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UKaid
from the Department for International Development

the future climate for development

scenarios for low-income countries in a climate-changing world

Forum for the Future, the sustainable development NGO, works in partnership with leading businesses and public service providers, helping them devise more sustainable strategies and deliver new products and services which enhance people's lives and are better for the environment.

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Please note that the scenarios contained in this report are not predictions, and do not represent desired futures. They are explorations of possible futures only, and reference to specific countries and events is purely illustrative.

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contents

executive summary

Low-income countries often get overlooked in discussions about climate change. Despite the fact that they are affected first and worst – and have done least to cause the problem – comparatively little attention has been paid to how climate change will affect the development of states which are home to over a billion people around the world. This is starting to change – but not fast enough.

The central message of this report is that successful development must take climate change into account. It has been supported by the UK Government's Department for International Development (DFID) to help facilitate a holistic approach to development, which looks to the long term. The work, led by independent sustainability experts Forum for the Future, draws on extensive research, the expertise of a high-level steering group and the opinions of more than 100 development experts from all over the world, including development professionals, government officials, business leaders, entrepreneurs and independent thinkers.

As our climate changes over the next 20 years, the probability is very high that temperatures will rise, the frequency of storms will increase and rainfall patterns will shift. Ecosystems will be disrupted, ice caps and glaciers will continue to melt and sea levels will rise. We may or may not reach tipping points within that timeframe, beyond which change becomes irreversible and much less predictable. Either way, climate change impacts will transform low-income countries, with significant social, economic and political repercussions.

It is therefore vital that development in low-income countries becomes 'climate-resilient'.[1] Without this, there is a significant risk that investment made today could be undermined by climate change impacts in the future. Furthermore, relying on carbon-intensive development today (such as coal-fired power stations) could well mean a lack of efficiency and competitiveness in the long term, when the world's economy becomes a low-carbon one, as eventually it must.

There is also a huge opportunity agenda to address. Low-carbon, 'climate-resilient' development could position low-income countries well in the future global economy. Addressing climate change can complement and reinforce other development goals, such as poverty reduction, health improvement and education. Identifying the 'win-win' opportunities is crucial: for example, how a low-carbon city can be designed so that it also improves the health of its citizens; or how climate-friendly business start-ups can generate wealth in low-income communities.

One thing is clear: low-income countries cannot and should not have to make a false choice between addressing climate change and development. This report shows how the two are fundamentally and inextricably linked, and demonstrates the value of a holistic approach that addresses them together. *The future climate for development* is designed for anyone who has a stake in the future of low-income countries, including development organisations and other non-governmental organisations (NGOs), businesses, policy makers and low-income country governments. It is a practical tool to aid long-term thinking, to ensure that decisions made today continue to have positive consequences in years to come.

The report contains a 'horizon scan', which examines key issues that will affect low-income countries over the next 20 years, and four scenarios, which explore how these issues may play out in different ways, highlighting the challenges and opportunities low-income countries may face in a climate-changing world. The horizon scan and scenarios can be used to:

- 'future-proof' current strategies, and prioritise areas for work;
- generate new ideas for future strategy or policy;
- look for opportunities for collaborative working;
- create a vision of a preferred future.

There are more details on how to use the scenarios at the end of the report. There is also a range of supporting materials available to download from our website, at: **www.forumforthefuture.org/projects/the-future-climate-for-development**

[1] **'Climate-resilient' is the term used in this report to refer to development that is robust in the context of climate change. Similar terms in use elsewhere include 'climate-proofed' and 'climate-smart'.**

2030: a horizon scan and four scenarios

We conducted a horizon scan to explore how key issues will influence the development of low-income countries and how they respond to climate change. It explores both the long-term trends and possible shocks in nine broad areas:

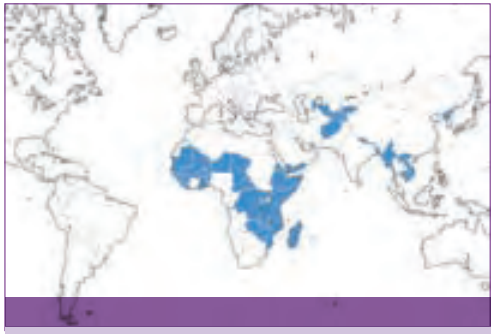
- the global political context;
- global economies;
- low-income country politics;
- demographics in low-income countries;
- attitudes to climate change in low-income countries;
- use of natural resources;
- the role of technology;
- the business response to climate change;
- the direct impacts of climate change.

Needless to say, not all low-income countries will face the same opportunities or challenges; a group (see map) that includes countries as diverse as the Comoros Islands, Bangladesh and Kenya will have equally diverse issues to contend with. We also recognise that the low-income countries of today are not necessarily the ones of 2030.

We explore the global context that these nations will share, and pull out common themes that will be significant for many of them.

The horizon scan poses questions as diverse as 'how politically stable will low-income countries be in 2030?', 'what developments in energy technology might we see?' and 'will business investors take climate change into account?'. The different possible answers inform the differences between our four scenarios. Climate change forms the backdrop to all of them.[2] For more analysis of these issues see pages 11–33.

The **scenarios offer vivid, plausible, and robust explorations of different possible futures**. Scenarios are powerful tools because they take us beyond the day-to-day, and show the inter-connections between different issues. They are not predictions, but are designed to challenge current thinking and provide a structured way of bringing the future into decision-making today. The following pages summarise the key points of each scenario.



Low-income countries (World Bank, 2009). The current list is: Afghanistan, Bangladesh, Benin, Burkina Faso, Burundi, Cambodia, Central African Republic, Chad, Comoros, Congo, Dem. Rep. Eritrea, Ethiopia, The Gambia, Ghana, Guinea, Guinea-Bissau, Haiti, Kenya, Korea, Dem. Rep, Kyrgyz Republic, Lao PDR, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Myanmar, Nepal, Niger, Rwanda, Senegal, Sierra Leone, Somalia, Tajikistan, Tanzania, Togo, Uganda, Uzbekistan, Vietnam, Yemen, Rep. Zambia and Zimbabwe.

[2] **The direct impacts of climate change do not vary across the scenarios – but the way each world responds to them does.**

summaries of the four 2030 scenarios

1
Reversal of Fortunes

This is a **fraught world** where the urgent need to cut carbon dominates international relations. Drastic measures to **decarbonise** the global economy spell crisis for many industries and no country is immune to the pain. Having rapidly developed – mostly on **carbon-intensive pathways** – many low-income countries of the 2010s are now middle-income. They speak with a strong, **united voice** on the world stage, holding wealthier nations to account for the problems of climate change. These new emerging economies are the **least resilient** and are suffering the most, and with the world focussed on cutting carbon there is little money in the pot for aid.

Reversal of Fortunes

In this world…

- the 2026 Climate Treaty makes failure to meet emissions reduction targets as serious as failure to comply with a UN Security Council resolution. Countries that refuse to sign the treaty are threatened with sanctions and even military intervention;
- low-income countries are handicapped by 'white elephant' high-carbon infrastructure. Carbon emissions penalties make coal-fired power plants and similar installations prohibitively expensive to run;
- the pan-African grassroots 'Elephant Movement' campaigns for high-income countries to repay their 'carbon debt' to Africa. It unites the voices of low-income countries in climate change negotiations and funds lawsuits against companies and governments;
- multinational companies' products disappear from many low-income countries. Entrepreneurs fill the gaps, offering locally-branded alternatives;
- the 2028 Olympics are cancelled for the first time since World War II, because of a lack of carbon credits to fund either the building of stadiums or travel;
- the UN sets up an office to coordinate geo-engineering initiatives to tackle climate change; China proposes the world's largest programme of seeding rain-clouds to protect its agricultural investments in Africa;
- the number of climate refugees grows by the day and campaigners demand that developed nations make land available for settlement.

2
Age of Opportunity

This is a world where low-income countries have received **significant and effective development assistance** as part of a strong climate change deal. They play a growing role in the world economy and are spearheading a **low-carbon energy revolution**, leapfrogging the old high-carbon technologies in pursuit of a prosperous and clean future. **Cultural confidence** in these countries is high: their politicians take a prominent place on the world stage, and increasingly people reject high-carbon Western lifestyles as uncivilised. In many states **power has devolved** to regions and communities; in some countries this has brought positive change, but in others large areas have fallen under the control of local mafia and warlords.

Age of Opportunity

In this world…

- billions of dollars are spent each year on emergency aid and measures to help countries adapt to climate change, funded by the 'Climate Relief Tax' – a 0.05% levy on international currency and commodity transactions (modelled on the so-called 'Tobin Tax');
- low-income countries generate 40% of the world's solar energy, a huge increase since 2010;
- communities and businesses have unprecedented access to low-carbon electricity thanks to a boom in decentralised power generation. Broadband internet access is widespread and almost cost-free. This has boosted delivery of water and services like health and education;
- there is a widespread move to more devolved politics, and cities become powerful political entities: Nigeria's protests are overruled when Lagos sends its own delegation to the United Nations;
- cultural confidence in low-income countries is high and rising: Kinshasa attracts musicians and artists from around the world; the Mali Film Festival receives as much coverage as Cannes;
- smallholder cooperatives have become the dominant agricultural model in low-income countries; these are linked into global supply chains and organised using collaborative online software;
- many multinational companies have moved their operations to low-income countries, attracted by cheap labour and low-carbon electricity. Home-grown businesses thrive, supported by microfinance and mobile phone-based payment systems.

3
Coping Alone

This is a world in which low-income countries feel increasingly **abandoned**. Two decades of **high oil prices and economic stagnation** have driven the global community apart. Attempts to coordinate action to reduce carbon emissions have been dropped. **Regional blocs** now focus on their own concerns, such as food security, resource shortages and adapting to climate change. Low-income countries face all these problems with **few resources** and limited support from wealthy nations; some states have collapsed. New models of business and governance are starting to emerge from the shadows of increasing inequality.

Coping Alone

In this world…

- the world is still recovering from the Middle East conflict of the 2010s which pushed the oil price above $400 and destabilised the whole region. Low levels of conflict over water persist;
- oil-importing countries have suffered hugely. Oil-exporting countries have built up huge sovereign wealth funds with massive influence over the global economy, and are starting to invest in renewable energy technologies;
- most global supply chains have contracted under the shadow of high oil prices; some are kept moving by biofuels, tar sands oil, and shipping powered by advanced kite systems;
- regional integration of low-income countries is a common strategy to increase resilience and political power: the Pacific members of the Alliance of Small Island States become a single state in 2023; the East African Union has a common currency;
- food security is a worldwide concern; vegetarianism is a global moral movement;
- 'nuclear offshoring' is becoming common: wealthy nations build nuclear plants in low-income countries, which are run by their own military; they export the power giving the host country a share;
- desktop manufacturing is beginning to take off in some low-income countries where energy is available: people use recycled plastics to make all sorts of products using 3-D printers to replicate blueprints available on the internet.

