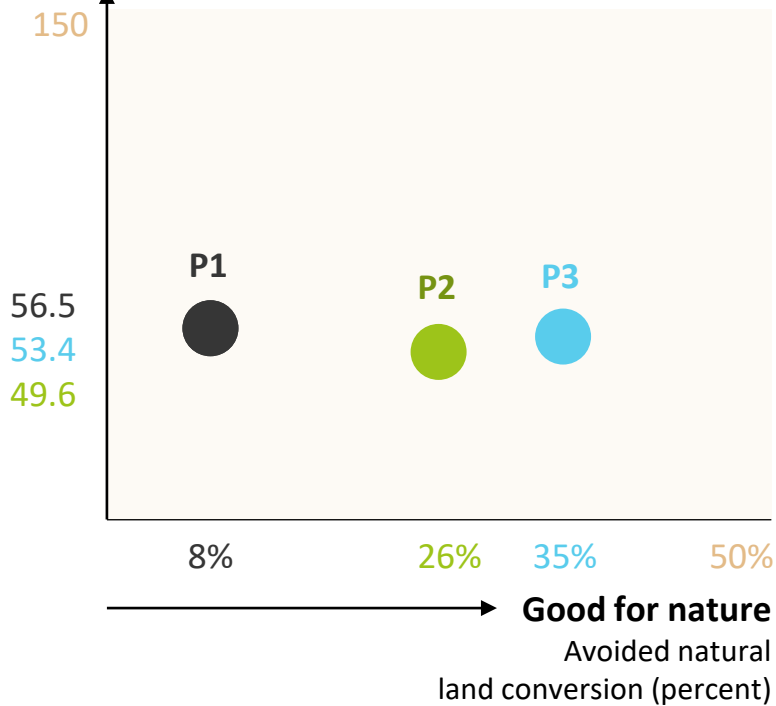
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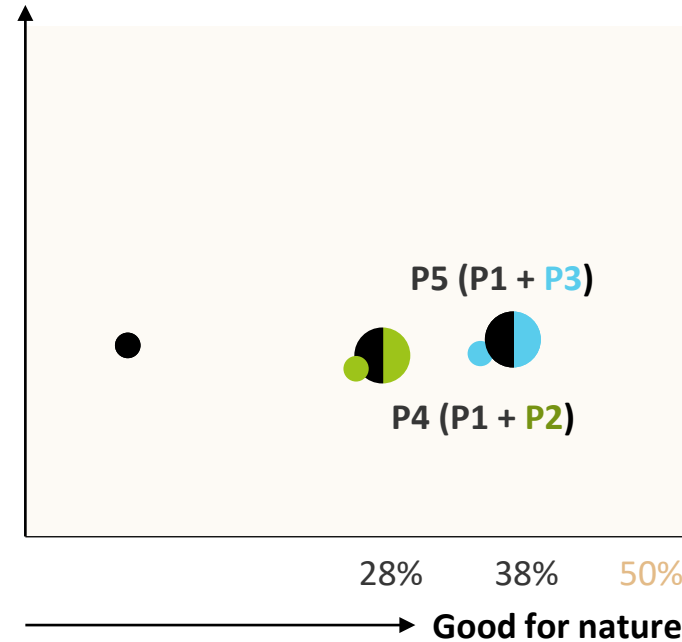


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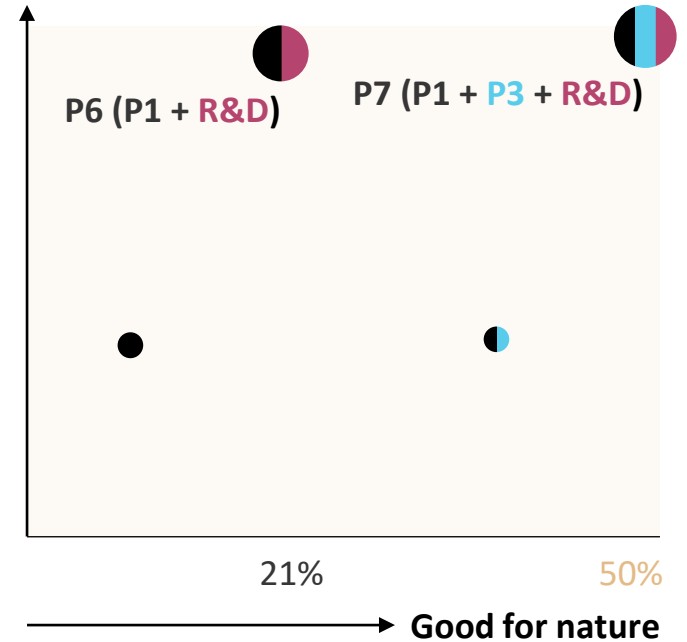


P4: Subsidy reform + Domestic FC payment;
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Research & development

Adding research & development improves the policy

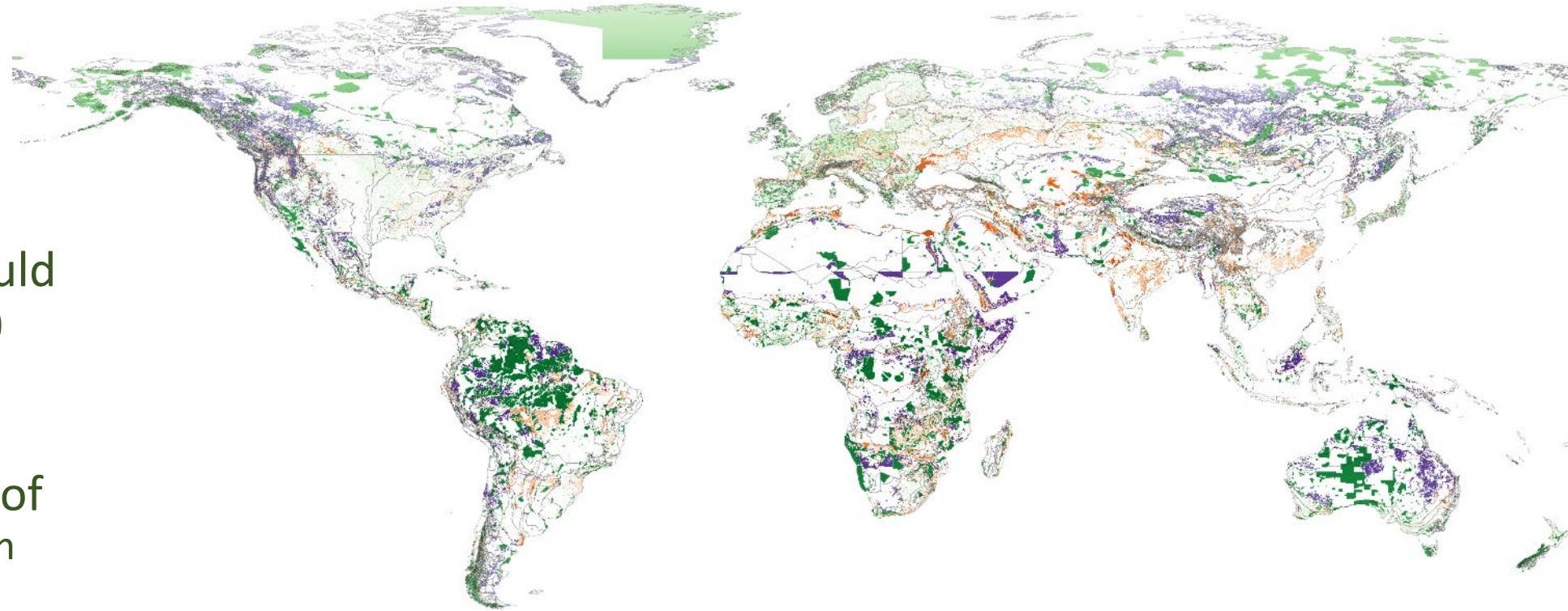
Good for the economy



P6: Decoupled Support to Farmers + RD;
P7: Decoupled Support to Farmers + RD + Global FC payment

What is the net effect of the 30x30 goal?

