



Victims of floods in Pakistan walk through water-filled streets in Nowshera.  
Source: UN Photo/WFP/  
Amjad Jamal.





# CLIMATE BASICS

“Climate” means average weather conditions, usually over a period of 30 years.<sup>356</sup> “Climate change” is the altering of these conditions. Humanity is extraordinarily sensitive to climate, and civilization might not have emerged without the warm, stable weather conditions that have prevailed since the end of the last ice age more than 10,000 years ago. That stability has collapsed over the last few decades, and now weather conditions are spiralling out of control. If we do not take action now to stop climate change, destructive weather will bring devastation capable of forever destroying much of our planet and the life it supports.

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## THE CONSENSUS

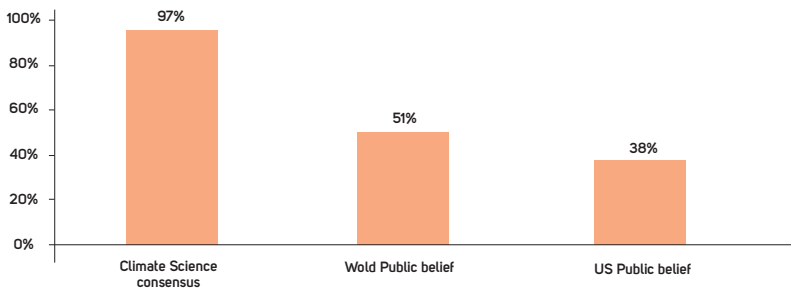
Climate change, in particular global warming, is an indisputable fact.<sup>357</sup> Scientists overwhelmingly agree that pollution is the main cause of this change.<sup>358</sup>

Recent study has shown that there is scientific consensus on climate change among more than 97% of experts actively publishing on the topic.<sup>359</sup> Other studies have revealed no trace of climate denial in hundreds of

mainstream scientific articles.<sup>360</sup> Such a high level of agreement among specialists is equal to the scientific consensus supporting the understanding that smoking is a risk factor for lung cancer.<sup>361</sup>

The Intergovernmental Panel on Climate Change (IPCC) – the world’s leading authority on the issue – pooled the work of more than 2,000 experts in its last major report in 2007.

### ARE SCIENTIST IN AGREEMENT?



Source: World Bank, world Development Report 2010: Development and Climate Change

A handful of errors recently uncovered from among the vast quantities of information covered in the report have not put the Panel's main findings into question. Discussions on how to reform the IPCC's working methods are ongoing. And prominent critics have found the IPCC's conclusions conservative or accurate in varying degrees.<sup>362</sup>

The most authoritative academic bodies from around the world all support the IPCC and the basic consensus on climate change.<sup>363</sup> In 2001, the Bush Administration asked the US National Academy of Sciences to examine the question, and it responded in clear support of the prevailing consensus.<sup>364</sup> As The Royal Society in the UK pointed out, those who disagree with the consensus on climate change have failed to put forward any competing models.<sup>365</sup>

And yet the consensus among specialists contrasts starkly with the opinion of the general

public. Only half of the world's population, and as little as 38% of the US population (depending on the study used), believes scientists are in consensus.<sup>366</sup>

The complexity of the subject is partially to blame. Mainstream media may also be contributing to the public's lack of awareness about climate change. Most people form their opinions about science through debate in the media. But the principle of "balanced reporting" automatically gives disproportionate emphasis to climate scepticism out of fairness to a side of the argument that no longer exists.<sup>367</sup>

The serious discord between science and the general public is a travesty given how important public opinion is in mobilizing the type of political action so desperately needed to tackle climate change today.

## THE CAUSES

The well-known greenhouse effect is a perfectly natural characteristic of our planet that sustains life. Gases such as water vapour, CO<sub>2</sub>, methane, and others cover the earth's surface closely like a blanket, slowing the escape of heat into the boundlessly freezing universe outside of the planet's atmosphere. Without this "blanket" the planet's average surface temperature (now 14 degrees Celsius or 57 degrees Fahrenheit) would be 30 degrees Celsius or 60 degrees Fahrenheit colder.<sup>358</sup>

If our climate were stable, the planet would see no real loss or gain of heat into outer space over the course of a year. But we are in imbalance, with slightly more heat entering earth (from the sun) every year than is leaving it.<sup>369</sup>

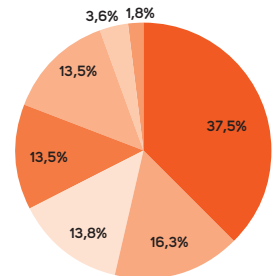
This global warming is happening because we are creating more heat-trapping greenhouse gases than in the past. We do so because the basic activities of human society -- from energy production, transport, and industry to deforestation -- all produce greenhouse gases.<sup>370</sup>

More greenhouse gases mean a stronger greenhouse effect, with less heat escaping back into outer space, and a hotter planet.

