ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT
ORGANISATION DE COOPÉRATION ET DE DÉVELOPPEMENT ÉCONOMIQUES
BETTER POLICIES FOR BETTER LIVES DES POLITIQUES MEILLEURES POUR UNE VIE MEILLEURE

# ENVIRONMENTAL OUTLOOK TO 2050:

## The consequences of Inaction

## Key Findings on Biodiversity

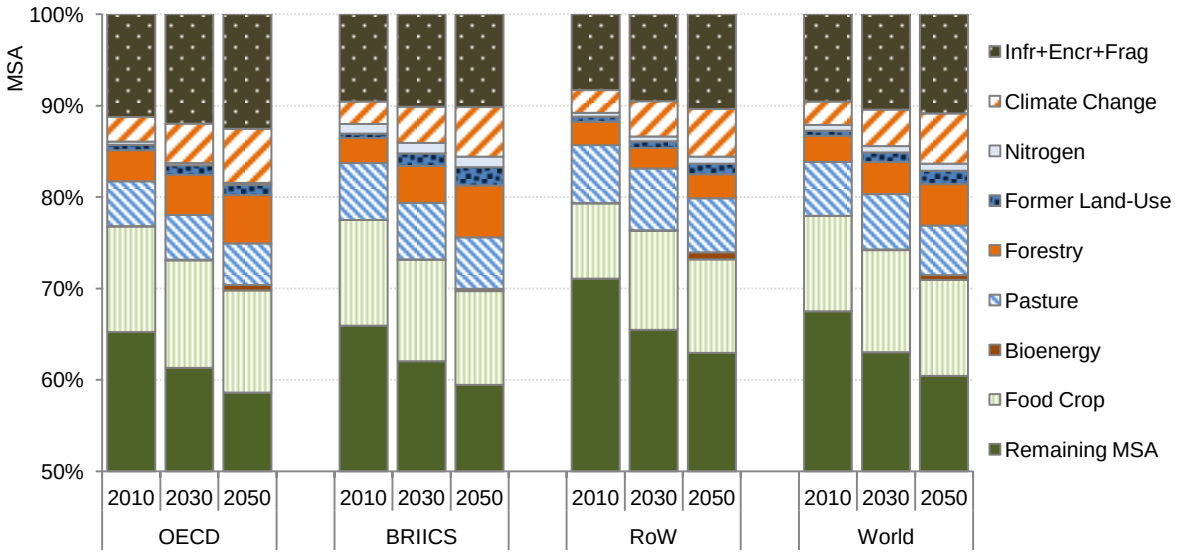
## 1. Trends and projections: biodiversity and ecosystems on the decline

### *Environmental state and pressures*

**Red: Biodiversity – the diversity of living organisms – has been declining** at the global level. Global indicators for biodiversity – species abundance, threatened species, forest area, and marine stocks – all show deteriorating trends to date. For example, the proportion of **marine fish stocks** that are over-exploited or depleted has increased over the past few decades. Today, over 30% of marine fish stocks are over-exploited or depleted, around 50% are fully exploited and fewer than 20% have the potential for increased harvest.

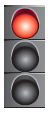
**Red:** Without more ambitious policies, biodiversity (measured as terrestrial mean species abundance[1]) is projected to **decline by a further 10% globally by 2050** under the *Environmental Outlook Baseline* scenario. Especially high losses are projected in parts of Asia, Europe and Southern Africa. These projected losses are driven by land-use change and management (e.g. for pasture, food crops and bioenergy crops), commercial forestry, infrastructure development, habitat encroachment and fragmentation, pollution (e.g. nitrogen deposition) and climate change (Figure 1). **Climate change is projected to become the fastest growing driver of biodiversity loss by 2050**, followed by commercial forestry and, to a lesser extent, bioenergy cropland.

**Figure 1. Effects of different pressures on terrestrial MSA: *Baseline*, 2010 to 2050**




*Notes*: MSA of 100% is equivalent to the undisturbed state; See Chapter 3, Table 1 of the *Outlook* report for further explanations. RoW = rest of the world. Infra+Encr+Frag = infrastructure, encroachment and ecosystem fragmentation,
*Source: OECD Environmental Outlook Baseline*, output from IMAGE suite of models.

