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Global warming and ecological disasters

Report
Committee on the Environment, Agriculture and Local and Regional Affairs
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Summary

Global warming is increasingly causing ecological disasters with disastrous effects on the natural and human environment worldwide and severe consequences for populations, especially for agriculture and infrastructures.

Europe will not be spared the changes in climate caused by global warming. It is and will probably continue to be subject to higher temperatures and extreme weather conditions such as heatwaves, storms, droughts, glacier melt, irregular rainfall, floods, rising sea-levels and other disasters.

The Assembly considers that the response must be global and based on a shared understanding of the long-term objectives and agreement on the framework for action. This approach should be also applied on a European scale.

It urges Council of Europe member states and observer countries to co-ordinate their action at both European and world level and take account of climate change in their sectoral policies such as spatial planning, water management, land use and agricultural policies, particularly with regard to forestry and the organisation of harvests, so as to counter flood and drought risk.

It also urges Council of Europe member states and observer countries to make precise commitments to cut greenhouse gases by setting a binding target of reducing CO2 emissions by 20% by 2020 while simultaneously encouraging the sharing of technologies and know-how through international co-operation between industrialised countries – which produce most of the greenhouse gas emissions – to help developing countries that are most affected by the natural disasters caused by global warming.

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A. Draft recommendation

1. Europe will not be spared the changes in climate caused by global warming. For the past three decades climate change has had a growing impact on many biological and physical systems on a planetary scale. Climate change affects the basics – access to water, food production, health, and the environment – for people all over the world.

2. Such effects are already significant and measurable in Europe, and particularly so in the Arctic. The whole natural environment and all socio-economic spheres in Europe are and will continue to be affected. With the relationship between climate change and its effect on ecosystems not being a linear one, even slight variations in temperature are causing serious repercussions.

3. At present, the Arctic is the region which gives the greatest cause for concern, with temperatures rising twice as fast there as the global average and many of the consequences having serious impacts on other parts of the planet.

4. In Europe, because the Mediterranean basin is likely to be one of the parts of the world most affected by global warming, present issues and tendencies as regards sharing water between agriculture, tourist facilities and urban areas are going to be exacerbated.

5. The most optimistic estimations of the 4th Report of Working Group 1 of the Intergovernmental Panel on Climate Change (IPCC) forecast rises in temperature of between +1.8°C and +4.0°C if an effective global policy for mitigating climate change is not introduced quickly.

6. Europe, like the remainder of the planet, will therefore most probably be subject to higher temperatures and extreme weather conditions such as heat-waves, storms, drought, glacier melt, irregular rainfall, floods, rising sea-levels and other human and environmental disaster situations.

7. Freshwater resources will also be directly affected in terms of both quantity and quality as a result of extreme occurrences like drought and flood: fluctuations in river flow, much lower minimum water levels, high concentrations of pollutants and toxic substances in water, reduced replenishment of groundwater reserves, increased nitrate pollution, water stress, etc.

8. Moreover, because climate change will influence migration of populations threatened by ecological disasters and make access to drinking water even more difficult in some regions, there is a risk that tensions in international relations will increase and that climate change becomes a frequent cause of conflict and even war.

9. The Parliamentary Assembly therefore reaffirms its unswerving commitment to sustainable development and, in particular, its support for the United Nations Framework Convention on Climate Change, aimed at stabilising atmospheric concentrations of greenhouse gases, and for the Kyoto Protocol. It refers in particular to its most recent documents on the subject, Resolution 1406 (2004), “Global warming: beyond Kyoto”, and Resolution 1552 (2007) on capture of carbon dioxide as a means of fighting climate change.

10. In particular, the Assembly supports the IPCC’s work on evaluation of the vulnerability of natural and human systems and their ability to adapt to climate change and its possible consequences, and welcomes the Nobel Peace Prize award to Al Gore and the IPCC for their efforts to increase knowledge about global warming.

11. The Assembly welcomes the conclusions of the UN Climate Change Conference held in Bali (3-14 December 2007) which include an agreement in principle on a 2050 target of halving emissions, an agreement to negotiate a binding deal in 2009, an agreement to provide assistance to developing countries for both mitigation and adaptation and an agreement by China to pursue emissions-cutting actions that are “measurable, reportable and verifiable”. It believes that the adoption of the Bali roadmap, which charts the course for a new negotiating process to be concluded by 2009 and that will ultimately lead to a post-2012 international agreement on climate change, is a major step towards the fight against climate change.

12. The Assembly also draws attention to the Stern review on the economic impact of global warming. Using the results from formal economic models, which estimate that, unless we act rapidly, the overall costs and risks of climate change will be equivalent to losing at least 5% of global GDP each year. If a wider range of risks and impacts is taken into account, the estimated damage rises to 20% of GDP or more.