4
The Greater Good

This is a world where people understand that economies rely fundamentally on access to natural resources. Climate change is seen as the **ultimate resource crunch**, but there are equal concerns over water, food and soil depletion. **States manage natural resources pragmatically** to give the greatest good for the greatest number and are prepared to take draconian action to protect them. **Individual liberties and choice have suffered**, but most people feel that their future is at least being safeguarded. Those low-income countries with natural resources prosper; those without have little bargaining power. **Tensions** between rival resource blocs are intense, and sometimes spill over into violent conflict.

The Greater Good

In this world…

- new political alliances form around natural geographic boundaries such as the Niger/Volta watershed collaboration. Regional blocs manage food, energy, biodiversity and even population;
- state-sponsored family planning and public health initiatives – and limits on numbers of children – are common;
- compulsory identity cards holding information about personal resource consumption are common all over the world; companies sell services (such as 'personal carbon quota management') to help people avoid falling foul of the strict legislation;
- 'smart dust' – a worldwide network of nanotech computers – monitors environmental conditions, resource use and pollution, providing governments and business with real-time information;
- international retailers, whose presence in low-income countries increases year-on-year, demand full 'ecosystem integrity' in the goods that they sell; entire product lines have been withdrawn for being unsustainable;
- insects, such as farmed grasshoppers, have replaced animals and fish as the main source of protein for hundreds of millions of people in Africa and Eurasia. Vegetarian diets are common – and enforced in some areas;
- rapid urbanisation and new planned cities create a huge market for flat-pack housing which can be constructed quickly and easily using government-approved materials.

what does this mean for development in low-income countries?

The scenarios are tools that any organisation can use for strategic planning, but we have given particular thought to what they mean for development agencies. We believe that the seven points below are important messages for anyone working in the development field.

1. Climate change is a development issue

Climate change and development should be seen as complementary, not competing, issues: acting on one involves acting on the other. If ignored, climate change has the potential to fundamentally undermine even the best development initiatives.

Taking action on climate change can bring a host of co-benefits for development: these 'win-wins' need to inform the development discourse. Investment in renewable energy generation and energy efficiency can enhance energy security. Promoting low-carbon transport means reduced congestion, pollution and healthcare costs. Low-input agriculture focussed on maintaining soil quality boosts food security and is likely to be a robust strategy for adapting to a changing climate. All of these examples can also lead to the creation of new jobs.

Development in a climate-changing world is not about sacrificing opportunities, but about making smart choices, which address these kinds of long-term co-benefits.

2. Climate change will change the nature of development

Whatever happens, there will still be a need to focus on some of the fundamental tenets of development with which all development professionals are familiar: building peaceful states and societies; protecting and enhancing the livelihoods of the poor and vulnerable; and building governance systems that are capable, responsive and accountable to their citizens.

But some elements of development 'success' may look very different in the future, and our scenarios explore this possibility. For example in 'The Greater Good' democracy is no longer perceived by Western donors as fundamental for development, and in 'Age of Opportunity' GDP (gross domestic product) loses its place as the defining measure of success. The prospect of radical changes such as these means that development organisations will need a flexible approach and a readiness to deploy different strategies.

3. All development must be 'climate-resilient'

Development initiatives must be evaluated against the context of climate change and the radical changes it is likely to bring about in low-income countries, in terms of economic, social and political impacts as well as environmental ones. Decision-making processes must take into account the potential long-term consequences of today's initiatives to make sure they will survive and continue to deliver benefits.

Low-carbon development is part of a resilient long-term strategy. It is not the only way, nor should it be the only consideration, but it is a vital ingredient in the development mix if low-income countries are to be competitive players in a climate-changing world.

4. Climate change may cause dramatic reversals in countries' fortunes

Climate change may cause major reversals in the economic fortunes of countries at every development level – for both better and worse. This may result from both the direct impacts of climate change and the indirect ones such as political and economic restructuring, and the value attached to different resources.

It will be crucial to map the potential 'winners' and 'losers' of the coming decades by considering which countries are the best and worst prepared, socially and economically, to adapt to climate change in a variety of futures. This is likely to highlight the limited usefulness of the current categorisation of low-income countries, which does not capture characteristics like economic diversity that will help determine how they are affected by climate change and how they may respond.

5. Support change from within

As those working in development know, building a stronger civil society in low-income countries will bring many benefits. In the future, provision of climate finance (to help countries adapt to climate change) and the price of various natural resources may change suddenly and in unexpected ways. Demand for accountability that comes from within, rather than from external partners, will therefore be the most robust strategy. It will also be important to increase public understanding and awareness of climate change in low-income countries, in order to build both social support for climate change action and scrutiny of whatever climate change initiatives are undertaken.

6. Work with business to catalyse change

Business can be an important vehicle for catalysing low-carbon approaches globally and a powerful partner, particularly where government-level engagement is difficult. There is significant potential for multinational corporations to export climate change good practice from high and middle-income to low-income countries, even if the latter's governments are pursuing high-carbon growth strategies. Development agencies could play a vital role in helping low-income countries put in place incentives to attract business investment in low-carbon development, such as tax relief.

Partnering with business can also unlock new ways of working: because companies need to respond to (or create) demand, they are well placed to take a proactive, opportunity-focussed approach to climate change.

7. Prepare for the challenges that feature in a range of futures

The four scenarios are very different, but they have several common themes that development organisations should be prepared for:

- rapid urbanisation is one theme: projections indicate that in many low-income countries the majority of the population will live in cities by 2030. There is huge potential for early intervention to maximise sustainability – effectively designing expanded cities from first principles;
- change in agriculture and land use more broadly – especially how forests are managed – will also be of great significance in low-income countries, affecting their capacity to adapt to climate change and avoid emissions, and of course their food security;
- absolute population growth persists in all scenarios, and cannot remain the taboo subject it currently is in some quarters. Development organisations will need to explore the implications of this trend and consider their views on the subject;
- persistent and growing inequality is likely, so continuing investment in social policy will be important;
- future political 'heavyweights' such as China, and other rapidly growing economies may interact with low-income countries in unexpected ways; there is a need to better understand how these relationships could play out;
- established political boundaries may change: the wider region or the individual city could be the crucial points for engagement in the future.

introduction

Why do this work?

This report was supported by the UK Government's Department for International Development to shift the debate on the relationship between development and climate change. It aims to facilitate a longer-term and more holistic approach to decision-making, in particular to highlight the 'win-win' opportunities where acting on climate change and development simultaneously can have positive consequences for both.

Much of the discourse on climate change so far has been about, and dominated by, high-income countries and rapidly growing economies. This project is one attempt to redress that, and to think systematically through the possible future development pathways for low-income countries in a climate-changing world.[3]

This work, led by independent sustainability experts Forum for the Future, draws on extensive research, a high-level steering group and the opinions of more than 100 experts in the development field. We have spoken to development professionals, entrepreneurs, government officials, independent thinkers and business leaders from all over the world, asking what the coming decades might hold and how low-income countries might best develop in these different possible futures.

One thing is certain: climate change is not going to go away, and such a long-term challenge needs a long-term approach to strategic decision-making if the risks and opportunities are to be managed effectively. It remains uncertain how exactly climate change will affect low-income countries but it is essential that humanity confronts these questions, and that we approach the future with our eyes wide open.

What's in the report?

The future climate for development begins with a '**horizon scan**' – identifying the factors which could influence the way low-income countries develop and respond to climate change over the next 20 years, such as the state of the global economy, how engaged businesses are with climate change and what technological innovations are forthcoming.

We then explore how these factors may play out in **four scenarios for 2030**, which present four possible but very different future worlds. The scenarios are a structured way of asking a lot of 'what if' questions about factors which may affect low-income countries and how they deal with climate change in the future. What if we have much faster than expected advances in renewable energy generation? What if we see new political alliances between different countries? What if global agreements to mitigate climate change stall repeatedly? These questions are impossible to answer definitively, but we can use scenarios to explore possible answers, discuss what those different answers might depend on, and explore what that means for low-income countries.

The next section outlines the **implications of the scenarios** and explores what all this means for the development agenda today.

The final section of the report provides guidance on **how to use the scenarios**, and details the supporting materials that are available.

Who is it for?

This report is for anyone who has a stake in the future of low-income countries; it is a tool to support a long-term holistic approach to decision-making. For example, the horizon scan and the scenarios can be used by:

- development organisations, both in the UK and internationally, to future-proof current strategy and provide inspiration for future initiatives;
- businesses operating in low-income countries, to look at the long-term impacts of investment decisions, and to stimulate new business ideas;
- low-income country governments, to explore the long-term impacts of decisions made today;
- policy makers, to ensure that policies put in place today are robust and stress-tested against a range of possible futures.

Exploring the future in this way can help us prepare for a wide range of possibilities, and may lead to insights which help us to shape a better future.

[3] World Bank, 2009. Low-income countries are those whose 2008 gross national income (GNI) per capita, calculated using the World Bank Atlas method, is $975 or less. The current list is: Afghanistan, Bangladesh, Benin, Burkina Faso, Burundi, Cambodia, Central African Republic, Chad, Comoros, Congo, Dem. Rep, Eritrea, Ethiopia, The Gambia, Ghana, Guinea, Guinea-Bissau, Haiti, Kenya, Korea, Dem. Rep. Kyrgyz Republic, Lao PDR, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Myanmar, Nepal, Niger, Rwanda, Senegal, Sierra Leone, Somalia, Tajikistan, Tanzania, Togo, Uganda, Uzbekistan, Vietnam, Yemen, Rep. Zambia and Zimbabwe.

what factors will shape the future response to climate change in low-income countries?

This section explores the key factors that will influence how low-income countries respond to climate change in the future. To identify these factors we conducted extensive desk research and spoke to over 100 people from around the world: entrepreneurs, futurists, sector specialists, government representatives, climate change scientists, individuals from non and inter-governmental organisations, and experts in international development.

We drew on Forum's previous work in this area – primarily Climate Futures, which examines the potential future human response to climate change with a focus on business and high-income countries. We visited Kenya, Bangladesh and Ethiopia to get a better understanding of these countries' perspectives, and to ensure the issues we explore do not just reflect the UK point of view.

In this section we explore where these factors stand today and how they might play out over the next two decades. We've clustered them into nine broad areas:

- the direct impacts of climate change;
- the global political context;
- global economies;
- low-income country politics;
- demographics in low-income countries;
- attitudes to climate change in low-income countries;
- use of natural resources;
- the role of technology;
- the business response to climate change.

Clearly, it would be easy to devote an entire report (or an entire career!) to any one of these subjects. We therefore take a topline approach to discussing their possible future directions, concentrating on the broad themes within these sections, and the linkages between them.

We recognise that each one of these nine areas encompasses a host of important, often interlinked, questions. Within business, for example:

- to what extent will businesses engage with climate change – from both an adaptation and mitigation perspective?
- to what extent will supply chains be affected by climate change?
- to what extent will investors see climate change as an issue for business to address?
- will we see new business models emerging in low-income countries?