- Determine the BAU land use pattern
- Define how that would change under 30x30 (optimized conservation)
- Assess the net effect of
 - Improved ecosystem service provision
 - Declined value added from reduced production



Currently protected

Newly protected (no conflict)

Displaced cropland

8605
hectares per
5-arc-minute
grid cell



Most

Least

Globally, small net cost: but with important geographic differences

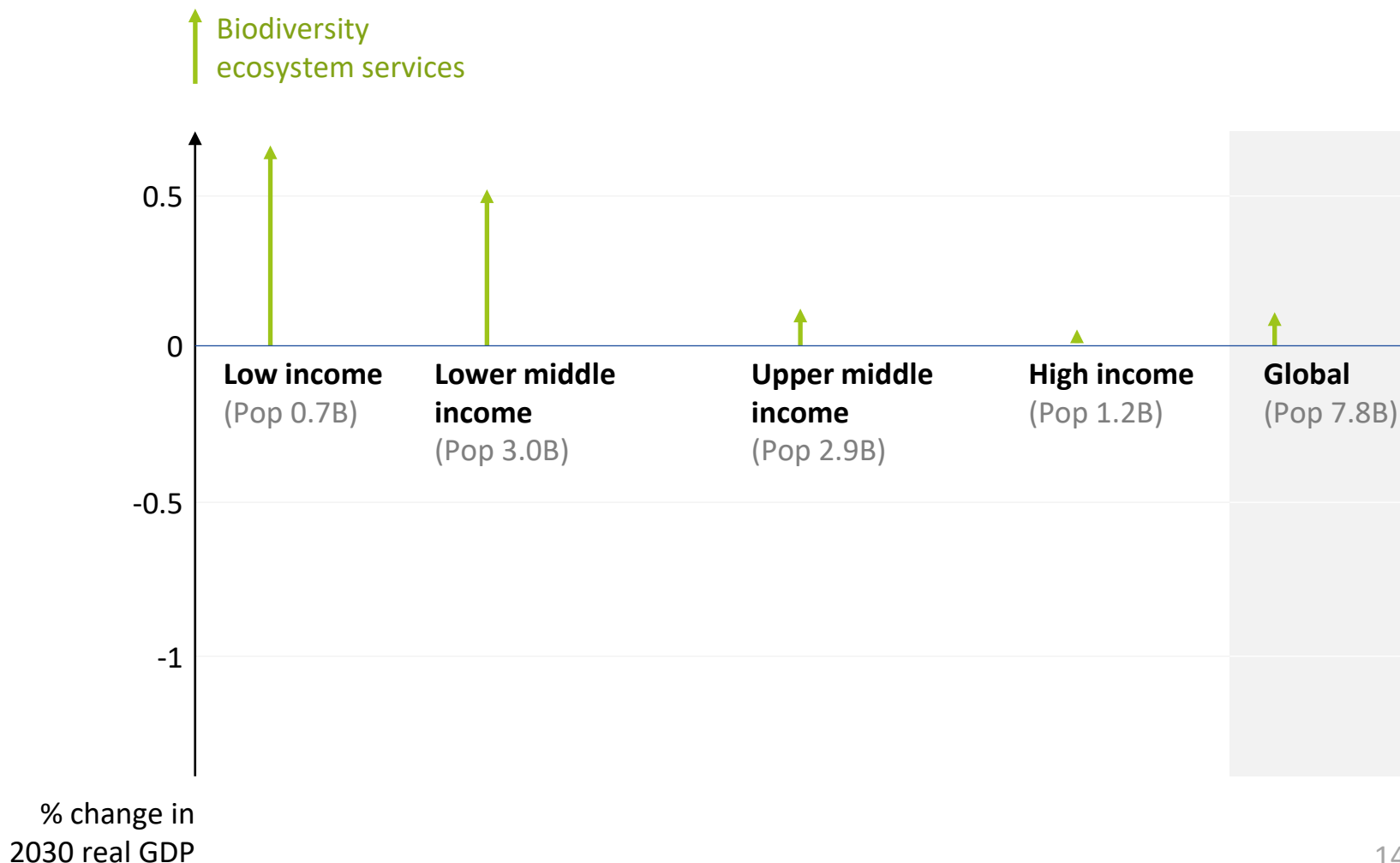
Globally, the costs of achieving the 30 x 30 target are largely offset by the benefits from ecosystem service gains, but there are important geographic differences

Draft Target 2 of the post-2020 global biodiversity framework:

By 2030, protect 30 percent of the planet

A negligible cost to the world, and the need to mobilize resources in low-income economies

- US\$ -115 billion (-0.10%) without CC co-benefits
- US\$ -13 billion (-0.01%) with CC mitigation co-benefits



