CHAPTER 3

The Baseline Scenario

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Summary

The Baseline assumes that many aspects of today's world remain the same – not frozen in time, but evolving along the same lines as today. The Baseline shows a stabilisation of the world population at around 9.1 billion inhabitants by 2050. The Baseline trends combine to produce a modest, but uniformly positive growth in real Global Gross Domestic Product (GDP) of 2.8% per year between 2005 and 2050. Although the modelling for this study is more nuanced than assuming a fixed relation between GDP and pressures on biodiversity, the uncertainty in the baseline leans to the side of more pressures on biodiversity. Final energy consumption increases from 280 EJ in 2000 to 470 EJ in 2030, and ca 600 EJ in 2050. Up to 2030, it is projected that global agricultural production will need to increase by more than 50% in order to feed a population more than 27% larger and roughly 83% wealthier than today's. Although it is assumed that productivity of land will increase substantially, the global agricultural area will have to increase by roughly 10% to sustain this production, roughly the current agricultural area in the US, Canada and Mexico together.

Regarding "protected area" policies, the implicit assumption in the Baseline is that its implementation will not substantially change current trends. An important assumption in the Baseline is that agricultural productivity, in terms of yield per unit of agricultural area, can continue to improve over the coming decades. Regarding trade in agricultural products the assumption is that there will be no major changes in the spirit of a new Doha round. As to climate change mitigation the Baseline assumes no post-Kyoto regime other than the policies in place and instrumented by 2005. The existing trading scheme for emission credits is included and only second generation, woody, biofuels are considered. Explicit adaptation policies are not included in the baseline. The Baseline assumes that the EU Common Fisheries Policy and equivalent policies in other world regions, remain in place and continue to be implemented as they are now. Several sector policies still provide substantive incentives to support short-term economic growth at the expense of long-term environmental sustainability and maintenance of biodiversity. Even though policies supporting conservation and sustainable use of biodiversity exist they tend to lack enforceability and suffer from ineffective implementation.

3.1 Introduction

Introduction

This COPI analysis is aimed at an estimate of the economic consequences of biodiversity loss. In this Chapter we present the quantitative basis of the projected future changes in the drivers and pressures on the ecosystems of the world with their biodiversity, ecological functions and services and subsequent changes in economic value to society. The OECD Baseline scenario (upper red oval in *figure 3.1*) encompasses the drivers which are translated into pressures (red rectangular box) which are also influenced by international (and national) policies.

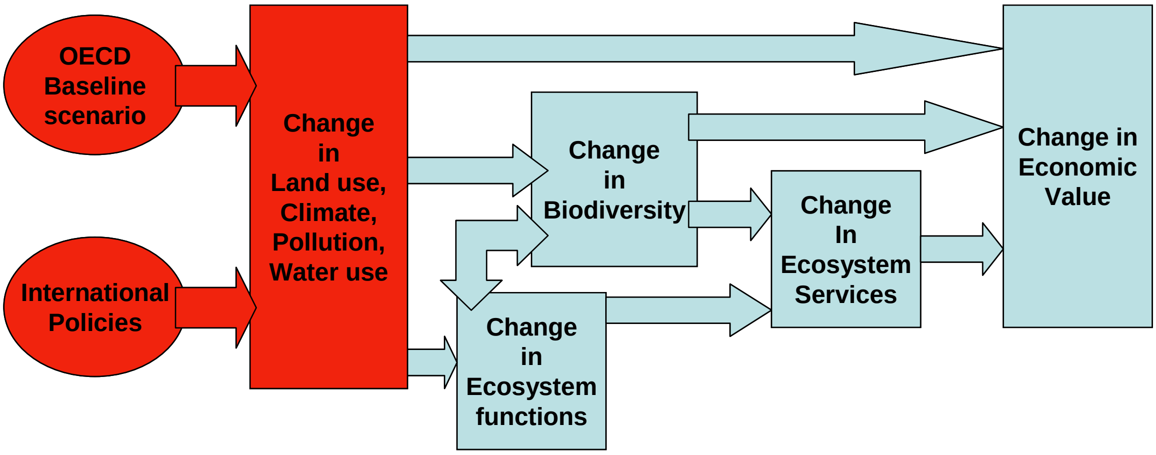


Figure 3.1 Chapter 3 in the Conceptual framework of the COPI analysis

By design, the Baseline scenario is a no-new-policies scenario. It imagines the world developing over the next decades largely as it does today, without new or intensified policies in response to projected developments. The Baseline assumes that many aspects of today's world remain the same – not frozen in time, but evolving along the same lines as today. Population and income are projected to increase, and diet, mobility demand and other consumption preferences keep shifting and increasing with income in the same way as in the past. By implication, the Baseline is not the most plausible future development. It is likely that decision makers in governments and elsewhere will react to all sorts of developments, including the environmental trends described in the Environmental Outlook, and that the Baseline trends will never occur in reality. *The Baseline is thus only a benchmark for comparison.* The purpose of a well-described Baseline is to identify the need for new policies in certain areas, and to provide a background for assessing the effect of new policies.

Although the Baseline shows a continuously increasing burden on the environment, the models used behave as if the projected quality of the environment would not disturb demographic and economic development! In Chapter 8 we shall return to and discuss the implications of this phenomenon. Because the purpose of the Baseline is to support a discussion that concentrates on policy options and possible alliances, rather than on the merits of the Baseline, it has been aligned as much as possible with authoritative thematic projections (as for population, energy, agriculture) and long-term historic series (in particular long-term growth rates of labour productivity).

3.2 The Baseline Scenario: Drivers

3.2.1 Population

The Baseline uses the "medium" population projection of the United Nations, which shows a stabilisation of the world population at around 9.1 billion inhabitants by the middle of this century (UN, 2005). Almost all of this increase will be in developing countries (see *Figure 3.2* and *Table 3.1*). The UN population projection is a "middle-ground" scenario with 8.2 billion people in 2030, compared to the extremes of the IIASA probabilistic population projections, that range between 7.7 and 8.8 billion in 2030 (Lutz et al., 2004).

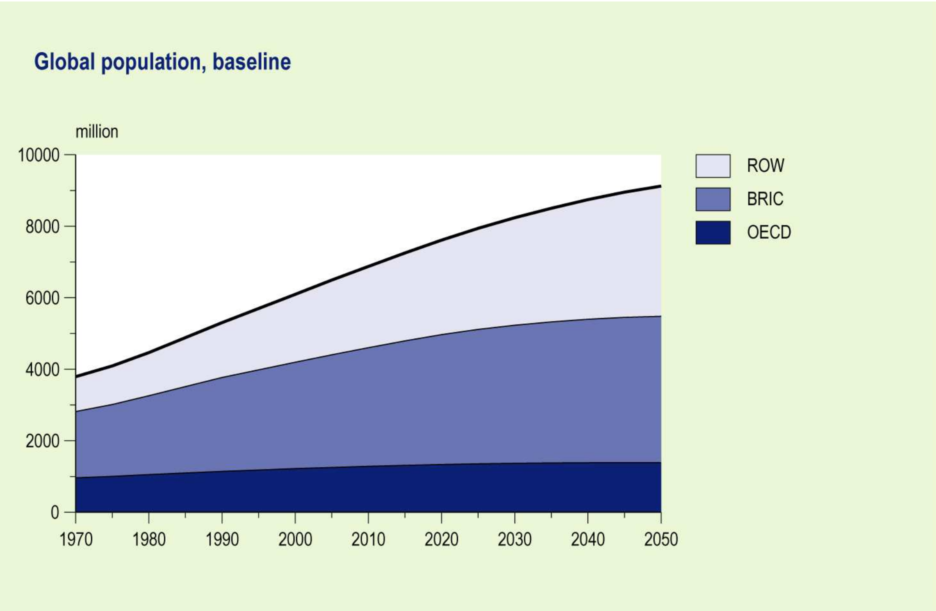


Figure 3.2: World population, baseline ***Source: UN (2005)***

Table 3.1 Population increase, baseline

	1970-2000	2000-2030	2020-2050
	%		
North America	43	27	15
OECD Europe	17	5	-2
OECD Asia	27	0	-11
OECD Pacific	44	26	18
Brazil	72	34	15
Russia & Caucasus	15	-13	-16
South Asia	79	33	15
China region	47	14	-2
Middle East	156	74	42
Other Asia	84	49	26
Eastern Europe & Central Asia	29	3	-7
Other Latin America & Caribbean	74	43	21
Africa	120	85	57
World	61	35	20

note: overlapping 30-year periods: 2000-2030 and 2020-2050
Source: UN (2005, 2006)

3.2.2 Economic developments

The Baseline projects for the next half-century a world that is very similar to today's in factors such as the role and size of government, policy priorities, taxes, technology diffusion, intellectual property rights, liability rules and resource ownership. Hence ongoing technological change will impact on the economy in much the same way it has in the past. The economic undercurrents of the baseline trends combine to produce a modest, but uniformly positive growth in real Gross Domestic Product (GDP) for the world as a whole under Baseline conditions: the *global average is 2.8% per year between 2005 and 2030*. China and India would see growth rates of 5 per cent per year averaged over the whole period (from approximately 7% per year in the first years to approximately 4% during 2020-2030). *Figures 3.3 and 3.4* show the resulting levels of GDP and GDP per capita.