We therefore conducted an online consultation with over 60 people from different parts of the world to ascertain which were the most important questions within each section. It's these questions – and their possible answers – that we've focussed on, both in the following horizon scan and in our scenarios.

Despite this extensive trawl of different stakeholders, we acknowledge that one voice is largely missing: the poor themselves. Understanding their perspective will be crucial in further research on the subject.

the direct impacts of climate change

We cannot begin to understand low-income countries' responses to climate change without considering the direct impacts of climate change itself. So this section focuses on the projected climate impacts by 2030. Although we cannot be sure about how exactly the climate will change, we have a good idea of the direction of that change and, for the next 20 years at least, of the scale of change we are likely to experience.

Estimating the impacts

The Intergovernmental Panel on Climate Change (IPCC) collects, assesses and summarises all the research evidence available, and produces regular 'assessment reports' that outline the range of expected impacts. The IPCC's fourth and most recent assessment was published in 2007, giving a mid-range estimate for the next 20 years of an average global warming of 0.4 degrees Celsius.[4] It states that in the years to come:

- the frequency and intensity of storms are likely to increase;
- there will be more areas affected by drought;
- there will be more and hotter heat waves in temperate zones;
- ecosystems will be affected and biodiversity will be hit;
- certain diseases could become more common;
- sea levels are likely to rise.

Latest thinking

At the time of writing it is over three years since the draft text was completed for the IPCC's Fourth Assessment Report (AR4) and, in the meantime, many hundreds of papers have been published on a suite of topics related to human-induced climate change. In order to capture this thinking in time to inform the climate change negotiations at Copenhagen in December 2009, 26 scientists released an 'interim evaluation' of the evolving science in November 2009. This report – **The 'Copenhagen Diagnosis' – highlighted the following as the "most significant recent climate change findings":**

- surging greenhouse gas emissions: Global carbon dioxide emissions from fossil fuels in 2008 were 40% higher than those in 1990. Even if global emission rates are stabilised at present-day levels, just 20 more years of emissions would give a 25% probability that warming exceeds 2°C, even with zero emissions after 2030. Every year of delayed action increases the chances of exceeding 2°C warming.[5];
- recent global temperatures demonstrate human-induced warming: Over the past 25 years temperatures have increased at a rate of 0.19°C per decade, consistent with predictions based on greenhouse gas increases;
- acceleration of melting of ice-sheets, glaciers and ice-caps: A wide array of satellite and ice measurements now demonstrate beyond doubt that both the Greenland and Antarctic ice-sheets are losing mass at an increasing rate. Melting of glaciers and ice-caps in other parts of the world has also accelerated since 1990;
- rapid Arctic sea ice decline: Summertime melting of Arctic sea ice has accelerated far beyond the expectations of climate models;
- current sea-level rise underestimated: Satellites show recent global average sea-level rise (3.4 mm/yr over the past 15 years) to be ~80% above past IPCC predictions;
- sea level predictions revised: By 2100, global sea level is likely to rise at least twice as much as projected by Working Group 1 of the IPCC AR4; for unmitigated emissions it may well exceed one metre. The upper limit has been estimated as ~ two metres sea-level rise by 2100;
- delay in action risks irreversible damage: Several vulnerable elements in the climate system (e.g. continental ice-sheets, Amazon rainforest, West African monsoon and others) could be pushed towards abrupt or irreversible change if warming continues in a business-as-usual way throughout this century. The risk of transgressing critical thresholds ('tipping points') increases strongly with ongoing climate change.

While these updated findings do not significantly alter the predicted physical changes that we are likely to experience by 2030, they do increase the urgency for action within that period if we are to avoid disruptive change over the remainder of the 21st century. "There is a very high probability of the warming exceeding 2°C unless global emissions peak and start to decline rapidly by 2020," warn the authors. If we do not act, and follow a business-as-usual pathway for the next few decades, then "global mean warming is estimated to reach 4–7°C by 2100, locking in climate change at a scale that would profoundly and adversely affect all of human civilisation and all of the world's major ecosystems".

This should not, however, suggest that dealing with climate change is a problem for future generations. The planet will experience real transformation as a result of climate change in the next 20 years. And, as many of the experts we interviewed stressed, individuals and communities in low-income countries are already experiencing elevated levels of environmental stress as a result of changes in the climate.

As Dr Vicky Pope, Head of Climate Change Advice at the UK Met Office puts it, **"While we are unlikely to cross any significant climate 'thresholds' in the next 20 years, many low-income countries are very vulnerable to current climatic variability**. And climate change will exacerbate that vulnerability. Events that have been rare – especially water-related events such as drought and flooding – will become much more common".

All our scenarios reflect the same level of climate change. We explore the same climate-related events in each, highlighting the different responses that these produce in each of the scenarios.[6]

[4] The *IPPC WGI Fourth Assessment Report* projects a scenario-independent global temperature increase of about 0.2°C per decade for the next two decades.

[5] Many nations recognise 2°C as the threshold below which the average global temperature rise must remain if we are to avoid 'dangerous' climate change. Others say that it should be lower.

[6] For an explanation of why we don't vary the level of climate change, or the climate-related events, between the scenarios, please see Appendix One.

the global political context

How might global patterns of political power evolve over the next 20 years? What are the prospects for a binding deal on climate change? And what will become of Overseas Development Aid? These are just some of the questions we address in this section, which explores what the world's political platform might look like in 2030.

Could globalisation – that seemingly unstoppable force – slow, or even reverse?

It may be difficult today to envisage a less globalised world in the future, as the clear direction in recent decades has been towards closer ties between countries. But many factors could undermine or even reverse this trend. Chief among these is surely how interconnected the global economy is, something we explore in our economics section below. **The cost of transportation, heavily influenced even in 2030 by the price of oil, will have a bearing on this question**, as will the degree to which global institutions such as the United Nations or World Trade Organisation are, or are seen to be, worthwhile and successful.[7] Increasing penetration of information technology, as explored in our section on technology, will also have an influence, perhaps helping to bind disparate cultures together whether or not governments and businesses are closely aligned.

Will we see changed political entities in the future? Could strong regionalisation or resource-based boundaries make this happen?

Some of the experts we spoke to while constructing our scenarios saw the prospect of new or altered states and new centres of power emerging in the next 20 years. The rise of China was mentioned by practically everyone we spoke to (see box on China on p15). Other countries such as India, Brazil, Russia, Mexico and Indonesia also came up as having the potential to wield more power on the world stage, influencing politics in ways that are hard to anticipate.

The next two decades could also bring changes to established political boundaries. Chris West, Director of the Shell Foundation, pointed out that "National boundaries are becoming less and less relevant in some areas. The agriculture sector is moving away from national boundaries to agricultural corridors".

Regional cooperation over natural resources such as water could also lead to a shift in the political landscape. According to Faisal Islam, Environment and Livelihoods Advisor at DFID Bangladesh, "The scope for regional solutions will need to be explored much more over the next 20 years. The South Asia Water Initiative promotes dialogue but more is needed, for example, with watershed management and possible new storage in Nepal and Bhutan. The South Asia region is already reasonably connected but more regional cooperation may be needed to address some of the connected energy, water, flood and food issues". We explore a possible move towards regionalism in our scenario 'Coping Alone', in which regional blocs such as East Africa move towards closer integration in response to economic and environmental pressures, and the Association of Small Island States becomes a state in its own right. Increasing attention is already being paid to potential benefits of regional economic consolidation: one project interviewee pointed out that "Regional integration has got a lot of potential to boost growth – Kenya's trade would really benefit from a strengthened market in East Africa. It's always been argued that global trade is more important, but the recession has shown sense in promoting regional economic expansion".

Could climate change put unmanageable pressures on weaker states?

Resource pressures and poverty could also lead to fragmentation and even the collapse of some states. Robin Milton, Senior Social Development Advisor at DFID Ethiopia pointed out to us that "If we don't manage the social impacts of globalisation then there is a risk of fragmentation of countries that can't deal with the levels of inequality, both internally and compared to neighbours".

> "
>
> **Part of the seriousness of climate change is that we can't understand it within our current frameworks and ideas of stability. Global terrorism and 9/11 are tiny in comparison.**
> Project interviewee

Climate change itself will tend to magnify risks, potentially leading to conflict. Nigel Inkster, Director of Transnational Threats and Political Risk at the International Institute for Strategic Studies told us that "Climate change impacts will be greatest in areas where conflict is already most common – the 'zone of conflict' stretching from Africa across the Middle East into South Asia. There is a possibility of managing down the risks but this will be difficult. We could see the return of inter-state conflict, particularly over water resources".

How coordinated will the global political response to climate change be?

International relations and the formation of new countries or geopolitical blocs will significantly influence how coordinated or uncoordinated the global response to climate change is. Many of those we talked to for this project – even before the Copenhagen climate change summit – were sceptical that the world will work together to solve the crisis. One interviewee in Bangladesh was of the view that "The large developing countries are not ready to face the reality that if the boat sinks then we all drown".

Some commentators have suggested that we are at a tipping point between an internationalist response and a nationalist, protectionist response – with many arguing that the outcomes of the COP15 conference in Copenhagen mark an early move towards a more protectionist world.

Our scenarios reflect the uncertainty around how geopolitics and the response to climate change will play out. In 'Reversal of Fortunes', climate change eventually drives the emergence of a new global ethic. In 'Coping »

[7] For example, see *World Trade: Possible Futures*, Foresight Government Office for Science, 2009.

» Alone', different countries and blocs struggle to cope with climate change in a politically and economically fragmented world, while in 'The Greater Good' a complex network of bilateral and multilateral agreements scale up to make de facto global structures.

How will relationships between low-income countries and the rest of the world evolve?

The approach that high and middle-income countries take to international development will be key to answering this question.

Greg Briffa, Team Leader on Low-Carbon Development at DFID, points out that **"There can be a tension between the two approaches that donors can take: a welfare approach and one that's more about stimulating private sector growth"**. Many of the experts we consulted had the view that the latter of these approaches would come to dominate over the next 20 years. One interviewee in Ethiopia said that "The age of development aid and systems is finished. The current system of aid is ultimately about charitable donation based on a moral issue, whereas Chinese and Indian interest in Africa is financial and commodity based". Seen in a positive light, this could usher in more balance in the relationship between rich and poor, based on equal exchange of materials, goods and knowledge. Alternatively it could lead to greater exploitation and less power for low-income countries over the use of their resources. China's influence stretches far and wide in our scenario 'The Greater Good', as it brokers bilateral and multilateral deals, and invests to protect its overseas assets. Land acquisition in low-income countries by other nations is currently a high-profile topic in the media, and one that a number of our interviewees saw as symbolic. How this will play out is highly uncertain. Global food security and commodity markets could be undermined, with local communities radicalised and left landless. On the other hand, long-term investments could have a positive outcome, channelling new funds to improve local infrastructure and skills.[9]

> **New donors are coming into the 'aid economy' – such as Taiwan, and Brazil. This will change how aid is done.**
> Natasha Grist, Research Fellow, Overseas Development Institute
>
> **[The Chinese] are not setting out to do good. They are setting out to do business. It's actually much less demeaning.**
> Arnold Ekpe, Chief Executive Officer, Ecobank, Togo[8]

What will become of Overseas Development Aid, and how will climate change fit in?