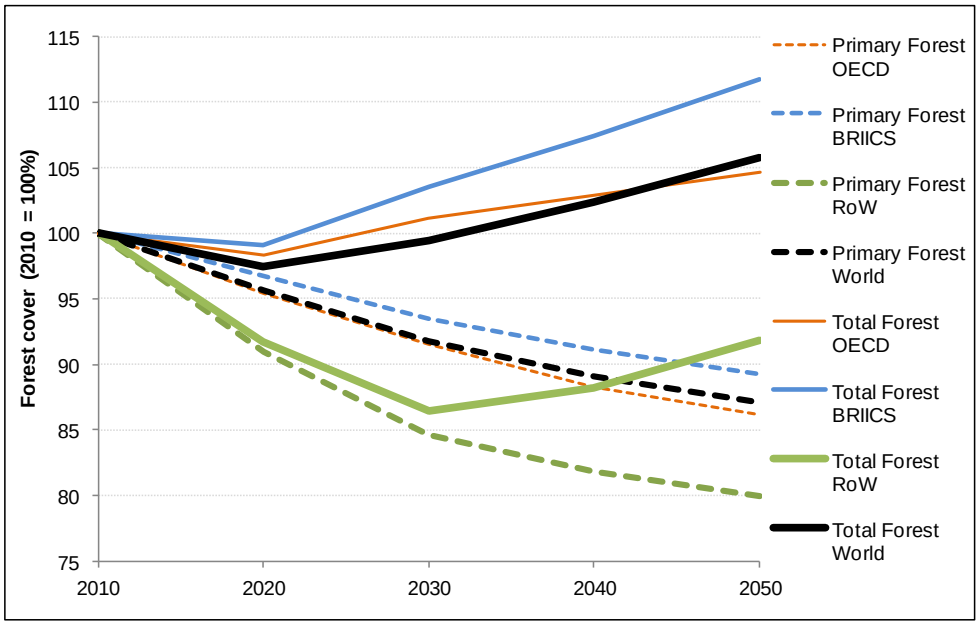
[1] The MSA provides a measure of the change in populations of species relative to intact or pristine ecosystems



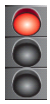
**Red: Mature forests** (primary forest)**,** which tend to be richer in biodiversity, have been on the decline and are projected to decrease steadily to 2050 in all regions under the *Baseline* scenario (Figure 2).

**Yellow:** The rate of **global deforestation** has recently slowed. The *Baseline* projects no net forest loss after 2020, and an expansion in forest cover to 2050 due to regeneration, restoration, reforestation and afforestation (including plantations), mainly in OECD and large emerging economies. However, an expansion in the forested area does not necessarily mean a reduction in biodiversity loss as there will be an increase in commercial and plantation forestry which supports less biodiversity.

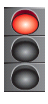
**Figure 2. Global forest area change: Baseline, 2010 to 2050**




*Source: OECD Environmental Outlook Baseline;* output from IMAGE.



**Red**: After 2030 the **area of natural land converted to agriculture** at the global level is projected to decrease under the *Baseline* as a result of improved agricultural productivity, and stabilising populations, thus reducing pressure on biodiversity and ecosystems. For the BRIICS for example, the *Baseline* projects a decrease of more than 17% in agricultural land use to 2050, largely reflecting the declining population in China and Russia. In contrast, a further expansion in agricultural area is projected for the rest of the world, at least in the coming decades, where population is still growing. The impacts of agriculture on biodiversity will continue for decades after land has ceased to be cultivated.



**Red**: Other important drivers of biodiversity loss, such as invasive alien species, forest fires, other forms of pollution (such as phosphorous) and over-exploitation of natural resources (not included in the *Baseline* model scenario) are expected to drive further biodiversity loss to 2050. **Invasive alien species,** for example, are an important driver of biodiversity loss across the globe. This pressure is likely to continue, as transport connected to trade and travel – predominant agents for moving species outside their natural ranges – is expected to grow strongly in the future.



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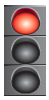


**Red:** These drivers can damage biodiversity and ecosystems irreversibly, with negative social, environmental and economic feedbacks. The lack of understanding of the **complex non-linear dynamics of ecosystems** and the **uncertainties surrounding ecosystem thresholds** means that continued loss of biodiversity poses significant risks and calls for a precautionary approach.