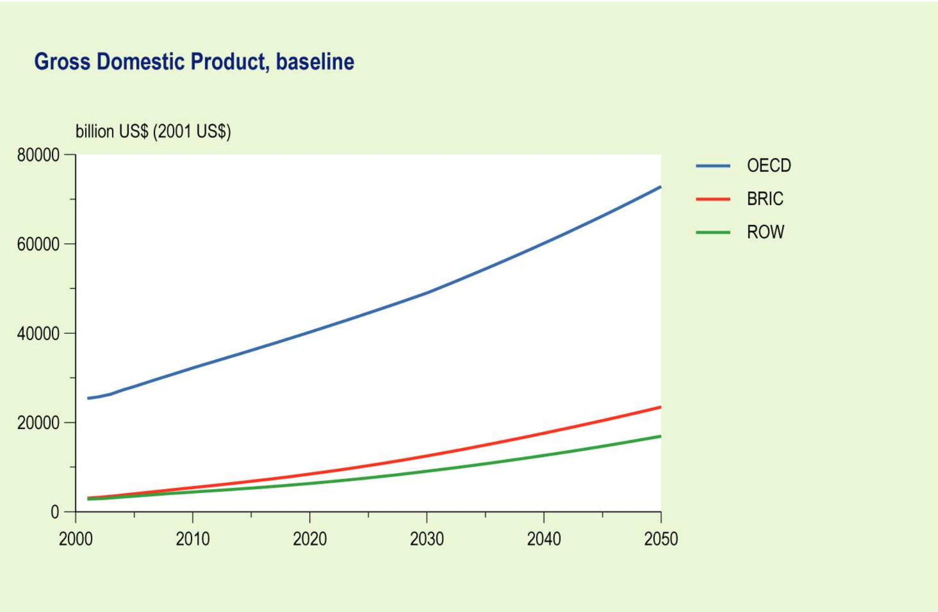


Figure 3.3 Gross Domestic Product, Baseline

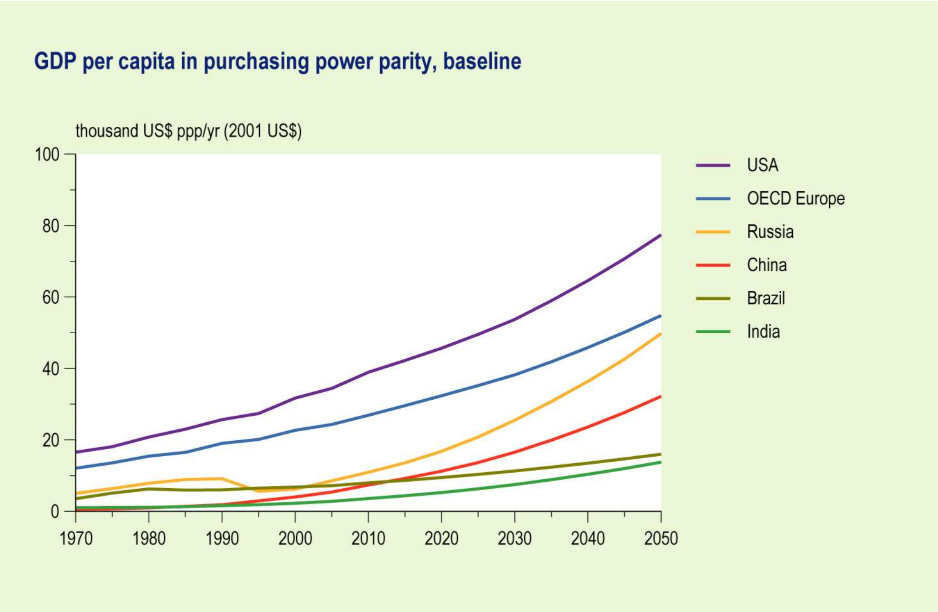


Figure 3.4 Gross Domestic Product per capita, baseline

The graphs show that the BRIC group, notwithstanding its strong and sustained growth, remains at a large distance from the OECD average in terms GDP per capita. By and large, this implies a similar distance for the average standard of living in this regional group. The baseline leads to shifts in sector composition over time, with the familiar pattern of stronger growth in the service sectors than in for example agriculture (*figure 3.5*). Thus, by 2030 or 2050 the weight of agriculture compared with the other sectors in most economies will be less than today. But this only means that the value added of other sectors has increased more than that of agriculture. It does not necessarily mean that the activity in agriculture in that region will shrink in physical terms. In most regions, it will not.

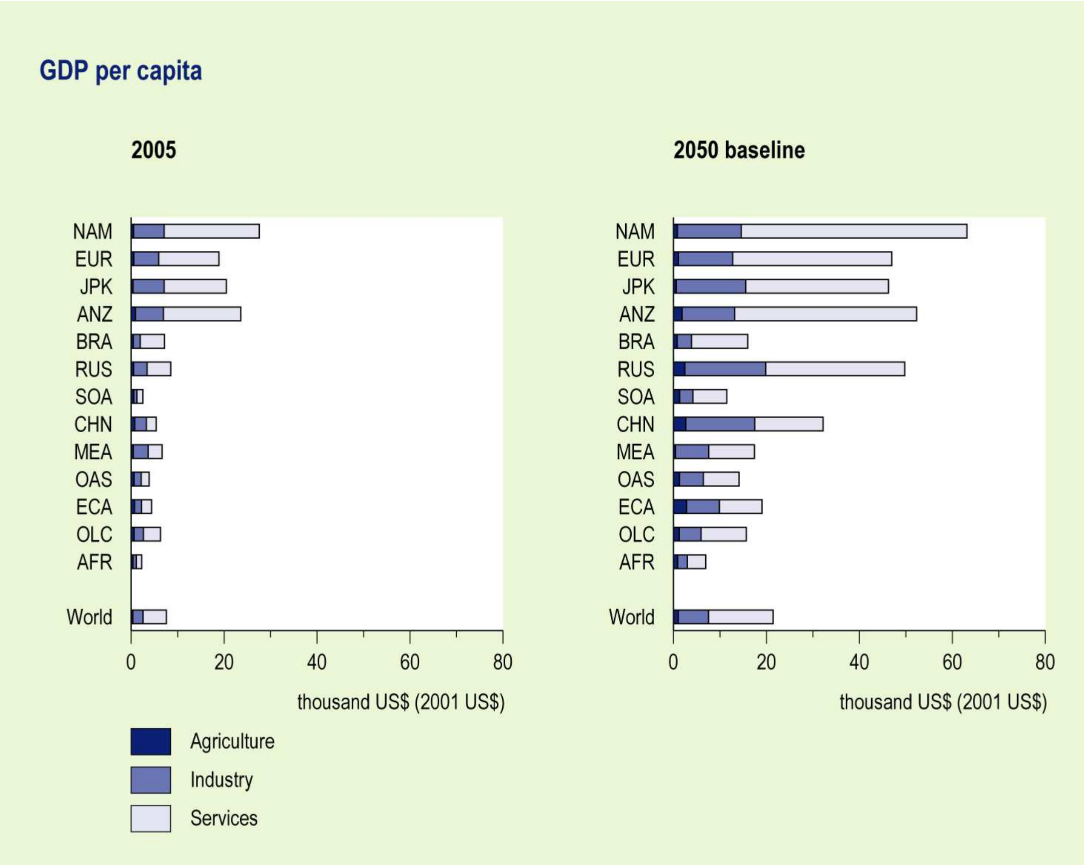


Figure 3.5 Sectoral value added, baseline

Figure 3.5 shows also that the increase in GDP per capita is especially fast in Russia, China and India. Details are given in chapter 3 Economic Development of the outlook main report.

In most regions, imports and exports have grown faster than the regional economy in general, as measured by GDP. To the extent that this is the result of explicit policies on tariffs and quotas, the Baseline assumes no new policies and therefore a gradual levelling off of the rate of trade growth. Thus, eventually, the Baseline features trade growing at just the same rate as the economy in general. This is shown in *figure 3.6*, depicting imports relative to GDP.

Against the background of a wider notion of uncertainties for the outlook, the key uncertainties have been identified in the three driving forces of the economic Baseline. Most importantly, a variant was explored for the recent history to which the Baseline is grafted. The Baseline evolves from growth rates in the 1980-2000 period.

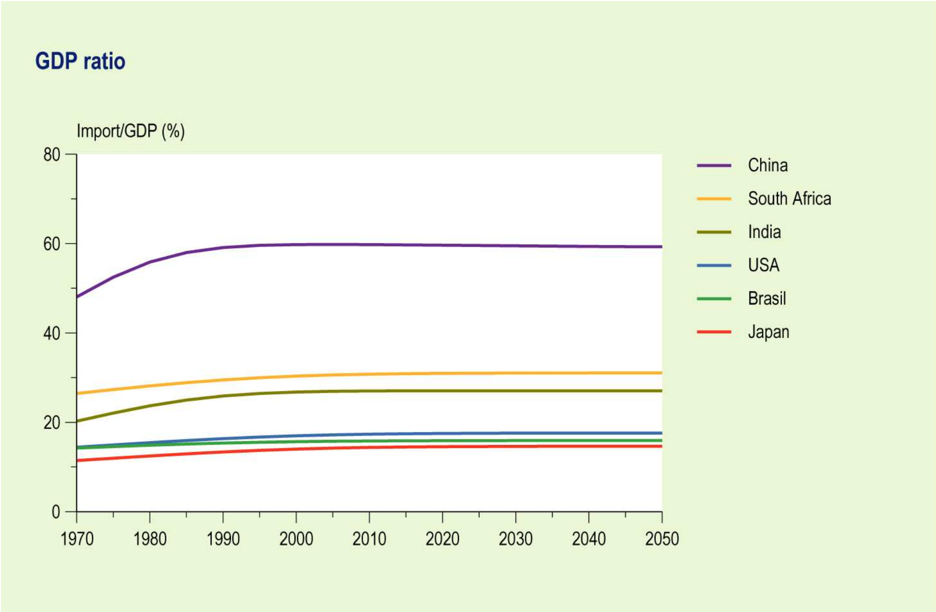


Figure 3.6: Imports in proportion to GDP, baseline

In contrast, the variant is derived from five-year growth rates around the year 2000 – for important countries a period of fast growth. Key lessons are:

- In a no-new-policies future, the volume of economic activity can be less, but also much more than projected as Baseline. The latter could happen if productivity trends in coming decades resemble the past few years, rather than the past two decades. Activity volumes in BRIC countries in particular may be larger.
- Autonomous developments such as a further decrease in transportation cost (money-wise or time-wise), could increase international trade more than projected in the Baseline. This can influence location as well as spatial distribution of production.

3.2.3 Energy use

The energy consumption for the OECD Baseline follows more-or-less the 2004 World Energy Outlook scenario of the International Energy Agency, adjusted for small differences in economic growth assumptions of this Baseline and for the higher energy price trajectory adopted from WEO 2006. This implies that final energy consumption increases from 280 EJ in 2000 to 470 EJ in 2030, somewhat faster than the historic trend. This is due to (1) specific events that have slowed down energy consumption in the last decades, e.g. the energy crisis in the OECD, the economic transition of the countries of Central and Eastern Europe, the Caucasus and Central Asia, and the Asia crisis, and (2) the increasing weight of developing countries, with typically higher growth rates, in the global total. While OECD countries accounted for more than half of the energy consumption in 2000 (53%), their share drops by 10 percentage points in 2030. In absolute terms, the energy consumption in BRIC and ROW groups roughly doubles until 2030. (*Figure 3.7)*

The oil price in the Baseline reaches a level of 60 US $ per barrel in 2005. After a slow relaxation to 45 $ per barrel around 2020 it climbs, as a result of depletion, to a value of just over 60$ per barrel in 2050. The relatively high price of oil leads to a lower share for oil products in final energy, partly replaced by modern bio-fuels in the transport sector. Coal use increases slightly, as the price differential with oil and gas makes it attractive for large industrial users to burn coal. This offsets the ongoing trend in the residential and services sector in OECD countries– where coal use is gradually phased out. Natural gas keeps its market share and, as observed in the past, the share of electricity in final energy use keeps increasing to reach 23% in 2030 (from 17% in 2000). All this must be considered again in view of the current oil prices (more than 100 US$ per barrel). All sorts of shifts may happen in the short and medium run, such as consumer reactions to fuel prices, slowing down of the phasing out of coal etc.