If the emphasis amongst aid-givers is away from charitable aid and towards trade and direct investment, what will become of Overseas Development Aid (ODA)? Repeated commitments to devote 0.7% of GNP (gross national product) to ODA[10] have in many cases yet to be honoured, with some countries actually moving in the wrong direction.[11] However, **some interviewees argued that enlightened self-interest will actually mean that high-income countries start to pay more attention – and money – to the issues of development which, if ignored, will have global ramifications**. Will Day, Senior Associate at the Cambridge Programme for Sustainability Leadership observed that "When migrants start to move then the aid budget will be seen in a different light – one of enlightened self-interest as well as moral duty. It's the same with food security and energy security – the impacts from these macro issues will mean that some high-income countries see ODA very differently".

Many of the experts we spoke to raised questions about the effect that the need for climate change funding would have on existing development aid. Will it divert funds? Or will the need to prove that any funds are additional (to existing ODA) mean that climate change money is ring-fenced, which might actually prevent it from having the most positive development outcomes? One interviewee suggested that "The climate change agenda is likely to go the way of gender: siloed rather than integrated. It may even be a necessity to do this in order to raise the required funding. Silos are common in aid and have contributed to the great historical failure of aid… given the long-term nature of climate change and need for integration, another silo won't help". Or, in a more positive future, as John Hudson, Forestry Advisor at DFID suggested, **"Climate change could act as a catalyst for treating the development question properly"**. By exacerbating so many historical development problems, climate change could focus global attention more keenly on the plight of poor people in poor countries. Moreover, as climate change grows in importance, the synergies between climate action and development action will surely only become clearer. This integration of issues is explored in our scenario 'Age of Opportunity'.

> **Climate change could re-enforce aid because it is measurable – for example saving X amount of rainforest. The imposition of metrics may help aid to become more robust. Also with climate change high-income countries have a greater incentive for the aid to work – they need the mitigation to take place.**
> Jeremy Oppenheim and Chloe Lamb, McKinsey & Co

[8] Quoted in 'Africa: Business Destination', in *Time Magazine*, March 2009.
[9] Cotula, L., and Vermeulen, S., 'Deal or no deal: the outlook for agricultural land investment in Africa', *International Affairs*, Vol. 85, No. 6, Nov 2009.
[10] See http://www.unmillenniumproject.org/press/07.htm for detail
[11] By the end of 2008, the G7 have delivered one third of the increases promised by 2010: only $7 billion of the $21.5 billion promised. One International, *data report 2009*, see http://one.org/international/datareport2009/foreword.html

How high will climate change sit on the political agendas of high and middle-income countries?

The outcomes of Copenhagen notwithstanding, many countries have begun to act decisively to both adapt to and mitigate climate change. In the run-up to the COP15 conference in Copenhagen, the EU was offering to replace existing commitments (to 20% cuts in emissions by 2020 on 1990 levels), with 30% cuts, in the event of an ambitious global deal.[12] Japan has indicated it will aim to reduce emissions by 25% in the same time frame. Even states that are resisting commitments to absolute emissions reductions are taking action. Gerry Duffy, Senior Policy Advisor at DFID told us that "Initially middle-income countries did not see the value of investing in low-carbon growth. However, **some (like Mexico, South Africa and Brazil), after being encouraged to develop low-carbon development strategies setting out the costs and benefits, saw the opportunities to take advantage of new and additional finance and discovered their first-mover advantage"**. China has pledged a reduction in 'carbon intensity' (i.e. its use of fossil fuels per unit of economic output) of 40 to 45%.[13]

While it would be wrong to assume that low-income countries will only 'follow the leader' on climate change, it is likely that a lack of visible action on climate change from wealthier countries would act as a serious disincentive to action in low-income countries. And quite apart from questions of political will, policies in high and middle-income countries will have massive global influence. For example, a carbon tax on imports into Japan would significantly affect the viability of some low-income countries' exports, and could force investment in low-carbon technology. It may even be that developed nations come to see high-carbon activity elsewhere as sufficiently irresponsible to warrant direct intervention. We explore this possibility in the fraught atmosphere of the scenario 'Reversal of Fortunes'.

[12] 'The Climate action and renewable energy package, Europe's climate change opportunity', European Commission's *Climate Action* site, see http://ec.europa.eu/environment/climat/climate_action.htm

[13] 'China sets target to cut carbon intensity', Marianne Bom, November 2009 on *COP 15 website* publications, see http://en.cop15.dk/news/view+news?newsid=2717

[14] Dadush, U., and Stancil, B., 2009, 'The G20 in 2050', *International Economic Bulletin*, Carnegie Endowment for International Peace.

[15] http://college.chinese.cn/en/node_1979.htm

[16] 'Heavy Metal', *Prospect Magazine*, November 2009.

[17] 'China's Growing Engagement in Africa', African Progress Panel, December 2009.

The future of China

——• At the time of writing China already emits more CO_2 per year than any other nation, and according to the World Bank has the third largest economy, after the USA and Japan. By 2030, although India could well have replaced China as the most populous country in the world, China is expected to be well on the way to global economic pre-eminence. One recent study suggested that China's economy will be the world's largest by 2032[14]; others indicate a quicker rise.

——• Along with its economic muscle, China's political influence is likely to grow, and its cultural reach to expand – trends already visible in 2010. China is currently investing in Confucius Institutes around the world, aimed at promoting Chinese culture globally. Launched in 2004, there are now 282 in 88 countries (including 23 low-income countries).[15] The Chinese government also recently announced the launch of a 24-hour English-language news station to compete with CNN, Al-Jazeera and BBC.

——• Recent attention has been focussed most on China's growing interests in low-income country resources, particularly in Africa. Ton Berg, Head of Missions for Médecins Sans Frontières reflected in her interview how "15 years ago you could point to where China is on a map of Africa. You can't do that now as it's everywhere". Robin Powell, a journalist based in Japan, wrote recently in Prospect Magazine that China controls 95% of the world's supply in heavy metals, both through extraction at home and through 'its courtship of mineral-rich African regimes', positioning China very well for the continuing boom in heavy metals use in electronics.[16]

——• China has a particularly strong presence in Ethiopia, a country we visited during the research for *The future climate for development*. Wendwossen Kebede, a Senior Programme Manager for VSO in Ethiopia could see the appeal for the Ethiopian government in working with China, as it is "willing to fund easily the things that World Bank and African Development Bank aren't interested in". While the African Progress Panel notes that "Chinese SOEs [state-owned enterprises] are regularly accused of taking advantage of the weak regulatory and enforcement capacities of African national and local authorities to circumvent international standards in areas such as contract bidding, employment law, and health and safety regulations", it also berates a simplistic analysis of China's role in Africa: "The notion that Sino-African relations can be viewed simply in terms of one giant resource grab is out-dated at best. While resource extraction remains a central objective, commercial relations between China and Africa are now increasingly multi-faceted, with interactions developing in areas such as financial services, agriculture, or information and communication technology".[17] Indeed, one interviewee wondered if China will "see climate change as a risk to its investments and therefore help low-income countries with adaptation and mitigation measures".

——• Most of the experts we spoke to assumed that China's growth would continue practically unabated and that we are entering a period of Chinese dominance. But discussions in one of our scenario workshops questioned this. China could experience increased political instability of the sort witnessed recently. Combined with the risk multiplier of climate change, and the potential for prolonged drought or even conflict over water resources, it is certainly possible to envisage a future scenario of partial collapse and retrenchment.

What are the prospects for a global climate agreement?

For some, the scale of the climate change challenge means that we will inevitably (eventually) witness an all-encompassing, high-impact global deal. Commenting on their recent paper 'An institutional architecture for climate change',[18] authors Alex Evans and David Steven said they can envisage a deal in which, "Either countries play a full part in the system, or they sit outside the international system and are effectively barred from all forms of international cooperation… that this should currently seem inconceivable indicates the extent of the shift in understanding that is still needed". For others, a deal is largely irrelevant, and a combination of enlightened self-interest and market mechanisms will provide the necessary impetus for change. Our scenarios explore various points on this scale, from the stringent global deal of 'Reversal of Fortunes', to the multiple bi- and multilateral deals of 'The Greater Good', to the largely regulation-free 'Coping Alone'.

Whether or not we see a binding global climate change deal, the amount of money available to low-income countries – for both adaptation and low-carbon development – will be a crucial factor in how they fare in a changing climate. But whilst the text of the Copenhagen Accord recognises the need to transfer funds, technology and capacity to low-income countries, the scale of this spend is highly uncertain, as is its allocation. As Calum Miller, Head of the Growth and Investment Group at DFID pointed out, "There is a balance to be struck between getting finance to those countries with significant assets (e.g. forests) and those that are most exposed to the impacts of climate change". At the moment it seems likely that a key focus for engagement with low-income countries will be on reducing emissions from deforestation and degradation (REDD) – for which 'substantial funding' was promised at COP15.

Will mitigation mechanisms hit their mark?

Current projects aimed at reducing global emissions, such as the Clean Development Mechanism (CDM), aim to put funding where it is most needed, but so far only two per cent of certified projects are in Africa. This is attributed to a variety of reasons, not least the difficulty of replicating projects, and the heavily bureaucratic process for approval. In the future, a number of changes might increase the impact of such mechanisms in low-income countries. **The requirement to show additionality[19] might be removed from small-scale projects in the future, or funding could extend to avoided emissions rather than just reductions.** The latter possibility would negate the current perception that in order to benefit from CDM a country already needs to be emitting carbon, and to go for 'dirty development' first before it can act positively.

> **"Billions, potentially trillions of dollars will need to move from places where carbon is being used to places where it isn't. We need to make sure the mechanisms are effective and transparent, otherwise the whole process could be undermined.**
> Will Day, Cambridge Programme for Sustainability Leadership

For some, an important variable is where the real benefit from any funding is felt. Some interviewees suggested that current carbon reduction mechanisms end up putting money in the pocket of the middleman when they take a top-down approach. There are a number of initiatives currently trying to counter this, and make sure benefits accrue from the bottom up. Carbon Manna,[20] for example, is a beta project whereby micro carbon payments reach the individuals involved via their mobile phones, rewarding them for emissions reductions made using efficient stoves or solar panels. Could we see this type of approach becoming much more widespread in the future?

