



**93<sup>rd</sup> DGINS Conference**  
20–21 September 2007, Budapest, Hungary



**DGINS 2007/93/III/3**

**Globalisation and environment:  
targets and tools for measuring progress**

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# Globalisation and environment: targets and tools for measuring progress

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Human influences on environment reached global level in the 20<sup>th</sup> century. Such consequences of human activities are unintended, however, as soon as these processes are recognized, there is an urgent need (i) to closely monitor their escalation, assess their possible implications, (ii) develop and implement the necessary response policies. For the latter purposes, global quantitative characteristics/indicators are used for setting concrete targets and measuring progress towards these targets. Such indicators as well as the related global targets and timetables are based on scientific assessments and have become usually the most critical subjects for the intergovernmental negotiations. The paper presents the process of selecting such global environmental indicators and setting targets through the example of three well-known global environmental issues, i.e. ozone depletion, the loss of biodiversity and the climate change hazard.

## 1. Variable state of environment and increasing human influences

Ecosystems and societies accommodated to the ambient environmental conditions, their average characteristics and annual, and multi-annual variability. Extreme environmental events, natural hazards – heat waves, forest fires, droughts, floods, tsunamis and others – caused severe damages and even large number of casualties, however, in many cases, those were followed with an almost complete recovery of the functioning of ecosystems and societies in the affected regions. On the contrast to such recurring cases, prolonged and/or extraordinarily large anomalies in certain environmental elements had substantial and sometimes even irreversible consequences. In the recent past, prolonged dryness in the Sub-Saharan region in 1960s and 1970s resulted in catastrophic famine with very many environmental victims and refugees. As a hazard of partially environmental origin (and also partially caused by economic mismanagement), the 19<sup>th</sup> century „Potato Famine” in Ireland caused about a 1.5 million death toll because of the consequent starvation and diseases, and also about one million Irish emigrants.

Human interference with the environment remained of rather limited scale by the 19<sup>th</sup> century. The Industrial Revolution marked the beginning of rapidly increasing use of the

fossil fuels and eventually in the middle of the 20<sup>th</sup> century it was revealed that the acidification of the Scandinavian lakes was a direct consequence of the sulphur emissions from the coal combustion in W-Europe. The sharply increasing population, urbanisation, food demand, mobility and many related processes resulted in large scale land use change, deforestation, ever growing consumption of natural resources and increasing volumes of waste. The shrinking area of global forest cover, the accelerating loss of biological diversity are only two well-known impact indicators of these human activities. The 1950s marked important inventions of synthetic gases, which could be used effectively e.g. as agents in refrigerators and for many other purposes. However, after about two decades it turned out that these substances cause the depletion of the upper-air ozone layer. Of course, at least one more example should be added, namely, the emission of the greenhouse gases that triggers global climate change.

## 2. Environmental globalisation, response policies and role of quantified targets

The escalating socio-economic globalisation goes ahead with the *environmental globalisation*. It is mainly a consequence, but it is also a cause and impetus for some aspects of socio-economic globalisation and the relevant international cooperation.

It is a consequence both in terms of large-scale environmental effects of certain human activities (atmospheric emissions, chemical pollution such the widespread use of DDT, deforestation etc.) and in terms of over-consumption of natural resources (“overfishing” and generally the rapid loss of biodiversity, increasing consumption of crude oil etc.).

It is also a cause, for instance, of enhanced global cooperation in the field of environmental monitoring and research. Measuring and analysing of global environmental processes result in identification of their causes and impacts. These also give rise to the demand of stopping or at least limiting the underlying human interference with the global environment.

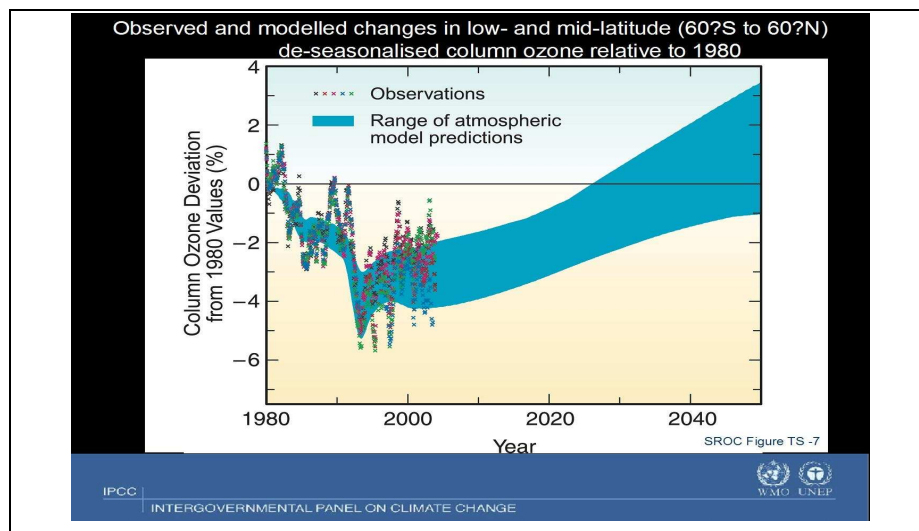
In relation to the global environmental effects of certain human activities and their control, derivation of common objectives and more or less concrete targets usually emerges from scientific foundations. Sometimes these mean the use of certain environmental principles, clear-cut arguments or relatively simple (backward) calculations. In other cases, sophisticated

theoretical and numerical models are developed and applied as a reflection of the complex interlinked nature of the global processes.