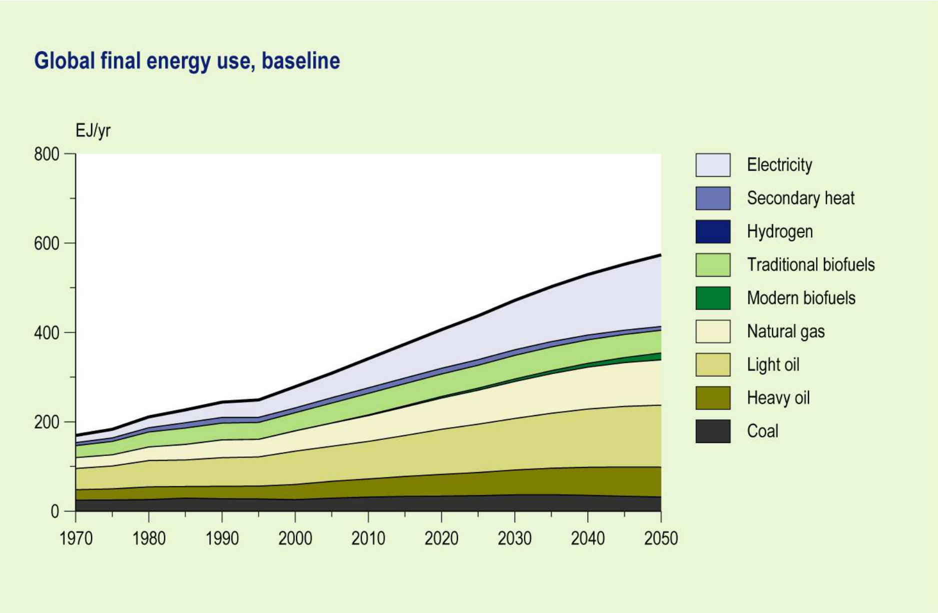


Figure 3.7: Final energy use by energy carrier, baseline

In the power sector, the main trend of the past decade is replacement of coal as the dominant fuel by natural gas, driven by the low investment costs, high efficiency and favourable environmental performance of combined cycle plants. Exceptions are regions with ample access to relatively low-cost coal and limited access to natural gas supplies, such as China and South Asia. As a result of the assumed continuation of high oil and gas prices, coal becomes the fuel of choice in practically all regions. The growing share in electricity generation plus the modest increase in final consumption imply that total coal use increases by 2.1% per year on average. Oil consumption, strongly driven by the transport market, grows by just over 1% per year. The continued high price of oil induces introduction of alternative transport fuels, mainly produced from bio-energy. Natural gas use grows by 2.3% per year between 2000 and 2030. Non-fossil power generation increases slightly, but on aggregate fossil fuels retain their high share (84% both in 2000 and 2030). Among the non-fossil resources, use of modern biofuels and renewables expands the most, together supplying 11% of global electricity in 2030.

3.2.4 Agricultural production and consumption

Up to 2030, it is projected that global agricultural production will need to increase by more than 50% in order to feed a population more than 27% larger and roughly 83% wealthier than today’s. Although it is assumed that productivity of land will increase substantially, the global agricultural area will have to increase by roughly 10% to sustain this production (*figure 3.8*). After 2030, the growth in crop area slows down, mainly due to a reduced population growth.

In developing countries, agricultural production is growing four times faster than in OECD countries, due to faster economic and demographic change, and availability of new agricultural areas. In OECD countries, per capita consumption of agricultural products is almost stable, while it is projected to grow by 70% in developing countries to 2030. Trade, however, plays an important role for some countries and commodities. In general, countries with a high population growth have increasing imports and decreasing exports.

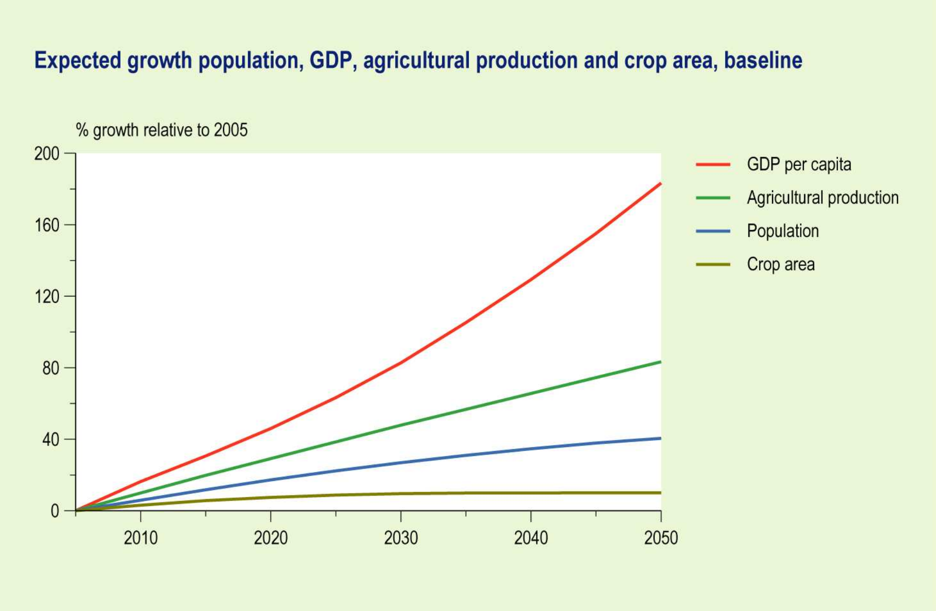


Figure 3.8 Growth of world population, GDP per capita, agricultural production and crop area; baseline

The largest part of the increase in agricultural production, as shown in detail in *figures 3.9 and 3.10*, can be explained by an increasing domestic demand.

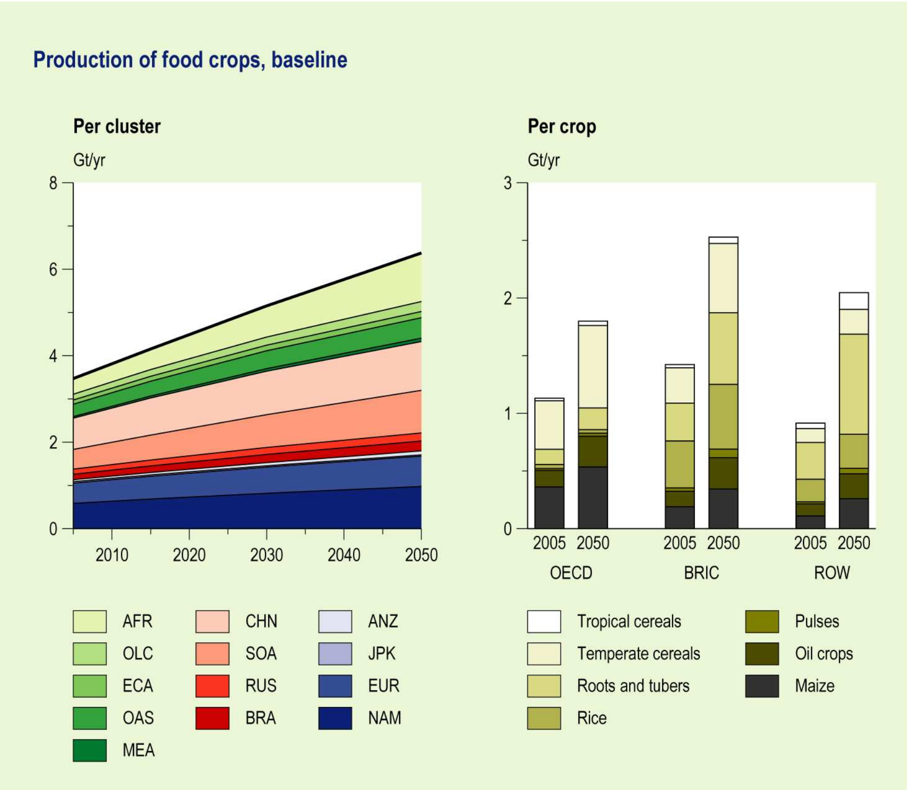


Figure 3.9: Production of food crops, baseline

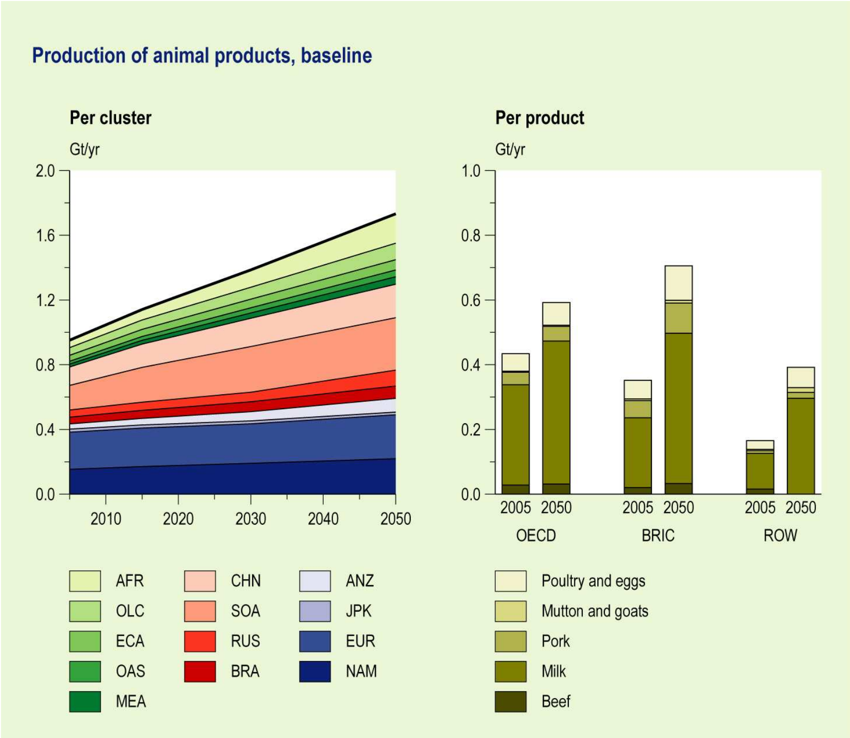


Figure 3.10: Production of animal products, 2005-2050, baseline

Oilseed production is projected to grow about 50% faster than overall average agricultural production to 2030. This growth is boosted not only by growing demand for vegetable oils for human consumption, but also for oilseed meal for feeding animals and for bio-diesel production. Oilseed trade is also projected to outstrip the trade in grain. The most important importer of oilseed is expected to continue to be China, which will double its imports from 2001 to 2030. The leading exporters are the United States and Brazil, with the United States almost tripling its oil seed exports by 2030.