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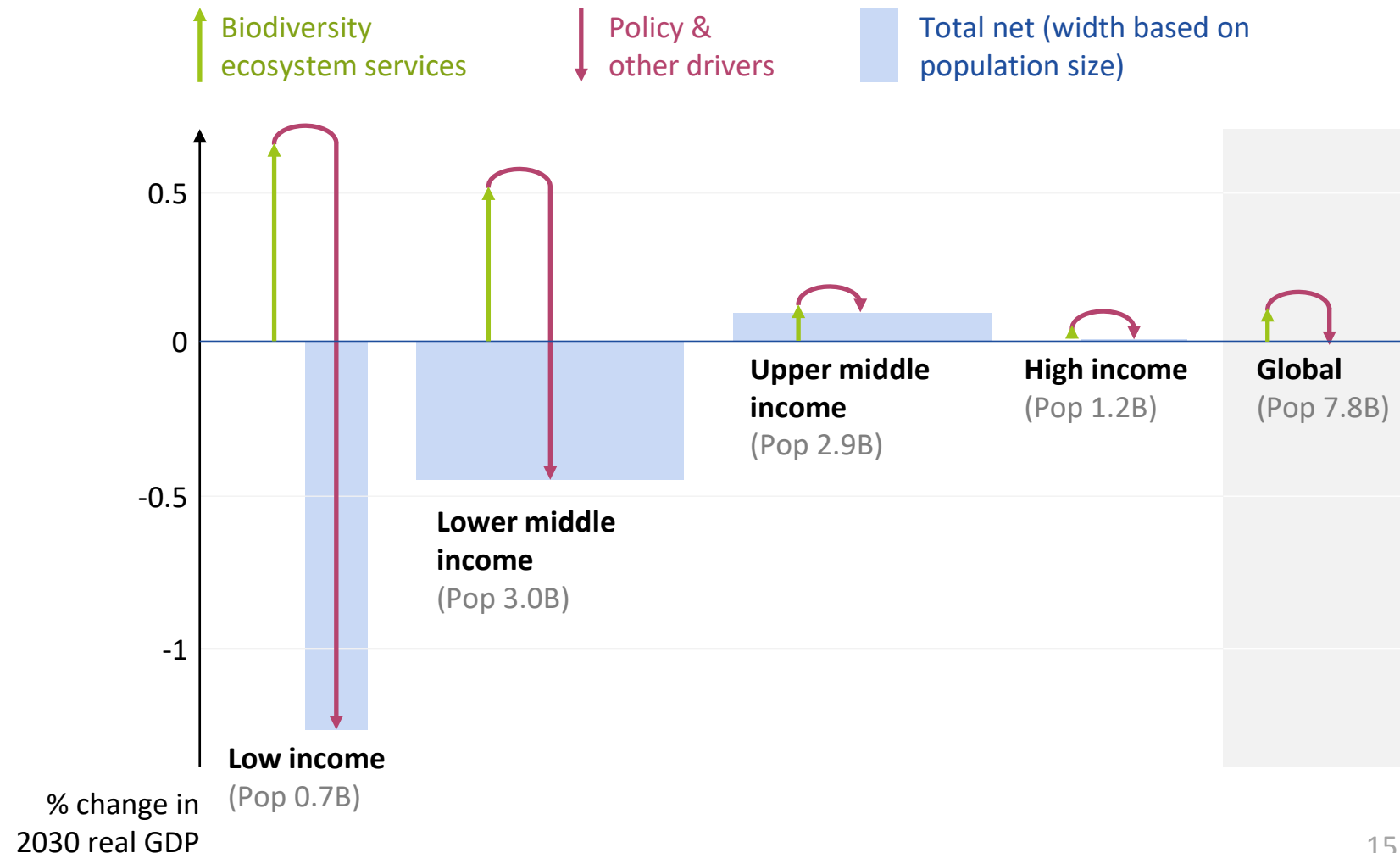
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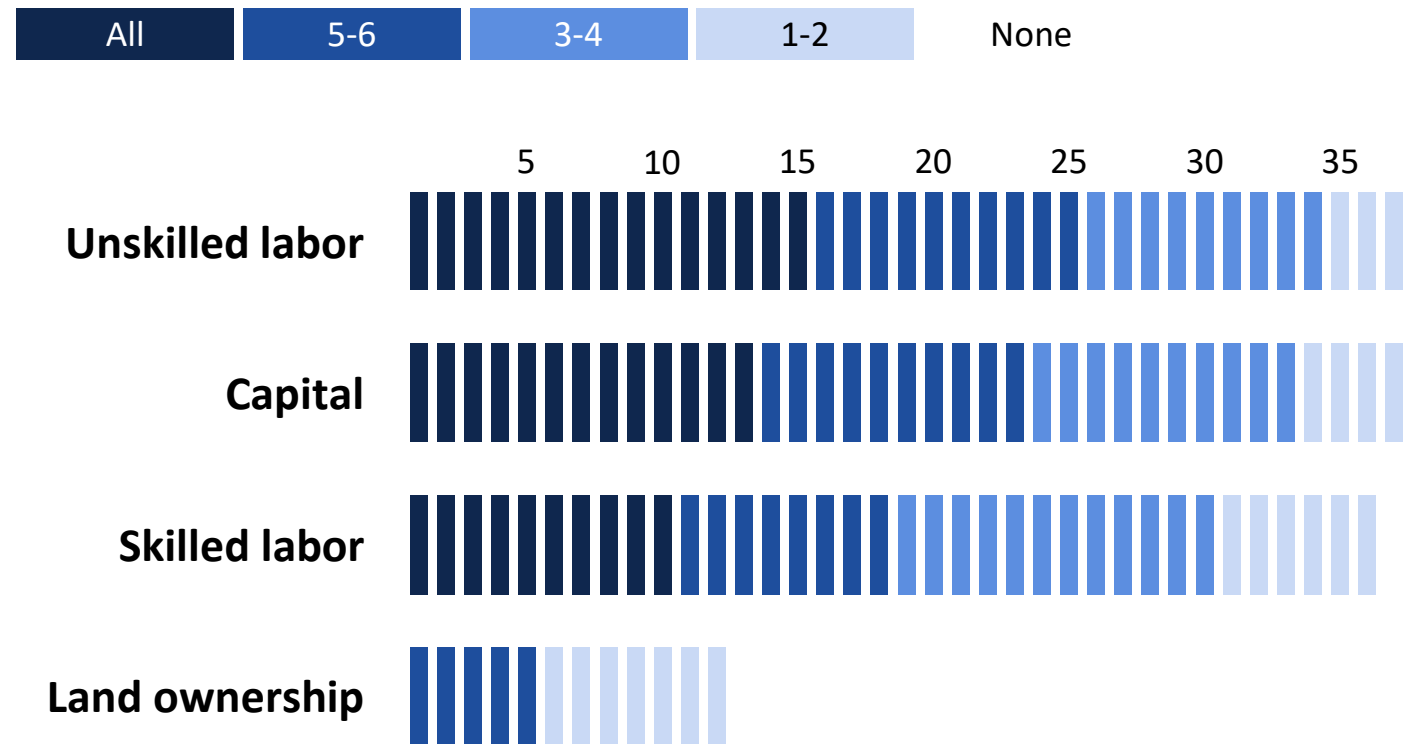
Winners and losers: Political economy poses the biggest challenge going forward

Although at the global aggregate level the case for adopting nature-smart policies is clear...

... Policy reforms tend to have a positive impact on labor wages and a negative impact on returns to land.

Country-level adoption of nature-smart policies crucially depends on reconciling incentives across social groups

Number of policies that will benefit each factor of production per country unit



NCA/ ES can inform the new Global Biodiversity Framework

Summary

- Biodiversity loss is **financially material** (this work provides novel evidence at a global scale)
- **Developing countries are most at risk** but can also **gain from policy reform**
- A **whole-of-economy approach** is essential: design policies that protect nature, improve the economy and are inclusive
- **Synergies with the climate agenda** are crucial. Explicitly accounting for the carbon benefits of nature-smart policies considerably strengthens the case for action

Good economics is instrumental for a successful Post-2020 GBF

Target 2

Protect and conserve 30 per cent of the planet

Target 7

Climate change mitigation from national biodiversity strategies

Target 8

Nutrition, food security, livelihoods from nature

Target 9

Productivity, sustainability and resilience in agriculture

Target 13

Biodiversity values into policies and accounts

Target 14

Green production practices and supply chains

Target 17

Repurpose subsidies and positive incentives

Target 18

Financing from all sources

Target 19

Quality information for decision-makers



Thank you!