13. The Assembly is aware that climate change could have very serious consequences for growth and development and that the cost of stabilising the climate would be considerable. However, it stresses that failure to take immediate action would be dangerous and result in much higher costs.

14. The Assembly considers that the international community must assume its responsibility for providing present and future generations with a viable, healthy and sustainable environment and urges Council of Europe member states and observers to take comprehensive and effective action on climate change and introduce the measures needed to cut emissions without necessarily capping either rich or poor countries' aspirations for growth.

15. The Assembly therefore welcomes the recent ratification of the Kyoto Protocol by Australia and regrets that the United States remains the only major developed nation that has refused to ratify the protocol.

16. It also welcomes the most ambitious policies for reducing greenhouse gas emissions and the measures already taken by numerous countries and regions such as the European Union (EU). It particularly underlines the role played by the EU, especially the decision taken by the Heads of State and Government of the EU on 9 March 2007 to commit themselves to a post-Kyoto objective of reducing greenhouse gas emissions by 20% by 2020 (30% if other industrialised countries, in particular the United States, introduce similar measures), bringing the percentage of renewable energies in the whole range of energy sources used in EU member states to 20% by 2020.

17. The Assembly is aware that, even with a sharp increase in the use of renewable energies and other less carbon-intensive energy sources, over half of the world's energy supply in 2050 might still be made up of fossil fuels. The Assembly believes that renewable energies will help to eradicate poverty and the energy dependency of developing countries, a great many of which have an abundance of renewable energy.

18. It believes that the loss of natural forest around the world is also a threat to biodiversity and does more to increase the greenhouse effect each year than the transport sector. In addition, agriculture represents 9% of greenhouse gas emissions and is the main source of methane and nitrogen protoxide emissions. It therefore sees curbing deforestation as a highly cost-effective way of cutting emissions and turning agricultural land back into forest which would then offer a considerable potential for absorbing atmospheric carbon dioxide (CO2).

19. It is convinced that firm, resolute decisions on future orientations in both developed and emerging economies can achieve the required reduction and stabilisation of emissions without restricting development.

20. The Assembly, aware that a global response must be based on a shared understanding of the long-term objectives and an agreement on the frameworks for action, urges those industrialised countries which produce most of the greenhouse gas emissions to help developing countries that are most affected by the natural disasters caused by global warming, by sharing their technologies and know-how and developing international technological co-operation.

21. In this context, the Assembly urges Council of Europe member states and observer countries to co-ordinate their action at both European and world level, in particular by co-operating with the relevant United Nations bodies and other European and international organisations and institutions.

22. With regard to adaptation to climate change, the Assembly recommends that the Committee of Ministers urge Council of Europe member states and observer countries:

22.1. to take account of climate change in their spatial-planning, water-management, land use and agricultural policies (particularly with regard to forestry and the organisation of harvests) so as to counter flood and drought risk;

22.2. to involve all political, economic and social players and develop local, regional and national capability, in both public and private sectors, for dealing with emergencies and natural disasters;

22.3. to use international funding to improve regional information on the consequences of climate change and to support research into new droughtand flood-resistant crop varieties;

22.4. to take account of climate change when making development policy choices and drawing up official development aid programmes;

22.5. to develop research programmes and flood and drought monitoring and warning networks on the basis of a common European approach and integrated river-basin management for the prevention and management of weather extremes.

23. With regard to reducing greenhouse gas emissions, the Assembly recommends that the Committee of Ministers urge Council of Europe member states and observer countries:

23.1. to make precise commitments to cut greenhouse gases by setting a binding target of reducing CO2 emissions by between 20% and 30% by 2020 and stabilising atmospheric concentrations of CO2 at the lowest possible level so as to contain temperature increase as far as possible;

23.2. to establish a carbon price through taxation, emissions trading and/or legislation;

23.3. to take the necessary steps to achieve greater energy efficiency by establishing conditions conducive to alteration of demand and adoption of clean technologies for electricity, heating and air-conditioning, in house building and renovation, in land transport (organisation of urban transport, promotion of rail freight networks, development of hybrid vehicles, etc.), in air and sea transport and in industrial processes;

23.4. to take comprehensive measures to promote the capture and storage of carbon on a large scale and develop natural mechanisms for absorbing and stocking carbon dioxide so as to restrict the use of fossil fuels and the damage they cause to the atmosphere;

23.5. to take measures to cut non-energy emissions, such as those resulting from deforestation and agricultural and industrial processes, in particular by developing largescale international pilot programmes to cut methane and nitrogen protoxide emissions while increasing the absorption of carbon dioxide;

23.6. to promote emission-trading quotas aiming at cost-effective reductions in emissions and allowing industrialising countries to further their economic development;

23.7. to encourage innovation and less carbon-intensive technologies and enact the necessary legislation to encourage use of renewable energies at all levels by such measures as development of research, incentives to industrial innovation, making the technology available to the consumer and tax incentives for energy producers and consumers;

23.8. to persuasively inform and educate the public as to what can be done to help tackle global warming and for that purpose, with the participation of major national media and of industries which produce energy-intensive consumer goods, organise awareness-raising campaigns on the state of the planet, the extent of the global warming problem and the socially responsible behaviour required of all members of society, consumers and producers alike, at their respective levels.

