



## Foreword

The year 2007 could perhaps accurately be described as the year when climate change finally received the attention that this challenge deserves globally. Much of the information and knowledge that was created in this field during the year was the result of the findings of the Fourth Assessment Report (AR4) of the Intergovernmental Panel on Climate Change (IPCC), which were disseminated on a large scale and reported extensively by the media. This was the result not only of a heightened interest on the part of the public on various aspects of climate change, but also because the IPCC itself proactively attempted to spread the findings of its AR4 to the public at large.

The interest generated on the scientific realities of climate change was further enhanced by the award of the Nobel Peace Prize to the IPCC and former Vice President of the US, Al Gore. By taking this decision in favour of a leader who has done a great deal to create awareness on climate change, and a body that assesses all scientific aspects of climate change and disseminates the result of its findings, the Norwegian Nobel Committee has clearly drawn the link between climate change and peace in the world.

There are several reasons why unmitigated climate change can be considered as a potential source of conflict and disruption of peace. The impacts of climate change are varied and can become serious unless effective steps are taken to stabilize the earth's atmosphere and the consequent changes in climate that would occur in the absence of such actions. Firstly, there is now adequate evidence to show that several extreme events are becoming more frequent and more intense. These include extreme precipitation events, heat waves, floods as well as droughts. Impacts of climate change include sea level rise which threatens several low lying islands as well as coastal areas. Melting of ice bodies such as glaciers across the globe and impacts on human health as well as on biodiversity are also projected to become much more serious over time. Climate change can also cause irreversible changes such as a threat to extinction of several species. Of all those species that were assessed by the IPCC, 20 to 30 percent were seen to face the threat of extinction with temperature increases of over 1.5 to 2.5 °C. Impacts on agriculture could also be serious, and there is already some evidence of a decline in productivity and yield of some species as a result of climate change. Recent research in India shows such a trend in the case of wheat productivity.

All of this means that human society could suffer serious consequences as a result of climate change which could not only result in conflict over resources such as water, exhibiting increasing scarcity in several parts of the world, but also lead to displacement of populations linked with these factors. Particularly vulnerable are the megadeltas in Asia, which include cities like Shanghai, Dhaka and Calcutta. These are centers not only of large populations, but also substantial assets of property and infrastructure. The threat of coastal flooding can, therefore, have high magnitude impacts on these megadeltas.

The growing impacts of climate change make it essential for communities and countries to adapt to the impacts of climate change. However, these impacts and the costs of adaptation will increase disproportionately as the impacts become more severe. Hence, an essential policy that would be required for minimizing the negative impacts which would otherwise take place in the future would be to carry out effective mitigation of greenhouse gas (GHG) emissions. The IPCC has clearly brought out several measures and options by which mitigation can take place with existing technologies and methods, but these would have to be supported by appropriate policies to be put in place by governments, including agreements at the global level. Fortunately, the costs of mitigation have been assessed as being very low and the co-benefits in the form of lower levels of local pollution, higher levels of energy security, improved health etc. would make these mitigation options far more attractive than has been believed by certain sections of society which have been resistant to action.

This book serves an extremely useful purpose, because it covers several critical elements of climate change and the challenges that are thrown up by consideration of the impacts of climate change and security issues related to it. Such a volume is not only highly readable for a very wide audience, but also contains valuable information and research based analysis that would provide a valuable reservoir of knowledge to researchers and students working in this field.

New Delhi, September 2008

R. K. Pachauri  
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Resources Institute (TERI)  
Chairman, Intergovernmental Panel  
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Peace Nobel Laureate, 2007



## Foreword

International discourse on the link between declining natural resources and instability, tensions and even conflicts has reached a new and urgent level in the early 21<sup>st</sup> century.

This is in part as a result of growing understanding that on many of the sustainability indicators humanity is pushing the limits - if not pushing past the limits - on many key fronts.

UNEP's latest Global Environment Outlook-4 puts these sobering realities into sharp focus.