3.2.5 Economic and social drivers of change in marine and coastal ecosystems

Marine products are used in developed economies as a luxury food and for subsistence in many coastal communities, but also as feed for aquaculture, pets and livestock. It is the relatively high prices for these products, combined with subsidies, that make aquaculture in coastal zones a feasible industry. The price of fish has increased in real terms while the price of red meat has dropped over the last 20 years. The result is that increasing scarcity, rather than causing a relaxation of pressure on the remaining remnants of the resource, acts to increase incentives to harvest the remaining individuals. On top of that, the, until recently, low price of fuel keeps fisheries in business. Within 10–15 years of starting to exploit a new fishing area, industrial fisheries tend to have seriously reduced the biomass of the resources. This process is often accelerated by encouragement from governments to diversify fisheries, often resulting in fleet overcapacity and a drive to exploit new or ‘‘unconventional’’ species. New technologies, while improving the safety of people working at sea, also allowed fishers to aim for specific places with high fish abundances, places that once were protected by the depths and vastness of the oceans. Much of the fish caught in the developing world (about 50% of the market value) is exported to countries in the developed world, which have thus been able to buffer against declines in fish availability and increases in prices. A benefit of globalization is the improved quality of fish that reaches the market, because most importing countries demand that exporting facilities meet safe food processing and handling standards. The associated benefits have been mainly to industrial countries, however. In developing countries, benefits have been limited MA(2005b).

3.3 The Baseline Scenario: Pressures

3.3.1 Introduction

In the DPSIR framework (see Chapter 2), the most important pressures on ecosystems and biodiversity are conversion of "pristine" ecosystem land cover to other forms of land use, climate change, air pollution and water use. These, and pressures on marine and coastal systems are discussed in this section.

3.3.2 Land use

The expected rise in agricultural productivity is not enough to meet the increasing demand. As a result, the global agricultural area will increase by roughly 10% to sustain this production (16% increase for food crops, 6% increase for grass and fodder, and 242% increase for biofuels). After 2030, the growth in crop area is slowing down, mainly due to a reduced population growth. Total land used is projected to increase in all regions except Japan and Korea. In South Asia, there could be additional loss of remaining forest areas (both tropical and temperate), savannah and scrubland. In Europe, much of the additional land for agriculture is expected to come from its eastern regions – a reversal of the trend during the past 15 years whereby land has been taken out of agriculture in these regions.

The increasing demand for agricultural products results both in an intensification of agriculture (more output per unit of land), and in an expansion of agriculture. *Table 3.2* presents the change in land used for agriculture between 2005 and 2030 as projected in the Baseline. *Figure 3.11* depicts the changes between 2000 and 2050. Total land used for agriculture, including crops, grass and energy crops, is projected to increase in all regions except Japan and Korea, mostly at the expense of remaining forest areas (both tropical and temperate), savannah and scrubland. In Europe, the increase is caused by an expansion of agricultural area in Turkey, while in West and Central Europe land continues to be taken out of production. After 2030, agricultural areas are roughly stable or decreasing in all regions except for Africa and Oceania.

Table 3.2: Change in land used for agriculture in 2030, baseline

North America	Europe	Japan Korea	Australia New Zealand	Brazil	Russia	South Asia	China	Middle East	South East Asia	Caucasus & Central Asia	Other Latin America	Africa	World
104	105	83	104	108	115	124	101	100	127	104	109	118	110

Note: Index 2005 = 100 ; if indexed at 2000=100 the world 2030 change would be 114.

The Baseline projects a considerable expansion of agricultural land in Africa, driven by population growth and relatively fast increases in food demand. A considerable part of that expansion is likely to occur in arid areas, contributing to the risk of desertification which happened already over the last few decades. The change shown for Europe is mostly in Turkey, where a significant expansion is projected in the Baseline. In Brazil, the small amount of agriculture that is in arid zones is gradually being phased out in favour of other, more profitable, areas. The results for Russia and South Asia are explained by a general expansion of agriculture, but because South Asia can only expand into arid zones, the environmental impact is greater there.

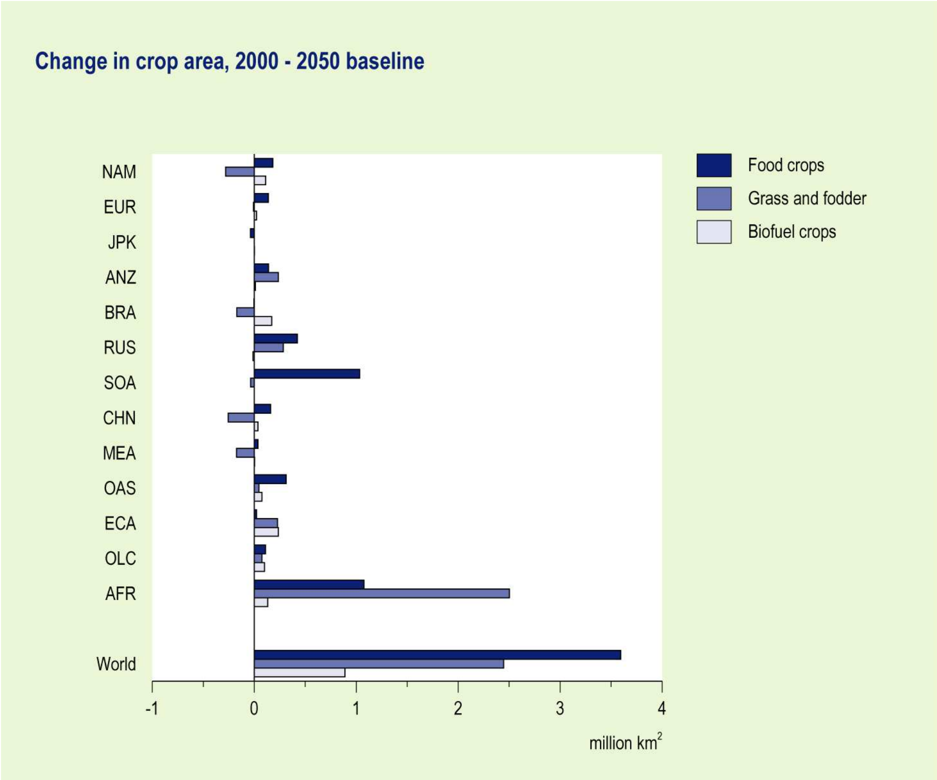


Figure 3.11: Change in crop area, 2005-2050, baseline

Another important environmental effect of global land-use change is the resulting CO_2 emission from biomass and soil stocks, following conversion of forests to cropland and grassland in (mostly) tropical regions. One of the currently promoted options is increasing the share of biofuels. Using mostly first generation crops, this option will lead to competition for land with agricultural crops and to further land conversion, as discussions at the IMF meeting in April 2008 illustrate. The role for biofuels in the baseline is limited. The projection takes a long-term perspective and only deals with second generation biofuels. In many regions, there is considerable potential for policies and market mechanisms to improve agriculture's efficiency of water use, making it environmentally sustainable. Of critical importance for land-use are the possibilities to continue the yield increase per hectare. The following Baseline assumptions are relevant for the development of land-use:

- There is a continued growth of trade, but it stabilizes relative to GDP (i.e. the proportion of goods and services that are traded internationally does not change). This is relevant for interpreting land-use projections, as the baseline does not show the effects of further liberalization of global trade. Under assumptions of tariff reform, total agricultural land use would increase in 2030 to almost 12%. There is considerable regional variation, such as increases in especially Brazil and parts of Southern Africa and decreases in especially those OECD countries with high tariffs. In a scenario study for the 2nd Global Biodiversity Outlook (CBD, 2007), global biodiversity decreased due to trade liberalisation, mainly as a result of shifting production to regions with lower production costs but with a lower agricultural productivity than in OECD countries.
- The trends for agricultural yields were largely adapted from the FAO Agricultural Outlook to 2030 (FAO, 2006) where macroeconomic prospects were combined with expert views. The increase in agricultural productivity is average, in comparison with other much used scenarios (*see figure 3.12*). The use of biofuels in the baseline scenario is relatively low and does not present an important additional pressure on land-use.

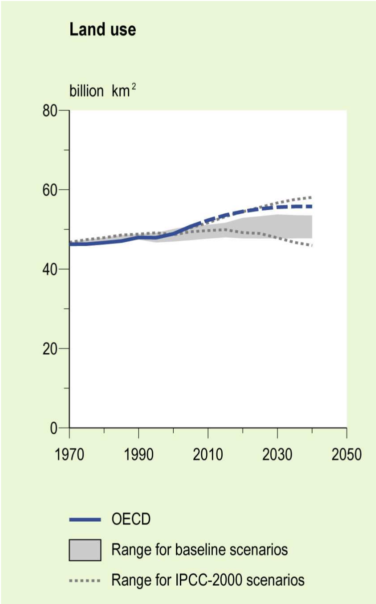


Fig. 3.12 Comparison of OECD baseline trends for land-use with several much used scenarios (grey area is for baseline scenarios without policy development).

The land use changes in the OECD Baseline scenario were calculated with the IMAGE model framework, specifically the LEITAP model and the IMAGE core model working together (see Box 3.1).

3.3.3 Climate change

Globally, carbon dioxide emissions from fossil fuel combustion increase under Baseline conditions from 7.3 GtC in 2000 to 12.5 GtC in 2030 and 14.7 GtC in 2050. Among the energy-related emissions, those from electric power generation and transport are the largest and also increase the most over the Outlook period. Per capita emissions in OECD countries remain much higher than for most non-OECD countries. Total global greenhouse gas emissions amount to 11.5 Gt C-equivalent in 2000 and are projected to be 17.5 Gt C-equivalent in 2030.Whereas emissions from OECD increase by nearly one-third (1.4 GtC) from 2000 to 2030, emissions from BRIC and Rest of the World nearly double over the same period and their share in the global emissions increases from 57% to 64%. These Baseline emissions would lead to a temperature increase of nearly 1.9 degrees Celsius above pre-industrial level by 2050. With higher temperatures, the hydrological cycle is also intensified as more water evaporates and on the whole more precipitation results. As with the temperature pattern, the effect is very unevenly distributed. In already water-stressed areas such as southern Europe and India, the negative impact on agriculture and human settlements can be substantial. Areas with substantial increases over already high levels in 2000 are more susceptible to run into water drainage or flooding problems. In general, all areas facing considerable changes in surplus will have to adapt to cope with these changes, including through adjustments in water management practices and/or infrastructure.

Box 3.1 The IMAGE framework of models: Land use and land cover (source: OECD 2008)

Agricultural land supply and use: LEITAP

The LEITAP model, named after the Agricultural Economics Institute (LEI) that developed and applies it, is an extended version of the GTAP model developed at Purdue University. A more detailed description of LEITAP is included in the background report to the *OECD Environmental Outlook* (Bakkes & Bosch, 2008); an example of a stand-alone application can be found in Francois *et al.* (2005).

