

KYOTO PROTOCOL - A MILESTONE ON THE ROAD TO A LOW CARBON ECONOMY

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Abstract

Human activities have had an impact on environment since immemorial times but significant effects could be traced since about 500 years. The world is getting rapidly warmer, and there is an overwhelming consensus among the leading climate scientists that this is being caused mainly by carbon dioxide and other 'greenhouse gases' emitted by human activities. the responsibility of various countries vis-à-vis environment pollution is not equal. At the same time, neither the resources and scientific capabilities of various countries which can be used for the control of pollution are not equal. The need for international cooperation and coordination is self-evident because less developed countries cannot by themselves find solutions to environment pollution and at the same time they cannot be condemned to underdevelopment.

Keywords: environment, global warming, pollution, ecological footprint

The impact of human activities on the environment

Human activities have had an impact on environment since immemorial times but significant effects could be traced since about 500 years. The Industrial Revolution and the large scale use of coal started to determine considerable effects which steadily increased every year.

The world is getting rapidly warmer, and there is an overwhelming consensus among the leading climate scientists that this is being caused mainly by carbon dioxide and other 'greenhouse gases' emitted by human activities, chiefly the combustion of fossil fuels and deforestation. These gases remain in the atmosphere for many decades and trap heat from the sun in the same way as the glass of a greenhouse.

Global warming is already causing changes in the world's climate and these will become increasingly severe unless urgent action is taken to reduce emissions.

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This year's Fourth Assessment Report from the UN Intergovernmental Panel on Climate Change (IPCC), which represents the most authoritative and up-to-date global scientific consensus on climate change, concludes that the warming of the global climate system is "unequivocal" and accelerating. It points to a greater than 90% probability that increases in man-made emissions of greenhouse gases have caused most of the temperature increase seen since the middle of the 20th century.

The global average temperature has risen by 0.76°C since 1850, with Europe warming faster than the average, by almost 1°C. The past 12 years (1995-2006) have included 11 of the 12 warmest years on record. The rate of sea level rise has almost doubled from 18 cm per century between 1961 and 2003 to 31 cm per century in 1993-2003.

The IPCC projects that temperatures and sea levels will continue rising without action to limit greenhouse gas emissions.

Its best estimate is an additional temperature rise over the course of the 21st century of between 1.8° and 4.0°C, but in a worst case scenario the increase could reach 6.4°C. In historical terms, these are enormously rapid changes. Our civilization has never been faced with a change in climate of anything like this magnitude. Even the lowest likely increase projected by the IPCC would push the world's temperature more than 2°C above the pre-industrial level by the end of the century. This would take temperatures into the danger zone where irreversible and potentially catastrophic changes to the global environment become far more likely.

A further rise in average sea level of between 18 and 59 mm is anticipated this century. However, this range may be underestimated as the projections do not include the full effects of changes in ice flows.

The economic developments of the 20th century regarding both developed and developing countries have added new dimensions to the impact on environment and that is why nowadays several types of pollution can be enlisted:

Air Pollution which refers to the introduction into the atmosphere of chemicals, particulate matter, or biological materials that cause harm or discomfort to humans or other living organisms, or damage the environment. This form of pollution is often generated by major stationary sources, like industrial factories but the greatest source of emissions today is represented by mobile sources, mainly automobiles. As part of air pollution gases such as carbon dioxide contribute to global warming and represent a major source of concern among scientists, politicians and general public. It is worth mentioning that carbon dioxide is essential for plant life through photosynthesis, but modern economy is unfortunately characterized by the drastic reduction of surface covered by plants (forests or otherwise) and simultaneously by a huge increase in the quantity of carbon dioxide released in the atmosphere.

Water pollution refers to the contamination of water represented by lakes, rivers , oceans and groundwater. Alteration of the ecological status of water can

be caused by natural phenomena such as volcanoes, algae blooms, storms, and earthquakes but such causes have been so far limited in their impact. It is human activities that can determine large scale, dangerous pollution of water either from industrial activities or from residential areas.

Soil contamination refers to the increase of the presence of man-made chemicals or other alteration in the natural soil environment. This type of contamination can be determined by: accidents related to underground storage tanks, use of pesticides, contamination through soil from waste deposits, direct discharge of industrial wastes to the soil. The most common chemicals involved are petroleum hydrocarbons, solvents, pesticides, lead and other heavy metals.

Radioactive contamination may occur from radioactive gases, liquids or particles which are accidentally discharged from industrial activities.

Although these forms of pollution are the most debated, there are also other types of contamination affecting human life, particularly in urban areas:

- Light pollution;
- Noise pollution;
- Radio spectrum pollution;
- Visual pollution.

