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ENVIRONMENTAL ISSUES AND SUSTAINABLE DEVELOPMENT IN OIC COUNTRIES

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The relationship between sustainable development and environmental protection is at the core of a relatively new debate that considers the latter an indispensable component of the former. Needless to say, such a relationship constitutes a challenge for both the developing and developed worlds. Since the level of environmental degradation may vary depending on countries' income levels, environmental protection represents today a key subject of investigation worldwide. Attaining satisfactory environment conditions while, at the same time, attempting to reach a sustainable level of development have become a prime objective of all international institutions, including the OIC which incorporated it into its Plan of Action as one of the aspirations of the peoples of its member countries. The paper looks into the issue of environmental degradation in those countries.

1. INTRODUCTION

The issue of environment is a relatively recent one in the literature on sustainable development. The debate on and the discussion of the relationship between different environmental aspects and the process of sustainable development started in the late 1980s and early 1990s. This new concept in the literature of development economics has also been emphasised by the efforts of the United Nations (UN) in this direction, particularly in 1991 when the UN Statistics Division introduced the new version of the UN System of National Accounts (SNA 1991), in place of the old version, however, of 1986. The most important development in this new version was the integration of environmental accounts into the national accounts. This has been followed in 1992 by the UN Conference on Environment and Development (Rio Conference) with the main theme of sustainable development and environmental aspects.

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Economic growth, per se, contributes to higher levels of economic well-being. However, it also leads to the degradation of environmental and natural resources if it leaves out the appropriate environmental strategies. Sustainable development on the other hand requires growth plus the right environmental strategies along with other aspects such as long-term planning, cost-effectiveness, pricing and policy integration. It has been a matter of concern for many developing countries including the member countries of the Organisation of the Islamic Conference (OIC). Environmental protection constitutes an integral part of the development process and is essential for achieving sustainable development. Environment is a wide subject which encompasses many indicators. Some of these (e.g. access to clean water and sanitation) point to deterioration in the environmental conditions of low-income countries and especially least-developed countries (LDCs), whereas some others (e.g. carbondioxide emissions) point to deterioration in the environmental conditions of high-income and/or industrialised countries. Therefore, environmental issues are not applicable only to a single group of countries with a certain income level. On the contrary, different environmental problems may arise for countries with different levels of income and/or development. Therefore, we can say that environmental degradation is the problem of both the rich and the poor. Securing sustainable development while considering the environmental aspects is a challenge faced not only by the developing countries but also by the developed and industrialised ones and is now even a challenge for the whole international community.

The eventual target of sustainable development is to attain a healthy and productive life in harmony with nature. From the low-income and least-developed countries' point of view, poverty is a negative factor that hampers efforts to reach this target. Since poverty reduction is an indispensable requirement for sustainable development, it goes hand in hand with the environmental aspects of development. In an integrated world, disease, environmental degradation and poverty are not the problem of particular countries and regions but also of the world. It is worth noting that countries, and especially the LDCs, which struggle with poverty as a major issue are also the ones environmentally most vulnerable as far as *some* of the indicators are concerned. For example, failure to establish clean water and sanitation facilities can lead to the spread of infectious diseases. Sub-Saharan Africa is the region where the

share of people who do not have access to safe water and sanitation facilities is the highest in the world. It is also the most poverty-stricken region in the world with the highest level of worldwide disease outbreak (Konac 2003).

Similarly, unsustainable patterns of production and consumption in developing countries prevent their governments from providing their peoples with a higher quality of life. Although trade and capital flows that integrate the world economy bring benefits to millions, poverty remains a global problem of huge populations. In many low-income OIC countries, as in other low-income countries for that matter, hunger and malnutrition, unsafe environments, ill health, increased morbidity and mortality from illness, limited or lack of access to education and health services destroy the income-earning capacity. Therefore, one can think that environmental degradation is very much related to poverty. However, as mentioned above, this is true only if some of the indicators are taken into account.

Since economic growth and sound environmental policies are both the components of sustainable development, it would be safe to say that the absence of one of them would hinder countries from reaching their ultimate ideal of a high level of well-being. For this reason, developing countries need complementary investments in environment while implementing their economic strategies. Additionally, global integration and technological advance must be harnessed to build a better environment in those countries.

Despite the fact that environment has been defined as one of the ten areas of cooperation in the OIC Plan of Action of 1994, the OIC cooperation activities in this important area are still very limited, and comprehensive studies on the subject are even missing. This paper attempts to investigate and assess the status and determinants of the environmental conditions in the OIC countries as well as the relationship between sustainable development in those countries and their progress along the environmental track. In so doing, the paper focuses on the linkages between income and the environment since the indicators of environmental degradation vary from one income level to the other. It first investigates the causes of environmental degradation in the OIC countries stemming from factors relating to population, land degradation and pollution. The following section focuses on the

environment-sustainable development relationship and explores its different aspects such as the importance of cleaner technologies, social capital, natural resource management and environmental impact assessment. The last section covers the appropriate policies to be adopted by the developing country governments, international organisations as well as the industrialised countries and makes recommendations in this respect.

The analysis is carried out on the basis of the classification of the OIC countries according to their income levels: Low-Income OIC Countries (OIC-LICs), Middle-Income OIC Countries (OIC-MICs) and High-Income OIC Countries (OIC-HICs). The figures for the OIC income groups and the whole of the OIC are compared with those of the world's income groups as well as those of the industrialised, developing and developed countries, LDCs and the world, wherever the data are available. When the figures for the world's income groups and the other groups mentioned above are not available, the data for the different OIC income groups are compared only with each other. The tables within the text display the data for the above-mentioned groups, but the detailed tables which display the data for all the OIC countries are annexed to the paper. The OIC group averages in tables within the text have been derived from the annexed tables, which will be referred to when necessary.

2. CAUSES OF ENVIRONMENTAL DEGRADATION

The accelerated growth of economic activities worldwide and the increase in global population have resulted in environmental degradation in almost all countries. Ozone depletion, loss of biodiversity, depletion of natural resources and desertification have all played a role in environmental unsustainability. There are several factors leading to environmental degradation which are often related to either one or more of the three main concepts, namely population, land degradation and pollution. Therefore, factors leading to environmental degradation can be classified under these three headings and represented by data for certain years or periods. Biodiversity, however, is not a subject of this paper and is left out as it does not have a direct interrelation with the development level of countries. There lie some factors under each of the above-mentioned headings. The following sub-sections deal with these factors and seek

to explain their roles in environmental degradation in the OIC countries.

2.1. Factors Relating to Population

In fact, the linkage between population and environment also drags into the picture another factor, i.e. poverty. However, we will not touch upon the poverty side of the relationship since the purpose of this section is to explain rapid population growth as a determinant of environmental degradation.

2.1.1. Rapid Population Growth

Rapid population growth affects environment through:

- Increasing pressure on marginal lands, over-exploitation of soils, overgrazing and overcutting of wood,
- Soil erosion, silting and flooding,
- Increased use of pesticides, fertilisers, water for irrigation, increased salination and pollution of fisheries, and
- Migration to overcrowded slums, problems of water supply and sanitation, industrial waste dangers, indoor air pollution and mud slides (Marcoux, 1999).

The above relationship suggests that efforts to slow down population growth would lead to an improvement in environmental protection. While sustained economic growth leads to the eradication of poverty and contributes to the slowing of population growth, thus achieving early population stabilisation, in poverty-stricken countries, the following vicious circle arises: Rapid population growth becomes an obstacle to sustained economic growth which in turn leads to an increase in the level of poverty and finally creates an even further escalation of the population growth rate. Although this vicious circle exists, there is also a belief that undertaking classical sectoral policies could break it. The policies to be adopted in this respect are as follows:

- Identification of the country's or region's priority environmental issues by quantitatively assessing and comparing the impacts of the

various issues on human populations. The criteria should not only be economic but also include for instance labour use and health indicators, with a gender dimension. The size of populations affected would be an important consideration in assessing priorities.

- Addressing the processes that underlie specific demographic, poverty and environmental outcomes. For example, abating high rural fertility entails an understanding of the economic and social functions of large family sizes in rural societies. It also entails synergetic economic and social policies that modify those functions. Likewise, improving environmental outcomes requires addressing the various actors in those outcomes and their rationales.
- Implementation of across-the-board policies and disaggregated scales of analysis for location-specific environmental problems, which are known to vary among different socio-economic and cultural groupings.
- Establishment of policies upon an understanding of the rationality of the households, the latter being the right locus to seek policy measures that facilitate population-poverty-environment adaptations.
- Implementation of productivity-raising measures, such as making progress in increasing the productivity of women's labour, in areas with minimum risk of resource degradation.
- Study and assessment of other environmental and economic policies and possible consequences of specific courses of action such as the identification of populations at risk given the trends in resources exploitation (including risks of population displacement) or the identification of potential migration flows linked to the development of new areas (Marcoux, 1999).

The last column of Table 1 shows that although there is not much difference between the OIC-LIC and LIC groups in terms of their annual population growth rates for the period 1980-2002, the data for the OIC-MIC group are higher that those for the MIC group and the gap is widest between the OIC-HIC and HIC groups. The developed countries, followed by the industrialised countries and HICs, have the lowest annual population growth rates in the same period, whereas the highest rate is observed in the OIC-HIC group. Also, the entire OIC average (2.3%) is higher than the world average (1.5%). "However, the OIC

projection for the 2000-2015 period indicates a decrease to 1.9% in the average annual population growth rate. This decrease can be foreseen in the 2000-2015 projections for all three OIC sub-groups, albeit to a lesser extent in the OIC-LIC group as opposed to the other two groups" (Konac 2003, p.6).

Table 1: Population Statistics

	Urban Population (% of total)		Average Annual Population Growth Rate (%)
	1980	2002	1980-2002
OIC-LIC[1]	**22.9**	**36.2**	**2.3**
OIC-MIC[1]	**48.2**	**61.2**	**2.3**
OIC-HIC[1]	**81.3**	**90.6**	**3.9**
OIC[1]	**30.9**	**44**	**2.3**
LIC	22	31	2.1
MIC	39	53	1.3
HIC	73	78	0.7
SSA[2]	21	33	2.7
LDC[3,4]	17.3	26.6	2.6
Developing[4]	28.8	41.2	1.9
Industrialised[4]	74.5	78.2	0.7
Developed[4]	69.8	73.5	0.6
World	39	48	1.5

Source: Table A.1 in the Annex.

[1] Averages for the OIC sub-groups and the whole OIC have been calculated by weighting the figures with the total population.

[2] Sub-Saharan Africa.

[3] Least Developed Countries.

[4] FAOSTAT Database.

2.1.2. Rapid Urbanisation

People who live in rural areas tend to migrate to urban areas due, inter alia, to the rural poverty they live in. As a result of this migration, urbanisation may become out of control with too many people pouring into the cities and the demand for urban utilities skyrocketing. In most developing countries, however, the local authorities cannot meet this rapidly increasing requirement.