24. The Assembly recommends that the Committee of Ministers instruct:

24.1. the EUR-OPA Major Hazards Agreement to develop without further delay joint action plans to meet the major challenges posed by climate change, with the emphasis on prevention, education and development of early warning systems and post-disaster assistance;

24.2. the European Conference of Ministers responsible for Regional Planning (CEMAT) to draw up and promote a common policy so that all spatial planning, development and management instruments take climate change into account and provide for closer vertical and horizontal consultation between bodies concerned.

B. Explanatory memorandum, by Mr Alan Meale

1. Introduction

1. Global warming increasingly continues to cause ecological disasters with disastrous effects on the natural and human environment worldwide. Every natural system is currently being affected (for example, water resources, seas/oceans, air, ecosystems, human health), causing severe consequences for agriculture and territorial communities.

2. According to the International Panel on Climate Change[1]the warming of the climate system is unequivocal. Direct observations of increases in global average (air and ocean temperatures, widespread melting snow and ice, rapid increases in areas of desertification and rising sea-levels) show that the past twelve years have been the hottest on record since 1850.

3. The United Kingdom Met Office Hadley Centre[2]has forecast that 2007 will be the warmest year on record due to increasing greenhouse gas (GHG) emissions, responsible for heating of the atmosphere and for the El Nino effect – that is, the arrival of unusually warm waters off the north-western coast of South America leading to increased rainfall, storm activity and flooding in the Americas (especially the south-western United States and Peru) and drought conditions in Australia and other areas in the western Pacific and the Indian Ocean.

4. The greenhouse effect is not exactly new, but 4 billion years old. GHGs absorb infra-red radiation (for example, the heat reflected from the earth), without which the temperature of the earth would be -18°C. Carbon dioxide (CO2) acts as a thermostat mechanism: when the earth cools, less water will evaporate, it will rain less, and less CO2 will be removed from the atmosphere. Conversely, when the earth is hotter, more rain falls in order to remove CO2 from the atmosphere.

5. Today, however, the phenomenon is greatly linked to human activities. For example, every time we switch on a light, use a computer, watch television or travel by any form of motorised transport, we generate CO2, the principal contributor to global warming.

6. Among the GHGs, CO2 – principally produced by fossil fuel burning, wood fuel, land-use change and cement manufacture – contributes to global warming at a rate of 55%. The other two main contributors are methane (coming from gas/oil/coal production, the bowels of ruminants, wetland rice cultivation, landfill waste, burning and decay of biomass) contributing 15%, and chlorofluorocarbons (CFCs, from solvents, refrigerants and aerosols) contributing 24%. Also nitrous oxide (N2O, from fertilisers, fossil fuel burning, deforestation and agriculture), nitrogen oxides, carbon monoxide and non-methane hydrocarbons cause global warming in minor proportions.

7. History reveals that as far as back as 1896, Svante Arrhenius first established a quantitative link between CO2 and climate, predicting that the doubling of the CO2 concentration in the atmosphere would produce a rise in temperatures of between 5°C and 6°C. The first actual widespread scientific monitoring began in the 1960s, when a consensus that human activities increased the temperature by between 0.3°C and 0.6°C was compounded by the shock discovery of the “ozone hole”. In 1990, the CO2 concentration was assessed as 30% above preindustrial levels.

8. The prediction for the year 2050 does not seem so remote from the one made by Arrhenius: model estimate range of carbon emissions between 20 Gt and 2 Gt per year, which would mean, in the worst scenario, a doubling of pre-industrial carbon concentration by 2050. According to UNEP projections, warming in this century will be between 1.4°C and 5.8°C, which is about the same increase in temperature as that since the last glacial era, but 100 times more rapid.

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1. The Intergovernmental Panel on Climate Change (IPCC) has been established by WMO and UNEP to assess scientific, technical and socioeconomic information relevant for the understanding of climate change, its potential impacts and options for adaptation and mitigation. It is currently finalising its 4th Assessment Report “Climate change 2007”, also referred to as AR4. The reports by the three working groups provide a comprehensive and up-to-date assessment of the current state of knowledge on climate change. The “Synthesis report” integrates the information around six topic areas.