The impact of economic activity on environment is perceived by every citizen of the planet both through direct experience in daily activities but also through the raising awareness regarding long term effects and sustainability of the situation. From this latter perspective, an interesting concept is that of ecological footprint. This concept, developed during the period 1990 – 1994, has in view the comparison between human demand on nature and the biosphere's ability to regenerate resources and provide services.

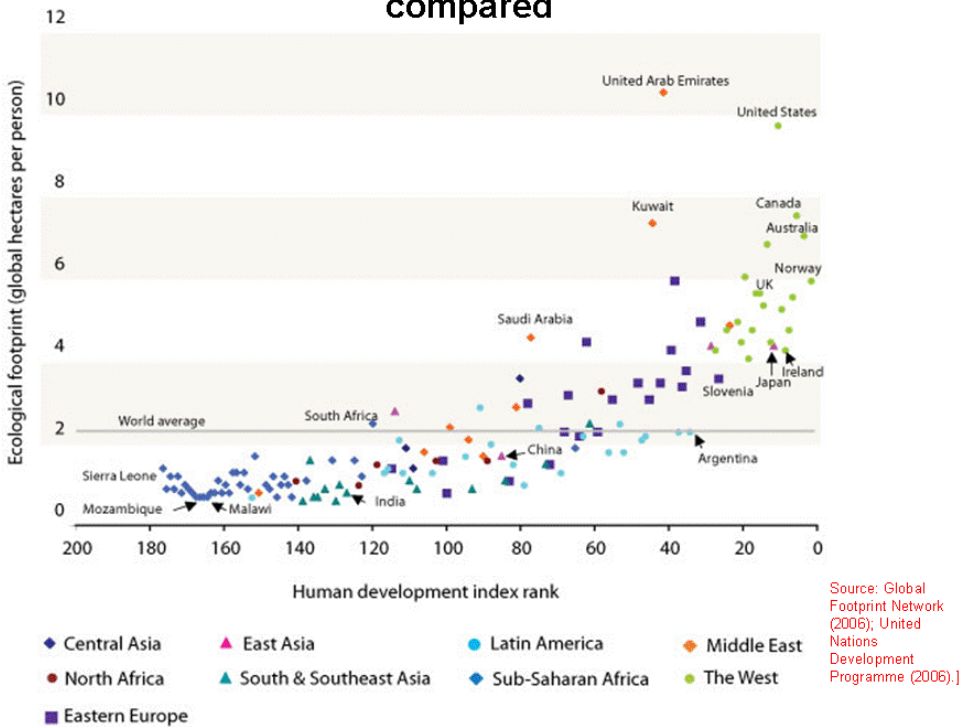
The concept is based on the assessment of the biologically productive land and marine area required to produce the resources a population consumes and absorb the corresponding waste, using prevailing technology. This resource accounting is similar to life cycle analysis wherein the consumption of energy, biomass (food, fiber), building material, water and other resources are converted into a normalized measure of land area called 'global hectares' (*gha*).

Per capita ecological footprint (EF) is a means of comparing consumption and lifestyles, and checking this against nature's ability to provide for this consumption.

In 2003, the average biologically productive area per person worldwide was approximately 1.8 global hectares (gha) per capita. The U.S. footprint per capita was 9.6 gha, and that of Switzerland was 5.1 gha per person, while China's was 1.6 gha per person. The WWF claims that the human footprint has exceeded the biocapacity (the available supply of natural resources) of the planet by 20%.

A conclusion from the above figures is that the responsibility of various countries vis-à-vis environment pollution is not equal. At the same time, neither the resources and scientific capabilities of various countries which can be used for the control of pollution are not equal. The need for international cooperation and coordination is self-evident because less developed countries cannot by themselves find solutions to environment pollution and at the same time they cannot be condemned to underdevelopment.

Human Welfare and Ecological Footprints compared



Towards a low-carbon economy

A Low-Carbon Economy (LCE) is a concept that refers to an economy which has a minimal output of greenhouse gas (GHG) emissions into the biosphere, but specifically refers to the greenhouse gas carbon dioxide. Recently, it became evident that over-concentrations of these gases will fundamentally change our climate dangerously in the foreseeable future.

The aim of a LCE is to integrate all aspects of human activities (manufacturing, agriculture, transportation and power-generation etc.) around technologies that produce energy and materials with little GHG emission. As result of LCE implementation population, buildings, machines and devices will

use energies and materials efficiently and will dispose of or recycle its wastes so as to have a minimal output of GHGs.

Furthermore, it has been proposed that to make the transition to an LCE economically viable we would have to attribute a cost (per unit output) to GHGs through means such as emissions trading and/or a carbon tax.