According to records of the last 400,000 years of the earth's past, every major peak or trough in temperature has been accompanied by a peak or trough in greenhouse gases such as CO<sub>2</sub>.<sup>371</sup> Today's CO<sub>2</sub> levels exceed anything seen over this time.<sup>372</sup>

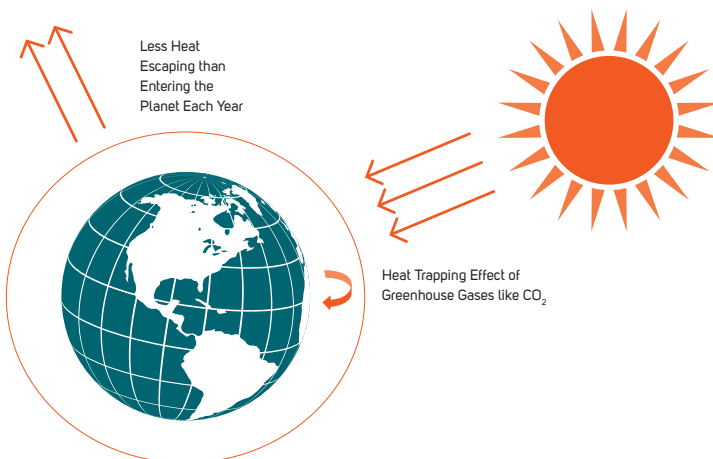
### SOURCE OF GREENHOUSE GAS EMISSIONS

Emissions from Human Activities - CO<sub>2</sub> equivalent, 2000



- Electricity, heat and other energy
- Net deforestation
- Industry
- Transportation
- Agriculture
- Waste
- Other land-use changes

Source: World Resources Institute



# THE CHANGES

Our earth has warmed by roughly 0.8 degrees Celsius or 1.4 degrees Fahrenheit since the industrial revolution, when serious levels of pollution began. CO<sub>2</sub> levels have grown by more than 30% since that time and continue to grow every year.<sup>373</sup>

But most of the change has taken place since the 1970 and 80s. The last three decades are clearly the hottest on record since 1850.<sup>374</sup> And of the 20 hottest years on record, only three were before the 1990s (they were in the 1980s).<sup>375</sup>

The heating up of the atmosphere is causing a variety of other major environmental changes, such as warmer oceans and widespread melting of glaciers and ice. Since 1980, all of the world's glaciers have either been in long-term retreat or have disappeared.<sup>376</sup>

The melting of ice and the heating up of the earth's oceans -- which expand as they warm -- contribute to a rise in global sea-levels. And sea-level rise has doubled in speed over just the last few decades.<sup>377</sup>

We see shocking evidence of change in the Arctic. Most of the Arctic is ocean. In 1980, Arctic ice covered a minimum area of 7 million square kilometres, or around 3 million square miles, of that ocean during the height of summer. By 2007, that area had halved to just 3.5 million square kilometres, or less than 1.5 million square miles.<sup>378</sup>

The Arctic region, when defined as an area of consistently cold temperatures, has actually been retreating toward the North Pole at a rate of some 35 miles or 56 kilometres per decade over the last 30 years.<sup>379</sup>

Many of these changes are self-reinforcing, establishing a vicious cycle that will continue to accelerate climate change. In the Arctic, for instance, less sea ice means less heat reflected back into space, and warmer oceans absorb less heat and CO<sub>2</sub>, leaving more of both in the atmosphere. Worse still, as the Arctic region shrinks, otherwise permanently frozen land (permafrost) on its margins could release up to a billion tons of greenhouse gases per year as it thaws (or some 3% of today's global emissions).<sup>380</sup>

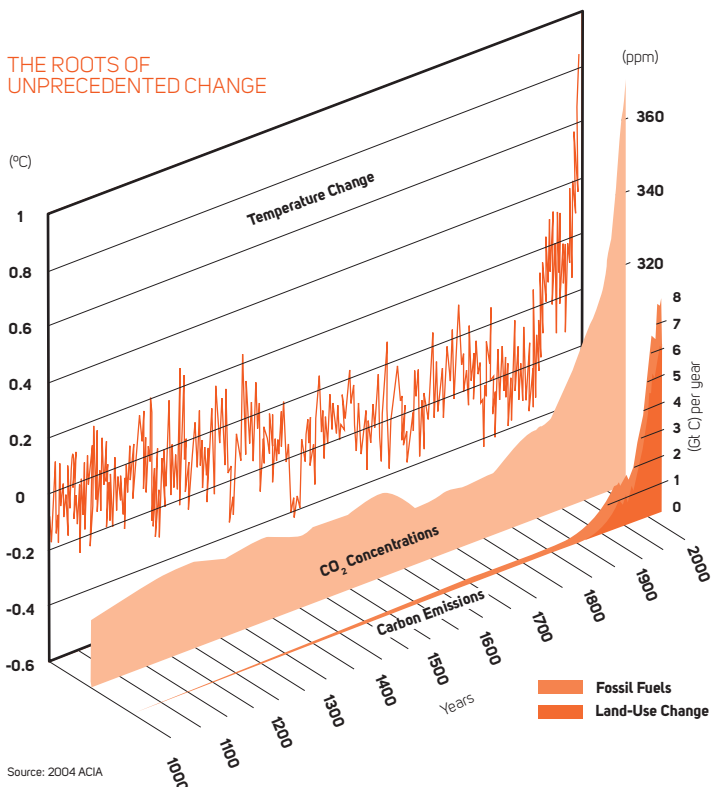
Not all changes are felt the same everywhere. Rainfall, for instance, is increasing due to higher temperatures, which cause moisture to evaporate faster.<sup>381</sup> But while northern parts

of America, Asia and Europe, as well as much of South America have experienced increases in rain, areas of Africa, the Mediterranean, and Asia have seen rainfall drop as weather patterns shift.<sup>382</sup>