### *Policy responses*

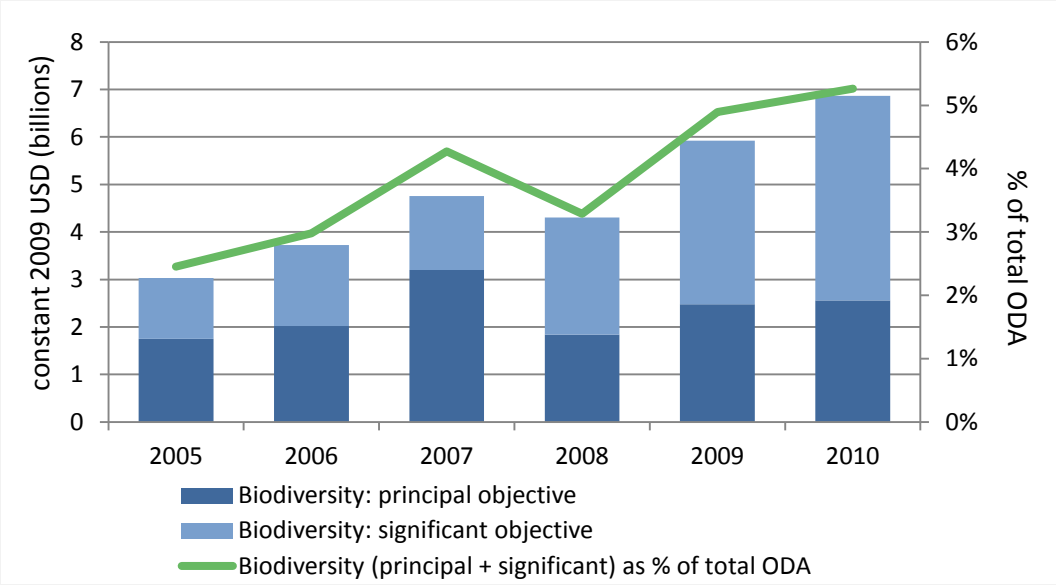
**Yellow:** Globally, the number and size of **protected areas** have increased and now account for nearly 13% of the global terrestrial area. However, temperate grasslands, savannas, shrublands and marine ecosystems are poorly represented and only 7.2% of territorial seas are designated as Marine Protected Areas.

**Green**: A new policy package for biodiversity was agreed by the 10th Conference of the Parties to the **Convention on Biological Diversity (CBD)** in 2010. Parties successfully agreed on the Strategic Plan for Biodiversity 2011-2020, the Aichi Biodiversity Targets for 2020, a Resource Mobilisation Strategy, and the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilisation.

**Box 1. Biodiversity and Development**

Bilateral **biodiversity-related aid** as monitored by the OECD has increased to USD 6.9 billion in 2010, from USD 3 billion in 2005. Biodiversity-related aid as a percentage of total Official Development Assistance (ODA) has increased from about 2.5% in 2005 to over 5% in 2010. ODA with the principal objective of biodiversity (aid that *directly* and *explicitly* aims to achieve one of the three objectives of the CBD) increased from about USD 1.7 billion to 2.6 billion over the same period.

**Figure 3. Biodiversity-related Official Development Assistance, 2005-2010**




*Source:* OECD 2011, *ODA for Biodiversity,* OECD Publishing.

Biodiversity and natural resources management is closely intertwined with economic development – biodiversity loss and degradation will have particularly severe implications for the rural poor. National governments and donor agencies have a key role to play in integrating biodiversity strategies into development planning.



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## *2. Time to act: Policy priorities for effective biodiversity conservation and sustainable use*

Continuing with business-as-usual will have **adverse and costly impacts** on human well-being, security and economic growth. Reversing the trends in biodiversity loss will require a more consistent, co-ordinated and strategic response, driven by political commitment and broader stakeholder involvement. This requires a coherent and comprehensive policy mix (Table 1).

**Table 1. Policy instruments for biodiversity conservation and sustainable use**

| Regulatory (command-and-control) approaches | Economic instruments | Information and other instruments |
|---|---|---|
| Restrictions or prohibitions on use (*e.g.* trade in endangered species and CITES).* | Price-based instruments<br>• Taxes (*e.g.* on groundwater, pesticide and fertiliser use)<br>• Charges/fees (*e.g.* for natural resource use, access to national parks, hunting or fishing license fees)<br>• Subsidies. | Eco-labelling and certification (*e.g.* organic agriculture labelling schemes; labels for sustainably harvested fish or timber). |
| Access restrictions or prohibitions (*e.g.* protected areas; legislated buffer zones along waterways). | Reform of environmentally harmful subsidies. | Green public procurement (*e.g.* of sustainably harvested timber). |
| Permits and quotas (*e.g.* for logging and fishing). | Payment for ecosystem services. | Voluntary agreements (*e.g.* between businesses and government for nature protection or voluntary offset schemes). |
| Quality, quantity and design standards (*e.g.* commercial fishing net mesh-size specifications). | Biodiversity offsets/biobanking. | Corporate environmental accounting. |
| Spatial planning (*e.g.* ecological corridors). | Tradable permits (*e.g.* individual transferable quotas for fisheries, tradable development credits). | |
| Planning tools and requirements (*e.g.* environmental impact assessments [EIAs] and strategic environmental assessments [SEA]. | • Liability instruments<br>• Non-compliance fines<br>• Performance bonds. | |