Concerning practical solutions for the transition to LCE we can indentify two approaches:

a) the use of renewable energy as the main basis of a LCE. This solution is still associated with problems of high-cost and inefficiency but the situation is changing since investment and production have been growing significantly in recent times. Furthermore, regardless of the effect to the biosphere by GHG emissions, the growing issue of oil and energy prices may also be reason enough for a transition to an LCE.

b) the increase in use of nuclear power or of technologies for carbon capture and storage (CCS) as the primary means to achieve a LCE while continuing to exploit non-renewable resources. This approach raises concerns with the matter of spent-nuclear-fuel storage, and the uncertainty of costs and time needed to successfully implement CCS worldwide and with guarantees that the stored emissions will not leak into the biosphere.

Beyond LCE

A zero-carbon (also called non-carbon or post-carbon or post-fossil fuel economy) is a step beyond a low-carbon economy. This type of economy may include the complete elimination of the use of fossil fuels and will be based on renewable alternative energy sources.

As of 2007, Iceland and Sweden have been making big progresses in this direction, with a lot of organizations in the rest of countries, promoting also zero-carbon.

Inter-governmental treaties dealing with pollution control

As result of the general concern regarding pollution, especially through consequences related to climate change, there are several initiatives that proved to be active in the past two decades.

The Montreal Protocol on Substances That Deplete the Ozone Layer is an international treaty designed to protect the ozone layer by phasing out the production of a number of substances believed to be responsible for ozone depletion. The treaty entered into force on January 1, 1989. Since then, it has undergone seven revisions, in 1990 (London), 1991 (Nairobi), 1992 (Copenhagen), 1993 (Bangkok), 1995 (Vienna), 1997 (Montreal), and 1999 (Beijing). Due to its widespread adoption and implementation it has been hailed

as an example of exceptional international co-operation with Kofi Annan quoted as saying it is "Perhaps the single most successful international agreement to date...".

Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution Concerning the Control of Emissions of Nitrogen Oxides or Their Transboundary Fluxes entered into force on 14 February 1991, was to provide for the control or reduction of nitrogen oxides and their transboundary fluxes.

The signatory parties: Austria, Belarus, Belgium, Bulgaria, Canada, Czech Republic, Denmark, Estonia, European Union, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Liechtenstein, Luxembourg, Netherlands, Norway, Russia, Slovakia, Spain, Sweden, Switzerland, Ukraine, United Kingdom, United States. Countries that have signed, but not yet ratified: Poland.

Anyway, among these international agreements the most prominent is **The United Nations Framework Convention on Climate Change (UNFCCC or FCCC)** which is an international environmental treaty established on the occasion of the United Nations Conference on Environment and Development (UNCED), informally known as the Earth Summit, held in Rio de Janeiro in 1992.

The FCCC was opened for signature on May 9, 1992 and it entered into force on March 21, 1994. Its stated objective is "'to achieve stabilization of greenhouse gas concentrations in the atmosphere at a low enough level to prevent dangerous anthropogenic interference with the climate system'"[1].

One of its first achievements was to establish a national greenhouse gas inventory, as a count of greenhouse gas (GHG) emissions and removals. Accounts must be regularly submitted by signatories of the United Nations Framework Convention on Climate Change.

This treaty is aimed at stabilizing greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Initially the treaty set no mandatory limits on greenhouse gas emissions for individual nations and contained no enforcement provisions; **it is therefore considered legally non-binding**. Rather, the treaty included provisions for updates (called "protocols") that would set mandatory emission limits.

The principal update is the Kyoto Protocol, which has become much better known than the UNFCCC itself.

The Kyoto Protocol

The Kyoto Protocol is a protocol to the international Framework Convention on Climate Change with the objective of reducing greenhouse gases that cause climate change. The Kyoto Protocol is an amendment to the United Nations Framework Convention on Climate Change.

It was agreed on 11 December 1997 at the 3rd Conference of the Parties to the treaty when they met in Kyoto, and entered into force on 16 February 2005. As of November 2007, 178 parties have ratified the protocol.

Of these, 36 developed countries (plus the EU as a party in its own right) are required to reduce greenhouse gas emissions to the levels specified for each of them in the treaty with three more countries intending to participate.

One hundred and thirty-seven developing countries have ratified the protocol, including Brazil, China and India, but have no obligation beyond monitoring and reporting emissions. The United States has not ratified the treaty.

Among various experts, scientists, and critics, there is debate about the usefulness of the protocol, and there have been cost-benefit studies performed on its usefulness.