The economic case for nature:

<https://openknowledge.worldbank.org/handle/10986/35882>

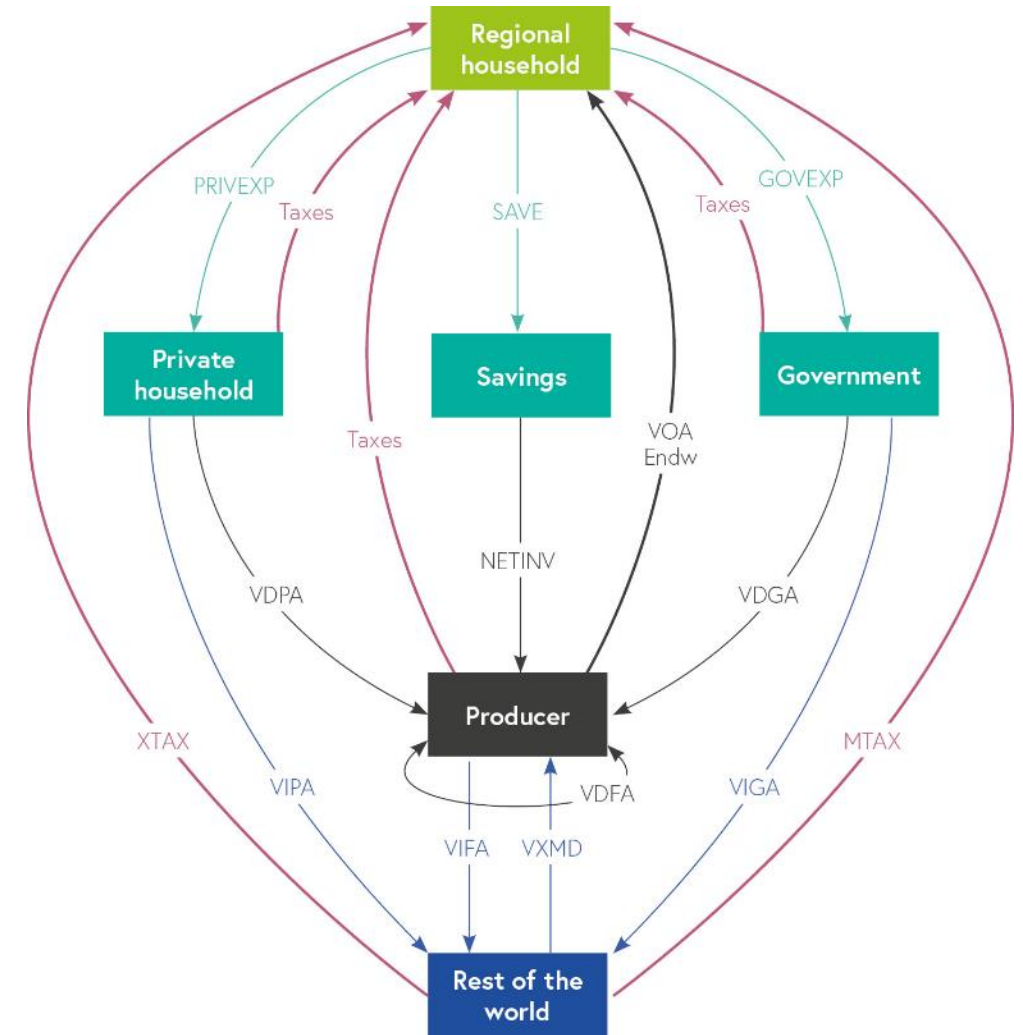
Yes, there is! Key messages

1. The world cannot afford to lose ecosystem services: even a **partial collapse** would be detrimental, particularly for **low- and lower-middle-income countries**
2. Win-win, nature-smart **policies** exist: they can reduce systemic risks and generate **economic gains**
3. Ambitious targets, including the 30x30 target, are **within reach**, particularly when **synergies with climate change** are exploited
4. Nature-smart transition needs to be **inclusive and fair**



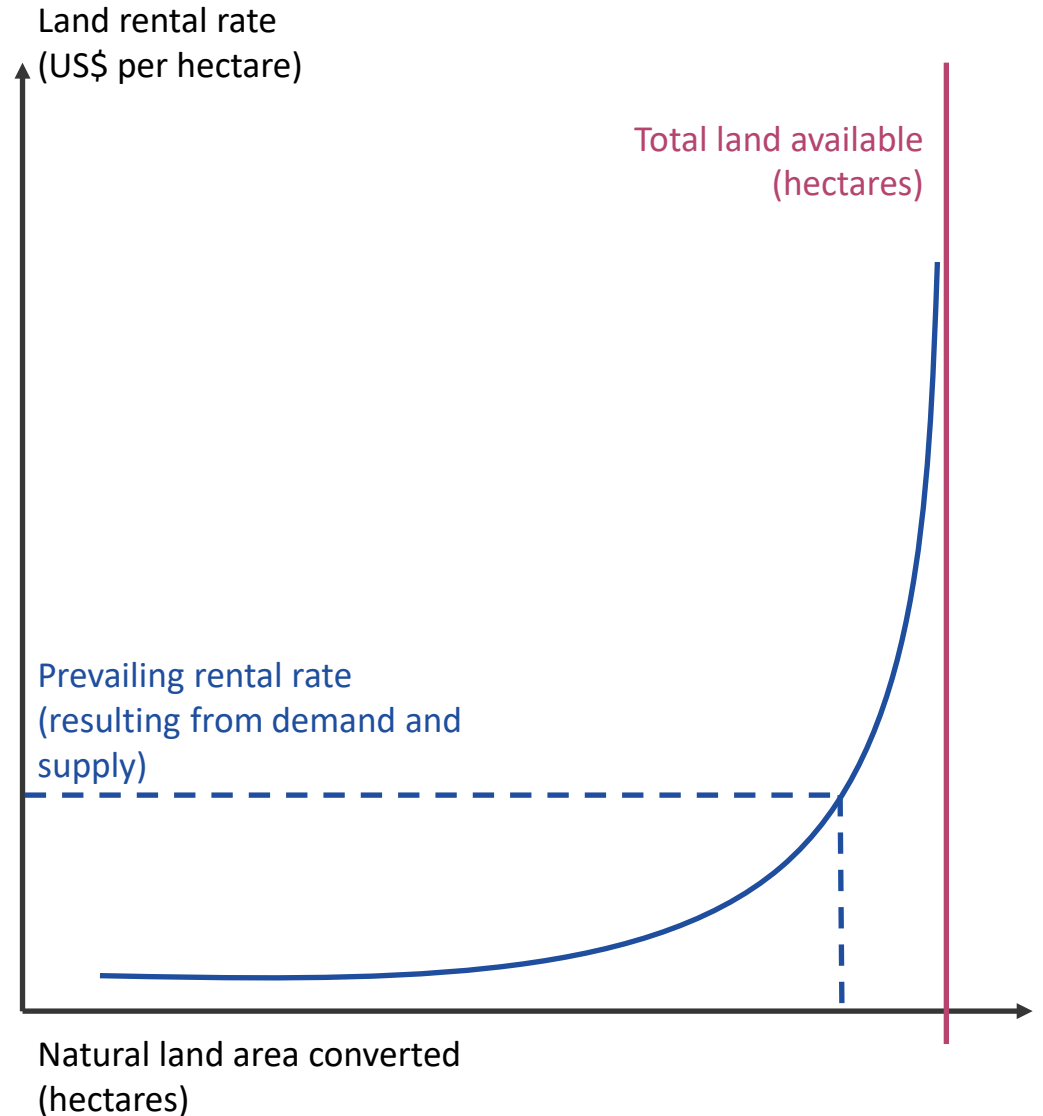
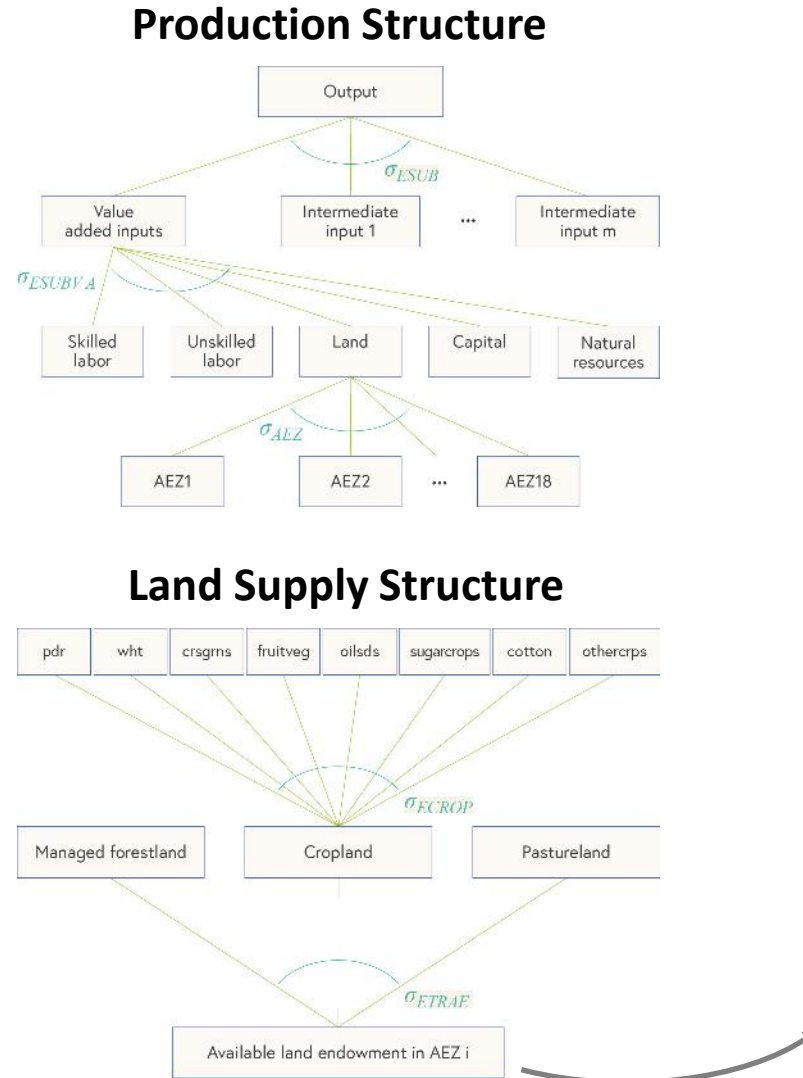
GTAP (Global Trade Analysis Project) model