Let us consider three very well known cases for such global processes and the international target setting.

### 3. Decreasing the use and phase-out of the ozone-depleting substances

Discovering of the ozone-depleting and increased solar UV-B radiation effect of certain substances, which were produced from the 1960s and understanding that the unintended emission of these synthetic gases may lead to dramatic impacts on all living organisms prompted international deliberations on the possible actions. In spite of the remaining scientific uncertainties, it was clear from the very beginning that these dangerous substances should be phased out and substituted as soon as possible because of the long atmospheric residential time of these substances.

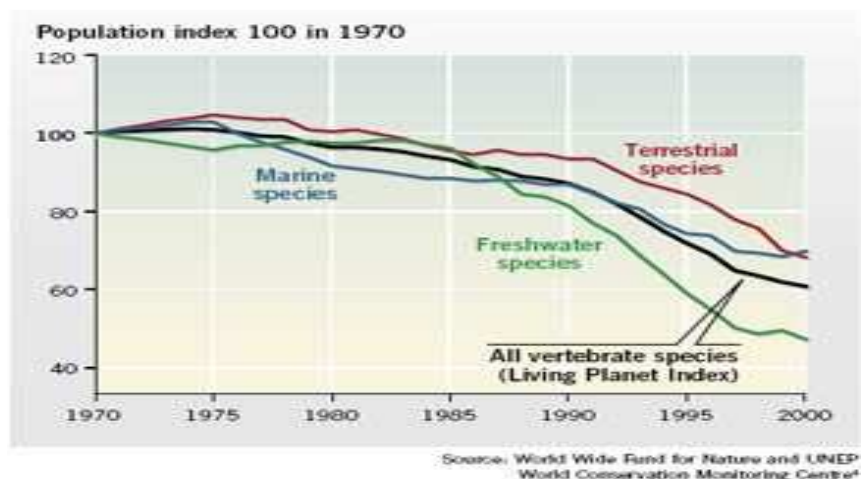


In the framework of the 1985 Vienna Convention, only a general objective could be agreed, namely to further develop and harmonise policies controlling, limiting, reducing or preventing the production and use of those substances. Two years later, however, some concrete targets were adopted within the Montreal Protocol, including that the production and consumption of the freons should not exceed their 1986 level; they should be reduced by 20% by mid-1994 and 50% by mid-1999. According to the related provisions, statistical data on the production, import and export of each controlled substance had to be provided to the international secretariat, as well.

Therefore, the “elementary” indicators of human influence on environment, namely the amounts of freon production have been used for setting the most adequate qualitative targets in parallel with the regular monitoring of the upper air ozone volume by means of a specific measure (the Dobson Units). Of course, the ultimate goal was and remained the protection of the stratospheric ozone layer, stopping its depletion and followed by a gradual recovery, i.e. return to its “original” level.

#### 4. Halting the loss of biological diversity

The accelerating human influence on the Earth’s biological diversity has been turned out as another globalised phenomenon. Compared to the ozone-layer depletion, this was a much more complex process at least for two reasons. Firstly, various human activities (extensive land use change, the use of chemicals etc.) interfered with the multitude of diverse natural factors, which forced gradual and sometimes abrupt changes in the qualitative and quantitative characteristics of the biodiversity at all levels. Secondly, there was no such relatively simple solution – technological “fix” – for this problem as in the case of the ozone-depleting substances, i.e., the development and production of alternative presumably “ozone-friendly” synthetic gases.



After lengthy scientific preparations and discussions within various international organisations, the rapid loss of the biodiversity was revealed in the Brundtland’s report as one of the major global environmental hazards and intergovernmental negotiations were launched in the early 1990s on the possible coordinated actions to cope with this problem. The

Convention on Biological Diversity was adopted in 1992 with the general objective to conserve the Earth's biodiversity. In spite of the universality of the convention and the various actions, the accelerated decrease of the biodiversity continued and eventually the Parties agreed to set a more concrete target on coping with the further loss.

The controversy around the interpretation and/or reality of this aim was clearly reflected in the discussion at the 2002 WSSD. As a result, "only" the following formulation could be agreed: "... the achievement by 2010 of a significant reduction in the current rate of loss of biological diversity will require the provision of new and additional financial and technical resources to developing countries, and includes actions at all levels ..". Various intergovernmental organisations, including the EU and international non-governmental organizations took a much stronger stand on halting the further loss of biodiversity. One important element of their holistic approach is to stop the decrease of the area of natural habitats. Obviously, adding specific measurable targets demonstrates a much more transparent political commitment based on the increasing scientific evidence and the potential of science-based response policies. Later this target was included in the so-called "Countdown 2010" Declaration signed by a number of national governments and many organizations. Within the EU, for instance, such instruments offer an effective basis for the implementation of the two relevant nature conservation directives (the Habitats and the Birds Directives).