2. The Met Office Hadley Centre is leading international research into what could happen under climate change and the impacts on current and future generations. Met Office global forecast for 2007: global temperature for 2007 is expected to be 0.54°C above the long-term (1961-90) average of 14°C. There is a 60% probability that 2007 will be as warm as or warmer than the current warmest year (1998 was +0.52°C above the long-term 1961-90 average).

2. Global warming and ecological disasters

9. As we are all aware, global warming is affecting regions in different ways: some human-induced factors that affect climate are global in nature, while others differ from one region to another. For instance, although CO2 is distributed evenly around the globe, regardless of where the emissions originate, sulphate aerosols that offset some of the warming tend to be regional in their distribution. We can identify some of the criteria that can help us to understand the projected impacts of global warming. For instance:

– latitude indicates that the amount of projected warming generally increases from the tropics to the poles;

– precipitation, also latitude-dependent, is likely to increase in circumpolar regions, while it is going to decrease in regions near the tropics;

– the location of oceans and mountain ranges is also an important factor, because according to projections the interior of continents will warm up more than the coastal areas;

– the most difficult aspect to assess is the circulation of the atmosphere and the oceans, and their patterns of variability.

10. Global warming-led ecological disasters will thus impact differently, in terms of scale and target, on the regions of the earth as specific country vulnerabilities may aggravate the consequences. There are several areas of vulnerability in case of disaster, which influence the capacity to anticipate, cope with, resist and recover after a catastrophe. The areas of vulnerability are poverty and marginalisation, social instability and conflict, population growth, coastal and flood plain settlement, rapid and unplanned organisation, overloaded infrastructure and environmental degradation, which inevitably mean that it is the poorest countries that are the most vulnerable and least capable of adaptation.

11. Some impacts, however, are expected to produce benefits in some places and some sectors of agriculture.

2.1. Projections for Europe[3]

12. Europe is warming more quickly than the rest of the world, with a 0.95°C increase since 1900. These temperatures increase more in winter than in summer.

13. The changes, recorded at different levels, show that these are deviant from possible exceptions. Among the changes we can highlight:

– European air temperature: over the past one hundred years, it has warmed 0.95°C over a global average of between 0.2°C and 0.7°C;

– precipitation: annual trends in Europe for the period 1900-2000 show a contrasting picture between northern Europe (10% to 40% wetter) and southern Europe (up to 20% drier);

– weather extremes: in the past one hundred years the number of cold and frost days has decreased in most parts of Europe, whereas the number of days with temperatures above 25°C and of heatwaves has increased;

– glaciers: eight out of nine European glacier regions are in retreat, which is consistent with the global trend. From 1850 to 1980, glaciers in the European Alps lost approximately one third of their area and one half of their mass. Since 1980, another 20% to 30% of the remaining ice has been lost. Current glacier retreat in the Alps is reaching levels exceeding those of the past five thousand years;

– snow cover: the northern hemisphere's annual snow cover extent has decreased by about 10% since 1966. The snow cover period in the northern hemisphere shortened by a rate of 8.8 days between 1971 and 1994;

– sea-level rises: sea-levels around Europe increased by between 0.8 mm/year and 3 mm/year in the last century;

– sea surface temperature: since the late 19th century the global average sea surface temperature has increased by 0.6°C, consistent with the increase in global air and temperature. The Baltic, the North Sea and the Mediterranean show a slight warming over the past fifteen years of about 0.5°C;

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3. Source: European Environment Agency, 2004, "Impacts of Europe's changing climate"; and IPCC, 2007, 4th Assessment Report, "Climate change 2007"

– plant species composition: climate over the past three decades has resulted in decreases in plant species across Europe, and many species migrated northwards.

14. The past pan-European weather extremes have been another important sign that man-made global warming is happening and further proceeding.

15. It is possible to make reference to some catastrophic events that are closely linked to climate change:

– Europe, 2003: a heatwave killed 33 000 people in Europe and caused €13 billion of damages. It also caused tremendous forest fires in the south of Europe that destroyed large ecosystems with serious effects on the tourism sector. The extremely hot weather produced unprecedented melting in the alpine areas which also reduced the glaciers by one tenth. The summer of 2003 was the hottest in five hundred years;

– Italy, August 2004: freak weather caused the collapse of some of the most famous peaks in the Italian Dolomites. The erosion process was accelerated by a summer of unusually violent storms and an unseasonably cold and snowy winter;

– northern Europe, 2005: countries across northern Europe face the fiercest storm in forty years, leaving hundreds of thousands homes in Scandinavia, Latvia, Estonia and Lithuania, without power. Northern Britain was also hit by the storm and experiences the worst flooding in decades;

– Romania, 2005: most severe flooding in forty years followed by further flooding some months later, damaging 35 000 farms and houses to the value of €1 billion.