- The GTAP model is a multi-commodity, multiregional computable general equilibrium (CGE) model
- Designed for analysis of trade agreements and national policies
- Resolution is limited by national economic accounts
 - 141 regions, 65 sectors



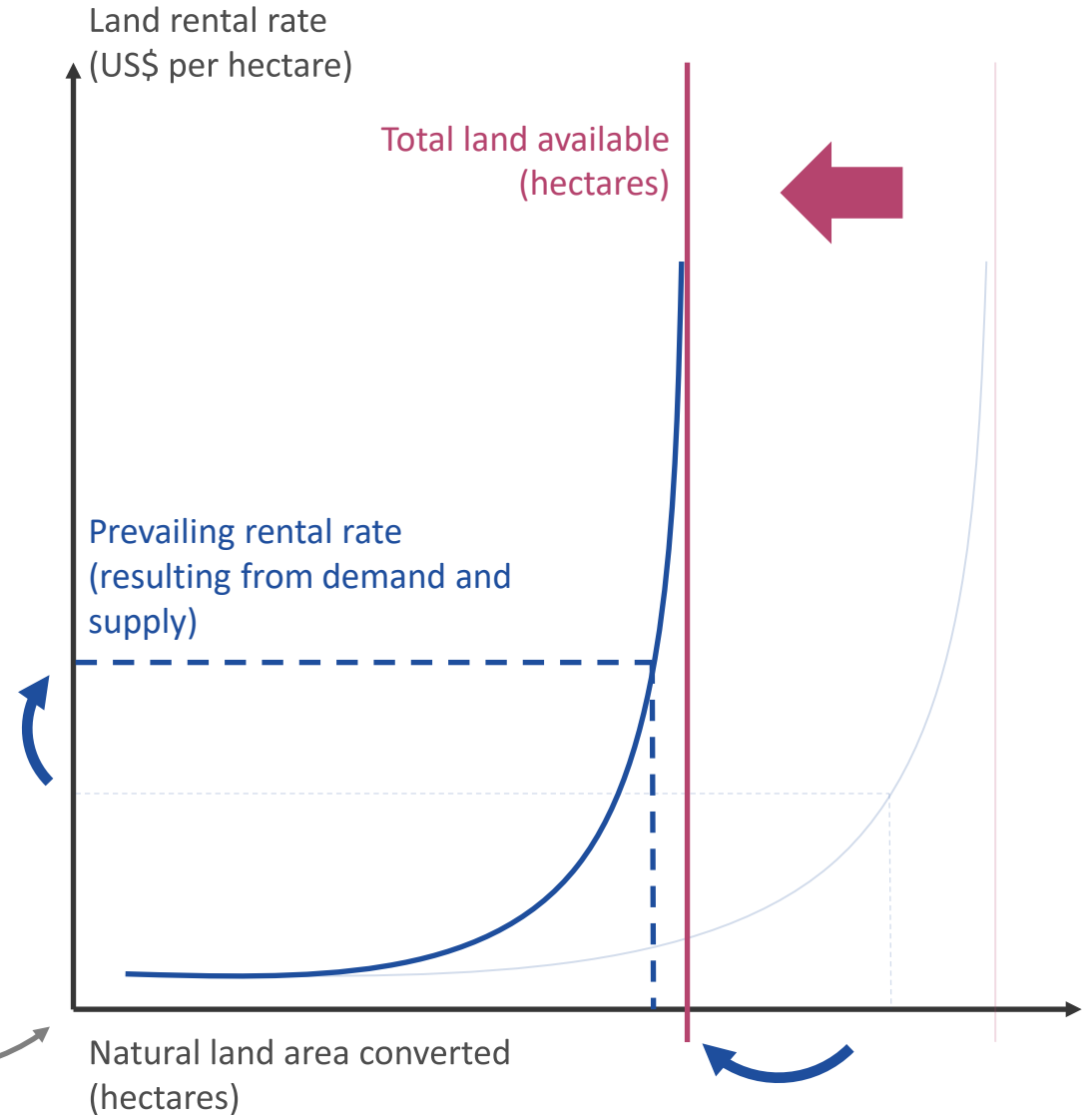
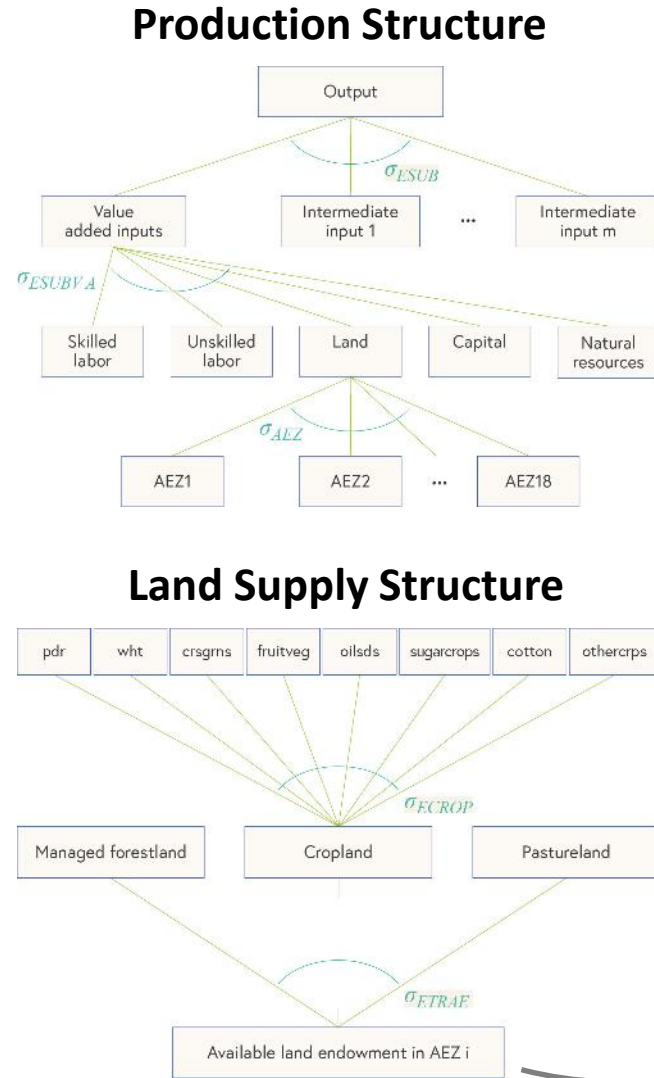
GTAP Agro-Ecological Zones Model