Functioning mechanism of the Kyoto Protocol

The major distinction between the Protocol and the Convention is that while the Convention **encouraged** industrialized countries to stabilize GHG emissions, the Protocol **commits** them to do so.

The Protocol places a heavier burden on developed nations under the principle of “common but differentiated **responsibilities**”. The detailed rules for the implementation of the Protocol were adopted at COP 7 in Marrakesh in 2001, and are called the “Marrakesh Accords.” Under the Treaty, countries must meet their targets primarily through national measures. However, the Kyoto Protocol offers them an additional means of meeting their targets by way of three market-based mechanisms.

The Kyoto **mechanisms** are:

- Emissions trading – known as “the carbon market” - the clean development mechanism (CDM) and joint implementation (JI).

- Stimulate sustainable development through technology transfer and investment

- Help countries with Kyoto commitments to meet their targets by reducing emissions or removing carbon from the atmosphere in other countries in a cost-effective way

- Encourage the private sector and developing countries to contribute to emission reduction efforts

To participate in the mechanisms, Annex I Parties must meet, among others, the following eligibility **requirements**:

- They must have ratified the Kyoto Protocol.

- They must have calculated their assigned amount in terms of tons of CO₂-equivalent emissions.

- They must have in place a national system for estimating emissions and removals of greenhouse gases within their territory.

- They must have in place a national registry to record and track the creation and movement of ERUs, CERs, AAUs and RMUs and must annually report such information to the secretariat.

- They must annually report information on emissions and removals to the secretariat.

The mechanisms help stimulate green investment and help Parties meet their emission targets in a cost-effective way. The UN Climate Change Secretariat, based in Bonn, Germany, keeps an international transaction log to verify that transactions are consistent with the rules of the Protocol. Reporting is done by Parties by way of submitting annual emission inventories and national reports under the Protocol at regular intervals. A compliance system ensures that Parties are meeting their commitments and helps them to meet their commitments if they have problems doing so.

The Kyoto Protocol, like the Convention, is also designed to **assist** countries in adapting to the adverse effects of climate change. It facilitates the development and deployment of techniques that can help increase resilience to the impacts of climate change. The Adaptation Fund was established to finance adaptation projects and programmes in developing countries that are Parties to the Kyoto Protocol. The Fund is financed mainly with a share of proceeds from CDM project activities.

The Conference of the Parties (COP) serves as the meeting of the Parties to the Kyoto Protocol. This is referred to as the **Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP)**. The CMP meets annually during the same period as the COP. Parties to the Convention that are not Parties to the Protocol are able to participate in the CMP as observers, but without the right to take decisions. The functions of the CMP relating to the Protocol are similar to those carried out by the COP for the Convention. The first meeting of the Parties to the Kyoto Protocol was held in Montreal, Canada in December 2005, in conjunction with the eleventh session of the Conference of the Parties (COP 11). Decisions were adopted that outline the path to future international action on climate change. The Parties to the Kyoto Protocol also formally adopted the “rulebook” of the 1997 Kyoto Protocol, the so-called ‘Marrakesh accords’, which sets the framework for implementation of the Protocol.

The **Subsidiary Body for Scientific and Technological Advice (SBSTA)** and the **Subsidiary Body for Implementation (SBI)** These two permanent subsidiary bodies established under the Convention also serve the CMP.

The **Bureau** The Bureau of the COP also serves the CMP. However, any member of the COP Bureau representing a non-Party to the Kyoto Protocol has to be replaced by a member representing a Kyoto Protocol Party.

Clean Development Mechanism (CDM) Executive Board The CDM Executive Board supervises the CDM under the Kyoto Protocol and prepares

decisions for the CMP. It undertakes a variety of tasks relating to the day-to-day operation of the CDM, including the accreditation of operational entities.

Joint Implementation Supervisory Committee The Joint Implementation Supervisory Committee (JISC), under the authority and guidance of the CMP, inter alia, supervises the verification of emission reduction units (ERUs) generated by JI projects following the verification procedure under the JISC.

Compliance Committee The compliance regime consists of a Compliance Committee made up of two branches: a Facilitative Branch and an Enforcement Branch.

Post-Kyoto Protocol negotiations on greenhouse gas emissions

In the non-binding 'Washington Declaration' agreed on February 16, 2007, Heads of governments from Canada, France, Germany, Italy, Japan, Russia, United Kingdom, the United States, Brazil, China, India, Mexico and South Africa agreed in principle on the outline of a successor to the Kyoto Protocol. They envisaged a global cap-and-trade system that would apply to both industrialized nations and developing countries, and hoped that this would be in place by 2009.