Other effects include more hot days and nights, more heat waves and heavy rain, more flooding and more drought.<sup>383</sup>

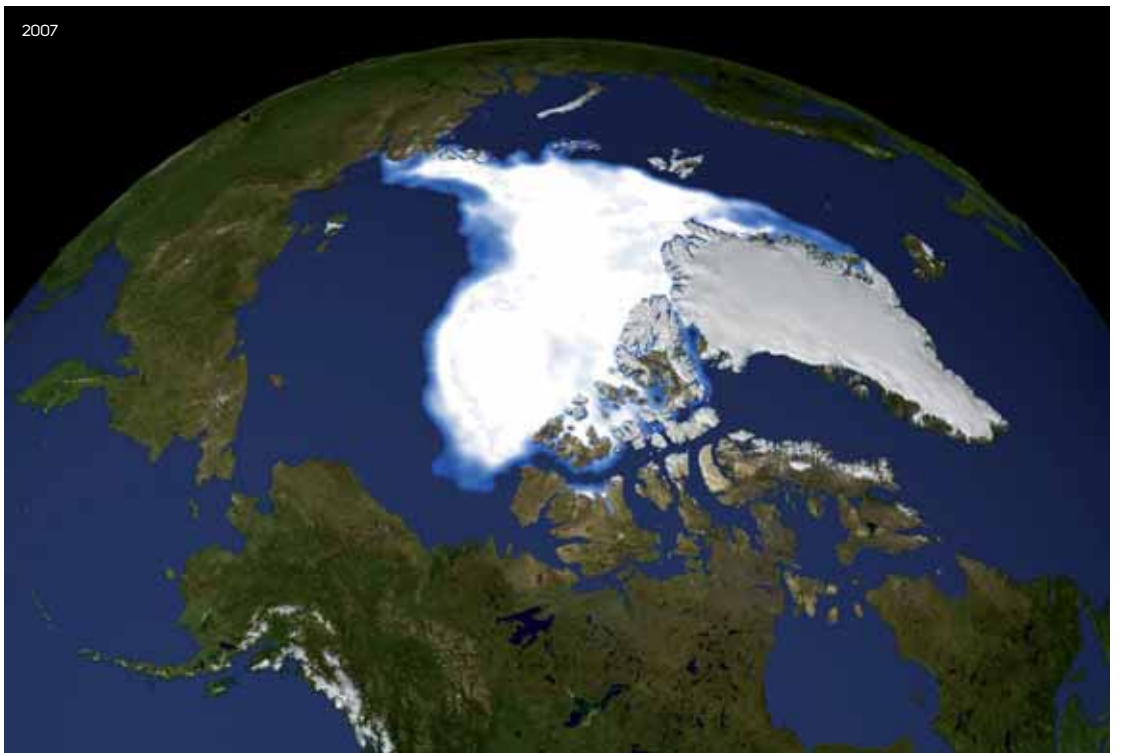
All of these changes have profound effects on plant and animal life, including significant adverse effects on biodiversity (such as species extinctions) and, of course, on human populations, which is a key topic of this report.<sup>384</sup>

## THE ROOTS OF UNPRECEDENTED CHANGE



Source: 2004 ACIA





Source: NASA

## THE MOMENTUM

None of these changes shows any sign of slowing. Quite the opposite: One of the largest ever symposiums on climate science, held in Copenhagen in March 2009, concluded that, in most areas, change was happening at the upper estimates or faster than foreseen by scientists only two years earlier.<sup>385</sup>

Greenhouse gases, rises in average temperatures and sea-levels, disappearing ice and glaciers, and other indicators of change far exceed anything seen over much of the last million years of life on earth.<sup>386</sup> And much of that change has occurred over the last 30 years.<sup>387</sup>

Temperature fluctuations have occurred over the past millennia, but civilization emerged during a period of relative stability in climate.<sup>388</sup>

While a stable climate has allowed life on earth to flourish, an unstable climate can have the opposite effect. Increasingly, rapid change is outstripping the ability of the environment, animal life, and human society to naturally adapt. Plant and animal species rendered extinct will not return. And many of the effects of an unstable climate are compounded by factors such as population growth and increasing consumer consumption, which already strain the planet's ability to support some 7 billion people and counting.

It's important to note that there is a long delay between any increase or decrease in greenhouse gases and a corresponding warming or cooling effect on the planet. This is mainly because the earth's oceans absorb heat but only release it back into the atmosphere over a series of decades. So continued production of greenhouse gases doesn't just mean a warmer planet today, but a continuous heating up of our planet for years to come.

There is currently enough heat in the oceans to cause an additional 0.6 degrees Celsius or one degree Fahrenheit of warming over the next decades even if we were to stop emitting greenhouse gases today.<sup>389</sup> That means 1.4 degrees Celsius or 2.5 degrees Fahrenheit of warming is already unavoidable and something we must accept.<sup>390</sup> Depending on the amount of pollution we continue to release, we could well reach that temperature by 2030.<sup>391</sup> This fact not only underscores the necessity of acting well in advance to reduce emissions but also compels us to prepare for the far greater impacts of climate change that will hit us during the coming 20 years.