- In 1987, around 15 per cent of global fish stocks were classed as collapsed. GEO-4 says this has roughly doubled to 30 per cent.
- 20 years ago around a fifth of fish stocks were deemed over-exploited this has now risen to about 40 per cent.
- Land use intensity, with links to land degradation, soil erosion, water scarcity, nutrient depletion and pollution has increased. In 1987, a hectare of cropland yielded 1.8 tonnes. Now the intensity is 2.5 tonnes.
- In Latin America and the Caribbean, desertification - caused by deforestation, over grazing and inadequate irrigation - affects a quarter of the region.
- Available freshwater resources are declining; by 2025, close to two billion people are likely to live with 'absolute' water scarcity.
- Populations of freshwater vertebrates have declined on average by nearly 50 per cent since 1987 as compared with an around 30 per cent decline for terrestrial and marine species.
- About 40 per cent of big estuaries in the United States including those that link to the Gulf of Mexico and Chesapeake Bay suffer severe eutrophication - which can lead to deoxygenated 'dead zones' - because of nitrogen enrichment.
- In the Caribbean, over 60 per cent of economically important coral reefs are threatened by sediments, pollution and over-fishing.
- War and conflict has raised the number of refugees and internally displaced people in West Asia to about four million.

On top of these come the ever more worrying impacts of climate change, outlined in the 4<sup>th</sup> assessment of the Intergovernmental Panel on Climate Change (IPCC).

It is not by chance that the IPCC - jointly established by UNEP and the World Meteorological Organisation - jointly won the Nobel Peace Prize.

How indeed will the world cope with the millions of people on small islands and in low lying areas such as Bangladesh who are set to lose their land, livelihoods and their homes?

What will tens of million - if not hundreds of millions - of people in Asia, Africa and Latin America do when the glaciers melt away turning many of the world's mighty rivers into seasonal, rather all year round runs.

It is for these very reasons that climate change and security was placed in 2007 and for the first time, on the agenda on the UN Security Council.

Also why it has begun animating leading members of the military in countries such as Australia, the United States and the United Kingdom.

There is clearly an urgent need to bring more intelligence and creative solutions to the way we manage the world's ecosystems and the nature-based assets that fundamentally underpin human well-being while also investing in a new and more sustainable energy mix.

The returns, both economic and social, are potentially enormous from overcoming poverty and providing the food and livelihoods for over six billion people - shortly rising to nine billion - and at the same time delivering equity and stability to communities and countries across the globe: in short a peace policy for the new millennium.

So I welcome this *Security Handbook for the Anthropocene - Facing Global Environmental Change: Environmental, Human, Energy, Food, Health and Water Security Concepts* and its 100 peer-reviewed chapters as an eye-opener to both the challenges but also the opportunities of our age.

I hope that private foundations and donors can ensure that its important ideas, debates and essential reading find their way equally onto the library book shelves of the South as well as the nations of the North.

Nairobi, September 2008

Achim Steiner  
UN Under-Secretary General and  
Executive Director  
UN Environment Programme (UNEP)



## Foreword

This volume – *Facing Global Environmental Change: Environmental, Human, Energy, Food, Health and Water Security Concepts* – is of utmost importance for Africa. I am pleased that one of the coeditors is a Kenyan and 15 authors come from, live or worked on problems related to the challenges facing the African continent during this century.

This scientific peer-reviewed volume with 100 chapters contributes to global dialogue and learning based on topical new evidence from several disciplines and mutual respect for cultural diversity. Africa has already been severely affected by the effects of global environmental change during the 20<sup>th</sup> century due to progressing desertification, drought, famine as well as floods and heat waves that have killed and affected or forced millions of Africans to leave their homes.