Rapid urbanisation impacts the health situation of populations in the developing countries through the following channels:

- Spread of infectious diseases: Rapid urbanisation in developing countries is one of the factors that increase the potential for the spread of infectious diseases. Diseases once thought to be under control, like cholera, may again become major health problems in the cities.
- Public health infrastructure: Health systems in the urban areas which are already inadequate to handle ongoing surveillance of known infectious diseases will find it increasingly difficult to deal with emerging threats, from identification to prevention and control.
- Demands on the food and water supply: Many places in the world are without safe and running water and suffer from malnutrition. As urbanisation accelerates, more fertile lands are taken for housing, thereby potentially increasing food shortage. These deficiencies lead to approximately 3.2 million deaths annually.

Environmental problems affecting the health conditions of the urban poor stem from inadequate water supply and sanitation services, overcrowding, housing and traffic problems which in turn would lead to infectious diseases, pollution, accidents and the consumption of junk food. However, the largest effect is made by pollution, especially in the newly-industrialising countries where a series of environment problems such as high rates of air and water pollution and decisive damages to ecosystems may be caused in urban and suburban areas as a result of industrial production expansion.

According to Table 1, the urbanisation rate is increasing globally as well as for the world and OIC sub-groups. Urbanisation rates in 1980 and 2002 are higher in the OIC-HIC group than in the OIC-MIC group which ranks higher than the OIC-LIC group. A similar sequencing also applies in both years to the HIC, MIC and LIC groups respectively. Furthermore, the data suggest that all three OIC sub-groups have higher urbanisation rates than their world counterparts, with the exception of the OIC-LIC in 1980. Despite the fact that those rates are higher in the OIC sub-groups than in their world counterparts, the situation is just the opposite when we look at

the data for the entire OIC and the world. Interestingly, world figures are higher in both years (39% and 48%) than the OIC figures (30.9% and 44%). The fact that the shares of urban population in both years are quite high in the industrialised countries (74.5% and 78.2%) and high-income countries (73% and 78%) may suggest that urbanisation rate is commensurate with industrialisation and/or high income. The highest urbanisation rates (81.3% in 1980 and 90.6% in 2002) are observed in the OIC-HICs. This is mainly due to the fact that these countries are oil-exporting and their land areas outside the cities are, to a large extent, made up of deserts.

Therefore, we may go on to say that since rapid urbanisation mainly takes place in industrialised or newly-industrialising countries, the chances are high that it could also be observed in countries with major environmental problems. In line with this suggestion, we may conclude that a large share of the environmental problems experienced in the cities in HICs could be attributed to causes that stem from rapid urbanisation. The share of the latter as a cause of environmental problems decreases as we move down the income scale.

Table 2: Agricultural Land

	Agricultural Area (Mln. hectares)		**Arable Land (Mln. hectares)**	
	1980	**2002**	**1980**	**2002**
OIC-LIC	**608.8**	**706.1**	**131.2**	**161**
OIC-MIC	**323**	**659**	**75.4**	**105.7**
OIC-HIC	**0.4**	**0.8**	**0.02**	**0.1**
OIC	**932.3**	**1366**	**206.6**	**266.8**
LIC	1273.8	1423.8	379.4[1]	405.3[1]
MIC	n.a.	n.a.	547.1[1]	640.6[1]
HIC	n.a.	n.a.	375.1[1]	359.6[1]
SSA	883.1	912.4	124.3	146.6
LDC	729.3	753.2	112.3	129.5
Developing[2]	2847.2	3185.9	691.5	792.5
Industrialised[2]	1261.7	1202.2	378.8	366.5
Developed[2]	1884	1833.8	651.3	611.5
World[2]	4731.2	5019.6	1342.8	1404.1

Source: Table A.2 in the Annex.
[1] Derived from data in the World Development Indicators, 2004.
[2] FAOSTAT Database.

Another negative effect of rapid urbanisation on the environment in many developing countries emerges from the conversion of agricultural land to urban uses. In consequence of this:

- Natural vegetation and agricultural areas are converted into urban areas,
- Natural corridors (animal habitats) are segmented,
- Urbanisation is much more energy-intensive and creates its own type of climate (no energy absorption, no vegetation, dense population, etc.), and
- Urban agriculture increases intensely (more meat production).

Table 2 shows the clear transformation of agricultural areas and arable land to non-agricultural assets in the countries where industrialisation is at its fastest pace. Both agricultural areas and arable land are decreasing in industrialised and developed countries whereas it is on the rise in all other groups and sub-groups, including the entire OIC and the world. This rise is slower in the OIC-HICs, however, as these countries already have very limited shares of their respective land areas slated for agricultural purposes due to their climatic conditions. The figures displayed in Table 2 would make more sense if they were taken into account together with the fact that industrialised countries have often been accused of playing the major role in global environmental degradation. Therefore, the Table is supportive of this land transformation process in those countries.

2.2. Factors Relating to Land Degradation

Land degradation, which is proceeding today at alarming rates, leads to a significant reduction in the productive capacity of land. Human activities contributing to land degradation include unsuitable agricultural land use, poor soil and water management practices, deforestation, removal of natural vegetation, frequent use of heavy machinery, overgrazing, improper crop rotation and poor irrigation practices. Natural disasters, including droughts, floods and landslides, also contribute to the degradation process.

Thirty-five percent of the Earth's land is already degraded and this damage is largely irreversible. Fifteen percent of the Earth's land area (an area larger than the United States and Mexico combined and equivalent to about 2 billion hectares of land) has been degraded through human activities. The main types of soil degradation are water erosion (56 percent), wind erosion (28 percent), chemical degradation (12 percent) and physical degradation (4 percent). The causes of soil degradation include overgrazing (35 percent), deforestation (30 percent), agricultural activities (27 percent), over-exploitation of vegetation (7 percent) and industrial activities (1 percent), (Nabhan, 2003).

Degradation of land has an economic impact and can therefore be expressed as a monetary value using the following approach:

- Production loss, as the reduced productivity of the soil as a consequence of degradation (expressed as a percentage of production from the undegraded soil).
- Replacement cost, as the cost of additional inputs (fertilizers) used by farmers in order to maintain desirable production levels on the degraded soils (Nabhan, 2003).

2.2.1. Deforestation

Forested areas are indicators of the pattern and intensity of land use in all countries. Demand for agricultural land, timber and other forest products significantly impacts the mode and rate of transformation of forested areas. Deforestation is the permanent destruction of indigenous forests and woodlands. At the current rate of deforestation, all moist tropical forests could be lost by the year 2050, except for isolated areas in the Amazon, the Zaire basin as well as a few protected areas within reserves and parks. Some countries such as Costa Rica, Ivory Coast, Nigeria and Sri Lanka are likely to lose all their tropical forests by the year 2010 if no conservation steps are taken.

One of the most important factors of deforestation-induced land degradation in the developing countries is the land tenure systems that

facilitate property-right acquisition in idle lands. Agricultural expansion caused by population growth, timber trade and cattle raising can be listed as other factors which negatively affect the forested land.

Forests have a crucial role in maintaining the Earth's geochemical balance. Therefore, the rate of deforestation has been a great concern as it creates a detrimental impact on the climate. The literature that links forest masses and the climate addresses a number of channels on how deforestation affects the climate. Several papers that analyse specifically the issue of deforestation came up with different conclusions on this mechanism. According to Myers, forests are factories of moisture-bearing air masses and, therefore, responsible for local and regional moisture condensation (Myers, 1988). Other studies indicate that forest biomes are potential carbon dioxide (CO_2) sinks that could help dampen greenhouse effects. To summarise, deforestation leads to: CO_2 release amounting to one-third of all CO_2 releases caused by people; a drier climate as a result of the suspension of the water cycle; soil erosion yielded by the loss of the protective cover of vegetation; silting of water courses owing to soil erosion; and extinction of species which depend on forests for survival.

At the Rio Conference, a non-binding Statement of Forest Principles was signed by which parties pledge a more sustainable use of forest resources. The Statement recommends sustaining the multiple roles and functions of all types of forests, forest lands and woodlands; enhancing the protection, sustainable management and conservation of all forests, and the greening of degraded areas through forest rehabilitation, afforestation, reforestation and other rehabilitative means; and promoting efficient utilisation and assessment to recover the full valuation of the goods and services provided by forests, forest lands and woodlands.

Initiatives that could be adopted to stop deforestation include a variety of policies based on an integrated approach that links forestry to other policies, such as improved legislation, action plans including reforestation plans and extensive research. The United Nations Food and Agriculture Organisation (FAO) proposes, in its Tropical Forestry

Action Plan, recommendations and a budget plan for a comprehensive forest management programme on a global scale (CIESIN Web Site).

Table 3: Forests

	Forest Area (% of total land)	Average Annual Deforestation (%)
	2000	1990-2000
OIC-LIC[1]	**19.7**	**1.3**
OIC-MIC[1]	**7.5**	**-0.9**
OIC-HIC[1]	**6.3**	**-2.8**
OIC[1]	**13.7**	**0.2**
LIC	27.1	0.8
MIC	32.7	0.1
HIC	26.1	-0.1
SSA	27.3	0.8
EMU[2]	37.0	-0.3
World	29.7	0.2

Source: Table A.3 in the Annex.

[1] Averages for the OIC sub-groups and the whole OIC have been calculated by weighting the figures with the total land area.

[2] European Monetary Union.

[3] Negative figures in the second column indicate reforestation, thus the creation of new forests.

Table 3 displays the forest areas as a percentage of total land area and the average annual deforestation rates of different world and OIC sub-groups. Negative figures in the second column indicate reforestation, thus the creation of new forests. Although the forest area of a country is very much related to the latter's geographical location, forestation policies still play an important role in preventing the losses of existing forests and the creation of new ones. The group which has the least number of forests is the OIC-HICs (6.3% of total land area) due to their warm climates and large desert areas. However, it is worth noting that the OIC-HICs, with their highest reforestation rate of 2.8% (or -2.8% of deforestation rate) are the ones that tried hardest to create new forests. The largest forest area is in the European Monetary Union (EMU) countries (37%) which also implement sound forestation policies (-0.3 deforestation rate) to keep their forests and create new ones. The OIC-MICs also have a reforestation rate of 0.9. On the other

hand, the highest deforestation rate belongs to the OIC-LICs (1.3%). The deforestation rate for the entire OIC (0.2%) is equal to that of the world.

2.2.2. Excessive Fertiliser Use

Although the soil pollution problems are not only of a chemical nature but are also associated with human-induced acidification, salinisation (excess of salts at toxic levels to plants), loss of organic matter, decrease in soil biological diversity and physical degradation including erosion by water and wind, the excessive use of fertilisers and pesticides also have an enormous effect in this respect. This effect may originate from the use of hazardous substances containing toxic trace elements and heavy metals (Stanners and Bourdeau 1995).