[18] Evans, A., and Stevens, D., 2009, *An Institutional Architecture for Climate Change*, Center on International Cooperation.
[19] The principle that greenhouse gas emission reductions from a project must be additional to those that would have occurred as a matter of course without the project being undertaken; see also http://cdmrulebook.org/464
[20] See www.carbonmanna.org

global economies

The global economic crisis that started in 2008 has disturbed many trends – such as globalisation and continuing economic growth – that many were starting to consider unstoppable. Research and interviews for *The future climate for development* show that experts are now seriously divided over the future of the global economy, with several key questions emerging from our work: How much will the global economy grow? Will economic interdependency continue or go into reverse? And where will the locus of economic power be? Will we start to see new economic models emerging and becoming more dominant?

How big will the global economy be in 2030?

One key uncertainty is the extent to which the current economic crisis will have a long-term impact on the size of the global economy.

Projected population growth and increases in productivity per person lead Jeffrey Sachs to conclude that the future scale of the world's economic production is likely to be several times what it is today[21,22] and he estimates that it will be approximately $200tn by 2030.[23] But our research suggested that a lot will depend on the length and depth of the recession that began in 2008, which won't be clear for some time. There could also be secondary effects through other shocks such as increased oil and food prices, which could be worsened by the recession,[24] and there could even be a permanent restructuring of the global economy.[25]

For others the recession is unlikely to be more than a blip. Dimitri Zenghelis, an economist who worked on the UK's Stern Review[26] of the economics of climate change, argues that "There is no reason to think that the underlying pattern of economic growth will be different over the next 20 years; we won't reach binding sustainability constraints in that time".

Some believe that developing countries have the potential to be much more significant drivers of economic growth than they are currently. The World Economic Forum argues that Africa has been relatively shielded from financial meltdown because it is less interlinked with the global economy than other parts of the world – although resource rich countries, such as Nigeria, have suffered. They argue that Africa has the potential to be an engine for economic growth as the world comes out of crisis if there is suitable investment, for example in the education of girls and women.[27]

[21] Sachs, J., 2009, *Common Wealth: Economics for a Crowded Planet*.
[22] World Bank puts global GDP at 60,587 billion for 2008.
[23] From $70tn in 2008.
[24] *The global recession and Africa: Where next after the G-20?* ODI event report, May 2009.
[25] *What the world economic crisis of 2008/09 means for global agricultural trade*, United States Department of Agriculture, Economics research service, 2009.
[26] Stern, N., 2006, *Stern Review: the economics of climate change*, HM Treasury, London.
[27] *Implications of the Global Economic Crisis for Africa*, World Economic Forum for Africa, 2009.

> **"Once the immediate recession starts to soften we will see the return in the short term to positive economic growth in emerging markets, but as we start to experience sustainability impacts in emerging markets – for example the impact of climate change on agriculture, fisheries, water availability, people migration – then we may start to see flattening of that growth earlier than you might predict without those resource constraints.**
> Chris Burgess, Group Director of Corporate Responsibility, Vodafone

Will the economy buckle under sustainability constraints?

Speculation about the future of the global economy must take into account its fundamental dependence on the environment. **Resource constraints and climate change impacts will seriously constrain growth if not addressed**. Many low-income countries, such as Bangladesh and Ethiopia, have plans and visions to bring them to middle-income status over the next 20 years. But countries with a heavy dependency on farming and commodity exports are very vulnerable to climatic impacts.[28] In Bangladesh, for example, Faisal Islam of DFID told us that although economic growth is currently at five to six per cent, environmental limits are already being hit and welfare gains are becoming more limited. Could it be that by 2030 we witness non-functioning economies in some vulnerable countries, collapsing under the weight of sustainability pressures? **A wide variety of industries could be affected by climate change: insurance, agriculture, fisheries, forestry, real estate and tourism are industries that are particularly exposed because of their dependency on the natural environment.**[29] As Paul Watkiss, a Research Associate at the Stockholm Environment Institute told us, a number of aggregate models suggest that the economic cost of climate change[30] to Africa could be equivalent to an annual loss of 1.5–3% of gross national product (GDP) by 2030, but there's a "great deal of uncertainty" to these estimates.

> **"Ethiopian growth is fundamentally related to growth in agriculture. We did a study where we plotted average agricultural growth and deviation of rainfall from the mean and found a perfect fit. We found that 60–70% of growth is explained by rainfall – and that's stronger as you go north in the country. I would expect that you can generalise that throughout the Horn of Africa region.**
> Dr Alemayehu Geda, Professor of Economics at Addis Ababa University

[28] Eyakuze, A & Gitau M.J., 2007, 'Economic Policy & Performance in East Africa', in *Research Compendium for East Africa Scenarios*, Society for International Development, Nairobi.
[29] Lash, J., & Wellington, F., 2007, *Competitive Advantage on a Warming Planet*, Harvard Business Review.
[30] Including market and non-market sectors.

How interdependent will the world be in economic terms?

To some extent the degree of inter-dependency in 2030 depends in part on what happens as we come out of economic crisis and whether this leads to new systems and economic models. Protectionism could be one of the most significant modifiers of economic inter-dependency in 2030. The challenge of dealing with climate change and its knock-on impacts on resources such as water supplies could lead to a desire to keep natural resources within national borders. Other factors such as extremely high oil prices could also impact on global trading, as happens in our scenario 'Coping Alone', with serious development consequences for low-income countries.

Alternatively there could be increased economic cooperation between nations, and continued globalisation. We may see countries exploiting their comparative advantage with different natural resources, entering into resource-based cooperative deals; this becomes the foundation of a new – if precarious – global order in our scenario 'The Greater Good'.

Where will the locus of economic power be? Is a shift eastwards inevitable?

Most experts we interviewed believe that the locus of economic power will shift over the next 20 years, but are divided on what that means the world will look like in 2030 and the point at which China will surpass the US as the world's largest economy.

Jeffrey Sachs argues that Asia will be home to the world's economic centre of gravity by 2050 because of the rise in population.[31] Angus Maddison believes that China will overtake the US to have the world's highest GDP in 2015, and that by 2030 it will account for one quarter of the world economy.[32]

Despite consensus that there will be a general shift of wealth and influence eastwards, there is less agreement amongst our experts on the extent to which other powers such as the EU, Russia, India and Brazil will be important. Dimitri Zenghelis for example, argues that the US will remain the predominant power for the next 20 years, but China will grow to the size where it rivals the EU. Other interviewees feel that the EU can only remain a major player if it learns to act as a united whole – which some see as unlikely. International summits such as the 16th Conference of the Parties in Mexico in 2010 may provide early indicators of future power shifts.

Some experts see the world as becoming even more multipolar: one interviewee suggested that "The locus of economic power will shift so that it becomes a big circle around Africa, so everywhere else will be important apart from Africa". Camilla Toulmin, Director of the International Institute for Environment and Development is more optimistic about Africa's inclusion in such a multipolar world: "The centre of political gravity is changing and moving further east. In Africa, land is becoming much more valuable".

[31] Sachs, J., op cit.
[32] Maddison, A., 2007, *Chinese Economic Performance in the Long Run*, OECD.

What will be the dominant economic model in 2030? Could we see a fundamental reappraisal of economic value and social values?

Some believe the economic crisis and a shift in the locus of economic power will undermine the dominant economic model in the coming years. As Nick Dearden, Director of the Jubilee Debt Campaign commented, "The current economic crisis should be causing us to rethink the fundamentals". There has been some recent work, such as that sponsored by President Sarkozy of France, which does just that,[33] challenging the pre-dominance of GDP as an indicator of economic performance and social progress, and we explore this idea in 'Age of Opportunity'. Others such as Dimitri Zenghelis are less convinced: although it "feels like a moment of revolution", this is in fact illusory and though there may be increased regulation of markets for a while, change will not be revolutionary.

> **"It's just possible that we'll have a substantial values revolution in one or two countries, a fundamental reappraisal of life choices about how much we work, how much we consume and so on. It's unlikely, but certainly possible.**
> Project interviewee

If the locus of power in the global economy continues to shift eastwards, then low-income countries may well look to eastern economic models for inspiration. Or if the world becomes multipolar or more regionalised we might see a growing diversity of very different models, such as the ALBA model in Latin America which promotes regional networking and is based on fundamentally different principles.[34]

Others felt that there is already a shift in developing countries away from looking at Western models of development as these are too slow – Paul Walters, Senior Economics Advisor at DFID cited Indonesia, China and Taiwan, with their fast economic growth rates, as influences.

> **"I'm much more hopeful now than I was a year ago, because of the financial crisis, which changes everything, especially our perceptions of how a market economy works – what risks are appropriate to take and the allocation of resources. It's been demonstrated that this was wrong, not justified.**
> Terry Barker, Chairman, Cambridge Econometrics

[33] Stiglitz, J., Sen, A., and Fitoussi, J-P., 2009, Report by the Commission on the Measurement of Economic Performance and Social Progress.
[34] Project interviews; for more information see *ALBA: Venezuela's answer to 'free trade': the Bolivarian alternative for the Americas*, Harris, D., and Azzi, D., Focus on the Global South, 2006.

low-income country politics

Is it possible to group low-income countries together and refer in general to low-income country politics? In many respects, clearly not. Low-income countries range from politically fragile states such as Afghanistan and the Democratic Republic of Congo to relatively stable ones such as Vietnam and Tanzania; they includes former Soviet republics such as Kyrgyzstan and Tajikistan; the Asian kingdoms Bhutan and Cambodia, and African countries with populations battered by decades of stop-start civil war such as Sudan and Burundi. Regarding these countries as a group with identical interests would be mistaken.

However there are some common trends – influencing governance, institutions and stability – that run through this political complexity and will play a critical role in shaping the response to climate change in low-income countries.

How effective will political institutions and governance systems in low-income countries be?

Many people we consulted saw the efficacy of political institutions as the single most important factor in shaping the low-income country response to climate change – both through the contribution that low-income countries make on the global stage to climate change negotiations, and in dealing with resource constraints and climate change impacts as they arise. Our interviewees pointed to positive developments in governance in countries such as Ghana, Cameroon, Tanzania and Nepal. But they also pointed out that such systems in countries such as the Democratic Republic of Congo and much of central and western Africa remain inadequate.

Some interviewees suggested that in dealing with climate change, we might see governments in the future adopt a more 'command-and-control' approach. For example, Faisal Islam of DFID Bangladesh suggested that "In an economy such as Bangladesh where governance is weak and market mechanisms are poorly developed, a 'command-and-control' approach may be more effective. So for example only allow a certain type of car, ban two-stroke engines and necessitate the switch to better technology". This top-down approach is evident in the fraught and urgent atmosphere of our scenario 'Reversal of Fortunes'.

In the same vein, the US National Intelligence Council predicts a growing trend for more centralised economic models in developing economies. This is a characteristic of those countries benefitting from the worldwide shift of wealth from West to East and "… the impact of Russia, and particularly China, following this path is potentially greater given their weight on the world stage. Ironically, the major enhancement of the state role in Western economies now under way as a result of the current financial crisis may reinforce the emerging countries' preference for greater state control and distrust of an unregulated marketplace".[35] Strength of governance (including absence of corruption) – in whatever form this governance takes – will also be key in determining how much low-income countries can truly benefit from global payments designed to (for example) enable clean development and protect natural resources such as forests. We explore the role that governance plays in determining the varying fates of low-income countries in 'Age of Opportunity'.