16. Published at the end of the warmest winter on record for Europe, the 4th IPCC Assessment Report ("Climate change 2007") confirms that in the European region many of the early impacts of climate change are already being witnessed.

17. Predictions to date forecast the following trends for Europe's climate:

– European average temperature: from 1990 to 2100, while the global average temperature is projected to increase by between 1.4°C and 5.8°C, the temperature of Europe will increase by between 2°C and 6.3°C. Stronger warming in northern Europe in winter, making extremely cold winters disappear by 2080. Further and more intense warming in summer will take place in the Mediterranean region;

– precipitation: projections for Europe show a 1% to 2% increase per decade in annual precipitation in most of northern Europe and up to 1% per decade decrease in Mediterranean Europe (in summer, decreases of 5% per decade may occur);

– precipitation and agriculture: milder and wetter climates in the north, with the benefit of agriculture signifying a shift northward of agricultural production at the highest latitudes but leading to rising sea-levels and land loss in other parts;

– droughts: warmer, drier and drought-prone climate in southern Europe, already hot and semi-arid conditions expected, causing extremely severe water shortages that will threaten livelihoods and result in biodiversity loss, and increasing forest fires;

– retraction of glaciers: precipitation as rain instead of snow in current snow-covered areas in winter, thereby producing a reduction of snow depth of between 20% and 30%, a shortening of the snow season, with considerable losses for tourism;

– snow cover: in a long-term scenario, European glaciers will continue to disappear (in some areas by up to 60% under high emission scenarios, by 2080). This will further worsen the drought in the summer season, when the expected snow meltwater will decrease;

– temperatures and precipitation extremes: transport of water vapour from low to high latitudes will increase the risk of cyclone-induced flooding (namely the flooding in central Europe in August 2002), heatwaves (that is to say the 2003 summer heatwave that caused 15 000 additional deaths in France alone), forest fires and spread of what were formerly tropical diseases (for example, malaria). Increases by up to 25% in storm activity in central and western Europe, for those countries near the Atlantic Ocean;

– sea-level rise: the projected rate of sea-level rise between 1990 and 2100 is 2.2 to 4.4 times higher than the rate in the 20th century, and sea-level is projected to continue to rise for centuries;

– sea surface temperature: it is very likely that the seas will warm less than the land. By 2100 global sea surface temperature is projected to increase by between 1.1°C and 4.6°C compared to 1990 levels;

– plant species composition: there will be a further migration of plant species northwards and a large number of species might become extinct under future climate change.

18. All theses developments have a direct impact on human health and security and will affect the whole of Europe.

19. However, Europe's sensitivity to global warming is forecast differently for the northern and the southern areas of Europe, and the latter are more likely to be affected than the former

20. Changes are happening at such a pace that Europeans must put in place as quickly as possible strategies to adapt to an unfamiliar climate. The sustainable target set for Europe is to limit the temperature rise to 2°C above the pre-industrial levels. However, this target is likely to be exceeded by 2050.

2.2. Projections for the Arctic region

21. The Arctic is the region of greatest concern. It is warming twice as fast as the global average, and many of the effects on the Arctic will produce severe consequences elsewhere on the planet. In this connection, the rapporteur wishes to draw attention to the Assembly report on the specific situation of the environment in the Arctic region (rapporteur: Mr Vladimir Grachev), jointly debated with the present report.

22. Since 1980, 20% to 30% of the sea ice in the European Arctic has been lost. Indeed, the area of the Arctic Ocean covered by ice has been shrinking each summer, and the remaining ice is thinning. Because more heat is absorbed by the sea than by ice, a feedback is being created which, in turn, results in further melting.

23. In addition, a 20% to 35% thaw of the Arctic permafrost by the mid-21st century is predicted, which is likely to have implications for local communities' infrastructures, economy and housing, entailing, in the worst scenario, the costly relocation of populations. As to the economic impacts of global warming, both ends of the spectrum will be affected. For example, international oil corporations and the Inuit hunter communities will be affected, with pipeline infrastructure most likely being damaged and the decreasing ice stability making it necessary to find new hunting routes. Moreover, the thawing of the permafrost will mean an extremely severe risk for those areas where toxic materials are stored and contained in the frozen ground (namely methane deposits).

24. Furthermore, the combination of temperatures increasing by 3°C, reduced sea ice and thawing permafrost will mean three to five metres more erosion in western Siberia. Moreover, 10% to 50% of the Arctic tundra could be replaced by forests by 2100, while the narrow strips of tundra in the Russian European Arctic are likely to disappear.