Three major nutrients – nitrogen, phosphorous and potash – are used as synthetic chemical fertilisers in industrial agriculture. According to the OECD, the application of these fertilisers reflects the specialisation and intensification of cropping practices. These chemical fertilisers pose a threat to human health and the environment, particularly with respect to water quality. Nitrates from fertilisers can accumulate in ground water and reduce the ability of human blood to carry oxygen.

In fact, the use of fertilisers is an important tool in producing food for the still growing world population, especially in countries where food production is a major problem. Fertilisers are not inherently dangerous but need to be used with care and knowledge. When misused or overused, fertilisers can induce soil fertility degradation and lead to adverse environmental impacts on water, soil, and the atmosphere and eventually affect human health. Nutrient losses from the soil to the surface and ground occur even when fertilisers are not used and these losses are even slightly (but unavoidably) increased by correct fertiliser use. However, they are increased substantially by excessive or unbalanced use.

Fertiliser nutrients applied to the soil are not entirely taken up by crops. Some nutrients remain in the soil, gradually building up a reserve of fertility for the benefit of future harvests. Some nutrients will run off the land as a result of erosion and heavy rainfall, while others are lost to

the atmosphere through denitrification and volatilisation. Some nutrients are leached through the soil into ground waters.

On some occasions, however, fertiliser application can weaken the biological composition of the soil, thereby inhibiting the biological processes that naturally add fertility. Therefore, it can lead to an environment unable to sustain plant growth without adding another batch of the input. For the proper growth of plants, nutrients added should be adequately measured so that they are neither too much nor too low.

Where there is a nutrient imbalance, this also affects soil fertility. Firstly, too much nutrients may kill some micro-organisms that enhance the aeration of the soil. Secondly, too little nutrients may lead to a reduction in soil fertility. In both cases, it may also lead to the stunted growth of plants and crop failure.

Another issue that would have negative effects on the soil is the accumulation of heavy metals. The present levels of metals in the soil are not alarming in most developing countries, though they are in some developed ones. The existence of heavy metals in mineral fertilisers and the amounts of heavy metals added to the soil annually should be constantly monitored to exclude hazards. Some crops are particularly sensitive to soil contamination by heavy metals and, therefore, crop rotation must be maintained. Other crops do not absorb these elements and can be fertilised with mineral micronutrients without danger.

Farmers must have the necessary knowledge and know-how to use fertilisers efficiently in particular circumstances, in an integrated manner and as appropriate to each specific ecological, social and economic situation. In contrast to the limited success achieved in past years by traditional extension methods, where farmers were considered as passive recipients of externally derived research and extension, the Farmer Field School (FFS) is based on an innovative, participatory and learning-by-discovery approach. The FFS approach was developed by an FAO Project in South-East Asia and subsequently extended to several countries in Africa and Latin America.

Over the last 15 years, FAO has been actively supporting the development of an Integrated Plant Nutrition System (IPNS), an

approach through which the management of plant nutrition and soil fertility in cropping and farming systems is adapted to site characteristics and locally available resources. An important factor for the conservation of natural resources and environmental preservation is the maintenance and enhancement of soil fertility through the appropriate application of plant nutrients.

Table 4: Fertiliser Consumption

	Total Fertiliser Consumption (Thousand metric tons)	
	1979-1981	**2000-2002**
OIC-LIC	**3084.6**	**8457.4**
OIC-MIC	**3973.8**	**7818.6**
OIC-HIC	**5.0**	**36.7**
OIC	**7063.4**	**16312.7**
LIC[1]	10305.0	29001.1
MIC[1]	34472.8	66962.2
HIC[1]	48898.7	42823.3
Developed[1]	77571.4	50401.5
Developing[1]	37208322	87926.3
Industrialised[1]	49143.0	42783.9
LDC[1]	990.5	2280.7
World[1]	114779.7	138327.8

Source: Table A.4 in the Annex.
[1] FAOSTAT Database.

Table 4 shows that fertiliser use has decreased in the HICs as well as in the developed and industrialised countries from its level in the 1979-81 period to its level in the 2000-2002 period. However, fertiliser use has increased in all other groups including the world. Interestingly, the decrease in the consumption of fertilisers in the HICs is not valid for the OIC-HICs. Given the fact that there are only five countries in the OIC-HIC group and that the arable land area in those countries is very limited, the increase in fertiliser consumption in this group (from 5 ‘000 mt to 36.7 ‘000 mt) seems to be the sharpest (more than 7 times) among all others. This may mainly stem from efforts by those countries to carry out high-quality agriculture in a very limited arable land area.

2.3. Factors Relating to Pollution

Air and water pollution are among the most serious environmental problems that the Earth has to face. Global warming, a result of air pollution, is being increasingly accepted of life as a fact. Throughout history, as the populations of countries grew and moved from rural areas to the cities and industrial zones, the amount of land and people exposed to increased dirty air emissions from smokestacks expanded exponentially. The primary air pollutants found in most urban areas are carbon dioxide, carbon monoxide, nitrogen oxides, sulfur oxides, hydrocarbons and particulate matter (both solid and liquid). These pollutants are dispersed throughout the world's atmosphere in concentrations high enough to gradually cause serious health problems.

The two main sources of pollutants in urban areas are transportation (predominantly automobiles) and fuel combustion in stationary sources, including residential, commercial and industrial heating and cooling and coal-burning power plants. Motor vehicles produce high levels of carbon monoxides (CO) and are a major source of hydrocarbons (HC) and nitrogen oxides (NO_x). The latter contribute most of the atmospheric contaminants and have a role in reducing stratospheric ozone. Fuel combustion in stationary sources is the dominant source of sulfur dioxide (SO_2) that, at sufficiently high concentrations, irritates the upper respiratory tract of human beings due to its potential effect of making breathing more difficult by causing the constriction of the finer air tubes of the lung. “Power plants and factories emit 90-95 percent of the sulfur dioxide and 57 percent of the nitrogen oxides in the United States. Almost 60 percent of the SO_2 emissions are released by tall smoke stakes, enabling the emissions to travel long distances” (Miller 1990, p.494).

As emissions of SO_2 and NO_x from stationary sources are transported over long distances by winds, they form secondary pollutants such as nitrogen dioxide, nitric acid vapour and droplets containing solutions of sulfuric acid, sulfate and nitrate salts. These chemicals descend to the Earth's surface in wet form as rain or snow and in dry form as gases, fog, dew or solid particles. This is known as acid deposition or acid rain (Health and Energy Web Site).

2.3.1. Carbon Dioxide (CO_2) Emissions

Carbon dioxide (CO_2) is one of the major pollutants of the atmosphere, deforestation and fossil fuels burning being its major sources. "Before 1860, when industrialisation started to show its effects on the environment, the concentrations of CO_2 in the air were assumed to be about 290 parts per million (ppm). From then till the present, this value has increased by about 35 ppm or 10 percent" (Breuer 1980, p.67). Burning oil releases about 50 percent more CO_2 than burning natural gas, and burning coal releases about twice as much. Industrial countries account for 65 percent of CO_2 emissions with the United States and Russia being responsible for 50 percent. CO_2 emissions worldwide are increasing by 4 percent a year (Miller 1990, p.450).

CO_2 partially prevents infrared radiation from going back from the Earth into space, thus creating the greenhouse effect which prevents the Earth from cooling drastically at nights. An increase in the level of CO_2 in the atmosphere yields an increase in the greenhouse effect and causes the warming of the Earth's surface. Currently, CO_2 is responsible for 57 percent of the global warming trend (Health and Energy Web Site).

Table 5: Air Pollution Indicators

	Carbon dioxide emissions (per capita – metric tons)		**Consumption of CFCs (ODP metric tons)**
	1980	**2000**	**2002**
OIC-LIC	**0.4**[1]	**0.7**[1]	**12790**
OIC-MIC	**2.7**[1]	**4.5**[1]	**15262**
OIC-HIC	**27.4**[1]	**26.2**[1]	**959**
OIC	**1.2**[1]	**2.0**[1]	**29011**
LIC	0.5	0.9	14561
MIC	2.3	3.4	57484
HIC	12.0	12.4	927
SSA	0.9	0.7	5126
EMU	7.5	8.0	N.A.
World	3.4	3.8	72972

Source: Table A.5 in the Annex.

[1] Averages for the OIC sub-groups and the whole OIC have been calculated by weighting the figures with the total population.

Table 5 warns against the fact that CO_2 emissions are increasing in all groups except the SSA and OIC-HIC countries. The quantity of CO_2 emissions is at its peak in the OIC-HICs (27.4 mt in 1980 and 26.2 mt in 2000) followed by the HICs (12 mt and 12.4 mt). The high level of per capita CO_2 emissions in the OIC-HICs stems from the oil-based industries and the low population in those countries. The increase in the level of CO_2 emissions from 1980 to 2000 is highest in the OIC-MICs among all groups. The entire OIC averages (1.2 and 2.0), however, are below the world averages (3.4 and 3.8). In order of quantity, HICs have the highest level of CO_2 emissions, followed by the MICs and then the LICs. The same sequencing is also valid for the OIC sub-groups.

2.3.2. Release of Chlorofluorocarbons (CFCs)

Chlorofluorocarbons (CFCs) are responsible for the decrease in the average concentration of ozone in the stratosphere and contribute to global warming. "Since 1978, the use of CFCs in aerosol cans has been banned in the United States, Canada and most Scandinavian countries. Aerosols are still the largest use, accounting for 25% of global CFC use" (Miller 1990, p.448). Spray cans, discarded or leaking refrigeration and air conditioning equipment and burning plastic foam products release CFCs into the atmosphere. Depending on their type, CFCs stay in the atmosphere from 22 to 111 years. They move up to the stratosphere gradually over several decades. Under high-energy ultraviolet (UV) radiation, they break down and release chlorine atoms, which speed up the breakdown of ozone (O_3) into oxygen gas (O_2) (Health and Energy Web Site).

It could be seen in Table 5 that the highest levels of CFCs are consumed in the world's MICs (57484 mt) and in the OIC-MICs (15262 mt) within the whole OIC. At the level of the OIC sub-groups, the OIC-MICs come first followed by the OIC-LICs and OIC-HICs. Since the figures for this indicator are in absolute terms, thus are not weighted averages, it is meaningless to compare the entire OIC figure (29011 mt) with the world figure (72972 mt). However, we can conclude that the OIC countries account for almost one third of the world consumption of CFCs.

2.3.3. Smog

Photochemical air pollution, which is commonly referred to as “smog”, is a contraction of the words smoke and fog. Smog has been caused throughout recorded history by water condensing on smoke particles, usually from burning coal. With the introduction of petroleum to replace coal, photochemical smog has become predominant in many cities, especially in those located in sunny, warm and dry climates with plenty of motor vehicles. The worst episodes of photochemical smog tend to occur in summer. Smog's unpleasant properties result from the irradiation by sunlight of hydrocarbons caused primarily by unburned gasoline emitted by automobiles and other combustion sources. But it also appears in tropical and subtropical regions where savanna grasses are periodically burned. The products of photochemical reactions include many dangerous matters such as various oxidants, ozone, organic particles and acids. Ozone causes eye irritation, impaired lung function, and damage to trees and crops (Health and Energy Web Site).