How closely will low-income country governments work with business? Will the future be one of close cooperation, or simmering tension?

Strength of governance is also likely to influence the stance taken by low-income countries with regard to the activities of multi-national corporations (MNCs) within their borders. Whether and how countries open up their markets to foreign investors can vary even within a country by the type of industry: in Ethiopia, for example, we were told that the telecoms industry is very closed, whereas floriculture is open and a good environment for businesses to invest. The result has been much less growth in mobile telecommunications compared with other African countries.[36] However some Ethiopians saw the issue very differently: one interviewee told us that "At the moment it looks like the government is selling the country, we're giving prime lands to the flower industry. The companies that got kicked out of Kenya have come here".

On a different note, **it may be that the future brings very close cooperation between businesses (both international and local) and low-income country governments**. We could see businesses taking responsibility on a sweeping scale (perhaps in return for their licence to operate), and/or governments focussing unprecedented attention on creating favourable investment conditions. In Kenya one interviewee, Richard Fox, Managing Director of the company Homegrown predicted that "There is and will be an increasing realisation that economies can't develop without companies. There will be a strengthening of the relationship between government and the private sector".

> "**Entrenched interests do quite well from the current system of resource exploitation, and these entrenched interests are not eager to change. When this intransigence comes up against the vulnerability and fragility that also exists in low-income countries then we can expect flashpoints and conflict.**
> Dr Andy White, President,
> Rights and Resources Group

Many other factors are dependent on political stability. Will recent progress in this area continue?

The most recent Africa Progress Panel Annual Report states that **despite authoritarian and corrupt leaders, wars and coups, the overall trend in Africa is currently towards less conflict, more democracy and greater development.**[37] This reflects progress in recent decades in South Asia: one interviewee in Bangladesh commented that "We should take some comfort from the fact that for the first time, all of the countries in South Asia have democratic governments".

However these new democracies can be extremely fragile. Kenya, for example, has been relatively stable for a few decades but violence erupted after the last election, and many worry that might repeat itself. Mike Harrison, Deputy Head of DFID Kenya told us: "You see similar things across much »

[35] US National Intelligence Council, *Global Trends 2025*, 2008.
[36] Project interviews.
[37] Africa Progress Panel, *Annual Report 2009: An Agenda for Progress in a Time of Global Crisis*.

» of Africa in terms of political systems and mindset, resistance to sharing power, autocracy, and ethnic division. It's generational changes that are needed". We see hints of such changes emerging in some low-income countries in our scenario 'Coping Alone', when new governance regimes emerge following an abrasive era of volatile oil prices, severe food insecurity and some of the richer elite fleeing the worst affected countries.

Will climate change ignite simmering conflicts?

International Alert warns that **46 countries will face "a high risk of violent conflict" when climate change exacerbates traditional security issues, and a further 56 countries face "a high risk of political instability" as a knock-on consequence of climate change**. Of the current list of 43 countries classified as low-income,[38] 33 are on at least one of these two International Alert lists, which suggests a high risk of climate change-related conflict in low-income countries in the coming decades. Conflict of various levels features in all our scenarios. Some is brought about directly by climate change, whilst in others climate impacts amplify other sources of tension.

Several interviewees raised this issue, asking how already fragile governments will be able to cope with climate change impacts – on agriculture, water and human health – on top of existing poverty issues.

What level of priority will low-income country governments give to climate change?

Unsurprisingly our research showed that the level of priority that low-income country governments give to climate change will have a big impact on their responses. Most people we interviewed felt that it is not yet a high priority, and that despite growing awareness, particularly in the last few years, action has been slow to follow. This has been for a variety of reasons. Chris Hegarty, Advocacy Manager at the Scottish Catholic International Aid Fund points out that "Climate science is mostly based in the North. Although the internet helps this, access to computers is not equal". Dan Smith, Secretary General of International Alert told us: "For a long time the drumbeat was about it being a fiction or conspiracy of high-income countries. The presence of an Indian scientist leading the IPCC has helped".

> **"As climate change unfolds, one of its effects is a heightened risk of violent conflict. This risk is at its sharpest in poor, badly governed countries, many of which have a recent history of armed conflict. This both adds to the burdens faced by deprived and vulnerable communities and makes it harder to reduce their vulnerability by adapting to climate change.**
> International Alert, 2009[39]

Many of our interviewees felt that it was understandable that low-income countries don't focus too much on climate change, given the many more immediate and tangible issues they face. Calum Miller from DFID told us that "Even in those countries that will be impacted most by climate change, their immediate prosperity and welfare remains the priority rather than future climate impacts", and Johanna Jansson, Senior Analyst at Stellenbosch University agreed: "As long as bread and butter issues remain major political issues, it is not likely that climate change will become a political priority. Given the lack of capacity in most policy environments of the developing world, it will be difficult to devote important attention to climate change whilst still struggling to develop basic agriculture and infrastructure".

But others believe that this is a false dichotomy. As John Christensen, Head of the United Nations Environment Programme (UNEP) Risoe Centre on Energy, Climate and Sustainable Development says, "The trend in Africa has been to focus mainly on adaptation but this tends to preserve development rather than creating it". **By grasping instead the opportunities afforded by low-carbon development, many believe that we could see a serious shift in the development dynamic in the future**. Anne Wheldon, Technical Director of the Ashden Awards for Sustainable Energy argues that "Lots of necessary investment can easily be aligned to low-carbon development: e.g. health, welfare, education, housing". If co-benefits are readily apparent and demonstrable, then this might liberate climate change from environmental ministries, and bring it into mainstream analysis. If they're not, then we may see much more of the 'dirty development' evident in low-income countries in the early years of our scenario 'Reversal of Fortunes'.

> **"Historically there has been a very low understanding of climate change and interest was restricted to the Ministry of Environment and Forests… This has begun to change a bit in the last couple of years because of the intensity of the negotiations, political changes in the US and increased certainty of the climate science.**
> Project interviewee

Will low-income countries speak as one, or will a fragmented approach diminish each country's impact?

Alemayehu Geda of Addis Ababa University told us: "Low-income countries don't have a voice on the world stage – that's a function of economic power, which they don't have".

Most interviewees tended to agree with him, for example Nick Dearden of Jubilee South told us that he doesn't see any steps being taken towards giving low-income countries a greater voice and expects that they will continue to go unheard.

Many of our experts saw a united voice as important and desirable. Abu Kamal Uddin, Programme Manager for the Bangladesh Government's Climate Change Cell said that "Unity will be very important. We united in the past against various common enemies. It has to be different in the future – we need to unite through generating trust". A number of our interviewees pondered what role strong low-income country leaders might play in enabling this. We explore this in our scenario 'Reversal of Fortunes', where the uniting 'Elephant Movement' becomes a global phenomenon. Speaking with one voice is of course a challenge for such a diverse group of countries. For example, the small island countries tend to focus on total carbon emissions because of their fear of even small temperature rises and their impacts on sea level. Other low-income countries tend to focus more on the financing mechanisms and the potential for development funding, and won't support cuts which they fear will hamper their own development.[40]

Despite these difficulties there are some signs of low-income countries coming out from behind the Brazil-India-China grouping. At the 2009 COP15 conference in Copenhagen both the Alliance of Small Island States and the G77 group (of 130 developing nations) were more prominent, and argued strongly for more adaptation funding, deeper emissions cuts and binding targets.

[38] By the World Bank in 2009.
[39] Smith, D., and Vivekananda, J., *Climate Change, Conflict and Fragility*, International Alert, 2009.
[40] ChinaStakes.com, Beijing's Copenhagen Strategy – *Developing Countries, Unite!*, 25 May 2009.

demographics in low-income countries

The size and structure of low-income country populations will profoundly influence how these countries respond to climate change in the years to 2030. There are three aspects that have particular significance: total population growth, urban population growth and population displacement.

How many people will there be in 2030?

Growing human population can be seen as a stress-multiplier, much like climate change itself, increasing competition for resources and pressure on the earth's ecosystems.[41] The global population is set to grow by around 20% to 8.3 billion in 2030. Growth in low-income countries will be much faster. According to UN data, the population of low-income countries will rise from 919 million in 2005 to 1,473 million in 2030, an increase of 553 million or 60%, in just 25 years.[42]

Growth in absolute numbers of people could lead to higher overall emissions, but the real problem is that it makes creating solutions to climate change and other issues more difficult, as Ton Berg, working for Médecins Sans Frontières in Ethiopia remarked: "One key issue is population growth and no one is really talking about it. It hinders further development, but the outside world can't talk about it". In many poor countries, rapid population growth both drives and is driven by poverty.

> **Population growth is a key variable, but it is not exogenously (i.e. externally) determined; accelerating development can automatically lead to a dramatic reduction of population growth.**
> Ashok Khosla, Chairman, Development Alternatives, India

[41] Reid, W. V., et al., 2005, *Ecosystems and Human Well-being*, Millennium Ecosystem Assessment.
[42] *World Population Prospects: The 2008 Revision Population Database*, UN Dept of Economic and Social Affairs, Highlights.
[43] Kloos, H., et al., 2007, 'The AIDS Epidemic in a Low-Income Country: Ethiopia', in *Human Ecology Review Vol .14*, No. 1; see http://article.wn.com/view/2009/11/24/United_Nations_HIV_epidemic_peaked_in_1996_number_of_infecte/
[44] *Obesity and overweight*, Factsheet no 311, World Health Organisation, 2006.
[45] http://www.optimumpopulation.org/opt.earth.html
[46] *China View*, 10 December 2009, see http://news.xinhuanet.com/english/2009-12/10/content_12624315.htm
[47] See http://www.popoffsets.com/
[48] World Urbanization Prospects: *The 2007 Revision Population Database*.
[49] *United Nations World Population Prospects database* http://esa.un.org/unpp/
[50] *Demographia World Urban Areas and Population Projections 5th Ed* 2009 http://www.demographia.com/db-worldua.pdf
[51] UN-Habitat, 2008, *The State of African Cities 2008*.

What factors could throw population projections off course?

Population projections are not set in stone, and there is scope for faster or slower growth than anticipated. Whilst the evidence suggests that deaths from HIV have peaked in most regions,[43] unfortunately there is always the risk of serious impact on human numbers from the emergence (or re-emergence) of infectious disease; at the same time obesity is rapidly increasing in some low-income countries, giving a 'double burden of disease' and its associated influence on life expectancy.[44]

On a more positive note, we could also see slower population growth if low-income countries develop their economies quickly, as in our scenario 'Reversal of Fortunes', or if more deliberate interventions are made.