GTAP Agro-Ecological Zones (AEZ) model introduces competition for land resources across crops, pasture and forestry and heterogeneous land use and land endowments within each region



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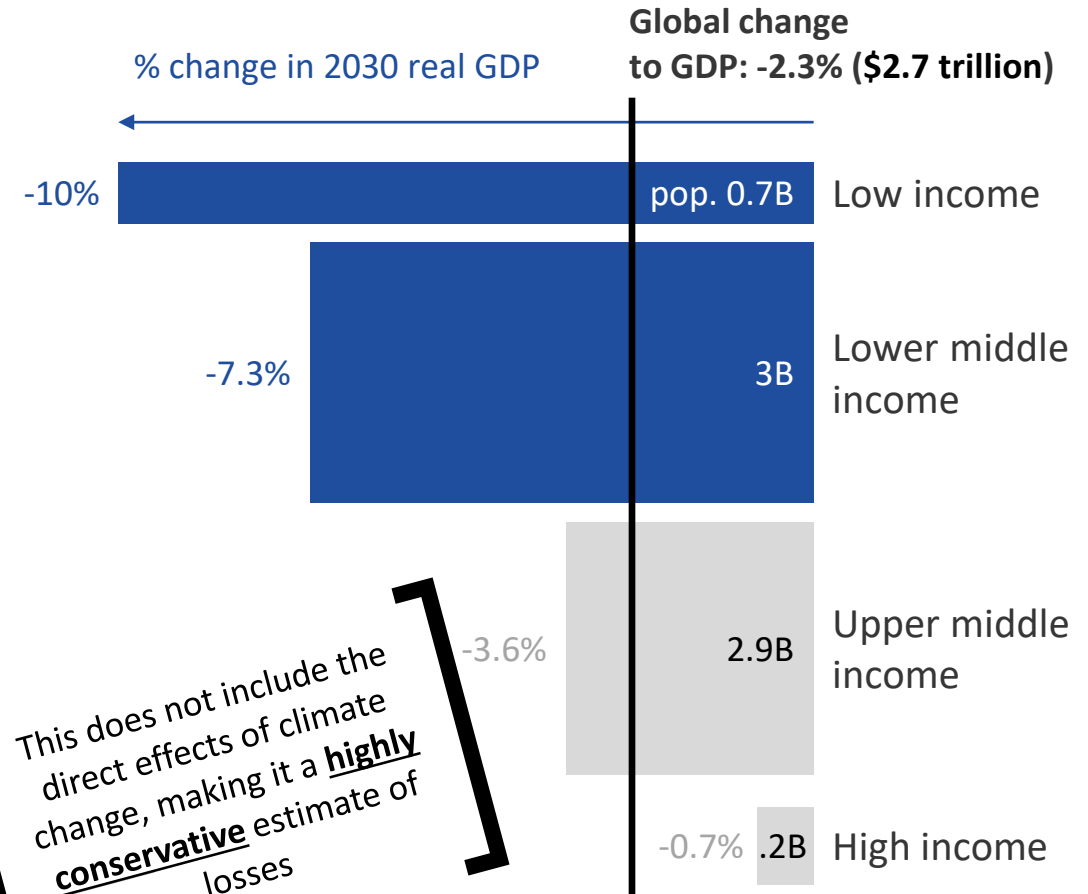
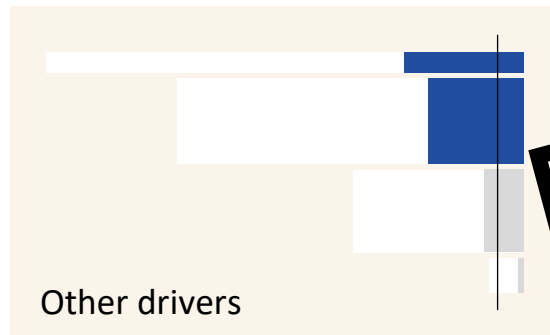
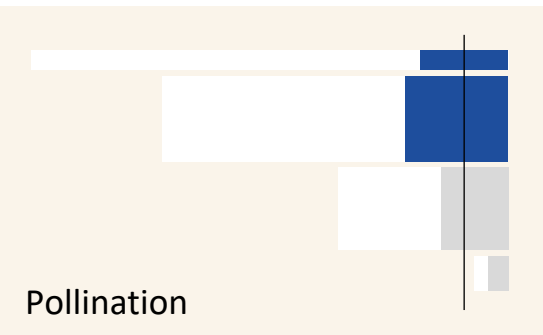
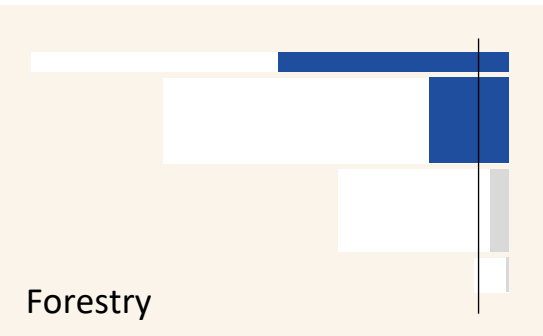


A partial collapse of ecosystem services would cost \$2.7 trillion, with higher impacts on poorer countries...

Reaching selected tipping points hurts **low-income** and **lower-middle-income** countries the most...