Another form of smog is called industrial smog. It is created by burning coal and heavy oil in power or industrial plants. Smog consists mostly of a mixture of sulphur dioxide and fog. Suspended droplets of sulphuric acid are formed from some of the sulphur dioxide and a variety of suspended solid particles. Large-scale problems were witnessed when large amounts of coal and heavy oil were burned without control of the output in some industrial cities. In 1952, 4,000 people died in London as a result of industrial smog. Today, coal and heavy oil are burned only in large boilers and under reasonably good control so that industrial smog is less of a problem. However, some countries such as China and some eastern European countries still burn large quantities of coal without using adequate controls (Health and Energy Web Site).

Burning coal and oil does not just cause the formation of smog. As explained earlier, burning oil releases about 50 percent more CO_2 than burning natural gas, and burning coal releases about twice as much. As can be seen in Table 6, preferences for electricity sources have shifted over the past two decades, though coal still dominates. This shift has been more profound in the LICs. As sources of electricity, coal has increased in these countries from 12.4 percent in 1980 to 49.2 percent in 2001 while oil has declined from 54.2 percent to 8.8 percent. Similarly,

in the OIC-LICs, while coal usage increased from 0.6 percent in 1980 to 13.7 percent in 2001, oil usage declined from 33.8 percent to 23.4 percent. The shift towards coal is also observed in the MICs and OIC-MICs. In all groups displayed in Table 6, including the world, the usage of oil as a source of electricity indicates declines, except for the OIC-HICs whose economies largely depend on oil. This decline may be partly explained by the boosts in the oil prices all over the world, especially in the LICs and LCDs which are more vulnerable to price shocks. In the OIC-HICs, oil usage went from 11.7 percent in 1980 up to 37.8 percent in 2001, the highest rate among all groups. It is worth remembering that the OIC-HICs have the highest level of CO_2 emissions as well as the fastest rate of increase in CO_2 emissions. Therefore, one can easily see the relation between oil usage and the release of CO_2 emissions in those countries.

Table 6: Use of Coal and Oil as Sources of Electricity

	Share of Electricity Generated by:			
	Coal (%)		**Oil (%)**	
	1980	**2001**	**1980**	**2001**
OIC-LIC[1]	**0.6**	**13.7**	**33.8**	**23.4**
OIC-MIC[1]	**24.5**	**34.3**	**49.7**	**29.9**
OIC-HIC[1]	**N.A.**	**N.A.**	**11.7**	**37.8**
OIC[1]	**13.9**	**24.6**	**43.1**	**28.7**
LIC	12.4	49.2	54.2	8.8
MIC	22.6	38.8	47.5	10.1
HIC	39.4	37.6	18.0	5.9
SSA	70.9	69.1	4.4	2.9
EMU	37.3	27.0	23.2	6.9
World	33.0	38.8	28.5	7.4

Source: Table A.6 in the Annex.

[1] Averages for the OIC sub-groups and the whole OIC have been calculated by weighting the figures with total electricity production.

The highest share of coal usage in electricity production today is in the sub-Saharan Africa (SSA) (69.1 percent) and the highest share of oil usage in the OIC-HICs (37.8 percent), followed by the OIC-MICs (29.9 percent) and the OIC-LICs (23.4 percent). As far as the entire OIC countries are concerned, the situation is in favour of oil (28.7 percent) as opposed to coal (24.6 percent). However, it is also worth noting that the share of coal in the whole OIC is increasing whereas that of oil is

decreasing. Apart from the other sources of electricity such as hydropower, gas and nuclear power, a reverse situation holds for the EMU countries in favour of coal (27 percent coal as opposed to 6.9 percent oil) and the world (38.8 percent coal as opposed to 7.4 percent oil).

2.3.4. Emissions of Organic Water Pollutants

The main cause of water pollution is the disposal of waste by dumping it, either intentionally or accidentally, into a river or lake. Even if the waste is carried away by the current, it will never disappear. It eventually reappears in a changed form, or is just diluted. Although fresh water bodies have the ability to break down some waste materials, the quantities discarded by today's society are too much to handle. Most often, waterways are polluted by municipal, agricultural and industrial wastes, including many toxic synthetic chemicals which cannot be broken down at all by natural processes. Some of these substances can cause serious damage even when generated in tiny amounts.

Some common pollutants and their sources are as follows:

- Sediment: Land surface erosion, pavement and vehicle wear, atmosphere, spillage/illegal discharge, organic matter (e.g. leaf litter, grass, droppings), run-off water from washing cars, weathering of buildings/structures.
- Nutrients: organic matter, fertilisers, sewer overflows/septic tank leaks, animal/bird droppings, detergents (car washing), atmosphere, spillage/illegal discharges.
- Oxygen demanding substances: decaying organic matter, atmosphere, sewer overflows/septic tank leaks, animal/bird droppings, spillage/illegal discharges.
- Ph (acidity): atmosphere, spillage/illegal discharges, decaying organic matter, erosion of roofing material.
- Micro-organisms: animal/bird droppings, sewer overflows/septic tank leaks, decaying organic matter.
- Toxic organic matter: pesticides, herbicides, spillage/illegal discharges, sewer overflows/septic tank leaks.

- Heavy metals: atmosphere, vehicle wear, sewer overflows/septic tank leaks, weathering of buildings/structures, spillage/illegal discharges.
- Oils and surfactants: asphalt pavements, spillage/illegal discharges, leaks from vehicles, car washing, organic matter.
- Increased water temperature: run-off from impervious surfaces, removal of riparian vegetation (Flood Water Damage Web Site).

Table 7: Water Pollution

	Emissions of Organic Water Pollutants (Kilograms per day)	
	1980	**2000**
OIC-LIC	481985	1330350
OIC-MIC	699074	919860
OIC-HIC	11445	11412*
OIC	1192504	2261622

Source: Table A.7 in the Annex.
*Kuwait only.

There is a lack of sufficient data for emissions of organic water pollutants (see Table A.7). Nevertheless, based on the data at hand, Table 7 shows that in 1980, the OIC-MICs had the highest level of emissions of organic water pollutants, followed by the OIC-LICs and then by OIC-HICs. This order has changed in 2000, with the OIC-LICs this time leading the way. Emissions of organic water pollutants have increased over the two decades in the OIC as a whole as well as the OIC-LICs and OIC-MICs sub-groups, the increase being extremely large in the former group. Although it would be meaningless to draw a conclusion regarding the OIC-HIC group due to lack of data, a small decrease is observed in the emissions of organic water pollutants in Kuwait, the only member of the group for which data for 2000 are available. The data for the world as well as other groups are also unavailable.

3. SUSTAINABLE DEVELOPMENT: THE ROLE OF ENVIRONMENTAL ELEMENTS

In various World Bank publications, sustainable development is generally referred to as a process of change in which the exploitation of

resources, direction of investment, orientation of technological development and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations. This view acknowledges the priority of development without compromising the conservation of ecological integrity. The Brundtland Commission's Report* of 1987 defines sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". From the ecologists' point of view, sustainable development implies a pattern of development based entirely on renewable resources and one which maintains the natural capital stock and the overall ecological system.

Among the questions that may arise in one's mind are "why is environment a component of sustainable development?" and "is it not possible to economically grow at the expense of degrading the environment?" There are different aspects of the relation between environment and economic activity which may also be explanatory in answering the above questions.

Resource allocation is an important aspect of the theory of economic growth as natural resources are in fact factors of production and at the same time economic assets that could be bought/sold, imported/exported on the world markets. Interruption in one of the natural resources, especially the non-renewable resources, would constitute setbacks in the economies of countries. Land degradation or climate change, for example, hampers agricultural activity, which in turn leads to a decrease in the agricultural output and income gained therefrom. In the LDCs, the consequences could be even broader as poverty and food shortage may erupt due to the cut in agricultural output. Rising poverty in these countries is a major consequence that increases the pressure on natural resources even further. Overuse of natural resources (e.g., water for irrigation, overfishing, forest land for agriculture, etc.) would drain countries of their potential income sources. Deforestation may have a severe impact on the economy by leading to a boost in the prices of fuelwood and construction materials.

* The Rio Conference convened as a follow-up to the report "Our Common Future" of the World Commission on Environment and Development, also known as the Brundtland Commission, which calls for strategies to strengthen efforts to promote sustainable and environmentally sound development.

Health problems that stem from environmental degradation result in the loss of labour and decrease in working hours, thus reductions in household income. Furthermore, treatment of the ill constitutes another cost item and may not be carried out efficiently in countries that lack sound social security schemes. As a result of water resource depletion associated with rapid population growth, water availability per person would decline and, when this is accompanied by water pollution, water-related diseases spread out. The detrimental effects of environmental degradation on humans mainly present themselves in the form of health problems. Environmental damage may already be responsible for 2-6 percent of the total disease burden in OECD and for 8-13 percent in non-OECD countries (OECD 2001, p.16). A better understanding of the disease burden imposed by environmental degradation on the well-being of societies could be crucial in drawing more effective environmental policies in the long term.

Cost of environmental protection is another factor that affects the economy. Taking the necessary steps to employ environment-friendly technologies imposes certain costs on the budgets of countries and has been a serious problem especially for the developing countries. Adopting recycling centres, for example, is a good step for both averting deforestation and increasing paper production, but has a certain cost to be borne. Cost-effective policies and the appropriate inclusion of environmental protection tools in their respective budgets are a challenge that the developing countries would have to face.

For these reasons, environmental protection, thus sound environmental policies along with economic growth, are key components of sustainable development. On the one hand, economic growth contributes to the implementation of sound environmental policies by paving the way for a higher income level and therefore providing the resources to address a range of environmental objectives. On the other hand, it may also lead to the degradation of environmental and natural resources in case they are inappropriately managed. Sustainable development aims to attain well-being. However, that cannot be achieved unless sufficient measures are taken to neutralise the detrimental effects of environmental degradation on humans.

Sustainable development requires the good management of all ecosystem services, in terms of both quantity and quality, in areas of

farmlands, forests, water bodies, etc. For this reason, international organisations introduced new treaties and conventions in order to address these challenges. However, the non-ratification of these treaties and conventions has often undermined the credibility of this process (see Table A.8 for the status of the ratification of environmental treaties by the OIC countries).

While dealing with the environment-sustainable development relationship, we have to stress some key elements which play important roles in reversing the detrimental effects of environmental degradation. Without the realisation of these elements, it would be very difficult for societies to achieve sustainable development.