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## THE WINDOW OF OPPORTUNITY

The international community has agreed that 2 degrees Celsius or 3.6 degrees Fahrenheit of warming above pre-industrial levels is a threshold we must not exceed.<sup>392</sup> There are legitimate fears that over-passing that level could cause irreversible changes to the earth's climate -- termed "runaway climate change" -- that feed back into themselves in a self-perpetuating cycle of warming no longer stoppable by emission reductions.<sup>393</sup> Even at that level however, we could see the extinction of 30% of the planet's species, the disappearance of the world's coral reefs, and severe water shortages and hunger for hundreds of millions of people.<sup>394</sup>

Greenhouse gases are measured in parts per million (ppm). They amount to about 390 ppm today and are growing at roughly 2 ppm per year.<sup>395</sup> The IPCC recommends limiting greenhouse gas concentrations to 400 ppm in

order to avoid 2-2.4 degrees Celsius or 3.6-4.3 degrees Fahrenheit of warming. That would mean halting all emissions in a matter of just a few years, which is unrealistic given that emissions currently grow at a rate of around 3% per year.<sup>396</sup>

But if we delay action until after 2020, we will be faced with having to make enormous emission reductions of 5% per year just to have a chance at keeping to the internationally recognized safety threshold.<sup>397</sup>

Decisive and comprehensive action must begin now. If not, massive costs linked both to hasty emission reductions and/or colossal and irreversible impacts of climate change will be inevitable. The costs of climate change in human, economic, and environmental terms as outlined in this report are only a shadow of what humanity will face in the years to come.



Hurricane Dennis batters palm trees and floods parts of Naval Air Station Key West's Truman Annex in the United States. Source: U.S. Navy/Jim Brooks.



# RESEARCH GAPS

Important research gaps limit our understanding of the impact of climate change on human society. That equally limits the effectiveness of our response to counteracting its negative effects, as well as our understanding of the true extent of the climate crisis. Significant resources should be channelled urgently into addressing these and other key shortcomings in our understanding of climate vulnerability

## THE MONITOR QUANTIFICATION/ ATTRIBUTION ISSUES

Quantitatively attributing impacts to climate change will be of vital importance to preparing any response that seeks to address the added stresses triggered by global warming. Such quantifications are particularly weak in the area of extreme weather, especially tropical cyclones, where scientists still disagree on the extent of the observed intensification effect on major storms, especially in the North Atlantic. Quantification must go far beyond measures of changes in the actual physical effects -- such as storm intensity, frequency, or spatial occurrence variations -- to a more comprehensive understanding of the socio-economic and human effects that result from such changes, in particular as relates to possible threshold breaching or tipping-points when communities become overwhelmed as a result of just small excess pressures. The impact of climate change on marine fisheries is another major area of concern lacking any clear scientific quantification scenarios. Several other such areas are mentioned below under "Information Gaps".

## INFORMATION GAPS

Inadequate understanding of the impact dynamics of climate change on a number of key phenomenon with known climate sensitivities (negative and positive) require more thorough enquiry, including:

- Freshwater fisheries
- Habitat degradation to Arctic, alpine and high-latitude communities
- The full spectrum of climate-sensitive diseases, including in particular infection rates/morbidity and other infection dynamics
- Hail
- Mudslides (mass movement - wet)
- In the field of development: access to education, sanitation, and energy or school participation rates
- International trade
- Political stability
- Conflict
- Migration and displacement
- Service or industry sectors of the economy, such as transport, tourism, textiles, energy, brewing, plastics, and many other business fields potentially affected especially by pass-on effects of climate change

## DATA

The Monitor relies on internationally standardized data sets. The lack of standardized disaster and impact accounting -- in particular, inconsistencies, socio-economic or cultural differences in reporting of disaster events, the number of affected people/people in need of emergency assistance, injuries, damage costs, and losses -- greatly limit comparability across the board. There is an urgent need to harmonize reporting and maintain stringent gathering and coverage of such information according to international standards. In other cases, data is reasonably reliable but irregularly updated, such as the comprehensive World Health Organization's Global Burden of Disease Database (WHO). Some data in authoritative databases, such as CRED EM-DAT have likely inaccuracies. Several countries have been entirely excluded from the Climate Vulnerability Monitor because of gaps across almost every impact area, something that particularly affects very small countries and small island developing states.

## SPATIAL SCALE

Information on sub-national scales varies hugely from country to country. Governments should prioritize national assessments of vulnerability down to the community scale, where impacts actually play out on society.

## CLIMATE INFORMATION

Climate models vary enormously in their prediction of different mainstay climate effects, such as changes in rainfall or temperature over all time horizons, short, medium and longer term. More detailed information is needed about the way in which water vapour -- the main greenhouse gas -- behaves in the atmosphere under external climate forcing from non-natural sources. Further research should be devoted to improving understanding of the behaviour of water vapour and other key climate parameters in order to reduce uncertainty in models and improve advance planning. Another limitation is a major gap in ground-level climate information in low-income countries around the world, in particular in Africa. Filling the persisting ground-level data gaps via the widespread installation of meteorological/hydrological monitoring equipment, in particular in Africa, would be a crucial contribution to enhancing the bases of climate information.

## ADAPTATION PERFORMANCE REVIEW POLICY EVALUATION

Currently no adequate theory exists that allows us to effectively measure the success of policy-making and adaptation efforts.

### EVIDENCE BASE

The evidence base for the effectiveness of a number of key adaptive measures is very limited, and not all adaptive measures presently have cost-benefit or cost-effectiveness measures.