25. Nevertheless, some might consider that certain impacts of climate change may improve human well-being because, for instance, opportunities for agriculture and forestry could increase in some areas. Receding sea ice will be likely to open up the Arctic to more shipping, oil and gas exploration and fisheries. However, what needs to be remembered is that Arctic communities' and indigenous peoples' livelihoods are intimately linked to their existing environment, and the above-mentioned advantages might turn out to be disappointing because of the arrival of new pests and diseases and changes in estuary and marine biodiversity because of the impact of global warming.

26. Finally, the complete melting of the Greenland ice sheet and the west Antarctic sheet would lead to a sealevel rise of up to seven metres and five metres respectively. Therefore, it is important to highlight the effect that the thawing of the permafrost will have worldwide and in particular for northern European nations as well as the Pacific island countries.

2.3. Water shortages and agriculture

27. Many of the worst effects will hit those countries that have contributed least to global warming: for example, the least developing countries of Africa, South-East Asia and the Pacific islands. Not only are these countries the smallest contributors to carbon emissions, they are also the most vulnerable as they very often lack the economic, social, technical and environmental means to gain adaptive capacity.

28. It is forecast that by 2020 in Africa, between 75 and 200 million people will be exposed to an increase in water stress due to climate change. If extended to the whole world, this figure rises to between 1 and 3.5 billion people in 2080 – that is one third of the world population (data from Christian Aid).

29. Deserts will also be subject to growing pressure in the coming years: the changes in precipitation and temperature patterns will irreversibly affect water regimes, and thus worsen moisture deficits, droughts, erosion and patchiness of desert ecosystems. In this respect, it has been estimated that desertification is likely to increase by 25% by the year 2025. Indeed, even deserts fed by snow or ice, such as those of central Asia and the Andean foothills, will be affected, because the snow pack will diminish with a resultant decline in water run-off

30. Seawater intrusion into groundwater caused by sea-level rises may also further damage underground aquifers, forcing increased investments in desalination. These water shortages with their effects on agricultural and industrial potential would therefore severely affect the development potential of many areas.

31. Needless to say, for most of the least developed countries, this will lead to increased food shortages due to declining agricultural production and compromised fisheries, further aggravating the vulnerability of the local populations.

32. As far as the Pacific islands are concerned, as stated earlier, the most noticeable effect is going to be the unprecedented sea-level rise resulting in increased vulnerability for the 2 to 7 million people who will be affected, via their agricultural lands, tourism and infrastructures. Under the worst case scenario of one metre sea-level rise, studies show that flooding, erosion and intrusion of seawater into aquifers would be the likely impacts with both an economic and a social cost exceeding the possibilities of these countries. Furthermore, this scenario would be aggravated by the shifts in rainfall regimes (according to which there will be an increase in rainfall in the north-east Pacific, while the south-west will face a decrease in precipitation) and by the increase in the frequency and intensity of cyclone phenomena.

33. Therefore, for many low-lying islands, the effects of global warming would mean that their very survival is at risk, such as Tuvalu, which will probably become totally uninhabitable because of the higher sea levels.

34. Aggravation of the extreme climate in deserts and the risk of low-lying islands sinking confront us with the daunting issue of ecological refugees. According to the NGO Christian Aid, which published a report entitled “Human tide in May 2007, the real migration crisis”, if no effective measures to combat climate change are taken, in 2050 there will be one billion refugees directly due to the effects of global warming. It is hard to imagine the social and economic tensions that would stem from the displacement and relocation of one billion people on our small planet. The process has indeed already begun with ecological refugees already fleeing Tuvalu, which since 2002 has faced increasing saltwater intrusion, cyclones, droughts and coastal erosion. These people displaced for environmental reasons have been so far rejected by some neighbouring countries, such as Australia, and are compared to illegal asylum seekers. In contrast, other neighbours, notably New Zealand, have responded in a more sensible and humanitarian way.

35. For years, early intervention against the greenhouse effect was postponed by the fact that the causes were known but uncertainties still surrounded the causal link between GHG and environmental disruptions. There also remained to be established the extent of possible ecological disasters, because the climate models and projections were unreliable. Improvements in data sets and analysis were made, allowing a broader geographical coverage and a better understanding of the outstanding uncertainties. Today, however, one can talk about facts rather than climate model projections as many effects are already visible.

36. Quoting Keith Allot, Head of the World Wide Fund for Nature’s (WWF) Climate change programme, “there is no time left for procrastination. Climate change is right here, right now and it is killing people and wiping out the very biodiversity that sustains us all. The science tells us that the effects of climate change are already being felt both at a regional and global level – and it’s going to be a lot worse. This is a global emergency and we need an urgent global response … One reason that climate crisis is not being tackled with the urgency it demands is that to most people’s eyes it seems to be happening in slow motion.”