3.1. Mitigation of Climate Change and the Role of Technology in Creating Environment-friendly Development

When we look into the environment-sustainable development relationship, climate change imposes itself as one of the most important environmental issues. The mitigation of or adaptation to climate change is crucial as the latter is widely considered to be one of the gravest threats to the sustainability of the Earth's environment, the well-being of its inhabitants and the strength of its economies. The Earth's climate is changing due to the build-up of greenhouse gases, such as carbon dioxide resulting from essential human activities including electricity generation, transportation, etc. Climate change negatively affects food production and distribution as well as water availability and causes the spread of diseases. To tackle this problem, the industrialised countries, whose per capita emission levels are very high, need to reduce their consumption of fossil fuels, improve agriculture practices and conserve forests and other ecosystems that absorb carbon from the atmosphere. On the other hand, developing countries, who are the most affected by climate change and whose per capita emissions are generally lower, are concerned with meeting the immediate energy needs of their peoples than reducing emission levels.

Under the Kyoto Protocol to the UN Framework Convention on Climate Change (UNFCCC) which was adopted at the third session of the Conference of the Parties (COP3) held in Kyoto, Japan, on 1-10 December 1997, it was agreed that the developed countries would take steps to reduce their emission levels by an average of 5 percent, and

the OECD countries by 20-30 percent. However, concrete and unilateral actions to this end by countries are still lagging and only a few developed countries are on track to meet the requirements set by the Convention and the Protocol. Limiting climate change requires the involvement of many different actors such as governments, international organisations, the private sector and even the public communities.

It is expected that the improvement of technology may, in the long run, have a positive impact on the environment through the creation of cleaner technologies. The application of old technologies involving enormous environmental risks has been a serious problem for many developing countries. This is mainly due to the fact that it is very difficult to predict all the consequences of the applications of technology and that nearly all technological applications carry with them a potential risk of misuse and/or negative impacts. When those negative impacts eventually make themselves felt, it is generally very difficult to abandon those technologies as their suspension may disrupt the production of some basic commodities or services that have become indispensable to the populace. For example, important advances have been realised in the ability to measure the effects of potentially hazardous materials on the environment. Yet, when it comes to the actual application of these findings, the necessary actions might sometimes be postponed due to the embodied costs.

Developing countries, including many OIC members, lack the most basic industries and infrastructures. Therefore, they are in urgent need of building up their basic infrastructure and industries. That is where the two following questions arise: Is it possible for the developing countries, while building up their industries and infrastructure, to adopt and apply environment-friendly technologies? If the answer is in the affirmative, who will have to bear the costs of such applications? As far as the second question is concerned, developing countries are being expected today to bear and/or share in the costs of eliminating the global environmental hazards and/or reversing their further proliferation, albeit those hazards are mainly the result of historical patterns of development in the industrialised countries in which the developing countries did not participate and from which they did not derive any benefits. In most cases, substantial transfers from developing country governments are required to carry out technology-based programmes.

To give a specific example, let us take a look at the new-generation power plants which produce lower emissions. Technologies based on non-exhaustible and renewable energy sources that would generate electricity with lower emissions are at their early stages of deployment and are expensive compared with conventional power plants. Their profitability will depend partly upon whether they, and the technologies they will have to compete with, are required to internalise the embodied environmental costs. Where internalisation policies are in place, the need for government support is less (OECD, 2001).

Another concern of the developing countries in this respect, in addition to their cost-related concerns, is that they would often look for a proof that the new environment-friendly technology has already been successfully employed by other countries. Moreover, they would want to observe an expansion in the market before the benefits to the society from employing a new technology are realised.

Nevertheless, many studies, especially in the densely populated countries, have shown that there is a strong correlation between environmental degradation and technological backwardness. Hence, technological advancement in the developing countries is a crucial prerequisite for protecting the environment.

3.2. Role of Social Capital

The OECD defines social capital as "networks, shared norms, values and understandings that facilitate cooperation within and among groups" (OECD 2001, p.18). In other words, social capital is the level of public awareness or improvement of knowledge base and information by setting up sufficient communications channels. The higher the level of social capital in a society, the higher its level of social cohesion and ability to effectively achieve collective goals. Countries with high levels of social capital possess the ability to take collective action against environmental degradation.

Most developing countries, however, lack the knowledge and information that would enable them to challenge the outcomes created by policies which lead to environmental degradation. Important gaps exist between different societies regarding the perception of the negative effects of human activities on ecosystems or a range of ecosystem

services or the health implications of various environmental hazards. Those countries lack adequate information on the environmental risks entailed during the establishment of industries and infrastructure. The difficulty in reaching comprehensive and concise information in those countries may be attributed mainly to the lack of social capital.

Even if sufficient information is readily available in certain areas that would serve as a basis for policies, action may still be inadequate. This yields *implementation gaps* which, according to the OECD, are caused by the following:

- Lack of cost-sharing: For common resources like biodiversity, climate, freshwater, marine life, etc., any one country has little incentive to take unilateral action as the costs would be borne by the country involved whereas the benefits will be shared by all.
- Concerns over household income and employment: If there is a belief that the policies implemented to protect the environment would, in the short term, distort the distribution of household income and lead to unemployment, delays may be observed in the implementation of those policies.
- Insufficient tools employed by individual governments: Governments are not always well-equipped to meet the long-term consequences of environmental challenges, or their economic, social and environmental objectives may not be sufficiently integrated.
- Lack of public participation: Lack of participation and support from the public, consumers, businesses and the civil society may contribute to the widening of implementation gaps (OECD, 2001).

3.3. Natural Resource Management

Natural Resource Management can be defined as the responsible and broad-based management of the land, water, forest and biological resources base needed to sustain agricultural productivity and avert the degradation of potential productivity. Natural resources, which encompass animals, plants, water, minerals and air, provide the raw materials necessary for economic activity and are all important for one or more aspects of sustainable development. At the same time, those resources are scarce. Therefore, a development strategy that ignores their depletion would not be a sustainable one. In other words, sound

natural resource management strategies are necessary for countries to secure their future needs.

There are two kinds of natural resources: Renewable (e.g. marine estuaries and rain forests) and non-renewable (e.g. minerals and oil). The environmental role of the non-renewable natural resources is insignificant prior to their extraction. However, once extraction begins, the environmental role of those resources comes forward as their extraction may disrupt surrounding ecosystems. Despite their possible negative effects on the environment, oil and minerals are important sources of capital not only due to the way they are used in many different industries but also to the millions of people employed in mining and extraction. "What matters more for sustainable development is not the absolute quantity of resources, but whether human ingenuity can keep combining different forms of capital in ways that enable both human and ecosystem needs to be met" (OECD, 2001).

Policy makers in many developing countries seek to address these problems by involving users through participatory management or co-management approaches. The governments of those countries transfer the responsibilities for and rights to forests, coastal areas, range lands or irrigation systems to organised groups. For the latter to manage resources successfully, a concerted effort must be made to build local collective action to make decisions, monitor use, and even invest in maintaining or developing the resource base. Success is not guaranteed (IFPRI Newsletter).

A comprehensive natural resource management programme would employ several tools such as the adoption of new legislations, improvement of the knowledge base, subsidisation of natural resources and their products, adequate supply of environmental services, improvement of resource efficiency, reduction of waste and cooperation between different governments as well as between governments and international institutions.

Another crucial point to emphasise is the unpriced natural resources or the absence of markets to reflect the actual value of natural resources. Environmental degradation imposes significant costs on the economy in the long term. This cost increases if the environmental problems are left

unresolved. However, in today's standard national accounts statistics, natural resources are not treated as productive tangible assets subject to depletion and degradation. Since the economic benefits gained from the services of the natural environment are not recognised, the economic damages resulting from environmental degradation are ignored in the accounts. Therefore, today's accounting system can be deemed inadequate for policy formulation.

The United Nations Statistics Division (UNSD) has come up in 1991 with a new method called the "United Nations System of National Accounts (SNA)" which integrates environmental accounts into the national accounts. The framework for SNA calls for an environmentally adjusted gross domestic product which is calculated by subtracting from conventional GDP all identifiable expenditures on environmental protection by households and governments, thus treating those accounts as intermediate costs rather than final expenditures. It constructs a measure of "sustainable GDP" by further subtracting the estimate of the quantitative depletion of non-renewable and renewable natural resources and the qualitative degradation of natural resources due to air, water and soil pollution. Under this definition, the stock of natural resources responds to market and technological changes as do the other assets on the national balance sheet. (ESCWA 1998).

3.4. Environmental Impact Assessment

As explained earlier, sustainable development and its interaction with environmental protection are not about making a choice between development and the environment but about understanding and incorporating cost-effective measures to restore, sustain and protect natural systems and maintain environmental quality at the very early stages of planning. This brings us to the subject of Environmental Impact Assessment (EIA) which is the information gathering and analytical process that helps ensure an environmentally sound development. The EIA process attempts to identify potential problems so that the economic feasibility and environmental impact of alternative approaches can be assessed while there is still time to make changes. Many countries today have their own EIA procedures as part of their land-use planning. EIA is now applied at all decision-making levels including plans and programmes with public involvement at key stages within the process.

As developed in many countries, EIA involves a number of procedures and stages. These include:

- Identification of projects requiring EIA, sometimes known as screening.
- Identification of the key issues to be addressed in an EIA, often called scoping.
- Impact assessment and evaluation.
- Impact mitigation and monitoring.
- Review of the completed EIS by competent authorities.
- Public participation.

All of these stages and procedures are important for the successful use of EIA. The mechanisms and institutional arrangements for their use, however, are not uniformly developed throughout the world. Rather, they have tended to follow procedures adopted within the general framework of planning and development control or other project approval procedures (Bradley, 1991).

Land planning is an important component of the EIA. Countries should have well-established land planning programmes for the EIA as a whole to work successfully. Unfortunately, land-use planning processes which integrate resource use and environmental considerations are not well-developed in most developing countries. The primary reason for this is that land-use planning tends to be seen as an “advisory” function only and not an integrated and important element in environmental management infrastructure. The result could be the unplanned exploitation of a resource base. In such situations, the ability to minimise environmental impacts using EIA alone would be limited.

The only way to overcome this problem is to assess the environmental impact of the entire plan. In this way, greater emphasis can be placed on alternatives and, in the case of transportation, other modes and the cumulative impact of different road proposals. Thus, one can develop scenarios for the environmental impact of a given plan and, in the end, choose the one with the least impact, that is whose resource use and wastes/pollution are minimum.

3.5. Price Mechanism

Over the last three decades, OECD countries managed simultaneously to achieve several economic and environmental policies. During the said period, the OECD region almost doubled its GNP and increased its trade threefold while at the same time protecting its natural resource base and reducing pollution. Fast economic growth in the OECD region has been achieved through the implementation of sound micro and macroeconomic policies, which points to another fact, namely environmental policies should also work through the price mechanism and natural resources should be priced at their social costs. In so doing, the OECD countries adopted some principles which helped them combine a high degree of economic growth and environmental quality. The two most important principles adopted to reach this goal have been the Polluter Pays Principle (PPP) and Resource Pricing or User Pays Principle (UPP), which should be applied in an economically efficient and coordinated manner.