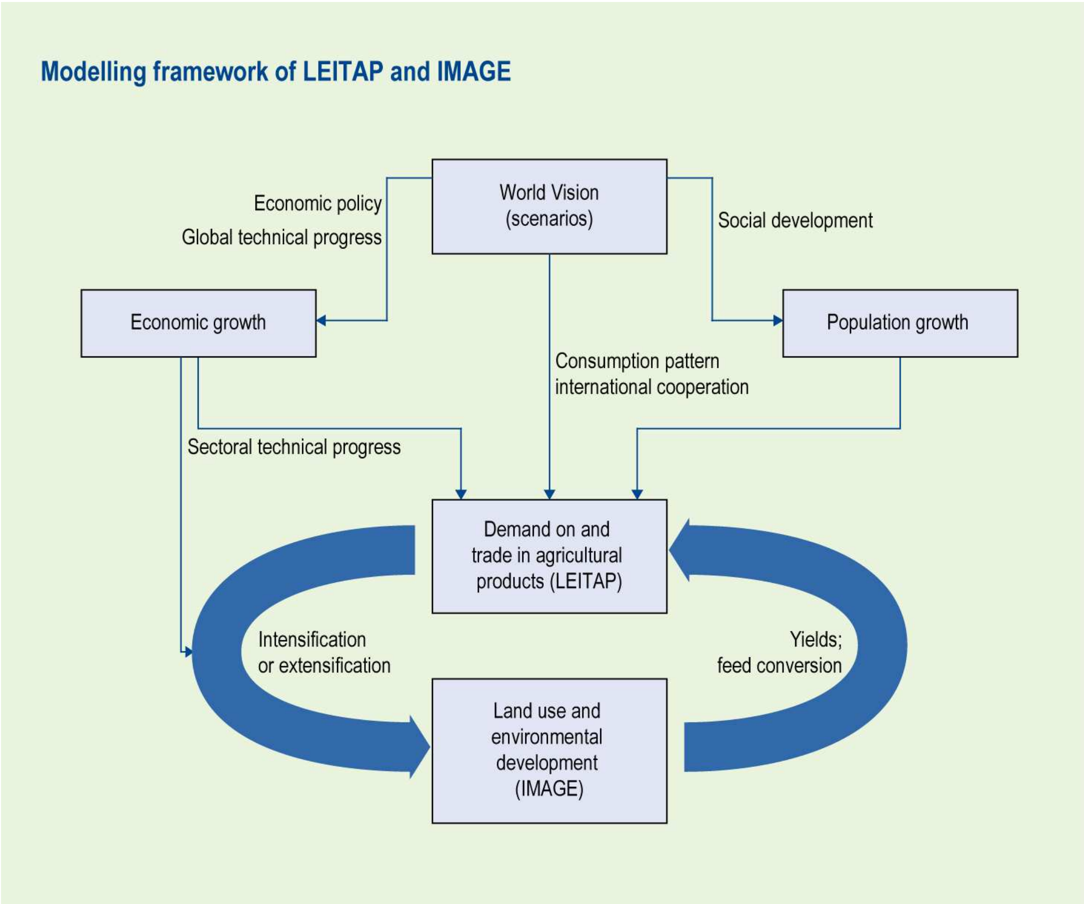
The base version of GTAP represents land allocation in a structure of constant elasticities of transformation, assuming that the various types of land use are imperfectly substitutable, but the substitutability is equal among all land use types. LEITAP extends the land use allocation structure by taking into account the fact that the degree of substitutability of types of land differs between types (Huang *et al.*, 2004). It uses the more detailed OECD's Policy Evaluation Model (OECD, 2003) structure. This structure reflects the fact that it is easier to shift land between producing crops like wheat, coarse grains and oilseeds, than between land uses like pasture, sugarcane or, even more so, horticulture. The values of the elasticities are taken from OECD (2003).

In the standard GTAP model the total land supply is exogenous. In LEITAP the total agricultural land supply is modelled using a land supply curve which specifies the relationship between land supply and a land rental rate in each region. Land supply to agriculture can be adjusted as a result of idling of agricultural land, conversion of non-agricultural land to agriculture, conversion of agricultural land to urban use and agricultural land abandonment. The concept of a land supply curve has been based on Abler (2003). The general idea underlying the land supply curve specification is that the most productive land is first taken into production. However, the potential for bringing additional land into agriculture is limited. If the gap between potentially available agricultural land and land used in the agricultural sector is large, the increase in demand for agricultural land will lead to land conversion to agricultural land and a modest increase in rental rates to compensate for the cost of bringing this land into production.

The land supply curve is derived using biophysical data from the IMAGE modelling framework, described below. In the IMAGE model, climate and soil conditions determine the crop productivity on a grid scale of 0.5 by 0.5 degrees longitude-latitude. This allows spatially heterogeneous information on land productivity to be fed into the agro-economic model with LEITAP. In practice, land use change projections are iterated between LEITAP and the IMAGE until a stable solution is reached — typically one iteration is enough. Land supply functions differ between region according to survey results on land type supply constraints.

Land use and land cover from an environmental point of view: IMAGE

The IMAGE model is geographically explicit in the description of land-use and land-cover change. The model distinguishes 14 natural and forest land-cover types and 6 man-made land-cover types. The land use model describes both crop and livestock systems on the basis of agricultural demand, demand for food and feed crops, animal products and energy crops. A crop module based on the FAO agro-ecological zones approach (FAO, 1978-1981) computes the spatially explicit yields of the different crop groups and the grass, and the areas used for their production, as determined by climate and soil quality. Where expansion of agricultural land is required, a rule-based "suitability map" determines the grid cells selected (on the basis of the grid cell's potential crop yield, its proximity to other agricultural areas and to water bodies). An initial land-use map for 1970 is incorporated on the basis of satellite observations combined with statistical information. For the period 1970-2000, the model is calibrated to be fully consistent with FAO statistics. From 2000 onwards, agricultural production is driven by the production of agricultural products as determined by LEITAP and demand for bio-energy crops from the TIMER model. Changes in natural vegetation cover are simulated in IMAGE 2.4 on the basis of a modified version of the BIOME natural vegetation model (BIOME, Prentice, 1992). This model computes changes in potential vegetation for 14 biome types on the basis of climate characteristics. The potential vegetation is the equilibrium vegetation that should eventually develop under a given climate (Bouwman et al., 2006).



Modelling of change in agricultural land use

3.3.4 The nitrogen cycle

With the assumed increase in fertilizer use efficiency, most industrialized countries and developing countries with a current surplus (India, China) show a decrease of total Nitrogen (N)-inputs per hectare of agricultural land, while many developing countries with a current deficit show an increase. However, due to expanding agricultural areas this increase is often small. Gradually the N-inputs in the form of fertilizers, animal manure and biological N-fixation have increased in most developing countries and will continue to do so in the coming three decades. Hence, agricultural systems with N-deficits gradually change into systems with N-surpluses, leading to growing losses of reactive N to the environment. At the same time, there is an increasing efficiency of the agricultural system as a whole. It depends on the relative importance of each of these developments (intensification, increasing efficiency) whether the loss of reactive N will increase or decrease.

Although the livestock production in OECD decreases somewhat between 2000 and 2030 (and associated manure production even more by higher efficiency), fertilizer use increases as a consequence of the strongly increasing crop production for all crops, and the assumption that the fertilizer use efficiency is the same as that assumed in the FAO-Agriculture Towards 2030 study and follow-on work (FAO, 2006). The overall result is a slightly decreasing (3% less than in 2000) total ammonia emission in the Baseline. However, the ammonia emission per hectare is constant (or a minimal increase), due to the fact that the agricultural area shrinks somewhat (also a minimal change) by assumed productivity growth. For ammonia volatilization the assumption is that manure is incorporated in arable land, and broadcast in grassland. For stables, there are no additional emission reduction techniques included in the calculation.

Typical of non-OECD regions, the improvements in treatment of sewage are not enough to keep up with the increased access to sanitation and connection to sewerage. This problem is foreseeable for the Baseline but also in the case of acceleration of environmental policies. At the same time, an even larger load of nutrients originates from agriculture. As a result, for the regions Other Asia and Africa, a marked deterioration of the nutrient load on aquatic systems is projected precisely under the conditions of a global environmental policy package.

On the basis of the Baseline projections for agricultural production, deposition from the air and urban sewage, the global quantity of reactive nitrogen exported by rivers to coastal marine systems will increase by 4% in the coming three decades. While the nitrogen export by rivers will decrease by about 5% in OECD countries, an 11% increase is projected for the BRIC countries and 2% in the Rest of the World. This is a continuation of the trend observed in the past decades. There are, however, large differences between regions. For example, fast increases in nitrogen loads will occur according to the Baseline in India and Middle East, with a somewhat slower increase in China.

3.3.5 Pressures which are not included in the GLOBIO model.

In the modelling exercise to assess changes in Biodiversity factors such as air pollution and water use are not included (yet). In the cases, discussed in chapters 4, 5 and 6, the quality of ecosystems, ecosystem services and the economic value may however be affected by these pressures. A short summary of the baseline scenario results is therefore given here.

Air pollution

In the Baseline the global totals of emission of sulphur dioxide and nitrogen oxides remain almost unchanged between now and 2030 (*Figure 3.13*). However, the regional contributions to the global total change drastically over this period, decreasing in OECD countries,- reflecting the progress in abating air pollution-, stabilizing in the BRIC countries and increasing in the rest of the world where the institutional capacity or the financial resources to control air pollution are still insufficient. Compared with the global projection by IIASA (Cofala et al., 2005) the OECD Baseline features larger emissions in the base year as well as in the future, reflecting a less optimistic view on industrial emissions outside OECD countries. The development over time is very similar. Both projections are lower than those of the IPCC (2000), reflecting newer insights in the most plausible development of emissions sulphur and nitrogen oxides under Baseline conditions.

Key uncertainties include the future use of coal worldwide, quantity as well as technology; use or non-use of existing abatement equipment in power plants in China; and industrial emissions for example from metallurgy in Russia. The focus of the OECD environmental outlook regarding air pollution is on the future air quality on over 3000 urban agglomerations worldwide. It analyses the associated impacts on population health, in conjunction with urbanisation and ageing. This line of analysis is not included in this COPI study, but the contributions of ecosystems in improving air quality are (see Chapter 5).