This book deals in detail with these natural hazards and their often severe impacts Africa has been facing. Chapters in this book discuss the severe food insecurity and the impact of HIV/AIDS and of other pandemics on national and human health security and the need for a sustainable energy system. Problems of water security in the Nile Basin and in other parts of Africa have triggered cooperative solutions, as with the Nile Basin Initiative. In the past environmental security problems have repeatedly contributed to conflicts in Sub-Saharan Africa and they stress an urgent need for Pan-African as well as national human and environmental, water, food and health security approaches across Africa and elsewhere

The fourth IPCC Assessment Report of 2007 has stressed that climate change will have many negative impacts for the African people regarding their access to clean water, sufficient food, stable health conditions, ecosystem resources, and security of settlements. In the view of the IPCC there is also high confidence that many semi-arid areas, e.g. in North and Southern Africa will become severely water-stressed, and by 2020, between 75 and 250 million people are projected to experience increased water stress.

Climate change will not only affect food security, but also exacerbate malnutrition. By 2020, in some African countries, yields from rain-fed agriculture could be reduced by up to 50 per cent. Agricultural production and access to food will be severely compromised. Africa is also likely to be strongly affected by climate change, because of its limited adaptive capacity to projected climate change impacts. Furthermore, several African mega-deltas, due to large populations and high exposure to sea level rise, storm surges, and river flooding will also suffer from the impacts of global environmental and climate change to which Africans have historically contributed little.

This huge volume of excellent scholarship from all parts of the world helps to sensitize policy makers but also a young generation of professors and students globally but specifically in the most affected countries in the South for the need for proactive and cooperative action and for a global science partnership to reduce the worst impacts of the projected trends in business as usual strategies.

This book deserves many readers in all parts of the world, but especially in those countries where university and research libraries are unable to afford such references books. It is my sincere hope that this high-quality and multidisciplinary study and reference book and its key messages will be made available with the support of private foundations and public donors to the young generation in the global South that will face these challenges to their security in the 21<sup>st</sup> century. I wish the book-aid project success for the benefit of university libraries and research institutes and their readers in Africa, Asia and Latin America.

New York, September 2008

Ambassador Prof. Dr. Joy Ogwu  
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United Nations  
New York, NY



## Foreword

The title of this volume - *Facing Global Environmental Change: Environmental, Human, Energy, Food, Health and Water Security Concepts* - sums up many of the dilemmas and challenges facing policy-makers today. First, environmental change is global; no part of the world is spared. Second, we have to face change now; ignoring the challenge is not an option if our children are to thrive. Third, in an increasingly connected world, security is more than just the absence of war; it depends on diverse, but linked - indeed, often competing - factors such as political, social, economic, and environmental interests. Central to these, as the title of this book suggests, is the environment.

As a large and economically powerful union, the EU enjoys economies of scale. These can be exploited to address environmental threats - at local, national, and Union levels. It is sobering to recall, however, that even the enlarged EU is not autonomous and that the health of the European environment also depends on policies and practices in other parts of the world. Nowhere is this more evident than with climate change. Changes and challenges are now global, and thus our policy responses must be global too. Our security is indivisible, but our responses remain all too clearly fractured and divided.

Second, the concept of 'sustainable development' shows that time is a crucial factor in environmental security. The future can only be secured insofar as we act responsibly now; prevarication will have costs which future generations will pay. This implies urgent choices now. Fortunately, the developing science of costing environmental goods and services suggests that taking action on the environment not only has costs, but also has significant short- to medium-term financial and other benefits. Nonetheless, questions remain as to when best to take action and how such action can accommodate political and economic timetables.

Third, the environment is indeed a key component of modern security. Environmental degradation may destabilize societies by reducing economic opportunity. Degraded environments can be breeding grounds for other social ills, such as impaired human health or declining social cohesion. Developing countries with populations directly dependent on environmental resources are also particularly vulnerable to conflict over access to limited or declining resources. Environment is thus central to modern security, but also needs to be integrated with other factors such as energy, mobility, and food requirements. The question for policy-makers is how, in practical terms, to align these diverse interests.

Since the end of the Cold War, the security debate has changed fundamentally. A study which addresses the new challenges and suggests responses will therefore be a welcome addition to the policy-maker's toolkit. For this reason, I warmly welcome this volume.

A handwritten signature in dark ink, appearing to read 'Stavros Dimas'.

Brussels, September 2008

**Stavros Dimas**  
**Commissioner for the**  
**Environment, European Union**