PPP has two principal objectives: (a) to promote microeconomic efficiency in the pollution control policies, and (b) to minimise the potential trade distortions arising from environmental measures (Juhasz, p.36). According to PPP, the polluter should bear the cost of pollution control by either introducing new pollution control technologies or changing production patterns. With the exception of certain conditions, PPP does not allow for subsidies in environmental measures as non-subsidisation should ensure that the price mechanism works efficiently and there is no burden on the public budget with possible destabilising effects (Juhasz, p.37). PPP also stipulates that environmental measures should avoid creating non-tariff barriers.

Resource pricing, on the other hand, suggests that those who benefit should pay. UPP is expected to reduce conflicts over resource use, minimise environmental and social impacts and improve resource use efficiency. By imposing the economic and environmental cost as the price, the use of the resource would be limited to an economically and environmentally acceptable level. In case of renewable resources, the price should cover the resource itself and all the services associated with it which cease to be available if the resource is used up or overused. The price should also be the opportunity cost including the capital, operation and maintenance costs as well as depletion and environmental damage costs.

4. CHALLENGES AT NATIONAL AND GLOBAL LEVELS

The challenging problem that arises for the developing countries, including the OIC members, is that the application of OECD-style policies would not be easy for them. The cost of implementing those policies in most OIC countries would have a destabilising effect on their macroeconomic policies. In fact, the OIC countries need even stronger policies than what the above-mentioned principles can provide. They also need substantial assistance in their efforts to maintain a reasonable rate of economic growth.

The United Nations Conference on Environment and Development, which was held in Rio de Janeiro on 3-14 June 1992, specified various guidelines for the developing countries in their efforts to attain sustainable development while at the same time and implementing environment-friendly policies. In fact, the responsibility for achieving the objectives set by the Rio Declaration falls on the shoulders of both developing and industrialised country governments as well as international organisations, the private sector, the general public and the civil society. All parties have certain responsibilities in attaining better environmental conditions.

4.1. Actions to be Taken by Governments

As a starting point, governments may work on identifying their own or their region's priority environmental issues. One sensible approach to that identification would be to quantitatively assess and compare the impacts of the various issues on human populations. This is a complex but necessary process which should take into account various economic factors as well as others such as labour use, health situation, etc. The necessity of this process stems from the fact that the size of populations affected would be an important consideration in assessing the overall environmental priorities. Principle 17 of the Rio Declaration suggests "*Environmental impact assessment, as a national instrument, shall be undertaken for proposed activities that are likely to have a significant adverse impact on the environment and are subject to a decision of a competent national authority*". Therefore, EIA is an inevitable tool in identifying environmental priorities with the end purpose of attaining sustainable development. It is required especially for new projects which are at the pre-feasibility stage.

Since social considerations are also important in pursuing sustainable development, governments should try to establish safety nets, education and health systems as well as institutional, governmental and legal frameworks necessary to deliver these services to their citizens. Social protection systems may also help create the necessary circumstances to preserve long-term environmental common assets.

It is important that governments conduct risk assessment and risk management schemes prior to the implementation of policies that lead to sustainable development. Following these risk studies, governments could use several market-based tools in order to better carry out environment-friendly policies. The extent to which these tools are used would of course change from one country to another depending on the economic conditions of the country concerned. These tools include the following:

- Setting tax rates consistent with environmental targets and reducing the exemptions on environmental taxes,
- Expanding the use of tradable permit systems to address domestic, regional and global concerns and reducing the exemptions on tradable permit systems,
- Using revenues collected from these instruments in line with national priorities,
- Phasing out subsidies that are environmentally damaging (e.g. subsidies on chemical fertilisers) and rendering the remaining ones consistent with environmental policies,
- Ensuring that benefits from support payments for environmental services meet the cost of provision,
- Making a sound cost-benefit analysis of proposed environmental regulations,
- Strengthening the environmental effectiveness of voluntary arrangements through provisions for follow-up, verification and control,
- Educating and informing the public about the effects of their consumption choices (OECD 2001, p.23).

In addition to the tools defined by the OECD, there are some other economic mechanisms that could be adopted by both developing and industrial country governments such as compliance with global environmental treaties and the implementation of policies suggested by the international community. These policies include: using natural resources so that the rate of their use does not exceed their regeneration rate; keeping the waste flows below the absorptive capacity of the environment; increasing renewable resources to compensate for the depletion of exhaustible resources; and increasing the efficiency with which resources are used.

Evidently, technology plays an important role in the implementation of all the above-mentioned recommendations. Therefore, governments should also harness science and technology and incorporate cleaner technologies in their strategies of sustainable development. Supporting or funding long-term research for capacity building in this respect would help governments adopt new technologies and also diffuse them in the society. Direct cooperation with the public sector and organised groups in the civil society, facilitating collaboration among private companies and groups and allowing competition among technologies are positive steps in the right direction to achieve environmental protection. Technological policies should embrace pollution control as well as the conservation of water used in agriculture, industry and households. Strategies for reducing urban population should include the improvement of transit systems and vehicle maintenance, introduction of lead-free oil and adoption of new technologies for sanitation and waste disposal.

This would not only bring along the positive impact of trade liberalisation on economic growth but also lead to the diffusion of new and clean technologies as well as furthering cooperation to develop good governance systems. In addition, as previously explained, the industrialised countries account for 65 percent of the world CO_2 emissions. Therefore, measures taken by industrialised countries to reduce CO_2 emissions would benefit not only those countries, but also all countries in the region. The short-term objective for those countries should be to reduce emissions from existing sources whereas the long-term objective should be to favour investments towards less carbon-intensive energy and transport infrastructure and facilitate cost-effective adaptation to changing climate. “Adaptation measures could include the

construction of protective infrastructure (e.g. against flood), re-settlement of populations and development of plants and animals that can produce food under different climatic conditions" (OECD 2001, p.82).

4.2. International Cooperation

Principle 7 of the Rio Declaration states that *"States shall cooperate in a spirit of global partnership to conserve, protect and restore the health and integrity of the Earth's ecosystem. In view of the different contributions to global environmental degradation, states have common but differentiated responsibilities"*. Similarly, Principle 9 states that *"States should cooperate to strengthen endogenous capacity-building for sustainable development by improving scientific understanding through exchanges of scientific and technological knowledge, and by enhancing the development, adaptation, diffusion and transfer of technologies, including new and innovative technologies"*.

The economic problems of the developing countries are many. It is likely that most of those countries, although endowed with rich natural resources, do not have the necessary mechanisms which would enable them to develop the skills, knowledge and technical know-how required to adopt environment-friendly technologies, identify priorities for sectoral reform, design market incentives and develop the institutions necessary for the formulation of national climate plans, emissions monitoring, mitigation assessment and adaptation options. In accordance with the Rio Declaration as well as the Kyoto Protocol, industrial countries can assist developing countries in their efforts to develop their capacity to respond to environmental threats. Multilateral mechanisms that accommodate financial aid and technology transfer to developing countries are methods of this assistance. As another method, industrialised countries can help developing countries achieve the objectives required for sustainable development by providing them with increased access to investment flows and to their own markets. Furthermore, assistance schemes could be included in Official Development Assistance (ODA) for strengthening cooperation at the international level.

Besides the industrial countries, international organisations also have responsibilities in undertaking successful cooperation at the international

level. "Some donor agencies have been the driving force behind several kinds of country environment studies in the region, in which the assistance of the World Bank, USAID and other agencies has produced national strategies or environmental plans in countries such as Egypt, Jordan, Lebanon and Yemen" (ESCWA 1998, p.25). Since 1987, these international organisations have been providing financial and technical assistance for the implementation of national environmental action plans. These action plans have been designed to provide a framework for integrating environmental considerations into a nation's overall economic and social development programmes. International organisations also make recommendations for action and outline the policies, legislation and arrangements necessary for the implementation of the action plans. Similarly, national tropical forestry plans have been promoted, since 1986, by the Food and Agriculture Organisation of the United Nations (FAO).

Measures at the international level are also needed to minimise the costs of domestic policies. Principle 16 of the Rio Declaration states that "*National authorities should endeavour to promote the internalisation of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution, with due regard to the public interest and without distorting international trade and investment*". As far as the costs are concerned, for common resources like biodiversity, climate, fresh water, marine life, etc., any one country has little incentive to take unilateral action as the costs would be borne by the country involved whereas the benefits shared by all. Cooperation among countries is, therefore, required for the effective implementation of environmental policies.

4.3. Actions to be Taken by the General Public and Civil Society

In attaining sustainable development, although the larger part of the burden lies on governments, progress achieved would be enhanced if the public sector, general public and civil society took part in meeting the demands of an environment-friendly growth. Principle 10 of the Rio Declaration states that *"Environmental issues are best handled with the participation of all concerned citizens, at the relevant level"*. Businesses, for example, can play an important role in adopting and diffusing new clean technologies used elsewhere. Organised groups in civil societies may have their shares in the ultimate purpose of attaining

sustainable development by identifying new challenges and facilitating adaptation. Providing the society with information on the environmental effects of the goods and services they consume may change the decisions of the consumers and consequently the consumption patterns of the public in general. Transparency and adequate information would improve the capacity to better address environmental problems.

5. CONCLUSION

As explained in this paper, there exists an organic relationship between development and protection of the environment in the sense that they both need and could harm each other. Sustainable development is possible if countries can make use of the resources offered by the Earth efficiently and without critically harming the environment. Achieving the desired level of development while at the same time preserving the Earth's natural resources and ecosystem is the core of the issue which is required to keep our planet habitable for future generations.

To achieve this ideal, governments should adopt the necessary legislations which would help them implement sound environmental policies. They should also carry out environmental impact assessments which would, in turn, lead to positive steps in the fight against environmental degradation. They should cooperate with other countries as well as international organisations while implementing their environmental strategies and seek assistance from them if necessary.

Citizens, the private sector and local communities have a vital role to play in environmental management and development due to their knowledge and traditional practices. Developing country governments should encourage and support their efforts and enable their effective participation in the achievement of better environmental conditions.

As pointed out in this paper, the OIC countries are faced with enormous challenges in their efforts to reach sustainable development. A major challenge in this respect is the technology gap that separates them from the developed countries. Furthermore, environmental concerns have become a major world agenda. The challenge is thus more serious and complicated since technological development needs to be viewed within the constraints imposed by environmental concerns. On the other hand, it would be unfair to ask the developing

countries to impose limits on their industrial development, fertiliser use, mine exploitation, etc. Most of all, it would be unfair to ask them to pay for cleaning the Earth from damages done in the past, mostly by developed countries.

The OIC countries are required, then, to reconsider their development strategies, policies and practices in a fundamental manner. The development of technology should be given a central role in this new orientation. This, in turn, will entail some fundamental changes in the education and training systems as well the R&D activities. Although the development of technology is basically a national issue, the OIC institutions could play an instrumental catalytic role in this respect in close collaboration with the UN system. This role should be directed mainly towards information and technical cooperation. The modalities of such cooperation could best be worked out through the OIC-UN general coordination meetings.