3. Action

3.1. Mitigation versus adaptation

37. Mitigation activities are used as a tool that can help to prevent or reduce the environmental, human and economic impacts of a catastrophic event. Such a concept raises the question of how climate change should be dealt with. For instance, who is to bear the burden of emission reductions, which other strategies can be put in place to reduce concentration of CO2 in the atmosphere, etc.

38. In this respect it is important to bear in mind that unmitigated climate change would, in the long term, be likely to exceed the capacity of natural and human systems to adapt. Even the most stringent mitigation efforts cannot avert further impacts of climate change in the next few decades. This makes adaptation essential, particularly in addressing near-term impacts. In fact, adaptation will be necessary to address impacts resulting from global warming which are already rendered unavoidable by past emissions.

39. Moreover, adaptation can benefit from experience gained in responding to extreme climate events, by specifically implementing proactive adaptation plans for managing the risk of climate change. However, such adaptation needs to be anticipatory otherwise its cost will increase whilst its feasibility will decrease.

40. One means of anticipating the effects of climate change can be to enhance the adaptive capacity of a country. This can be achieved by, for instance, reducing poverty, improving education and information, achieving broad and representative participation in the decision-making process and prioritising integrated responses, etc.

41. Finally, this debate on mitigation versus adaptation brings us to the question of who should bear the cost of adaptation and who should cut emissions, hence to a brief evaluation of the Kyoto Protocol and what should be done to improve its impact on the reduction of global warming.

3.2. Limitations of the Kyoto Protocol

42. The Kyoto structure, conceived in 1997, establishes a commitment for developed countries (Annex B of the Protocol) while postponing the undertakings of the least developed countries. Some considered this a great stride in setting legally binding quantified limits on GHG for each industrialised country. However, there are today many countervailing factors which suggest that this treaty, as it applies at present, fails to address the power imbalances and the historical issues.

43. Firstly, the United States, the world's worst polluter, remains the only major developed nation that has refused to ratify the protocol, arguing that the commitments on GHG reductions would damage its economy. This is a crucial impairment of the treaty's effectiveness. The recent ratification of the Kyoto Protocol by Australia, the world's biggest coal exporter, is most welcome.

44. Secondly, the Kyoto Protocol actually establishes three mechanisms to help developed countries avoid the emission reductions. The targets are balanced against the emission trading scheme, whereby the North of the world is still allowed to emit between 92% and 108% of 1992 emission levels. According to Greenpeace this will allow the North to increase its emissions by 0.3% rather than reduce them by 5.2%. Moreover, the Clean Development Mechanisms and the Joint Implementation allow for a further reduction in targets in exchange for implementing mitigation projects in, respectively, non-Annex B and Annex B countries.

45. Thirdly, many argue that the adoption of Clean Development Mechanisms aggravates the controversy over the inequality, because many of these mitigation projects are land and forestry sinks. These projects entail North baseline and political problems. On the one hand, it is difficult to measure their sequestration potential, and uncertainties still weigh on leakage issues (do forest planting and protection displace deforestation elsewhere?). On the other hand, sinks might divert attention from much-needed mitigation strategies and take land from agriculture and territorial communities, thereby reinforcing neocolonialist power structures.

46. At present, the least developed countries do not have emission reductions for several reasons that allow for their history (they are the least responsible for the present global warming), their right to development (emission reductions should not be used to hinder their development), and their lack of the technologies needed to mitigate their emissions. Nevertheless, the severe threat the earth is facing, which will most likely affect them first and worst, does also necessitate clear emission reductions for the developing countries that are expected to become the biggest polluters in the years ahead. For instance, China has ratified the Kyoto Protocol on the understanding that at present it is not bound by emission reductions. However, together with India and South Korea, it resists entirely the idea of binding targets for developing nations.

47. The least developed countries ask, in exchange for legally binding targets, for the North's undertaking to transfer the necessary technology to reduce emissions. This is another critical issue that antagonises the two sides. The developed countries resist this choice, which is unfeasible according to them (because technology is owned by the private sector) and is likely to reduce the investment in research and development.

3.3. UN Climate Change Conference, Bali, 3-14 December 2007

48. The 13th Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) and the 3rd Meeting of the Parties of the Kyoto Protocol were held in Bali, Indonesia, from 3 to 14 December 2007.

49. The conference, hosted by the Government of Indonesia, brought together more than 10 000 participants including representatives of over 180 countries together with observers from intergovernmental and non-governmental organisations and the media.

50. The Bali conference was held in the aftermath of the publication, on 17 November 2007, of the 4th Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) that confirmed the severe threat posed by climate change on our planet.

51. A first important step has been the announcement, on the first day of the conference, by Australia of its ratification of the Kyoto Protocol, which undoubtedly changed the path of negotiations. Now the United States remains the only major developed nation that has refused to ratify the protocol.