According to the UK non-governmental organisation Optimum Population Trust (OPT), the number of countries with a policy to reduce birth rates has decreased in the past decade from 82 to 75.[45] But **as pressure on resources intensifies, the case for more concerted action may strengthen**. Zhao Baige, Vice Minister of China's National Population and Family Planning Commission, announced at the COP 15 conference in Copenhagen in 2009 that "China has managed to bring down its birth rate with the family planning policy in the past 30 years, which results in less population and fewer carbon dioxide emissions". According to Baige, the policy resulted in 400 million fewer births, meaning that China's annual emissions are currently 1.83 billion tons lower than they otherwise would have been.[46] Could we see population policy introduced as an explicit means of reducing future greenhouse gas emissions? The Optimum Population Trust has already suggested that investments in family planning should be treated as legitimate carbon offsets.[47]

How many people will be living in cities?

> **Migration will be mostly within poor regions rather than from poor to rich. Within these regions there could be a huge stretch on urban infrastructure, not only in megacities, but overwhelming it everywhere.**
> Dan Smith, Secretary General, International Alert

Among the least developed countries the percentage of the population living in urban areas is projected to rise from 29.4% to 41.5% between 2010 and 2030.[48] For some countries, the change could be even more dramatic. While the population of Democratic Republic of Congo (DRC) is expected to almost double between 2005 and 2030,[49] the population of Kinshasa is projected to increase from around 8.5 million today to over 20 million in 2030.[50] The DRC could become a majority urban country before 2035.

If megacities in low-income countries grow unplanned, this could lead to higher per capita emissions of greenhouse gases, greater difficulties in meeting people's needs and greater political instability.[51] On the other hand, according to Ashok Khosla from Development Alternatives, "The growth of cities could be an opportunity. By 2030 there will be 450 million more people in Indian cities. **There's an opportunity to design new cities that deliver high quality of life and have low carbon footprints. Ecological resources can be saved by an order of magnitude if cities are designed from scratch instead of old ones being retrofitted".** »

» Climate change could accelerate urbanisation, as pointed out by Rezaul Chowdhury of the Equity and Justice Working Group Bangladesh: "Bangladesh will lose a lot of land, so there will be lots of rural to urban migration. Coastal areas will disappear. Dhaka currently has 27,500 people per square kilometre, so by 2030, this could be 40,000 people. They'll need to double electricity, water supply, education provision etc".

Could anything ease the demographic pressure on urban areas?

It is difficult to foresee alternative pathways, but the rate of urbanisation could be slower than currently projected if:

- there is a 'new green revolution' and agricultural productivity in low-income countries (especially Africa) dramatically increases (as explored in our scenario 'The Greater Good');
- there is significant investment in decentralised systems (such as for energy) and rural livelihoods are supported as a consequence (as explored in 'Age of Opportunity');
- governments intervene effectively to plan city growth (for example diverting growth to secondary cities);
- some urban areas effectively fail and so become less attractive for potential migrants.

Population displacement as a result of climate change is likely to be significant, but how many people will have to move?

> **By 2050, there might be 20 million migrants from the coastal areas in Bangladesh.**
> Project interviewee

Many of the experts we consulted in the process of developing our scenarios said that population displacement was one of the factors with the greatest potential impact on development in low-income countries. **Migration will be the adaptation strategy for many households**.[52] There are widely varying estimates for the number of climate-displaced people we will see in 2030 – some suggest it will be at least triple the 26 million of today,[53] while others postulate far higher numbers – perhaps 200 million,[54] or more. A recent Christian Aid report suggested a total of one billion forced migrants by 2050, as climate change exacerbates existing problems.[55] Vulnerable areas for displacement include areas already suffering from environmental stress such as sub-Saharan Africa, and low-lying areas such as in Bangladesh or Pacific and Indian Ocean atolls. Famously, the government of the Maldives has sought land in India to settle should the country succumb to sea-level rise.[56]

Many climate refugees may be difficult to identify as such. As Dhananjayan Sriskandarajah, Director of the Royal Commonwealth Society told us, "It'll be very hard to spot a climate refugee. Gradual changes in the climate will drive gradual changes in migration. And many other drivers (economic, social and political) will influence migration choices and patterns too". This problem of causality may make accommodating refugees more problematic. Most migrants are likely to stay within their own country or region if possible, but there is chance that a proportion will seek refuge further afield. James Lovelock, the British scientist who developed Gaia theory, has talked of 'Lifeboat Britain', relatively undamaged by climate change, but forced to accept millions of climate refugees from around the world.

[52] Helbert, R., Jorgensen, S.L., Siegle, P.B., *Climate Change, Human Vulnerability and Social Risk Management*, Word Bank, 2008.
[53] Global Humanitarian Forum, 2009, *Human Impact Report: Climate Change — The Anatomy of a Silent Crisis*.
[54] Myers, N. (2005): *Environmental refugees: an emergent security issue*. 13th Economic Forum. http://www.osce.org/documents/eea/2005/05/14488_en.pdf
[55] Christian Aid, 2007, *Human tide: the real migration crisis*.
[56] See http://news.bbc.co.uk/2/hi/south_asia/7719501.stm

Will mass movement of people lead to violent clashes between different populations?

> **Even the strongest mitigation will not stop great flows of migration. We're seeing countries building walls and fences to keep people out.**
> Terry Barker, Chairman, Cambridge Econometrics

For many, the inevitable conclusion is that conflict will ensue. Walt Patterson, an Associate Fellow at Chatham House, said that "We will see large movements of people in the timeframe we're looking at, producing huge social and political stresses". According to Nigel Inkster of the International Institute for Strategic Studies, **"Climate change in the past has always led to movement of people and hence increases in conflict. It will continue to be a catalyst for existing security problems"**.

Climate refugees exist in all four of our scenarios, but are dealt with very differently. In our scenario 'Reversal of Fortunes', migration leads quickly to conflict. In 'The Greater Good' by contrast, countries adhere to global treaties designed to protect their rights.

attitudes to climate change in low-income countries

Our research showed that understanding of climate change and its possible impacts is currently quite limited in low-income countries (which is not to say that it is necessarily well understood elsewhere). As this changes and people become better informed – and start to link observed changes to their climate with the science of climate change – how will this impact on the political mandate for action? As awareness grows, will that lead to people seeking help in their own countries, or drive more towards blaming high-income countries and seeking recompense?

How aware of climate change will people in low-income countries be?

Our research and interviews found that awareness of climate change in low-income countries is patchy: most people we spoke to said that farmers in particular are talking about changes in growing seasons and rainfall patterns, but don't necessarily know or agree on what the cause is.

In Ethiopia, research by Oxfam on attitudes to drought found many saying that it had become more frequent. In some places this was supported by the rainfall data, in others it appeared to be a perception with no basis in fact.[57] In Kenya, Andrew Adwera, a Research Fellow at the African Centre for Technology Studies said, "Elders will tell you the difference between now and previously, but they're worried that people don't take what they say seriously".

In Bangladesh, Rezaul Chowdhury of Equity and Justice Working Group saw things from a very different perspective: "When I visited Europe recently, I was astonished by Europeans' attitudes. They see climate change as a problem for the future. My country is shrinking and suffering, but Europeans don't see the problem yet. We need to raise awareness in developed countries".

Does climate awareness translate into action, or will other challenges stay centre stage?

Several people we interviewed raised points neatly summarised by Johanna Jansson of Stellenbosch University: "Developing a response to climate change may not be seen as the most urgent political priority when you're still trying to feed your people". The idea that there are more 'pressing' issues is quite dominant in people living and working in developing countries. As Dhananjayan Sriskandarajah of the Royal Commonwealth Society put it, **"If we're having trouble in the UK convincing the rich to think about long-term problems, then why would we expect the poor – who face a host of more immediate problems – to engage?"**

But as the impacts of climate change hit low-income countries with increasing severity, awareness – and mandate for action – is likely to rise. Bangladesh is a good case study for this, as it has already started to move from what are perceived to be normal weather fluctuations into more extreme events that are being attributed to climate change. One interviewee in Bangladesh told us: "Weather shocks have influenced policy makers. Because Bangladesh is prone to natural disasters, these shocks have been treated as normal. Cyclone Sidr changed this – the intensity and speed of the wind was unprecedented, and most experts attributed this to climate change".

Linked to the issue of awareness is that of agency – even when people become aware, can they take relevant action? As Alex Mugova, Consultancy Manager at Practical Action in Kenya told us, "Awareness in communities is very high – people in arid and semi-arid areas are aware. But they have no option other than to pursue unsustainable activities". And as the Human Development Report 2007/08 points out, "Awareness of the problem is a necessary, but insufficient condition to motivate an individual or collective response".[58] **So what could tip the balance from awareness to action in the future? The ability to access up-to-date solutions-orientated information – perhaps via mobile internet – would be one thing. Access to climate support groups – be they local, religious or state-run in nature – could be another.**

> **"In a country like Bangladesh, 40% of people are illiterate. They think climate change impacts are the fate of the gods. Cyclones are acts of gods. The literate, on the other hand, think it's because of over-consumption in developed countries, and are demanding compensation.**
> Rezaul Chowdhury, Equity and Justice Working Group Bangladesh

[57] Jennings, Dr. S., and Magrath, J., 2009, 'What happened to the seasons?', *Oxfam Research Report*, Oxfam GB.

[58] Leiserowitz, A. (2007) *Human Development Report 2007/2008: International public opinion, perception and understanding of global climate change*. United Nations Development Programme.

Where will the blame be placed?

> **Awareness of climate change will increase with increasing climate change impacts, and the response could take two forms. One could be to say that it's a common problem that we all face together, and we need to help each other to deal with disasters. The second is that each country goes alone and against each other. Hence it is important to build trust and governance structures for cooperative solutions both on mitigation and adaptation.**
> Karsten Neuhoff, Senior Research Associate, University of Cambridge

How low-income countries allocate blame, and the responsibility that high-income countries take for causing climate change, could take different directions over the coming decades.

How seriously the high-income countries take their responsibility will be crucial to the response that we see from the developing world. As one interviewee postulated, "If we get a good global deal in the next few years, we could see a shift in the development paradigm… if not, we will see the bitterness and frustration coming out 20 years down the line".

Low-carbon development may present opportunities, but these could be overlooked if countries are seeking compensation rather than support. One interviewee summed it up like this: "The immediate response to an injustice is to seek some kind of redress, rather than see the opportunity. So if an opportunity presents itself, it may be that it's overlooked. In the dialogue around climate change there may be not enough emphasis put on opportunities. But **opportunism is only likely to become a prominent theme once adequate compensation is provided – and we [in high-income countries] haven't managed that yet"**.

What will the role of the media be in shaping awareness and responses?

The shape of the media is likely to change enormously in the next 20 years as centrally published media (newspapers, television and radio) continue to be displaced by more distributed means of relaying information. Many commentators noted the power of Twitter in the days after the 2009 Iranian elections, with the US government apparently going so far as asking the site not to do maintenance work in order to protect the interests of protesters.[59] This echoed the aftermath of the Asian tsunami of 2004, and the London bombings of 2005, when eyewitnesses rather than journalists supplied much of the reportage.