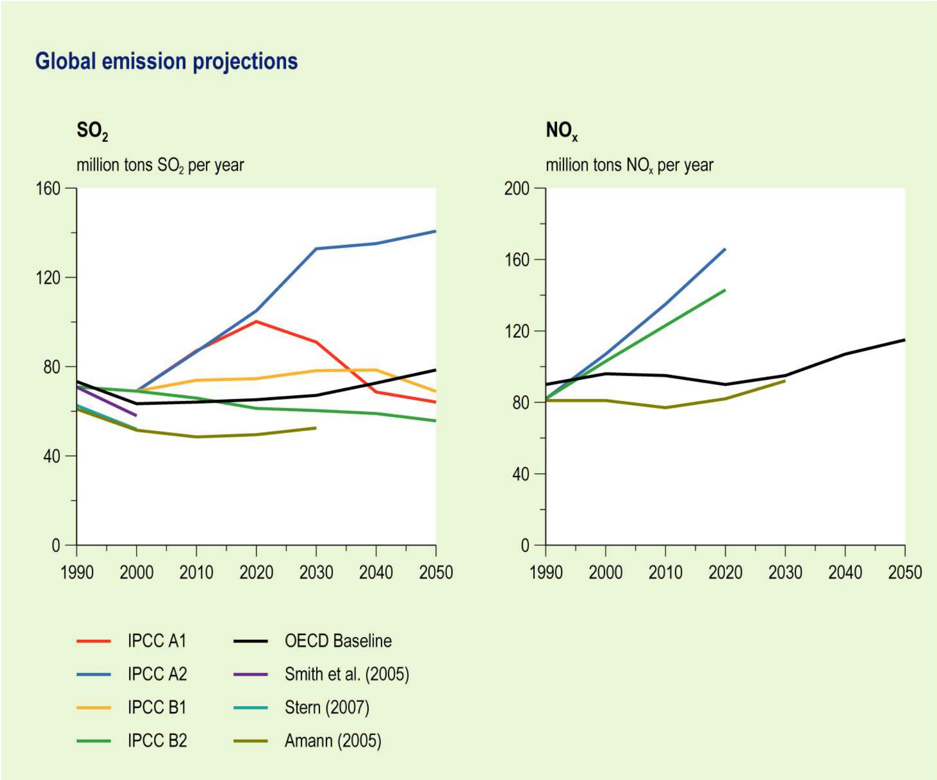


Figure 3.13: Global baseline emissions of sulphur dioxide and nitrogen oxides

Water issues

The Baseline simulation for water demand reveals a considerable increase of about 26% for overall water withdrawals between 2005 and 2030 (see *Table 3.3*). In almost all regions overall water demand increases, except in Canada and Japan (decrease of water withdrawals of -6% and -11% respectively). Especially in Central and South America, in Western Africa, Ukraine and in many parts in the South East Asia water, demand increases by more than 40%.

Table 3.3: Water use, baseline

	2005	2030	change 2000-2005
	km3		%
North America	639	679	1.1
OECD Europe	484	588	8
OECD Asia	61	75	8
OECD Pacific	34	37	3
Brazil	39	99	10
Russia & Caucasus	153	187	17
South Asia	1283	1713	-0.3
China region	689	1460	5
Middle East	236	342	5
Other Asia	163	382	14
Eastern Europe & Central Asia	134	155	4
Other Latin America & Caribbean	121	214	4
Africa	192	343	1.4
World	**4230**	**6275**	**3.5**

OECD Environmental Outlook modelling suite, final output from IMAGE cluster (WaterGAP)

In Indonesia and Western Africa water use doubles, however with medium or low contribution to the global demand. In contrast, in the two countries with the largest overall water use, namely India and China, water use increases less (18% and 49%, respectively).

This is in both cases due to a larger water demand in the electricity and manufacturing sector, with smaller increases in the domestic sector and a decrease in water use for irrigation. Consistent with the expectation in the Comprehensive Assessment on Water Management (Molden, 2007), it is assumed that irrigated area does not expand much. The room for change in irrigation globally is in efficiency of water use in existing systems rather than in expanding irrigated areas. Hence under the no-new policies Baseline, the total amount of water withdrawn for irrigation does not change, up to 2030. At the same time, water use in the electricity and manufacturing sectors increases considerably. The increase in total water demand together with the envisaged growth of the population in affected areas will increase the number of people living under water stress (see *figure 3.14*).

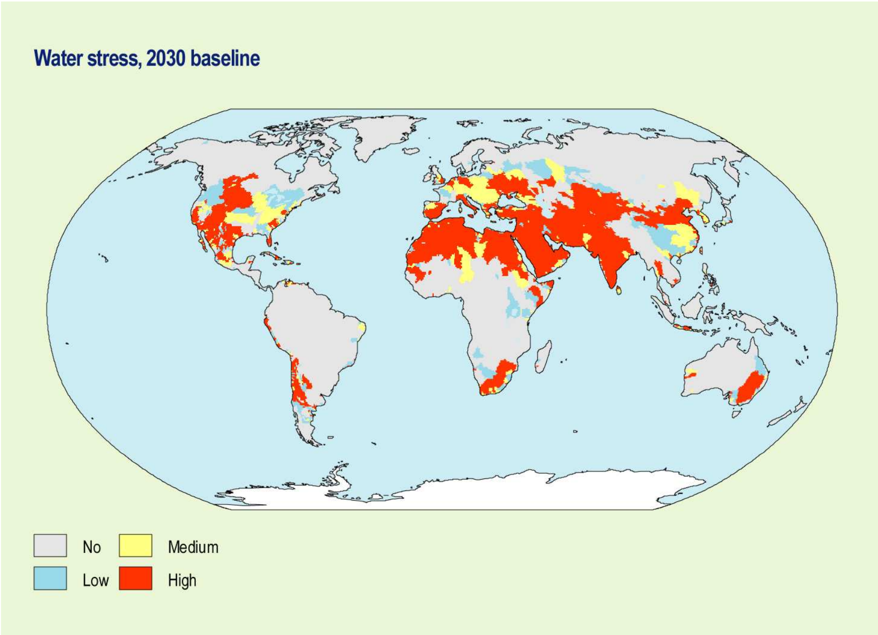


Figure 3.14: Water stress areas in 2030, baseline

3.3.6 Pressures on the marine and coastal ecosystems

Climate change is an important pressure in marine and coastal systems. Change in climate and weather influences oceanic processes. Changes in currents may result in changes in population abundance and distribution for many marine species. Habitat changes in coastal systems are a major cause of fisheries declines. Some coastal habitats have been converted to mangroves for coastal aquaculture ponds or cage culture of high valued species such as shrimp, salmon, or tuna. Such conversions affect wild-capture fisheries, which use these coastal habitats for part of their life cycle. Other factors of importance are invasive species, pollution, and disease. Moreover, persistent and widespread misconceptions about the ability of marine fish populations to withstand and recover from fishing continue to undermine initiatives to address the root causes of these problems (MA, 2005b)

3.4 The Baseline scenario: policy landscape

3.4.1 Introduction

Policy elements influencing biodiversity play an important role in the Baseline scenario. The Baseline builds on the current state-of-play assuming that no new policies are adopted in direct relation to biodiversity, including extra enforcing of existing policies. Moreover, as all scenarios do, the Baseline deals with a general and highly stylised picture of the current situation and foreseeable trends, and it does not make explicit links with individual policies or policy instruments. In other words, the Baseline has not been developed with a reference to any specific policy element but it is rather based on more generic considerations of the policy and non-policy related attributes and their foreseeable effects on land and resources use. Nevertheless, for orienting "inaction" in a policy context, this section first sketches the landscape of relevant policies. Then, it places a few markers pointing out - approximately – the position of the Baseline.

The policy "landscape", influencing current and future trends in biodiversity and ecosystem services, can be broadly considered to consist of two types of elements: (1) policies (including legislative instruments) that are specifically aimed at supporting the conservation and maintenance of biodiversity, and (2) policies with adverse impacts on biodiversity and ecosystems (see *figure 3.15*). In general, the observed trends in biodiversity and ecosystem services are a result of the interplay between these "pro and against" biodiversity elements of the policy landscape, combined with a number of non-policy dynamics affecting the land- and resources use, such as population growth and environmental factors.

The policies with negative biodiversity impacts form one of the main reasons behind the current loss of biodiversity and related services. They include different sector policies that stimulate unsustainable use of land and natural resources, resulting in increased pressure on biodiversity and related ecosystem services. In addition, the lack of pro-biodiversity policies and legislative instruments, including limited effectiveness and implementation in securing the conservation and sustainable use of biodiversity is also an important cause of loss.

There is not always a sharp distinction between – on the one hand - development in policies with a peripheral connection to biodiversity and – on the other hand - outright uncertainties. Therefore, this section includes comments on the latter as well.

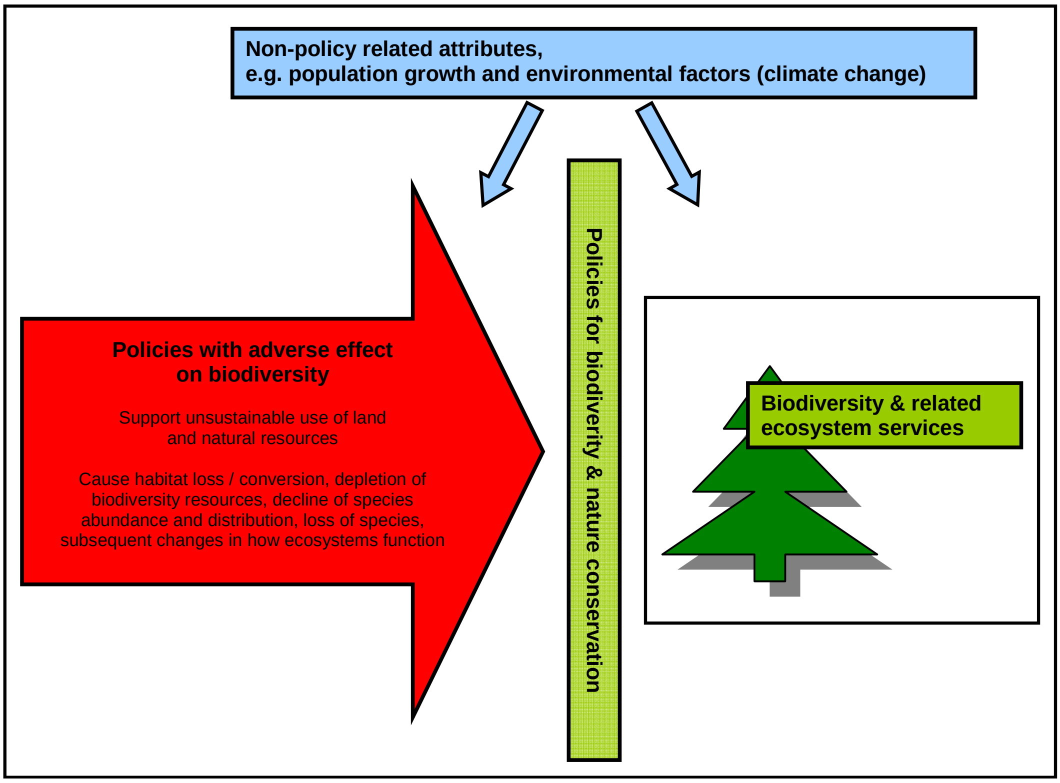


Figure 3.15 Policy and other attributes influencing trends in biodiversity and ecosystem services

The *Tables 3.4 and 3.5* identify the most relevant policy sectors, with specific policy and legislative elements and instruments, which influence the trends in biodiversity and ecosystem services supply. *Table 3.4* presents an overview of the key international, EU and national instruments currently in place to support the conservation and maintenance of biodiversity whereas *Table 3.5* outlines the major policy sectors with known negative effects on biodiversity. The latter table also summarises the main pressures these policies create on biodiversity.