**Key policy needs and priorities** for biodiversity conservation and sustainable use are:

- **Adopt more ambitious policy measures** to achieve internationally agreed plans, targets and strategies, such as those agreed under the CBD (see Box 2). Governments will need to renew their efforts to enhance the environmental and cost effectiveness of their actions. Designing the appropriate policy mix from the range of instruments will depend on the drivers of biodiversity loss and on national socio-economic circumstances.

- **Improve the quantity and quality of data** available to better inform biodiversity policy (at local, regional and global levels) and make further progress on the economic valuation of biodiversity and ecosystem services. Methods applied for collecting and reporting data should be as consistent as possible, so as to allow for comparison of information both within and between countries.



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- **Reform environmentally harmful subsidies**, including those that promote, without any environmental considerations, the intensification or geographic expansion of economic sectors such as agriculture, bioenergy, fishing, forestry and transport. Support to agricultural producers in OECD countries, for example, measured through the producer support estimate (PSE), was estimated at USD 265 billion in 2008. Though some progress has been made to de-couple support from direct production, further efforts are needed to switch it towards supporting environmental objectives. Subsidy reform can also increase economic efficiency and reduce the fiscal pressures confronting governments.

**Box 2. What if…terrestrial protected area coverage expanded to 17% globally?**

The Aichi Biodiversity Target 11 is to achieve a global protected area network of 17% of the world's terrestrial and inland water areas and 10% of coastal and marine areas by 2020. It specifies that the network should cover "areas of particular importance for biodiversity and ecosystem services" and be "ecologically representative" (Decision X/2, CBD, 2010).

The *Outlook* simulations suggest that in order to reach the 17% terrestrial protected area target in a way that is ecologically representative, a further 9.8 million $km^2$ of land would need to be protected. The additional land that each country would have to set aside varies. The largest effort would be required by the BRIICS, both in terms of absolute area and as a percentage of the regional area, especially Russia (14%) and India (10%). A substantial effort would also be required by OECD Europe (10%). Relatively low amounts are required in Southern Africa, Japan/Korea and Brazil.

- **Scale up private-sector engagement** in biodiversity conservation and sustainable use, including through innovative financing mechanisms at the local, national and international level. Clear price signals for natural resource use and pollution are needed that provide certainty yet offer the private sector flexibility in determining how they can most cost-effectively reduce their impacts on ecosystems. Though economic instruments for biodiversity are being increasingly applied worldwide, in most cases these are neither sufficiently stringent nor sufficiently comprehensive to address the scale of the biodiversity challenge. Governments also need to do more to show that there are both significant business risks and opportunities associated with biodiversity and ecosystem services and to encourage and facilitate innovation.

- **Mainstream and integrate biodiversity conservation and sustainable use into other policy areas** (e.g. economic affairs, agriculture, fisheries, forestry, land-use and urban planning, development co-operation, climate change, national accounting and R&D) to enhance synergies and prevent trade-offs. For example, some greenhouse gas mitigation strategies provide greater benefits to biodiversity than others. A climate change mitigation strategy involving heavy reliance on bioenergy could require an expansion of agricultural land, reducing the net benefits to biodiversity. Conversely, the financial mechanism for reducing emissions from deforestation and forest degradation (REDD) in developing countries could also have benefits for biodiversity (see Box 3).

- Effective biodiversity conservation and sustainable use needs to be realised through changes in policies, strategies, plans and programmes, as well as budgets. A proposed framework to help establish a more comprehensive, integrated approach to tackling this challenge could include the development of business-as-usual projections for biodiversity to identify key drivers of change and a baseline against which future progress can be assessed. A common long-term vision for **green growth and biodiversity** can then be developed by relevant policy makers. Those in charge of agriculture, energy, climate change, and development ministries need to work together to capture synergies and to address potential trade-offs. Underpinned by robust monitoring and review, a policy mix to achieve the vision can then be identified and implemented.