### MONETARY AND NON-MONETARY VALUE

Greater emphasis could be given to both the monetary and the non-monetary value of adaptation policies and/or characteristics of adaptive capacity/resilience of communities, including social safety nets, community support networks, and other societal resources that improve the ability of populations to cope with shocks and changes in the climate.

### BACKGROUND

An analytical undertaking such as the one conducted here, based on primary research sources and climate models, is by necessity limited by the underlying data and research. Furthermore, the Climate Vulnerability Monitor is also dependent on climate models such as the FUND model and the DIVA model. A disciplined effort has gone into ensuring that the best available research and data have been used and that only the most respected climate scientists have been referenced. The aim is to continuously improve the Monitor to make it ever more relevant to policy-makers in the context of evolving understanding of the impact of climate change on human society.



Member of a programme offering new farming techniques and inputs such as improved seeds and alternative drought-resistant crop varieties in Madagascar. Source: Tomas de Mul/IRIN.

# ACKNOWLEDGMENTS

## ROSS MOUNTAIN, DIRECTOR GENERAL OF DARA

I would like to express my sincere thanks on behalf of DARA and its Board of Trustees, in particular to the many experts and concerned individuals without whose personal engagement amid extremely busy schedules this important project would not have been brought to fruition in 2010.

The Climate Vulnerability Monitor has been developed as a core part of the Climate Vulnerability Initiative partnership between DARA and the Climate Vulnerable Forum through its founder, the Republic of the Maldives. President Mohamed Nasheed founded the Climate Vulnerable Forum in 2009 to highlight the urgent concerns and hopes of the most vulnerable communities around the world. The support provided by the Maldives has been key in providing focus guidance and in engaging many important stakeholders in the development of the Monitor. Our warm thanks go to the Maldives Ministries of Foreign Affairs and of the Environment and to the Office of the President. Special thanks go to Minister Ahmed Shaheed, Minister of State Ahmed Naseem, Aminath Shauna, Paul Roberts, Deputy Minister Hawla Didi, Iruthisham Adam, Abdul Ghafoor Mohamed, Thilmeeza Hussain, Ahmed Shiaan, Amin Javed Faizal, Rose Richter, Fathimath Inaya, and Mariyam Midhfa Naeem. We are also most grateful to President Anote Tong of Kiribati and Foreign Secretary Tessie Lambourne, as well as to Foreign Secretary Mohamed Quayes, Mohammad Khastagir, Tareq Ahmed, and Faiyaz Murshid Kazi of Bangladesh.

Other members of the Climate Vulnerable Forum endorsed and encouraged this effort at their high-level meeting in New York on 19 September 2010, where it was decided the report should serve as a reference for advocacy and promoting policy development in the area of climate vulnerability. Attendees to the September meeting included senior representatives of Antigua and Barbuda, Bangladesh, Costa Rica, Kiribati, Grenada, Maldives, Marshall Islands, Nepal, Philippines, St. Lucia, Solomon Islands, Timor-Leste, and Samoa, who joined earlier signatories to the 2009 Climate Vulnerable Forum Declaration -- Barbados, Bhutan, Ghana, Kenya, Maldives, Rwanda, Tanzania, and Vietnam.

The guidance and insight provided by the Advisory Panel was invaluable. Its members, Mary Chinery-Hesse, Helen Clark, Jan Eliasson, José María Figueres Olsen, Saleemul Huq, Yolanda

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In a field of expertise with still many uncertainties, the Peer Review Committee worked to ensure that the data presented in this document is based on a solid methodology. The detailed and prompt feedback received was indispensable for the robustness of the analysis achieved, and we are indebted to its members: Yasemin Aysan, Suruchi Bhadwal, Manuel Carballo, Diarmid Campbell-Lendrum, Ian Christoplos, Pierre Encontre, Anne Hammill, Juergen Kropp, Marc Levy, Bo Lim, Urs Luterbacher, Pascal Peduzzi, Hansjoerg Strohmeyer, and Farhana Yamin.

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Particular thanks is also owed to the following groups.



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#### Data Providers:

- World Health Organization (WHO)
- Centre for Research on the Epidemiology of Disasters (CRED) Emergency Events Database (EM-DAT)
- GermanWatch / MunichRe NatCatSERVICE
- Population, Landscape, and Climate Estimates (PLACE-II) / Center for International Earth Science Information Network (CIESIN) of Columbia University
- Dynamic and Interactive Vulnerability Assessment (DIVA) of the Potsdam Institute for Climate Impact Research (PIK)
- Climate Framework for Uncertainty, Negotiation and Distribution (FUND) model of Richard S. Tol and David Anthoff
- World Resources Institute (WRI) Database, Fisheries Exports
- World Bank 2008 for Gross Domestic Product (Purchasing Power Parity)

The report would not have been possible without the analytical expertise and dedicated work of Commons Consultants, the main research and production partner of DARA in this effort, a team led by Søren Peter Andreasen and including Jakob Mathias Wichmann, Peter Utzon Berg, Anne-Mette Steinmeier and Andreas Clemmensen and which was responsible in particular for developing the quantitative foundations of the report and contributing to its research base and substantive content.