3.4.2 Policy landscape affecting trends in biodiversity and ecosystem services: Pro-biodiversity policies

The existing pro-biodiversity policies (*Table 3.4)* differ as regards their implementation "power" and subsequent effectiveness. In general, the most effective biodiversity policies are the ones supported by legally enforceable instruments. These include, in Europe, the national and EU nature conservation policies that are supported by legislative frameworks for the establishment of *protected areas*. However, the majority of the existing national and regional "pro-biodiversity" policies in the world lack legal force, in particular those policies aiming at protecting biodiversity and ecosystem services outside protect areas.

Even when such instruments exist, e.g. the legal instruments supporting the sustainable use of biodiversity in the context of agricultural and fisheries policies, the political will and resources for their implementation and enforcement seem inadequate. Consequently, their actual positive contribution to biodiversity conservation is at present limited and to a large extent blocked by policy elements that continue to support unsustainable use of natural resources. Additionally, the existing instruments might fail to address the actual current biodiversity related threats within the sectors. For example, the environmental measures within the EU Common Agricultural Policy (CAP) are mainly directed to decrease agricultural intensification and they fall short on addressing the increasing problem of land abandonment

A number of international pro-biodiversity instruments, such as conventions and agreements, exist. Several of these are legally binding in terms of international law. However, in order to take effect, international law needs to be adopted in national and regional level legislations. Thus, the real value of international biodiversity related agreements depends on creating enough political impetus for their effective uptake, which is at present limited. Some international agreements have, however, created more concrete and enforceable international mechanisms for their implementation. For example, the WTO Agreements are supported by the Dispute Settlement Body that has legislative powers to ensure the proper implementation of the WTO trade rules. Similarly, the Kyoto Protocol functions as a concrete mechanism for the implementation of the UN Framework Convention on Climate Change. These types of mechanisms are absent in the current international biodiversity policy framework, thus it appears rather toothless in the face of existing policies supporting unsustainable use of land and natural resources.

In addition to issues related to enforceability, the availability of financial resources is often a bottleneck for implementation of "pro-biodiversity" policies. Conservation of biodiversity and ecosystems still generally looses out to financing policies focusing on short-term economic growth. Securing adequate financing can be identified as one of the main factors jeopardising the effective implementation and management of the current national and regional protected area networks, particularly in the developing world.

Table 3.4 Overview of international, EU and national policies (e.g. legislative and policy instruments) with <u>positive</u> contribution to the conservation and sustainable use of biodiversity
(Note: includes examples of main policy elements; it is not an exhaustive list)

International	EU	National
Biodiversity & nature conservation policy	**Biodiversity & nature conservation policy (see (1) in section 3.4.4.)**	**Biodiversity & nature conservation policy**
International binding agreements • UN Convention on Biological Diversity (CBD) • Cartagena Protocol on Bio safety • Ramsar Convention • Convention on the Conservation of Migratory Species of Wild Animals (CMS) • Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) • International Plant Protection Convention (IPPC) • Convention on the Conservation of European Wildlife and Natural Habitats (the Bern convention) **International non-binding agreements** • Pan-European Biological and Landscape Diversity Strategy (PEBLDS) • Political resolutions on biodiversity (2004 Kyiv Resolution on Biodiversity; 2007 G8 Potsdam Initiative on Biological Diversity) • Biodiversity related action plans, Codes of conduct and best practise etc. by organisations such as UNEP, IUCN etc.	**Legislative instruments** • Habitats & Birds Directives (e.g. official Guidance Documents for implementation) • EU Wildlife Trade Regulations **Policy instruments** • EU biodiversity policy and the 2006 Biodiversity Action Plan • Different non-binding Community Guidelines for the implementation of Habitats and Birds Directives and other elements of the EU biodiversity policy	**Legislative instruments** • National legislation for biodiversity and nature protection, e.g. in the EU national implementation of Habitats & Birds Directives **Policy instruments** • National biodiversity policies, Action Plans and guidance documents
Biodiversity elements within other policies	**Biodiversity elements within other policies**	**Biodiversity elements within other policies**
International binding agreements • UN Framework Convention on Climate Change (UNFCCC) • UN Convention on the Law of the Sea • Convention on the Protection of the Marine Environment of the Baltic (HELCOM) • Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention) **International non-binding agreements** • Political resolutions with included biodiversity as pecys, e.g. the 2002 UN Johannesburg Plan of Implementation on sustainable development • Action plans, Codes of conduct and best practise with biodiversity relevance etc. by authoritative organisations such	**EU environmental policy** <u>Legislative instruments</u> • Environmental Liability Directive • EIA and SEA Directives • Water Framework Directive • Directive on the assessment and management of flood risks • EU Marine Strategy Directive *(to be adopted)* <u>Policy instruments</u> • EU Soil Thematic Strategy • EU Marine Thematic Strategy and Maritime Policy (*under development*) • Thematic Strategy on the Sustainable Use of Natural Resources **EU Common Agricultural Policy (CAP)** <u>Legislative instruments</u> • Cross-compliance Regulation • Financial support under European Agricultural Fund for Rural Development (EAFRD) to agri-environment measures	Legislative and policy instruments for sustainable use and conservation of biodiversity integrated into national sectoral policies: • environmental policies • agricultural policy • forestry policy • fisheries policy • regional development policy • climate change and energy policy • transport policy • policies regulating land-use and land-use planning • policies for development cooperation and

as FAO UNEP, IUCN, International Council for the Exploration of the Sea (ICES)	• Regulation on organic production and labelling of organic products Policy instruments • EU Forest Action Plan **EU Common Fisheries Policy (CFP)** Legislative instruments • Provisions for conservation of fish stocks and marine ecosystems within the CFP Regulation • Financial support under European Fisheries Fund (EFF) to aqua-environment measures • Regulation on Using Alien and Locally Absent Species in Aquaculture Policy instruments • Action plan for the eradication of illegal, unreported and unregulated fishing (IUU) **EU Cohesion Policy and regional development** Legislative instruments • Financial support under European Structural and Cohesion Funds for conservation and sustainable use of biodiversity **EU climate change and energy policy** Policy instruments • EU policy for Climate Change adaptation *(under development, green paper 2007)* **EU policies on development cooperation and external assistance** Legislative instruments • Financial support under the EU Development Cooperation Instrument (DCI), European Neighbourhood and Partnership Instrument (ENPI) and European Development Fund (EDF) for conservation and sustainable use of biodiversity Policy instruments • Thematic Programme for EU 2007-2013 External Action on Environment and Sustainable Management of Natural Resources (inc. energy)	external assistance In the EU, this includes national level implementation of relevant EU provisions – with the exception on land use planning as this falls under the full competence of the Member States.
Policy instruments not specifically addressing biodiversity but with potential to do so	**Policy instruments not specifically addressing biodiversity but with potential to do so**	**Policy instruments not specifically addressing biodiversity but with potential to do so**
International binding agreements • United Nations Convention to Combat Desertification (UNCCD) • European Landscape Convention **International non-binding agreements** • UN Millennium Development Goals (MDGs) • Different regional agreements for sustainable development within river basins, mountain regions etc.	**Legislative instruments** • EU Regulations for animal and plant health (re: invasive alien species) Note: Additionally, all above mentioned sector EU legislative instruments could be used to protect biodiversity in more pro-active manner **Policy instruments** • EU Integrated Coastal Zone Management (ICZM) strategy • EU Sustainable Development Strategy • EU policies for chemicals and waste • Instruments Arhus Convention • Enterprise and industrial policies	All national legislative and policy instruments providing for environmental sustainability and sustainable development. Environmental education, e.g. awareness rising on the value of ecosystem services, could play an important role in changing unsustainable consumption patterns.

3.4.3 Policy sectors with known negative effects on biodiversity

The list of policy sectors with known negative effects on biodiversity (*Table 3.5*) is long, including policies on agriculture, fisheries, trade, energy and climate change, transport and regional development. In general, these policies cause decline in biodiversity and ecosystem services by either failing to address or actively supporting unsustainable exploitation of natural resources.

Table 3.5 Overview of international, EU and national policies with negative effects on the conservation and sustainable use of biodiversity (Note: includes examples of main policy elements, thus it is not aimed to be an exhaustive list)

International	EU	National
High concern	**High concern**	**High concern**
Trade: WTO and regional trade agreements (see (2) in section 3.4.4.) • trade liberalisation increases unsustainable land-use practises in areas with high production and export potential, e.g. intensification of land-use and converting unused ecosystems into human activities • trade liberalisation causes extensive, small scale and biodiversity-friendly agriculture to die out in certain regions as the product cannot compete at the world market • trade liberalisation results in increased spread of invasive alien species • WTO agreement narrows the scope to introduce regional / national environmental standards for guaranteeing sustainability of imports	**Climate change and energy policy (see (3) in section 3.4.4.)** • The EU biofuels targets require increase in a) biofuels production in the EU and b) imports outside the EU. This can cause rapid land-use changes with negative effects on biodiversity both within and outside the EU. • Commission 2008 proposals for an EU policy package on climate and energy **Common Agricultural Policy (CAP) (see (4) in section 3.4.4.)** • CAP direct aid to agricultural production (Pillar 1) continues to support intensive production oriented agriculture. This can increase water shortage (via irrigation) and the use of pesticides and fertilisers • The level of EU support to Pillar 1 continues to be significantly higher than to Pillar II (agri-environment measures) • Environmental measures within CAP are mainly directed to decrease agricultural intensification and they fall short on addressing the increasing problem of land abandonment **Common Fisheries Policy (CFP) (see (5) in section 3.4.4.)** • CFP continues to inadequately address unsustainable exploitation of fisheries resources and destructive fishing practices (e.g. failures in implementation) • Fishing Agreements with third countries continue to support exhaustion of resources by EU vessels outside the EU leading more generally to unsustainable use of natural resources in these countries, e.g. increased use of bush meat **Cohesion Policy and regional development** • Regardless of increasing potential for supporting sustainable development (e.g.	Similar to EU, national policies / legislation contributing to unsustainable use of natural resources in the following sectors: • Land-use and land-use planning • Use of water resources • Energy (and climate change) • Agriculture, forestry and fisheries • Biotechnology and GMOs • Policies for industries, e.g. extractive industries • Tourism Bi-lateral trade agreements between countries can cause similar effects than global trade liberalization.