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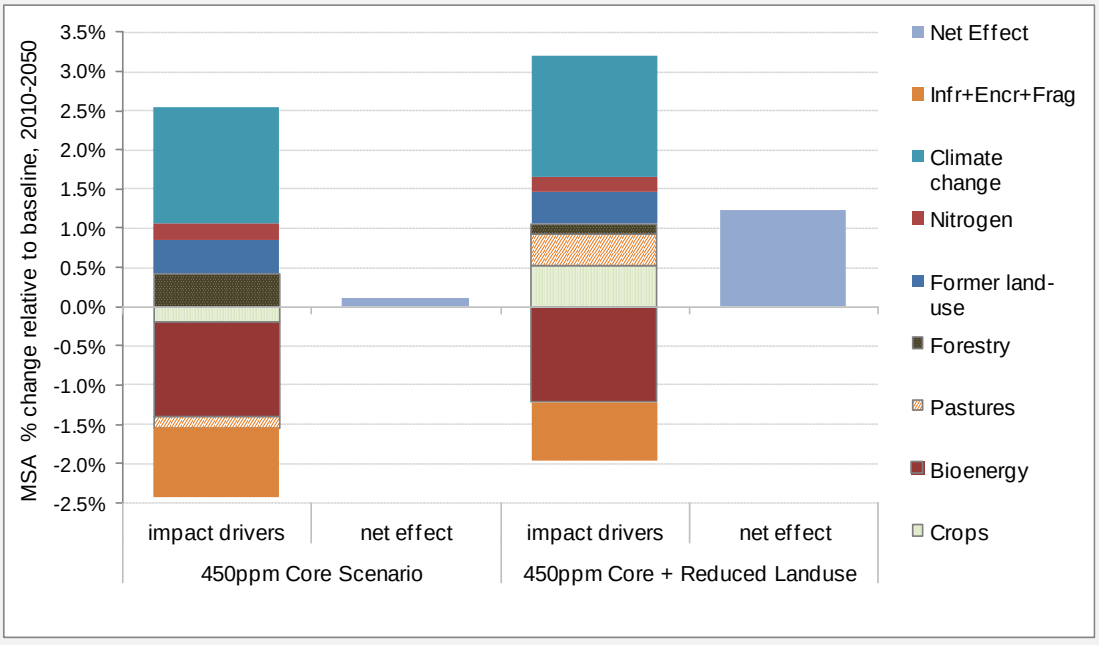
### Box 3. What if…ambitious climate change mitigation is done in a way that also reduces biodiversity loss?

Under the *Environmental Outlook Baseline* scenario, global temperature is projected to increase by 2.4 °C above pre-industrial levels by 2050 (uncertainty range 2.0 °C-2.8 °C), resulting in an additional mean species abundance (MSA) loss of 2.9 percentage points by 2050. The *Outlook* models suggest that stabilising greenhouse gas (GHG) concentrations at 450 ppm $CO_2$ equivalent could limit this temperature increase to 2°C above pre-industrial levels by the end of the 21st century, reducing MSA loss from climate change between 2010 and 2050 to 1.4 percentage points.

However, there a number of climate change mitigation options that can be adopted to reach this target, some of which are more biodiversity-friendly than others and may involve important trade-offs between climate policy, the use of bioenergy, and land use and biodiversity policies. For example:

- The ***450 Core*** scenario: about 20% of total primary energy supply by 2050 is assumed to come from bioenergy, requiring a total of 3.1 million km$^2$ of bioenergy cropland (compared to only 0.9 million km$^2$ in the *Baseline*). This increased land-use change would drive additional MSA loss. The projected net benefit for biodiversity from combining reduced climate change with increased land use and related changes in other pressures is an MSA gain of just 0.1 percentage points by 2050 compared to the *Baseline*.
- The ***450 ppm + Reduced Land Use*** scenario: a *450 core* scenario in which crop area is projected to decline by 1.2 million km$^2$ and pastures by 1 million km$^2$ by 2050 relative to the *Baseline,* as a result of increased agricultural productivity. Deforestation due to agricultural expansion, as projected in the *Baseline*, would be completely avoided, reducing GHG emissions by 12.7GtC in 2050 and delivering 7% of the emission reductions required by 2050. The projected net benefit for biodiversity of reduced climate change, reduced land use change and related changes in other pressures is an MSA gain of 1.2 percentage points by 2050 relative to the *Baseline*.

**Figure 4. Impacts on biodiversity of different *Outlook* climate change mitigation scenarios**




*Source: OECD Environmental Outlook* projections; output from IMAGE suite of models.



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The *OECD Environmental Outlook to 2050* was prepared by a joint team from the OECD and the PBL Netherlands Environmental Assessment Agency. The *Outlook* includes chapters on: socioeconomic developments, climate change, biodiversity, water, and health and pollution.

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