Difference in 2030 GDP under collapse scenario vs. baseline scenario, **by income group**

Share of GDP change attributable to each ecosystem service



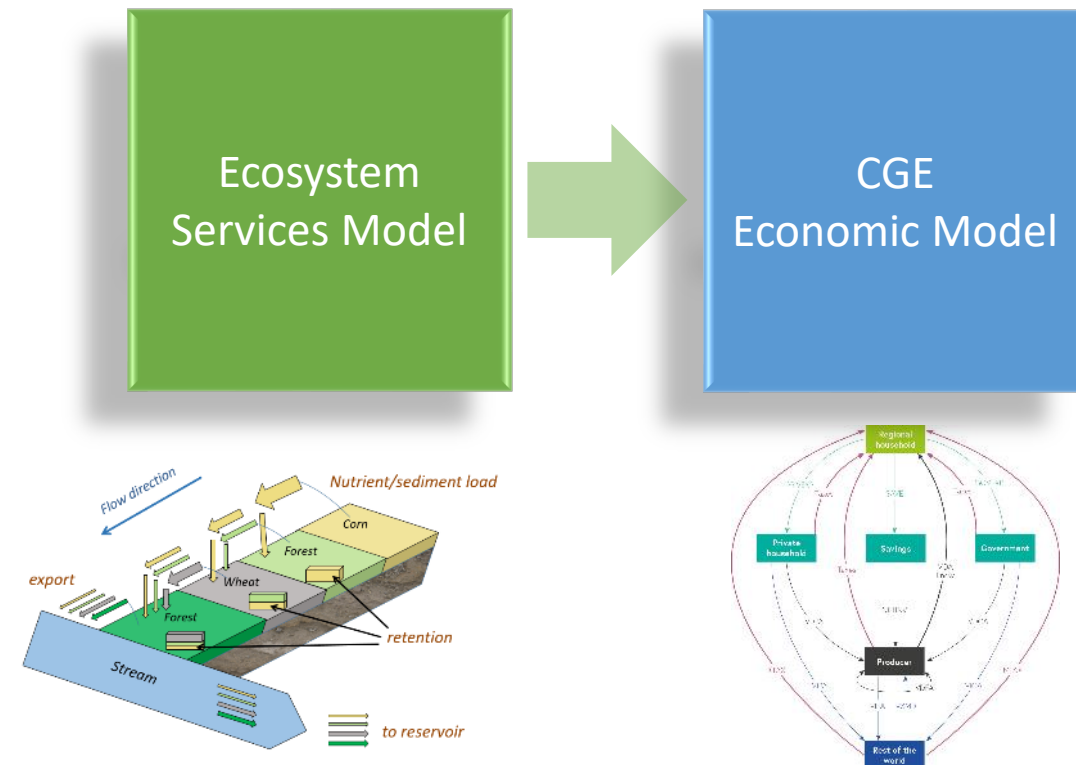
A novel approach: the integrated Global Earth-economy Model in a nutshell

Question 1: What happens when Nature services collapse?

(A stress test of the
global economy)

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2. *Timber*
3. *Fisheries*
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- **GDP**
- **Welfare**
- **Factor use**



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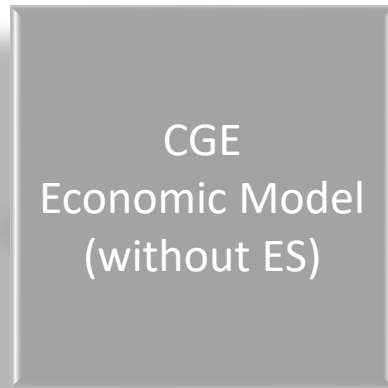
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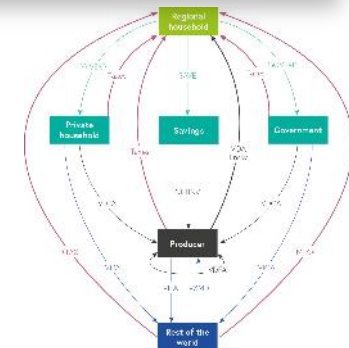
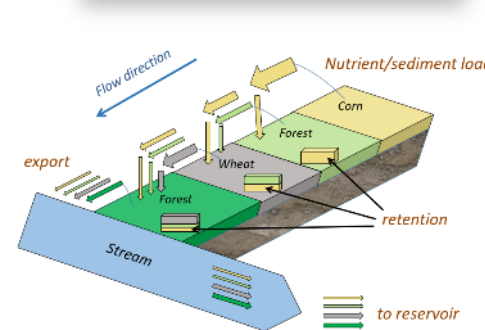
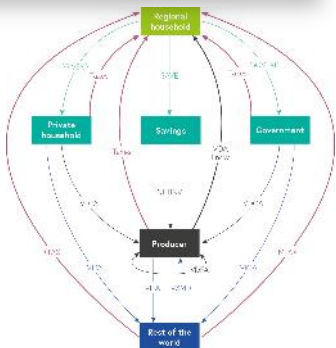
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Change in land use



Question 2:
Are there win-win policies?

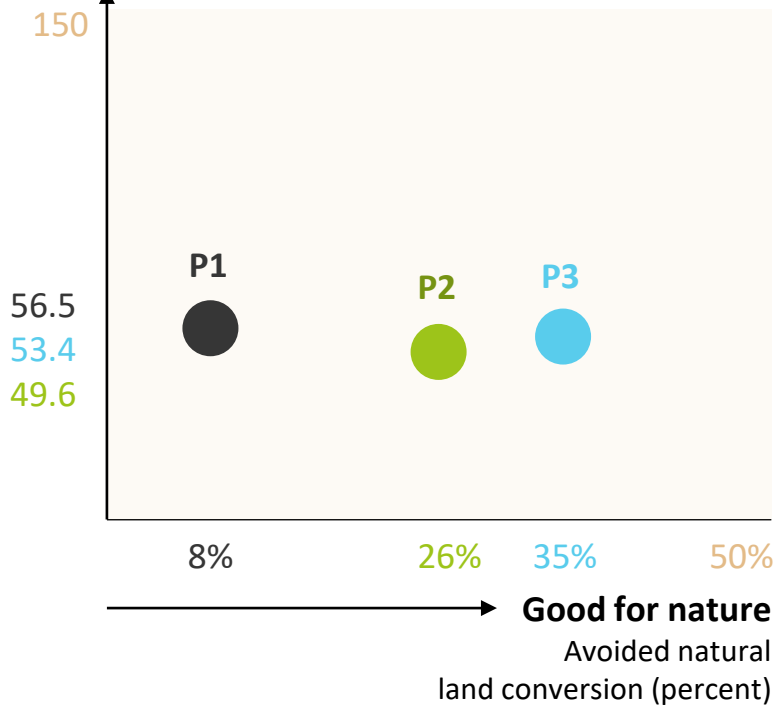


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Basic policy options

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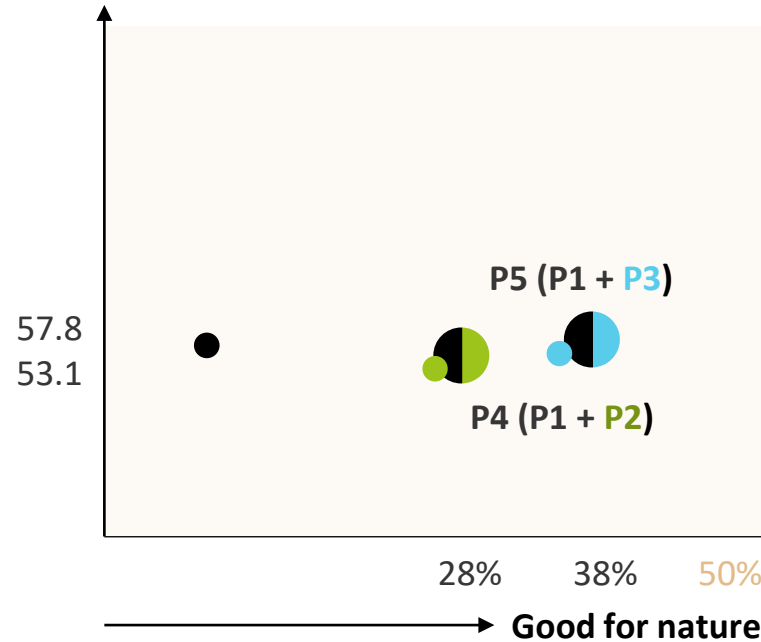