52. Against all odds and despite the participation of the Bush Administration, the outcome has been better than anyone could reasonably have expected and includes:

– agreement in principle on a 2050 target of halving emissions;

– agreement to negotiate a binding deal in 2009, when the Bush Administration will be gone, and short-term targets back on the table;

– agreement to provide assistance to developing countries for both mitigation and adaptation;

– agreement by China to pursue emissions-cutting actions that are “measurable, reportable and verifiable”.

53. Even if one can still regret that no firm short-term targets in the agreement of this round of negotiations, the conference culminated in the adoption of the Bali road map, which charts the course for a new negotiating process to be concluded by 2009 that will ultimately lead to a post-2012 international agreement on climate change.

54. Innovative decisions were taken which form core elements of the road map. They include the launch of the Adaptation Fund as well as decisions on technology transfer and on reducing emissions from deforestation.

55. For all other decisions taken at the Bali conference consult UNFCCC’s website: http://unfccc.int/2860.php.

4. Conclusions

56. The urgency of action has been reaffirmed by the report “Climate solutions: WWF’s vision for 2050”, launched on 15 May 2007, and at the UN Climate Change Conference 2007 in Bali (3-12 December 2007). It shows that it is possible to save the planet from a climate change catastrophe, but the world has just five years to do so: the major changes in the energy patterns need to be made before 2012.

57. The rapporteur refers in particular to Parliamentary Assembly Resolutions 1243 (2001) on the Kyoto Protocol on climate change: need for committed international solidarity, and 1292 (2002) on the World Summit on Sustainable Development: ten years after Rio, to Recommendation 1594 (2003) on follow-up to the World Summit on Sustainable Development: a common challenge, and to Resolution 1406 (2004) on global warming – Beyond Kyoto.

58. The comprehensive action plans for implementing the Kyoto Protocol depend on measures for reducing green-house gas emissions, on the one hand, and increasing absorption of those gases, on the other. For this purpose, it is necessary to encourage and develop the second most important instrument for combating climate change, namely the capture and storage of carbon dioxide by living matter. In this respect, the Assembly recalls its Resolution 1552 (2007) on capture of carbon dioxide as a means of fighting climate change.

59. Kyoto enforcement mechanisms should be strengthened by imposing stronger sanctions on infringing countries, by "name-shaming" after negative reports, etc., and all governments should involve themselves in the new negotiating process to be concluded by 2009 that will ultimately lead to a post-Kyoto, 2012 international agreement on climate change.

60. The Assembly should encourage the work of the Carbon Sequestration Leadership Forum, with the participation notably of the United States, to work together at promoting technologies that can reduce greenhouse gas emissions from coal power plants and produce hydrogen for use as a source of energy, particularly in the transport sector.

61. Efforts are to be stepped up to implement effective mechanisms to promote new technological processes contributing to carbon capture and the conservation of fuel resources.

62. The EU should take the lead role by harmonising energy policies and by committing itself to stricter emission reductions, at least 30% by 2020 of 1990 levels of CO2 emissions, because warming must be contained at no more than 2°C above pre-industrial temperatures.

63. Moreover, the entire world should reduce emissions by 50% by 2050, by signing a treaty for the post-2012 period. This still requires ratification by the United States of the Kyoto Protocol and the engagement in Phase II of the negotiations of the least developed countries, who will be the top emitters in the next fifty years (for example, China, India, Brazil, South Korea, etc.).

64. Furthermore, it is necessary to improve current Kyoto mechanisms, in the light of experience gained over the years. In order for emission trading to be successful, clear property rights, as well as workable accounting systems, must be established. This must overcome the intrinsic difficulties caused by the impossibility of quantifying carbon stocks and measuring emissions for each company, individual, government, etc. Intergovernmental accounting mechanisms must also be established to ensure that not only the most polluting, but also the least developed, countries are monitored for delivery of objectives.

65. It is urgent to step up efforts to reduce global green-house gas emissions and new and cost-effective processes aimed at reducing the amount of carbon dioxide released from coal-fired power plants should be developed. Innovative solutions are needed for the commercial production and use of clean energy for electricity generation as well as fuel for industry and transport. Further research in areas such as carbon sequestration, hydrogen production and storage, biomass conversion, advanced gasification, clean fuel technologies, and gas cleaning technologies must be supported.

66. In addition to governments, all actors must be involved at every level in the fight against climate change: NGOs, civil society, local and regional authorities, international corporations and financial groups, etc.

67. Some degree of direct foreign investment and technology transfer should take place, on "favourable terms" (for example, through joint ventures and public funding), in the Clean Development Mechanisms scheme, in order to involve the most disadvantaged countries in emission reduction targets.

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NB: The names of those members present at the meeting are printed in bold.

See 4th Sitting, 22 January 2008 (adoption of the draft recommendation, as amended); and Recommendation 1823.