DARA's role as developer of the report whereby it alone carries the ultimate responsibility for the content of the document was carried out together with Steering Group Co-Chair Marc Limon of the Maldives Mission in Geneva, who has my many thanks. Responsibility for the editorial content of the Monitor has been skillfully exercised by Matthew McKinnon, who is also Coordinator of the overall Climate Vulnerability Initiative. Lucía Fernández was also instrumental in bringing the project to fruition. Other DARA staff members involved at different stages were Belén Camacho, Belén Díaz, Fiona Guy, Daniela Mamone, Rebecca Moy, Amalia Navarro, Riccardo Polastro, Soledad Posada, Daniela Ruegenberg, Nicolai Steen, Philip Tamminga, Geeta Uhl, Susana Vicario, and Nacho Wilhelm.

This report could not have been realized without the generous support of DARA's President Diego Hidalgo and the enthusiastic engagement of DARA Trustee José María Figueres as well as the wholehearted support of the other members of DARA's Board of Trustees, Aldo Ajello, Emma Bonino, Jan Eliasson, Beatriz Iraburu, Juliet Pierce, and José Manuel Romero.

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# PARTNERS

The Climate Vulnerability Monitor benefits from the collaboration of its two lead partners, DARA and the Climate Vulnerable Forum at the core of the Climate Vulnerability Initiative. DARA brings specialist expertise and independent objectivity to the endeavour, building on its experience as a critical evaluator of development and humanitarian aid effectiveness. The Climate Vulnerable Forum and its members, particularly its initiating chair (the Maldives), have contributed prescient thought leadership to the project, as well as expertise from inside the climate frontlines.

## DARA

DARA is an independent international organization committed to improving the quality and effectiveness of aid for vulnerable populations suffering from conflict, disasters, and climate change. It carries out this mandate through research, evaluations, and knowledge sharing. DARA was founded with the compelling vision of Silvia Hidalgo to enhance the impact of international assistance for the benefit of the most vulnerable of the world's groups. DARA created the Humanitarian Response Index, which is the premier evaluation tool for donor effectiveness in humanitarian assistance.

## BOARD OF TRUSTEES

- Diego Hidalgo (Chairman)
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## CLIMATE VULNERABLE FORUM

The Climate Vulnerable Forum convenes governments from Africa, Asia, the Americas, and the Pacific, representing some of the countries most vulnerable to the adverse impacts of climate change. The Forum first convened in the Maldives in November 2009 and adopted a declaration that expressed alarm at the pace of change to the Earth caused by climate change and committed to demonstrating leadership aimed at tackling what for some nations is becoming an existential challenge. The Climate Vulnerable Forum brings to the Monitor its strategic leadership engagement and facilitates access to key expertise.

## COMMONS CONSULTANTS

Commons Consultants are the principal research and production partner of the Climate Vulnerability Initiative involved in the development of the Monitor. Commons Consultants is a management consulting and research firm with expertise in policy analysis and strategy development. Its focus industries are energy and environment, climate change, health, and responsible financial services.

# DECLARATION OF THE CLIMATE VULNERABLE FORUM

*We, Heads of State, Ministers and representatives of Government from Africa, Asia, Caribbean and the Pacific, representing some of the countries most vulnerable to the adverse impacts of climate change:*

*Alarmed at the pace of change to our Earth caused by human-induced climate change, including accelerating melting and loss of ice from Antarctica, Greenland, the Himalayas, Mount Kilimanjaro and Mount Kenya, acidification of the world's oceans due to rising CO<sub>2</sub> concentrations, increasingly intense tropical cyclones, more damaging and intense drought and floods, including Glacial Lakes Outburst Floods, in many regions and higher levels of sea-level rise than estimated just a few years ago, risks changing the face of the planet and threatening coastal cities, low lying areas, mountainous regions and vulnerable countries the world over;*

*Asserting that anthropogenic climate change poses an existential threat to our nations, our cultures and to our way of life, and thereby undermines the internationally-protected human rights of our people – including the right to sustainable development, right to life, the right to self-determination and the right of a people not to be deprived of its own means of subsistence, as well as principles of international law that oblige all states to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction;*

*Conscious that while our nations lie at the climate front-line and will disproportionately feel the impacts of global warming, in the end climate change will threaten the sustainable development and, ultimately, the survival of all States and peoples – the fate of the most vulnerable will be the fate of the world; and convinced that our acute vulnerability not only allows us to perceive the threat of climate change more clearly than others, but also provides us with the clarity of vision to understand the steps that must be taken to protect the Earth's climate system and the determination to see the job done;*

*Recalling that the UNFCCC is the primary international, intergovernmental forum for negotiating the global response to climate change;*

*Desirous of building upon the commitment of leaders at the recent United Nations High-Level Summit on Climate Change in New York in addressing the needs of those countries most vulnerable to the impacts of climate change as well as other political commitments, including the AOSIS Declaration and the African Common Position;*

*Underlining the urgency of concluding an ambitious, fair and effective global legal agreement at COP15 in Copenhagen;*

*Gravely concerned at reports of a downgrading of expectations for COP15 and calling therefore for a redoubling of efforts – including through the attendance in Copenhagen, at Head of State- or Head of Government-level, of all States, and especially of major industrialised nations and all major emerging economies;*

*Emphasising that developed countries bear the overwhelming historic responsibility for causing anthropogenic climate change and must therefore take the lead in responding to the challenge across all four building blocks of an enhanced international climate change regime – namely mitigation, adaptation, technology and finance – that builds-upon the UNFCCC and its Kyoto Protocol;*