Furthermore, as set out in the concerned section of the OIC Plan of Action, the OIC countries should cooperate in a spirit of global partnership to help conserve the global environment and protect the health and integrity of the Earth's ecosystems. They should also provide and encourage environmental education to increase public awareness on the effects of consumption patterns on the environment. They should promote research studies with a view to enhancing institutional reforms, capacity building and technical know-how in the field of environment. The private sector in the OIC countries should be encouraged to participate in issues related to the environment. Most importantly, OIC countries should carry out their own EIA programmes in order to strengthen the scientific base for the sustainable management of natural resources and better assess and establish national scientific capabilities. In so doing, they should undertake their respective land use planning processes that integrate resource use and environmental considerations. Environmental policies will lead to substantial positive outcomes only if when they are integrated into economic development programmes.

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Table A.1: Population

	Urban Population (% of total)		Average Annual Population Growth Rate (%)
	1980	**2002**	**1980-2002**
Afghanistan	16	23	2.6
Azerbaijan	53	52	1.3
Bangladesh	15	26	2.1
Benin	27	44	2.9
Burkina Faso	8	17	2.4
Cameroon	31	50	2.7
Chad	19	25	2.8
Comoros	23*	34	3*
Côte d'Ivoire	35	44	3.2
Gambia	20	32	3.5
Guinea	19	28	2.5
Guinea-Bissau	17	33	2.7
Indonesia	22	43	1.6
Kyrgyz Rep.	38	34	1.5
Mali	18	32	2.5
Mauritania	28	60	2.5
Mozambique	13	34	1.9
Niger	13	22	3.3
Nigeria	27	46	2.8
Pakistan	28	34	2.5
Senegal	36	49	2.7
Sierra Leone	24	38	2.2
Somalia	22	28	1.6
Sudan	20	38	2.4
Tajikistan	34	28	2.1
Togo	23	34	2.9
Uganda	9	15	3
Uzbekistan	41	37	2.1
Yemen	19	25	3.5
OIC-LIC	**22.9**	**36.2**	**2.3**
Albania	34	44	0.7
Algeria	44	58	2.4
Djibouti	74*	84	2.8*
Egypt	44	43	2.2
Gabon	50	83	2.9
Guyana	30*	37	-0.6

Table A.1: Population (continued)

	Urban Population (% of total)		Average Annual Population Growth Rate (%)
	1980	**2002**	**1980-2002**
Iran	50	65	2.3
Iraq	66	68	2.8
Jordan	60	79	3.9
Kazakhstan	54	56	0
Lebanon	74	90	1.8
Libya	69	88	2.6
Malaysia	42	59	2.6
Maldives	22	29	3.1
Morocco	41	57	1.9
Oman	32	77	3.8
Palestine	…	…	…
Saudi Arabia	66	87	3.9
Suriname	45*	75	0.7*
Syria	47	52	3
Tunisia	52	67	1.9
Turkey	44	67	2
Turkmenistan	47	45	2.3
OIC-MIC	**48.2**	**61.2**	**2.3**
Bahrain	81*	93	3.1*
Brunei	60*	73	2.7*
Kuwait	91	96	2.4
Qatar	86*	93	4.4*
United Arab Emirates	71	88	5.1
OIC-HIC	**81.3**	**90.6**	**3.9**

Source: World Bank, World Development Indicators 2004 and the Little Green Data Book 2004.
* SESRTCIC-BASEIND.

Table A.2: Agricultural Land

	Agricultural Area (1000 hectares)		Arable Land (1000 hectares)	
	1980	**2002**	**1980**	**2002**
Afghanistan	38049	38054	7910	7910
Azerbaijan	…	4692	…	1783
Bangladesh	9758	9029	8892	8019
Benin	2027	3365	1500	2550
Burkina Faso	8785	10400	2745	4348
Cameroon	8930	9160	5910	5960
Chad	48150	48630	3137	3600
Comoros	110	147	75	80
Côte d'Ivoire	17255	19900	1955	3100
Gambia	559	714	155	250
Guinea	11842	12240	702	900
Guinea-Bissau	1383	1628	255	300
Indonesia	38000	44877	18000	20500
Kyrgyz Rep.	…	10776	…	1345
Mali	32050	34700	2010	4660
Mauritania	39464	39750	210	488
Mozambique	47100	48435	2870	4200
Niger	13220	16500	3544	4487
Nigeria	70385	72200	27850	30200
Pakistan	25300	27120	19994	21448
Senegal	8050	8150	2341	2460
Sierra Leone	2703	2800	450	535
Somalia	44000	44071	984	1045
Sudan	110460	133833	12360	16233
Tajikistan	…	4255	…	930
Togo	3035	3630	1950	2510
Uganda	10680	12312	4080	5100
Uzbekistan	…	27046	…	4484
Yemen	17528	17734	1366	1538
OIC-LIC	**608823**	**706148**	**131245**	**160963**
Albania	1118	1140	585	578
Algeria	43830	40065	6875	7665
Djibouti	1301	1301	1	1
Egypt	2445	3400	2286	2900
Gabon	5152	5160	290	325
Guyana	1715	1740	480	480
Iran	57713	61088	12981	15020

Table A.2: Agricultural Land (continued)

	Agricultural Area (1000 hectares)		Arable Land (1000 hectares)	
	1980	**2002**	**1980**	**2002**
Iraq	9439	10090	5250	5750
Jordan	1127	1142	299	295
Kazakhstan	…	206769	…	21535
Lebanon	311	329	210	170
Libya	15080	15450	1753	1815
Malaysia	5059	7870	1000	1800
Maldives	8	13	4	4
Morocco	28930	30283	7530	8396
Oman	1051	1081	23	38
Palestine	375	381	104	113
Saudi Arabia	86962	173794	1890	3600
Suriname	69	88	40	57
Syrian Arab Republic	14062	13759	5230	4593
Tunisia	8700	9763	3191	2771
Turkey	38579	41690	25354	25938
Turkmenistan	…	32615	…	1850
OIC-MIC	**323026**	**659011**	**75376**	**105694**
Bahrain	10	10	2	2
Brunei	14	19	3	9
Kuwait	135	151	1	13
Qatar	55	71	4	18
United Arab Emirates	223	571	16	75
OIC-HIC	**437**	**822**	**26**	**117**

Source: FAOSTAT.

Table A.3: Forestry

	Forest Area (% of total land)	Average Annual Deforestation (%)
	2000	1990-2000
Afghanistan	2.1	0
Azerbaijan	12.6	-1.3
Bangladesh	10.2	-1.3
Benin	24	2.3
Burkina Faso	25.9	0.2
Cameroon	51.3	0.9
Chad	10.1	0.6
Comoros	3.6	4
Côte d'Ivoire	22.4	3.1
Gambia	48.1	-1
Guinea	28.2	0.5
Guinea-Bissau	77.8	0.9
Indonesia	58	1.2
Kyrgyz Rep.	5.2	-2.6
Mali	10.8	0.7
Mauritania	0.3	2.7
Mozambique	39	0.2
Niger	1	3.7
Nigeria	14.8	2.6
Pakistan	3.2	1.1
Senegal	32.2	0.7
Sierra Leone	14.7	2.9
Somalia	75	1
Sudan	25.9	1.4
Tajikistan	2.8	-0.5
Togo	9.4	3.4
Uganda	21.3	2
Uzbekistan	4.8	-0.2
Yemen	0.9	1.8
OIC-LIC	**19.7**	**1.3**
Albania	36.2	0.8
Algeria	0.9	-1.3
Djibouti	0.3	0
Egypt	0.1	-3.4
Guyana	85.7	0.3
Iran	4.5	0

Table A.3: Forestry (continued)

	Forest Area (% of total land)	Average Annual Deforestation (%)
	2000	**1990-2000**
Iraq	1.8	0
Jordan	1	0
Kazakhstan	4.5	-2.2
Maldives	3.3	0
Morocco	6.8	0
Palestine	…	…
Saudi Arabia	0.7	0
Suriname	90.5	0
Syria	2.5	0
Tunisia	3.3	-0.2
Turkey	13.3	-0.2
Turkmenistan	8	0
Gabon	84.7	0
Lebanon	3.5	0.3
Libya	0.2	-1.4
Malaysia	58.7	1.2
Oman	0	0
OIC-MIC	**7.5**	**-0.9**
Bahrain	…	…
Brunei	83.9	0.2
Kuwait	0.3	-5.2
Qatar	0.1	…
United Arab Emirates	3.8	-2.8
OIC-HIC	**6.3**	**-2.8**

Source: World Bank, World Development Indicators 2004 and the Little Green Data Book 2004.

Table A.4: Fertiliser Consumption

	Total Fertilizer Consumption (Metric tons)	
	1979-81	**2000-2002**
Afghanistan	48859	14733
Azerbaijan	…	11231
Bangladesh	408024	1397807
Benin	1653	38047
Burkina Faso	7123	12422
Cameroon	33199	44495
Chad	1833	17500
Comoros	0	300
Côte d'Ivoire	50822	81600
Gambia	2206	800
Guinea	1099	3200
Guinea-Bissau	619	2400
Indonesia	1160811	2707936
Kyrgyz Rep.	…	28139
Mali	12341	41282
Mauritania	1133	1933
Mozambique	30967	21367
Niger	3354	4825
Nigeria	165133	191567
Pakistan	1048686	2956577
Senegal	24233	33864
Sierra Leone	2595	250
Somalia	867	500
Sudan	63295	64799
Tajikistan	…	16300
Togo	2637	18698
Uganda	467	7248
Uzbekistan	…	723267
Yemen	12648	14366
OIC-LIC	**3084604**	**8457452**
Albania	91067	24252
Algeria	190551	98533
Djibouti	1022	0
Egypt	658537	1278961
Gabon	583	300
Guyana	10318	14488
Iran	590337	1336910
Iraq	90367	549733

Table A.4: Fertiliser Consumption (continued)

	Total Fertilizer Consumption (Metric tons)	
	1979-81	**2000-2002**
Jordan	12055	25488
Kazakhstan	…	50767
Lebanon	35600	50085
Libya	62539	63367
Malaysia	429167	1182997
Maldives	…	…
Morocco	203375	375539
Oman	1092	9464
Palestine	…	…
Saudi Arabia	43431	383753
Suriname	3300	5667
Syria	131080	329213
Tunisia	68697	104433
Turkey	1350671	1834207
Turkmenistan	…	100467
OIC-MIC	**3973787**	**7818623**
Bahrain	109	249
Brunei	229	0
Kuwait	533	908
Qatar	747	467
United Arab Emirates	3403	35033
OIC-HIC	**5021**	**36657**

Source: FAOSTAT.