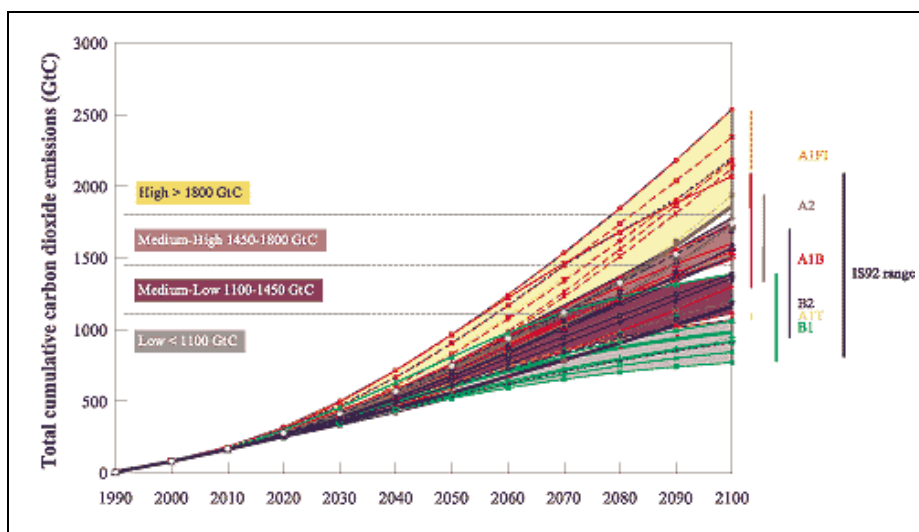
Again, we see the use of a concrete general monitoring instrument together with a series of various measuring tools (indicators) by means of which the process of environmental globalisation and also the efforts of coping with a complex global environmental process can be pursued.

##### 5. Emissions of the greenhouse gases and the mitigation efforts

As a consequence of combustion of fossil fuels and other human activities, carbon-dioxide and other greenhouse gases are emitted to the atmosphere. These gases have accumulated in the atmosphere and the present concentration of the CO<sub>2</sub>, for instance, is about 36% higher than it was before the Industrial Revolution. The subsequent hazard of the global climate change and its wide-range possible adverse impacts were assessed by the scientific community and their "messages" finally reached the high level policy-makers in the 1980s.

Despite of the significant uncertainty about the possible long-term consequences of these emissions on the Earth's complex environmental system and the socio-economic impacts, a universal political agreement was achieved in the late 1980s that international negotiations should be launched to find ways and means to tackle this emerging hazard.

The Framework Convention on Climate Change was adopted in 1992 under the auspices of the UN. At that stage no concrete quantified global target could be agreed upon due to the existing scientific uncertainty and due to the lack of preparedness for a substantial change towards sustainable consumption and production patterns. Nevertheless, the guiding principles of precaution and common-but-differentiated-responsibility were accepted, and the industrialized countries committed themselves to stabilize their emissions by 2000. Later within the Kyoto Protocol these countries also agreed to an average five percent emission reduction by 2008-2012 compared to the 1990 level of their emissions.



Later the European Community suggested another global objective, according to which overall global annual mean surface temperature increase should not exceed 2°C above pre-industrial levels. Based on researchers' models, from such an objective, concrete numeric targets could be derived such as the ceilings of the atmospheric concentrations of the greenhouse gases and, in turn, the requirements for global emission reduction. This objective would call for a substantial reduction of global emissions, as much as 50% by 2050 compared to the 1990 levels, and with a 60-80% „contribution” by the group of developed countries.

There is an “individual” emission limitation and/or reduction commitment for each developed country/Party to the Kyoto Protocol. The contribution of a particular country/Party to the average common target and the progressive implementation of the Protocol’s provisions is primarily measured by the same indicator, namely, the relative change of its national level emissions. The details of measuring national emissions – the greenhouse gas emissions statistics (inventories) – have also become of utmost importance.

The same approach is expected to be in the focus of the further negotiations about a new global post-2012 agreement that would include concrete medium-term and long-term global emission ceilings and related global reduction targets within which the developed countries continue to take the lead.

## 6. Conclusions

Tackling global environmental problems requires global statistical data. Policy-makers need information on characteristics of the state of the Earth’s environment on the one hand and key indicators of human influence on the global environment on the other.

The key indicators of human influence are used not only for monitoring the extension and changes of these anthropogenic factors but those also serve as instruments for global target setting and controlling the effectiveness of response policies implemented to achieve these targets.

The derivation of these quantified targets is usually based on complex scientific models, however, there are many other critical factors governing the international negotiations on the adoption of such common targets and particularly the contribution of the various countries and stakeholders to the achievement of these global targets. Adopting more specific and measurable targets means a stronger political commitment and a higher level of transparency.

In this sense, the quantified global environmental targets demonstrate essential instruments between the scientific and the policy-making community.