*Taking account of their historic responsibility as well as the need to secure climate justice for the world's poorest and most vulnerable communities, developed countries must commit to legally-binding and ambitious emission reduction targets consistent with limiting global average surface warming to well below 1.5 degrees Celsius above pre-industrial levels and long-term stabilisation of atmospheric greenhouse gas concentrations at well below 350ppm, and that to achieve this the agreement at COP15 UNFCCC should include a goal of peaking global emissions by 2015 with a sharp decline thereafter towards a global reduction of 85% by 2050;*

*Emphasising that protecting the climate system is the common responsibility of all humankind, that the Earth's climate system has a limited capacity to absorb greenhouse gas emissions, and that action is required by all countries on the basis of common but differentiated responsibilities, respective capabilities, and the precautionary principle; Underscoring that maintaining carbon-intensive*



*modes of production established in 19th Century Europe will incur enormous social and economic cost in the medium- and long-term, whereas shifting to a carbon-neutral future based on green technology and low-carbon energy creates wealth, jobs, new economic opportunities, and local co-benefits in terms of health and reduced pollution;*

*Convinced that those countries which take the lead in embracing this future will be the winners of the 21st Century;*

*Expressing our determination, as vulnerable States, to demonstrate leadership on climate change by leading the world into the low-carbon and ultimately carbon-neutral economy, but recognising that we cannot achieve this goal on our own;*

*Now therefore,*

*Declare our determination, as low-emitting countries that are acutely vulnerable to climate change, to show moral leadership on climate change through actions as well as words, by acting now to commence greening our economies as our contribution towards achieving carbon neutrality,*

*Affirm that this will enhance the objectives of achieving sustainable development, reducing poverty and attaining the internationally agreed development goals including the Millennium Development Goals,*

*Call upon all other countries to follow the moral leadership shown by the Republic of Maldives by voluntarily committing to achieving carbon-neutrality,*

*Assert that the achievement of carbon neutrality by developing countries will be extremely difficult given their lack of resources and capacity and pressing adaptation challenges, without external financial, technological and capability-building support from developed countries,*

*Declare that, irrespective of the effectiveness of mitigation actions, significant adverse changes in the global climate are now inevitable and are already taking place, and thus Parties to the UNFCCC must also include, in the COP15 outcome document, an ambitious agreement on adaptation finance which should prioritise the needs of the most vulnerable countries, especially in the near-term,*

*Call upon developed countries to provide public money amounting to at least 1.5% of their gross domestic product, in addition to innovative sources of finance, annually by 2015 to assist developing countries make their transition to a climate resilient low-carbon economy. This grant-based finance must be predictable, sustainable, transparent, new and additional – on top of developed country commitments to deliver 0.7% of their Gross National Income as Overseas Development Assistance,*

*Underline that financing for mitigation and adaptation, under the authority of the Conference of Parties to the UNFCCC, should be on the basis of direct access to implement country-led national Low-Carbon Development Plans and Climate Resilient Development Strategies, and the process to allocate and deliver the finance must be accessible, transparent, consensual, accountable, results-orientated and should prioritise the needs of the most vulnerable countries,*

*Further underline that fundamental principles and issues relating to the survival of peoples and preservation of sovereign rights are non-negotiable, and should be embedded in the Copenhagen legal agreement,*

*Call on Parties to the UNFCCC to also consider and address the health, human rights and security implications of climate change, including the need to prepare communities for relocation, to protect persons displaced across borders due to climate change-related impacts, and the need to create a legal framework to protect the human rights of those left stateless as a result of climate change,*

*Invite other vulnerable countries to endorse this Declaration,*

*Decide to hold a second meeting of the Climate Vulnerable Forum in Kiribati in 2010 to take forward this initiative, to further raise awareness of the vulnerabilities and actions of vulnerable countries to combat climate change, and to amplify their voice in international negotiations. In this context, request support from the UN system to assist the most vulnerable developing countries take action in pursuit of this Declaration.*

*Adopted in Male', Maldives,  
10th November 2009*

*Bangladesh, Barbados, Bhutan, Ghana,  
Kenya, Kiribati, Maldives, Nepal, Rwanda,  
Tanzania, Vietnam*



A girl attempting to fill containers with tricking water from a tap near an artesian well outside Yemen's capital, Sanaa. Source: Adel Yahya/IRIN.

# GLOSSARY

## ADAPTATION

In this report, adaptation refers to individual or governmental actions to reduce adverse effects or future risks associated with climate change. The IPCC/UNFCCC defines adaptation as the “adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.”

## ADAPTATION PERFORMANCE REVIEW

Rating system of adaptive effectiveness that assesses measures known to be effective to a specific degree in limiting the impact on vulnerable populations as identified in the Climate Vulnerability Monitor/Index section of the report.

## ADAPTIVE CAPACITY

The ability of a system to adjust to climate change, variability and extremes to moderate potential damages, to take advantage of opportunities, or to cope with the consequences.

## AFFECTED COMMUNITIES

Communities that have seen their livelihoods compromised temporarily or permanently by climate change.

## CLIMATE DISPLACED PEOPLE

Persons displaced temporarily or permanently due to climate change and its impacts or shocks, notably land desertification, sea-level rise and weather-related disasters. It is almost never possible to identify an individual as exclusively a climate displaced person due to the range of factors that are likely involved in forced or voluntary movement of people. Climate change, however, is still likely to generate additional numbers of migrants and displaced people.