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Combined policy options

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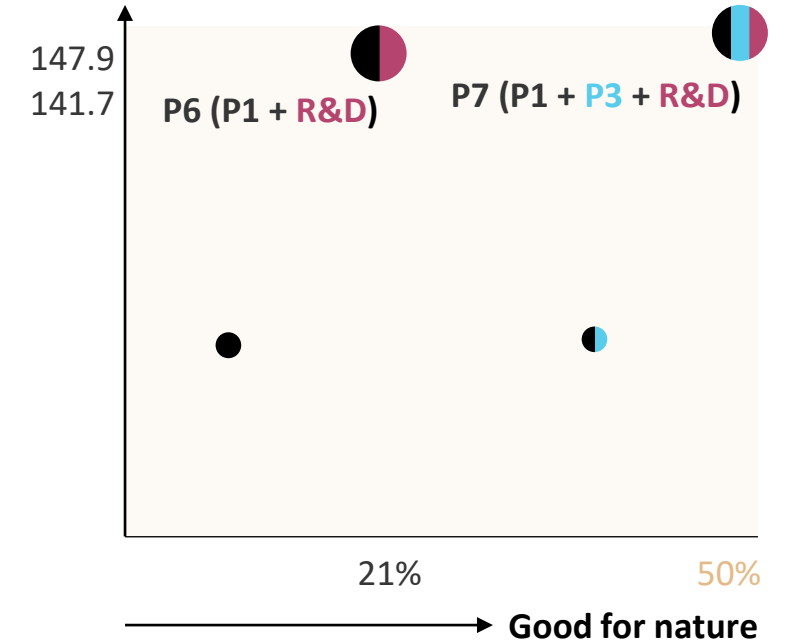


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Research & development

Adding research & development improves the policy

Good for the economy



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Impacts of meeting the 30x30 goal

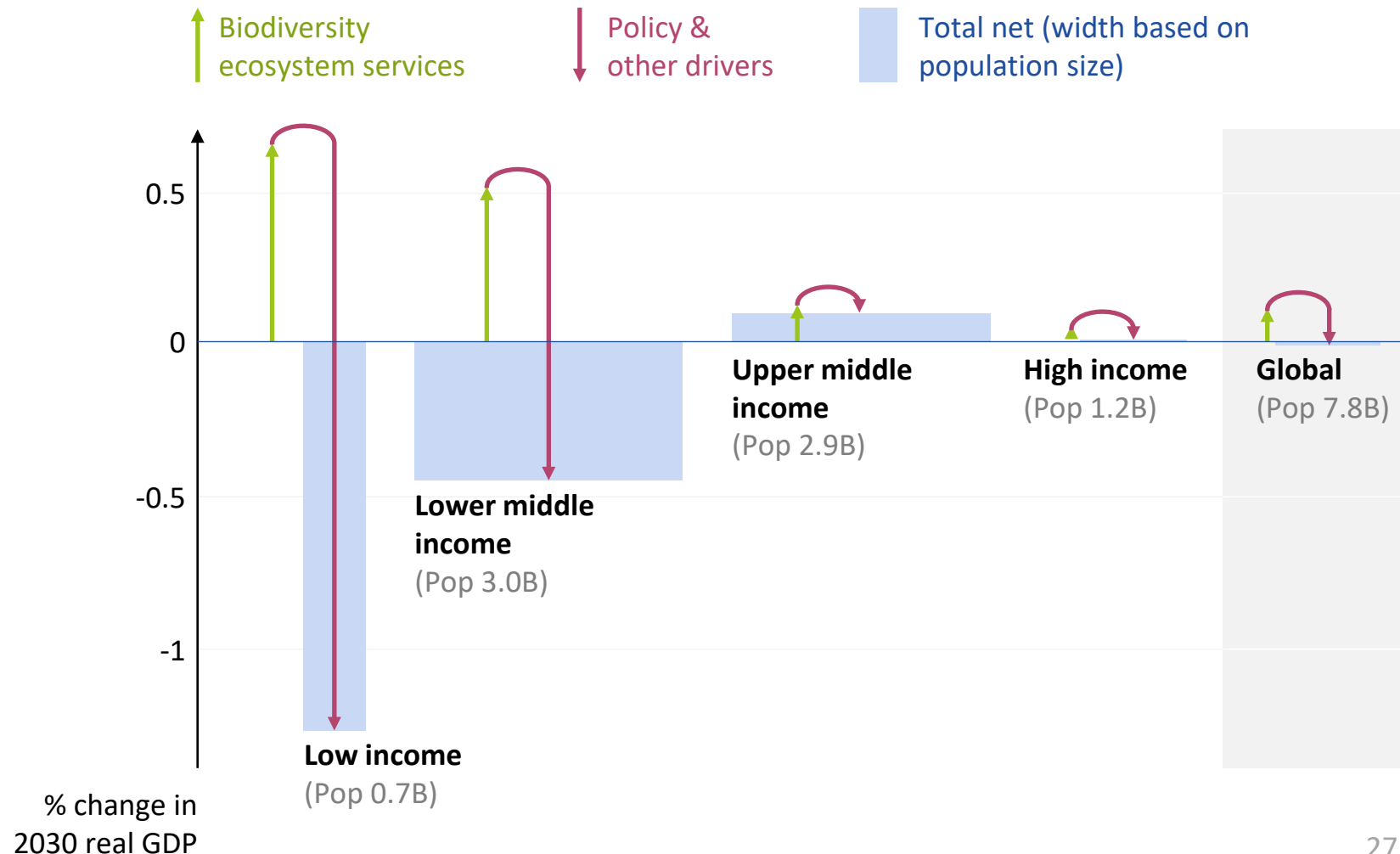
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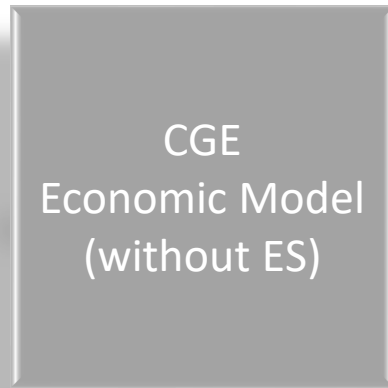
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Change in land use



**Question 3:
Who wins and who loses?**