	biodiversity conservation), the support to regional development continues, to a large extent, to be focused on development of growth, jobs, industries and infrastructure with limited biodiversity considerations. **Transport policy** • Considering potential impacts on biodiversity and ecosystem services have a limited role in the EU transport policy **Policies for extractive industries** • Existing EU policies and legislation for extractive industries (e.g. EIA and mining Waste Directives) fall short in their implementation	
Moderate / indirect concern	**Moderate / indirect concern**	**Moderate / indirect concern**
Investment policies, e.g. international and regional investment agreements • International investment agreements, particularly in developing countries, often introduce low requirements for environmental standards and liability etc. to foreign investors. This means that possible negative effects of foreign investors' activities, such as environmental impacts of extractive industries, can be hard to control at national level.	**EU budget (see (6) in section 3.4.4.)** • The decline in the EU overall and Member State species budgets increases competition for financial support between different sectors. It is likely that this will decrease available resources for environment. For example, general cuts in the Community budget will reduce the financing for environment within CAP and CFP. These cuts are likely to take place first in agri / aqua –environment measures. **Lisbon Strategy for Growth and Jobs** • Political discussion on growth and development of jobs in the EU attention tend to lack the full consideration of the aspects of environmental sustainability **EU internal trade** • Free intra-EU trade makes it difficult to control the spread of invasive alien species within the EU **Policies and legislation for biotechnology and GMOs** • Adopting liberal legislation and policies on GMOs resulting in the spread of GMOs could pose threats to biodiversity **EU Development Policy and External Assistance** • Despite of increased integration of environmental (e.g. biodiversity) related aspects into EU development cooperation and external assistance at the policy level the EU financed activities continue to have adverse effect on biodiversity in the third countries.	National policies and legislation regarding: • Investments • Security

There is a general lack of effective mechanisms to try to limit and control the pressures on biodiversity caused by increased and intensified use of land and resources. For example, national and regional legislative instruments to specifically address these pressures are scarce, particularly in the developing world, and they are fully lacking at the global level.

Additionally, the implementation and enforcement of the existing instruments is often inadequate due to lack of financial resources. Failures in enforcement have been identified among the main reasons why the EU Common Fisheries Policy (CFP) continues to inadequately address unsustainable exploitation of fisheries resources and destructive fishing practices. Furthermore, several sector policies, both at national and regional level, still provide substantive incentives to support short-term economic growth at the expense of long-term environmental sustainability and maintenance of biodiversity. These include, for example, subsidies for agricultural production. By subsidising the production and exports of a number of agricultural products several countries have distorted the international markets and contributed to global overproduction. Additionally, a number of the supported products, such as sugar beet and sugar cane, need to be widely irrigated, with negative environmental effects, to ensure consistent quality and productivity.

The scale at which biodiversity relevant policies are adopted ranges from global to regional and national. Similarly, their impacts on biodiversity and related ecosystem services can take place at different scales. Naturally, the national and regional policies play an important direct role in defining the trends in biodiversity within the scope of their geographic jurisdiction. In addition, national and regional policies also often have an indirect effect on biodiversity and ecosystem services outside their actual geographic scope (so called external effects). For example, the EU biofuels targets adopted as a part of the Community's climate change and energy policy are foreseen to have major impacts on biodiversity, in- and outside Europe.

The national and regional trade policies can also influence global trends in biodiversity. In particular, provisions for trade in agriculture and fisheries (e.g. favourable treatments or protective tariffs) can have a significant effect on land-use patterns in a wide range of exporting and importing countries. For example, international free trade policies and bilateral trade agreements, combined with export oriented national policies, can cause countries to focus on exporting natural resources at the expense of securing sustainable supply of resources at national and regional level. Also, the EU Fishing Agreements with third countries continue to support exhaustion of resources by EU vessels outside the EU. This is known to lead to a wider unsustainable use of natural resources in these countries, e.g. increased use of bush meat.

The observed global trends in biodiversity and ecosystem services supply are, to a large extent, a sum of different policy outcomes as outlined above. In short, the continued loss of biodiversity projected by the Baseline scenario provides a strong indication that the biodiversity policy landscape continues to be dominated by policies sustaining unsustainable use of land and natural resources with negative effects on biodiversity. Even though policies supporting conservation and sustainable use of biodiversity exist they tend to lack enforceability and suffer from ineffective implementation.

Box 3.2 The special case of the global marine system

Subsidies

Financial subsidies are one of the most important drivers of over-fishing. Cheap-fuel subsidies can keep fleets operating even when fish are scarce. Without such subsidies, many of these fisheries would cease to be economically viable. Globally, the extent of the subsidies to the fisheries industry has been estimated from $20 billion to over $50 billion annually, the latter roughly equivalent to the landed value of the catch. The subsidies given to fisheries vary between countries. For instance, in 1997 Canada provided over $198 million in unemployment benefits to its fishing sector; the United States gave $66 million in tax exemptions, and the European Union provided subsidies of $155 million to obtain access to other countries fishing grounds (MA, 2005b). Each of these has the effect of either reducing the cost of fishing or increasing the net revenues, and hence they lead to more fishing than would have been the case without the subsidies.

Illegal Fishing

The profits of fisheries that operate outside of national and international laws and conventions can be very high. In some areas there is a lack of surveillance, enforcement, and monitoring due to high operational costs. In other areas corruption and cheating are tolerated due to the economic conditions or social obligations within a country.

Effectiveness of International Instruments

In 1982, the United Nations Convention on the Law of the Sea was initiated, to become an international instrument for wise use of the oceans: it espouses the right and need for coastal nations to monitor and manage their fish stocks. However, UNCLOS has not been very successful, as will be described in chapters 4, 5 and 6. It is even considered to have increased over-fishing problems, as it gave coastal nations the ability to declare a 200-mile EEZ. By many national governments this was seen an opportunity to expand their fishing industries. A few industrial countries managed to achieve some of the expected benefits by testing and adopting new management measures (such as limited entry and fishing rights), most others simply failed to realize them. Furthermore, the UNCLOS requires that coastal nations without sufficient fishing capacity are allowed to make their EEZ resources available to other nations. The reimbursements are, as is usually the case with exports of raw resources, less than the potential market value of the resource.

There is no integrated approach to managing ocean use. Marine protected areas (MPA) with no-take reserves at their core may re-establish the natural structures that have enabled earlier fisheries to maintain themselves, but they are slow in being established and hard to enforce.

While more than 100 fisheries access agreements (multilateral and bilateral) are currently used to manage access to marine resources, few are monitored or evaluated for their effectiveness, equitable access, and sharing of economic benefits. The European Union has initiated a monitoring program for the EU’s Common Fisheries Policy, and other regional fisheries bodies are considering monitoring programs, but none have been developed to date.

3.4.4 The Baseline marked out in a landscape of policies and uncertainties

A dominating uncertainty is the rate of increase in economic activities. From the discussion of key variants to the economic Baseline (OECD, 2008 and Bakkes & Bosch, 2008) it is clear that the baseline is conservative. In particular, if the period around the year 2000 had been given more weight in constructing the baseline, as opposed to the 1980-2000 period, GDP per capita levels in countries like Brazil, Russia India and China would have been projected much higher. Historic trends are not the only ingredient for the economic baseline, but they constitute an important point of choice.

Although the modelling for this study is more nuanced than assuming a fixed relation between GDP and pressures on biodiversity, it should be noted that the uncertainty in the baseline leans to the side of more pressures on biodiversity. This by itself makes it more probable that the COPI assessment in this study errs on the side of underestimation, rather than overestimation.

(1) Regarding biodiversity policies such as Natura 2000, the implicit assumption in the Baseline is that its implementation will not substantially change current trends.

(2) As mentioned earlier in this chapter, regarding trade in agricultural products, the assumption in the Baseline is that there will be no major changes in the spirit of a new Doha round.

(3) Regarding climate change mitigation, three policy elements should be mentioned.

(1) the Baseline assumes no post-Kyoto regime other than the policies in place and instrumented by 2005. For the EU, this means that the Commission's early 2008 package of proposals on energy and climate change policies is not included in the Baseline. Obviously, the proposals are for new policy – in contrast to the Baseline, which projects a 'no new policies' future. The existing trading scheme for emission credits (ETS) is included.

(2) on biofuels the Baseline takes a long-term view and only considers second generation, woody, biofuels.

(3) on the fuel mix worldwide, the Baseline is calibrated to the World Energy Outlook 2006 (IEA, 2006). This implies the assumption that domestic energy demand in Russia will be largely met with natural gas. However, current policy in Russia is to reserve natural gas for export. Together with the expected privatisation of the electricity sector, this makes a strong increase in the use of coal likely. On this point of coal use in Russia, too, the Baseline is conservative in terms of future pressures on the environment.

The time horizon of 2050 (2030 for some themes) has the effect of limiting the cumulative of climate change on biodiversity that is taken into account. This, too, has the effect of making the COPI estimate conservative. Explicit adaptation policies are not included in the baseline.

(4) An important assumption in the baseline is that agricultural productivity, in terms of yield per unit of agricultural area, can continue to improve over the coming decades. (See Figure 3.3 and Chapter 4.) This is in line with productivity trends of Agriculture Towards 2030 (FAO, 2006). Among other things, this would require the declining trend in worldwide investments in agriculture-related research and development to be at least halted. Implicitly, the baseline assumes this will happen. An additional important assumption is that there will be enough water to realize the productivity increases. The Comprehensive Assessment on Water Use in Agriculture (Molden, 2007) finds that this will be feasible but that it will require novel and wide-ranging new policy approaches that go beyond engineering. Thus, on these two important areas just outside the environmental domain – but consequential to it – the Baseline implicitly assumes new policies. They would have to happen in particular outside the current OECD countries. Moreover on agriculture and land use, the baseline includes no policies aimed at decoupling the increase of meat consumption from the increase of disposable income worldwide. Finally, the no new policies assumption is that the further evolution of the Common Agricultural Policy will not significantly alter the level of agricultural production support.

(5) The Baseline assumes that the EU Common Fisheries Policy, as well as equivalent policies in other world regions, remains in place and continues to be implemented as it is now.

(6) Regarding EU enlargement, the Baseline is agnostic. Policy implications such as a possible dilution of the budget are 'below the radar' of the worldwide assessment that the Baseline has been designed for. Developments in neighbouring countries relevant in this respect (Turkey, Ukraine region) have been modelled independently of the EU, using the 'no new policies' rule of the Baseline.

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