On June 7, 2007, leaders at the 33rd G8 summit agreed that the G8 nations would aim to at least halve global CO2 emissions by 2050. The details enabling this to be achieved would be negotiated by environment ministers within the United Nations Framework Convention on Climate Change in a process that would also include the major emerging economies.

A round of climate change talks under the auspices of the United Nations Framework Convention on Climate Change (UNFCCC) (Vienna Climate Change Talks 2007) concluded in 31 August 2007 with agreement on key elements for an effective international response to climate change.

A key feature of the talks was a United Nations report that showed how energy efficiency could yield significant cuts in emissions at low cost.

Position of the European Union on Kyoto Protocol

The EU has been one of the major supporters of the Kyoto Protocol. On May 31, 2002, the fifteen then-members of the European Union deposited the relevant ratification paperwork at the UN. Nowadays, after the enlargements of 2004 and 2007 both the EU (as the European Community) and its member states are signatories to the Kyoto treaty.

The EU produces around 22% of global greenhouse gas emissions, and has agreed to a cut, on average, by 8% from 1990 emission levels. On 10 January

2007, the European Commission announced plans for a European Union energy policy that included a unilateral 20% reduction in GHG emissions by 2020.

In December 2002, the EU created an emissions trading system in an effort to meet these tough targets. Quotas were introduced in six key industries: energy, steel, cement, glass, brick making, and paper/cardboard.

There are also fines for member nations that fail to meet their obligations, starting at €40/ton of carbon dioxide in 2005, and rising to €100/ton in 2008. Current EU projections suggest that by 2008 the EU will be at 4.7% below 1990 levels.

Transport CO₂ emissions in the EU grew by 32% between 1990 and 2004. The share of transport in CO₂ emissions was 21% in 1990, but by 2004 this had grown to 28%.

The position of the EU is not without controversy in Protocol negotiations, however. One criticism is that, rather than reducing 8%, all the EU member countries should cut 15% as the EU insisted a uniform target of 15% for other developed countries during the negotiation while allowing itself to share a big reduction in the former East Germany to meet the 15% goal for the entire EU. Also, emission levels of former Warsaw Pact countries who now are members of the EU have already been reduced as a result of their economic restructuring. This may mean that the region's 1990 baseline level is inflated compared to that of other developed countries, thus giving European economies a potential competitive advantage over the U.S.

Greece, however was excluded from the Kyoto Protocol on Earth Day (April 22, 2008) due to unfulfilled commitment of creating the adequate mechanisms of monitoring and reporting emissions, which is the minimum obligation, and delivering false reports by having no other data to report.

Position of Japan on Kyoto Protocol

Japan has played a very important role in the Kyoto Process. Japan's decision to host the 1997 Kyoto Conference was an international sign of its commitment to the international effort. In Japan there was very strong public support for the Kyoto Protocol and an international image that needed to be upheld.

In the initial stages Japan's negotiating position was rather complex and more difficult to understand. When compared to other industrialized nations, Japan's per-capita domestic emissions are relatively low, as is its carbon intensity level (emissions per unit of GDP). Also, the status of the Japanese economy and Japan's traditional strong relations with the United States had a role. But it should be said that the structure of the Kyoto Protocol itself must also have played a part. Since Kyoto's reduction targets are based on proportional reductions from 1990 baselines, Japan's relatively more-efficient economy makes its reduction target somewhat tougher to achieve.

Japanese politicians have made a fair number of public statements about the importance of the Kyoto protocol, but they also played a negative role at COP6bis and COP 7, and did a great deal to weaken the final treaty rules by the insistence on deferring a decision on legally binding enforcement

Anyway, in the end, Japan chose to join the EU in pushing for Kyoto Protocol ratification (after winning many concessions from the Europeans on the use of flexible mechanisms in the agreement). Now Japan is in a similar position as discussions begin regarding a post-Kyoto international framework.

The target established by the Kyoto Protocol for reducing by 6 % the emissions is a tough target for Japan that has already achieved a high level of energy efficiency. GHG emissions have increased by 8% in 2004 from 1990 level, which even sum up to 14 % gap between the current emission level and the target.

A debate over environmental tax is stalled within a government-wide tax reform context, and the government is now preparing for introducing an emissions trading scheme. Although current policies in achieving the target are seemingly coordinated at a first glance, two divided views have been persisting ever since the US rejection of the Kyoto Protocol when it comes to perceptions on the future direction of climate regime. Those who concerned about economic competitiveness prefer less rigid target, whereas those who concerned about the environment and about the impact of climate change prefer continuing and enhancing the Kyoto. No consensus has yet emerged between the two blocks, and Japan has so far followed international initiatives on both sides, which are in effect complementary rather than conflicting.

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