## CLIMATE EFFECT

Indicates the relative effects of climate change on social and economic variables at the country level. Climate effect (CE) is calculated based on observed values of social and economic variables and the effects of climate change.

## CLIMATE IMPACT FACTOR

The relative contribution of climate change to the development of a given variable.

## CLIMATE VULNERABILITY FACTOR

The aggregate vulnerability factor is determined as an evenly weighted sum of the independent vulnerability factors across the various impact areas. It indicates the extent to which countries are affected by multiple stresses.

## CLIMATE VULNERABILITY MONITOR

The Climate Vulnerability Monitor provides a global overview of vulnerability to climate change. It provides fair estimates of the types of impacts we are already facing. It also shows where the impacts are taking place and captures our evolving global vulnerability to climate change.

## COST-EFFECTIVENESS

Refers to the relationship between the economic input/cost of a given adaptation measure and the degree of beneficial output.

## DEVELOPMENT AID

Aid to support the economic, social, and political development of developing countries. The aim is to alleviate poverty in the long run.

## DISABILITY-ADJUSTED LIFE YEAR

This time-based measure combines years of life lost due to premature death and years of life lost due to time lived in states of less than full health. The DALY metric was developed in the original Global Burden of Disease 1990 study to assess the burden of disease consistently across diseases, risk factors, and regions.

## DISASTER RISK REDUCTION

A framework for assessing various measures for minimizing vulnerabilities and disaster risks throughout a society, to avert (prevention) or limit (mitigation and preparedness) the adverse impacts of hazards within the broad context of sustainable development.<sup>398</sup>



### ECONOMIC STRESS

The economic stress due to climate change captured in this report is based on fisheries, forestry, and other agricultural losses or gains. It is, to a great extent, driven by water resource impacts and climate effects on biodiversity.

### EXPOSURE TO CLIMATE CHANGE

Exposure to physical manifestations of alterations in weather conditions and the environment as a result of climate change. See also "Vulnerability - Physical vulnerability to climate change".

### FOOD SECURITY

Refers to the availability of food and people's access to it. A household is food secure when its occupants do not live in hunger or fear of starvation.

### HABITAT LOSS

Refers to the loss of human habitats due to climate change impacts.

### HEALTH IMPACT

The impacts of climate change that have an effect (positive or negative) on human health.

### HUMANITARIAN ASSISTANCE

Material or logistical assistance provided for humanitarian purposes, typically in response to a humanitarian crisis. The aim is to alleviate suffering in the short term.

### MITIGATION

Actions taken to lower greenhouse gas emissions targeted at reducing the extent of global warming. This is distinct from adaptation, which involves taking action to minimize the effects of global warming.

### RESILIENCE

The ability of a community or ecosystem to recover from, return to equilibrium, or bounce back following a shock.

### SOCIO-ECONOMIC IMPACT

Refers to climate change impacts of both social and economic character.

### VULNERABILITY

The degree to which a community experiences danger and harm from the negative effects of climate change. Or: The degree to which a system (community, ecosystem, economy) is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity (IPCC definition).

### VULNERABILITY - PHYSICAL VULNERABILITY TO CLIMATE CHANGE

Refers to people who live in regions that are prone to more than one type of physical manifestation of climate change: floods, storms, droughts, sea-level rise, etc. (similar to "exposure").

### VULNERABILITY - SOCIO-ECONOMIC VULNERABILITY TO CLIMATE CHANGE

Refers to the capacity of individuals, communities, ecosystems, economies, and societies to adapt to climate change impacts and avoid suffering from long-term, potentially irreversible, losses in well-being and stability. Also referred to as "underlying vulnerabilities".

### WEATHER-RELATED DISASTERS

Natural disasters that are related to weather patterns, such as floods, droughts, and heat waves. Geophysical disasters such as earthquakes are not included in this category.

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# ABBREVIATIONS

- CE:** Climate effect
- CIF:** Climate impact factor
- CO<sub>2</sub>:** Carbon dioxide
- DALY:** Disability-adjusted life year
- DCPP:** Disease Control Priorities Project
- DIVA:** Dynamic Interactive Vulnerability Assessment
- ECA:** [Working Group] Economics of Climate Adaptation Working Group
- FAO:** Food and Agriculture Organization
- GDP:** Gross domestic product
- GEF:** Global Environment Facility
- GNP:** Gross national product
- GTZ:** Deutsche Gesellschaft für Technische Zusammenarbeit
- IFRC:** The International Federation of Red Cross and Red Crescent Societies
- IPCC:** Intergovernmental Panel on Climate Change
- MAD:** Mean absolute deviation
- MDGs:** Millennium Development Goals
- NAPA:** National Adaptation Programme for Action
- ORT:** Oral rehydration therapy
- PPP:** Purchasing power parity
- UNCCD:** United Nations Convention to Combat Desertification
- UNDP:** United Nations Development Programme
- UNEP:** United Nations Environment Programme
- UNESCO:** United Nations Educational, Scientific and Cultural Organization
- UNFCCC:** United Nations Framework Convention on Climate Change
- UNICEF:** United Nations Children's Fund
- UNISDR:** United Nations International Strategy for Disaster Reduction
- WHO:** World Health Organization

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