Table A.5: Air Pollution

	Carbon dioxide emissions (per capita metric tons)		Consumption of CFCs (ODP metric tons)
	1980	**2000**	**2002**
Afghanistan	0.1	0.0	…
Azerbaijan	...	3.6	12
Bangladesh	0.1	0.2	328
Benin	0.1	0.3	36
Burkina Faso	0.1	0.1	16
Cameroon	0.4	0.4	226
Chad	0.0	0.0	37*
Comoros	0.1	0.1	2
Côte d'Ivoire	0.6	0.7	107
Gambia	0.2	0.2	5
Guinea	0.2	0.2	38*
Guinea-Bissau	0.6	0.2	…
Indonesia	0.6	1.3	5506
Kyrgyz Rep.	...	0.9	38
Mali	0.1	0.1	26
Mauritania	0.4	1.2	13*
Mozambique	0.3	0.1	14*
Niger	0.1	0.1	27
Nigeria	1.0	0.3	3287
Pakistan	0.4	0.8	1647
Senegal	0.5	0.4	72
Sierra Leone	0.2	0.1	81
Somalia	0.1	...	…
Sudan	0.2	0.2	253
Tajikistan	...	0.6	12
Togo	0.2	0.4	35
Uganda	0.1	0.1	12*
Uzbekistan	...	4.8	0
Yemen	...	0.5	960
OIC-LIC	**0.4**	**0.7**	**12790**
Albania	1.8	0.9	…
Algeria	3.5	2.9	1475*
Djibouti	1.0	0.6	…
Egypt	1.1	2.2	1267*
Gabon	8.9	2.8	14*

Table A.5: Air Pollution (continued)

	Carbon dioxide emissions (per capita metric tons)		Consumption of CFCs (ODP metric tons)
	1980	**2000**	**2002**
Guyana	2.3	2.1	14
Iran	3.0	4.9	4438
Iraq	3.4	3.3	…
Jordan	2.2	3.2	90
Kazakhstan	...	8.1	112
Lebanon	2.1	3.5	492
Libya	8.8	10.9	985*
Malaysia	2.0	6.2	1606
Maldives	0.3	1.8	3
Morocco	0.8	1.3	669
Oman	5.3	8.2	180
Palestine	...	...	…
Saudi Arabia	14.0	18.1	1531
Suriname	6.7	5.0	…
Syria	2.2	3.3	1202
Tunisia	1.5	1.9	466
Turkey	1.7	3.3	699
Turkmenistan	...	7.5	19*
OIC-MIC	**2.7**	**4.5**	**15262**
Bahrain	23.4	29.1	95
Brunei	35.5	14.1	43
Kuwait	18.0	21.9	349
Qatar	56.3	69.5	102
United Arab Emirates	34.8	21.0	370
OIC-HIC	**27.4**	**26.2**	**959**

Source: World Bank, World Development Indicators 2004 and the Little Green Data Book 2003 and 2004.
* Data for 2000.

Table A.6: Use of Coal and Oil as Sources of Energy

	Share of Electricity Generated by:			
	Coal (%)		Oil (%)	
	1980	2001	1980	2001
Afghanistan	...	...	...	...
Azerbaijan	...	...	...	28.4
Bangladesh	...	...	26.6	9.4
Benin	...	...	100	97.7
Burkina Faso	...	...	...	...
Cameroon	...	...	6.1	1.9
Chad	...	...	...	...
Comoros	...	...	...	...
Côte d'Ivoire	...	...	22.7	0.3
Gambia	...	...	...	...
Guinea	...	...	...	...
Guinea-Bissau	...	...	...	...
Indonesia	...	28.9	84	23.6
Kyrgyz Republic	...	4.5	...	...
Mali	...	...	...	...
Mauritania	...	...	...	...
Mozambique	17.5	...	17.3	0.5
Niger	...	...	...	...
Nigeria	0.4	...	45.1	8.2
Pakistan	0.2	0.4	1.1	36
Senegal	...	...	100	100
Sierra Leone	...	...	...	...
Somalia	...	...	...	...
Sudan	...	...	30	51.7
Tajikistan	...	...	...	...
Togo	...	...	86.7	93.8
Uganda	...	...	...	...
Uzbekistan	...	4.2	...	11.4
Yemen	...	...	100	100
OIC-LIC	**0.6**	**13.7**	**33.8**	**23.4**
Albania	...	...	20.6	3.7
Algeria	...	...	12.2	2.9
Djibouti	...	...	...	...
Egypt	...	...	27.7	14.7
Gabon	...	...	50.9	20.6
Guyana	...	...	...	...

Table A.6: Use of Coal and Oil as Sources of Energy (continued)

	Share of Electricity Generated by:			
	Coal (%)		Oil (%)	
	1980	**2001**	**1980**	**2001**
Iran	...	...	50.1	21.2
Iraq	...	...	93.9	98.2
Jordan	...	...	100	89.2
Kazakhstan	...	69.9	...	4.9
Lebanon	...	...	69.1	95.9
Libya	...	...	100	100
Malaysia	...	3.4	84.9	8.6
Maldives	...	...	...	...
Morocco	19.5	72.2	51.6	21.1
Oman	...	...	21.5	17.7
Palestine	...	...	...	...
Saudi Arabia	...	...	58.5	63.5
Suriname	...	...	...	...
Syrian	...	...	31.9	19.9
Tunisia	...	...	64.5	9.8
Turkey	25.6	31.3	25.1	8.5
Turkmenistan	...	...	...	...
OIC-MIC	**24.5**	**34.3**	**49.7**	**29.9**
Bahrain	...	...	...	...
Brunei	...	...	0.9	0.9
Kuwait	...	...	20.1	76.6
Qatar	...	...	2.7	...
United Arab Emirates	...	...	3.7	7.9
OIC-HIC	**…**	**…**	**11.7**	**37.8**

Source: World Bank, World Development Indicators 2004 and the Little Green Data Book 2004.

Table A.7: Water Pollution

	Emissions of Organic Water Pollutants (Kilograms per day)	
	1980	**2000**
Afghanistan	6680	...
Azerbaijan	...	45025
Bangladesh	66713	273082
Benin	1646	...
Burkina Faso	2385	2598
Cameroon	14569	10714
Chad	...	...
Comoros	...	...
Côte d'Ivoire	15414	12401
Gambia	549	832
Guinea	...	...
Guinea-Bissau	...	...
Indonesia	214010	752834
Kyrgyz Rep.	...	20700
Mali	...	...
Mauritania	...	...
Mozambique	...	10230
Niger	372	...
Nigeria	72082	82477
Pakistan	75125	100821
Senegal	9865	6643
Sierra Leone	1612	4170
Somalia	...	...
Sudan	...	...
Tajikistan	...	...
Togo	963	...
Uganda	...	...
Uzbekistan	...	...
Yemen	...	7823
OIC-LIC	**481985**	**1330350**

Table A.7: Water Pollution (continued)

	Emissions of Organic Water Pollutants (Kilograms per day)	
	1980	**2000**
Albania	...	6512
Algeria	60290	45645
Djibouti	...	...
Egypt	169146	203633
Gabon	2661	1886
Guyana	...	...
Iran	72334	101900
Iraq	32986	19617
Jordan	4146	16142
Kazakhstan	...	...
Lebanon	14586	14899
Libya	3532	...
Malaysia	77215	158761
Maldives	...	...
Morocco	26598	88779
Oman	...	5798
Palestine	...	...
Saudi Arabia	18181	24436
Suriname	...	...
Syria	36262	15115
Tunisia	20964	46052
Turkey	160173	170685
Turkmenistan	...	...
OIC-MIC	**699074**	**919860**
Bahrain	...	...
Brunei	...	...
Kuwait	6921	11412
Qatar	...	...
United Arab Emirates	4524	...
OIC-HIC	**11445**	**11412**

Source: World Bank, World Development Indicators 2004.

Table A.8: Government Commitment

	Status of National Environmental Action Plans	Ratification of Environmental Treaties			
		Cartagena Protocol on Biosafety	Framework Convention on Climate Change	Kyoto Protocol	Convention on Biological Diversity
Afghanistan	n.a.		●		●
Azerbaijan	Completed		●	●	●
Bangladesh	Completed	○	●	●	●
Benin	Completed	○	●	●	●
Burkina Faso	Completed	○	●		●
Cameroon	Completed	○	●	●	●
Chad	n.a.	○	●		●
Comoros	Completed		●		●
Côte d'Ivoire	Completed		●		●
Gambia	Completed	○	●	●	●
Guinea	Completed	○	●	●	●
Guinea-Bissau	Completed		●		●
Indonesia	Completed	○	●	○	●
Kyrgyz Rep.	Completed		●		●

●: Ratification, acceptance, approval, accession or succession.
○: Signature.

Table A.8: Government Commitment (continued)

	Status of National Environmental Action Plans	Ratification of Environmental Treaties			
		Cartagena Protocol on Biosafety	Framework Convention on Climate Change	Kyoto Protocol	Convention on Biological Diversity
Mali	Completed	●	●	●	●
Mauritania	Completed		●		●
Mozambique	Completed	●	●		●
Niger	Completed	○	●	○	●
Nigeria	Completed	●	●		●
Pakistan	Completed	○	●		●
Senegal	Completed	○	●	●	●
Sierra Leone	Completed		●		●
Somalia	n.a.				
Sudan	n.a.		●		●
Tajikistan	Under Preparation		●		●
Togo	Completed	○	●		●
Uganda	Completed	●	●	●	●
Uzbekistan	Completed		●	●	●
Yemen	Completed		●		●
Albania	Completed		●		●

Table A.8: Government Commitment (continued)

	Status of National Environmental Action Plans	Ratification of Environmental Treaties			
		Cartagena Protocol on Biosafety	Framework Convention on Climate Change	Kyoto Protocol	Convention on Biological Diversity
Algeria	Completed	○	●		●
Djibouti	Completed	●	●	●	●
Egypt	Completed	○	●	○	●
Guyana	Completed		●		●
Iran	Completed	○	●		●
Iraq	n.a.				
Jordan	n.a.	○	●	●	●
Kazakhstan	Completed		●	○	●
Maldives	Completed	●	●	●	●
Morocco	Completed	○	●	●	●
Suriname	n.a.		●		●
Syria	Completed		●		●
Tunisia	Completed	●	●	●	●
Turkey	Completed	○			●
Turkmenistan	Under Preparation		●	●	●
Gabon	Completed		●		●

Table A.8: Government Commitment (continued)

	Status of National Environmental Action Plans	Ratification of Environmental Treaties			
		Cartagena Protocol on Biosafety	Framework Convention on Climate Change	Kyoto Protocol	Convention on Biological Diversity
Lebanon	Completed		●		●
Libya	n.a.		●		●
Malaysia	Under Preparation	●	●	●	●
Oman	n.a.		●		●
Saudi Arabia	n.a.		●		●
Bahrain	n.a.		●		●
Brunei	n.a.				
Kuwait	n.a.		●		●
Qatar	n.a.		●		●
UAE	Completed		●		●

Source: World Bank, World Development Indicators 2003 and UNDP, Human Development Report 2003.
●: Ratification, acceptance, approval, accession or succession.
○: Signature.