How far this trend will spread into less developed countries is unclear, although the take-off of mobile phone technology in Africa has shown the potential for such distributed technologies to leapfrog traditional development paths.[60]

In the meantime, how the conventional media report climate change can have a big impact on attitudes. **While the mass media are often looked to as a means of communicating the need for action, research suggests that such media often over-simplify and hype the issues involved in climate change, and blur fact with either misinterpretation or opinion**.[61,62] Even the desire to present both sides of a story can result in coverage that does not reflect the real balance of evidence. As shown in high-income countries on a number of occasions, such an approach can rapidly erode public consensus on climate change, making dependence on the media to educate people on the issues surrounding climate change questionable.

As low-income countries' conventional media outlets start to cover climate change in more detail in the coming years, there is no reason to think that the same problems won't occur. The emotive issue of blame may also be brought to the fore. Could the mass media contribute to a civil unrest on climate change in low-income countries? And would their campaign be based on sound science, or on misattribution of the causes and effects?

Finally, as one of our interviewees noted, **people are encouraged to aspire to material affluence with images and messages in the media that are inconsistent with a low-carbon lifestyle, and establishing a different narrative of aspiration will be difficult**.

> **Status fascination remains a problem in countries making the first transition from low-income country. High-income people in London will use the tube. High-income people in Nairobi will NOT use the bus. We need to be realistic here. We will not have emerging economy middle classes immediately jump to the attitudes of the green middle class in high-income countries.**
> Lord Adair Turner, Chair of the UK Committee on Climate Change

[59] *Time Magazine:*' Iran Protests, Twitter the Medium of the Movement', 17 June 2009.
[60] World Economic Forum on Africa, *Implications of the Global Crisis for Africa*, 2009.
[61] Cicmil, M., July 2009, *On climate change and the mass media*, ConservationToday.org
[62] Rhomberg, M., 2009, *The mass media and the risk communication of climate change*. Zeppelin University Friedrichshafen, Germany.

What will be the role of religion in shaping people's attitudes to climate change?

A recent Pew Global Attitudes[63] survey found that awareness of climate change is low in developing countries, noting that "large majorities of respondents had never heard of global warming in Pakistan, Indonesia, Nigeria, and Egypt. These results suggest that many, especially in the Muslim world, have never heard of global warming". There is however no analysis of why this might be the case, and the idea that there would be a different response to climate change in countries with different predominant faiths was not raised by any of our interviewees.

However as Peter Madden, Chief Executive of Forum for the Future points out, "Something that has been largely missing from the debate so far is what the responses of the major religious faiths will be. Europe is largely secular, and we sometimes forget how important religion is in people's lives and politics in other parts of the world. **How the world's major faiths, in particular Islam, Christianity and Hinduism respond to this challenge will be crucial – and it's a big unknown at the moment"**.

In general our research suggests that religion will continue to be a defining issue in world politics, and that climate change is intimately connected with conflict: from this basis it is not unlikely that we will see conflicts that are linked with both climate change and religion in the coming decades.

[63] The 2006 Pew Global Attitudes Survey, cited in Leiserowitz, A., 2007, A Human Development Report Office Occasional Paper: *International public opinion, perception and understanding of global climate change*. United Nations Development Programme.

use of natural resources

"Climate change will show up first in water systems and the species we depend on for agriculture such as pollinators. The price of food will go through the roof. The energy, food and water crunch will happen whatever we do." So said one project interviewee, starkly highlighting how climate change will act as a 'stress multiplier' in our already precarious balance with the natural world. This section explores how the world's approach to the use of resources such as fossil fuels, water, productive land and forests might interact with the future low-income country response to climate change.

Will we still be burning fossil fuels in 2030? Or will costs and sanctions be prohibitively high?

Will we still be burning coal and oil in 2030? The IPCC scenarios suggest the answer is 'yes' and project that the main sources of primary energy will remain a combination of coal, oil and gas, ranging from 75–85% in 2030.[64] And what will it cost? For oil, the International Energy Agency assumes an average of $100/barrel from 2008 to 2015 and then $120/barrel average to 2030 (2007 dollars so a nominal value of $200).[65] However, our project interviews indicated much less consensus around these issues, with some suggesting that oil price may be prohibitively high, and others envisaging renewable breakthroughs making fossil fuels wholly uncompetitive (see technology section p27).

A number of our interviewees saw the oil price in particular as a key variable likely to affect low-income countries and their response to climate change. "Future shortages, erratic supply and a volatile price will have a significant impact especially in more remote areas in low-income countries," said Anne Wheldon of the Ashden Awards for Sustainable Energy. She pointed out that "Fuel shortage could lead to increasing isolation of remote rural areas, an increase in the rural-urban divide. This could mean either a world of connected cities and unconnected and ignored rural areas or a world of prosperous agriculture tied into global trade". High oil prices – as explored in our scenario 'Coping Alone', affect agriculture, transportation and trade in myriad ways. Wheldon suggests that they may also be "more likely to lead to low-carbon transition than climate change, unless there are real incentives for low-income countries" – but this transition would almost certainly not be a smooth one. 'Coping Alone' is truly a rough ride for low-income countries.

Global food demand is going up, but how will climate change affect supply?

World food demand is projected to increase by 50% by 2030.[66] This is the result of the combined effects of world population growth, rising incomes and dietary changes towards higher per capita meat and dairy intake as the global middle class grows. At the same time, some of the most profound and direct impacts of climate change over the next few decades will be on agriculture and food systems.[67] **All quantitative assessments show that climate change will adversely affect food security**.[68] As David Croft, Director of Conformance and Sustainability at Cadbury said, "Depleted water resources, increased salinity, and higher temperatures will impact on crop type and yield unless serious adaptation measures are put in place".

> "
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> **Food shortages have already happened, and are likely to continue in the future. This will force the government to rethink the utilisation of land resources, and a major part of this will be addressing adaptation to climate change.**
> Alex Mugova, Consultancy Manager, Practical Action, Kenya

What other trends could affect agricultural production?

Climate change is not the only challenge to food supply in the future; soil degradation is also a major contributor to cropland loss. Globally, 20,000 to 50,000 square kilometres of arable land are lost annually through degradation, chiefly soil erosion, caused in part by overexploitation of land and unsustainable irrigation practices.[69] Desertification and NPK (nitrogen, phosphorous, potassium) nutrient depletion are also major issues, particularly in sub-Saharan Africa. Based on these trends up to 20% of global cropland may be lost by 2050 resulting in food shortfall of up to 25%.[70]

The key uncertainty is therefore how agricultural systems will be organised and whether they will successfully adapt to changing pressures. Many argue that there is significant potential to boost the productivity of poor soils if accessibility to basic fertilisers and improved low-input farming methods can be mainstreamed. Christof Walter, a sustainable agriculture expert at Unilever, argued that "The theoretical potential to feed the world's population of 2030 is there through improvements in overall agricultural productivity… and ensuring that, globally, crops are grown where they grow best". We explore this kind of coordinated approach in our scenario 'The Greater Good'. Walter also pointed out that "The food industry tends to source from those 0.5% of the world's farmers who farm more than 100 hectares. The greatest potential for productivity increases is with smallholders in low-income countries. However, it is often expensive and complicated for the food industry to buy from smallholders. So the question is: **can we efficiently scale up models of smallholder-based buying that have proven to work?**"

Could advances in distributed Information and Communications Technology (ICT) play an important role in maximising agricultural productivity in the future? Data on product and input prices, weather and rainfall patterns, and of early storm or flood warning systems, currently seldom reach those most in need, particularly women.[71] »

[64] World Bank, 2006, *Clean Energy and Development: Towards an investment Framework*.
[65] International Energy Agency, 2008, *World Energy Outlook*.
[66] UN Secretary-General Ban Ki-moon, at the High-Level Conference on World Food Security in Rome, 2008, see http://www.un.org/News/Press/docs/2008/sgsm11612.doc.htm
[67] Brown, M.E., and Funk C.C., 2008, 'Food security under climate change'. *Science 319: 580–581*.
[68] Schmidhuber, J. and Tubiello, F.N., 2007, 'Global food security under climate change', *Proceedings of the National Academy of Sciences 104: 19703–19708*.
[69] Adeel, Z., et al., 2007, *Rethinking Policies to Cope with Desertification*, United Nations University. The major degrading areas are in Africa south of the Equator, Southeast Asia, southern China, north-central Australia and the pampas of South America.
[70] Nellemann, C., et al., (eds), 2009, *The Environmental Food Crisis – the environment's role in averting future food crises*, UNEP.
[71] Tyler, S., and Fajber, L., 2009 *Land and water resource management in Asia: challenges for climate adaptation* International Institute for Sustainable Development.

» The negative impacts of climate change and short-term weather variation on productivity could be mitigated if the 'last mile of communication' on key information could be conquered.[72] Current pilot studies show the potential in this area, and might become viable at scale.[73]

On the other hand, there may be more significant factors affecting the future of world food security. The Food and Agriculture Organisation of the United Nations (FAO) anticipates continuing growth in the demand for biofuels (partly driven by high oil prices and government policies, and partly by slow developments in widespread adoption of second-generation biofuels and technologies).[74] A number of interviewees also saw large-scale purchases of land – 'land grabs' (both for food and fuel production) – as a key variable, potentially constituting "a serious threat to global food security". The key word here is 'if'. Land grabs are the stuff of headlines in 2010, but will this still be the case in 2030?

Some experts saw the role played by agricultural processes in the carbon markets of the future as equally significant. Might we see climate change priorities as a key driver of agricultural practices, and even assess crops on the basis of their albedo?[75]

Other shocks to the system could also have profound effects. **Some experts warn of the danger of 'peak phosphorus', i.e. a point after which production will decline**, which some estimate could occur in the next 30 years.[76] Given the reliance of modern agricultural systems on phosphate fertilisers, and the lack of currently scalable alternatives, what impact could this have on food production systems?

Wars over water, or concerted collaboration?

Freshwater consumption worldwide has more than doubled since World War II and is expected to rise another 25 percent by 2030.[77] The 2009 World Water Development Report warns that, by 2030, 47% of the world's population will be living in areas of high water stress[78] although the exact nature of changes in water availability and rainfall patterns is difficult for climate models to predict.

At the same time urbanisation and intensive agricultural and industrial production pose new management challenges and new demands on water resources.[79] Will low-income countries successfully manage these large-scale demands, or could limited water availability be a fundamental barrier to future development? Austen Davies of the United Nations Children's Fund (UNICEF) points out that **"Access to water is crucial not just for drinking and for health, but because without it countries will find it difficult to collectivise and industrialise; from an agricultural and industrial point of view, water shortages will certainly affect the economy"**. In extreme circumstances, could such shortages even lead to population collapse?

> **"There will be competition over the use of water between urban areas and agriculture ones, and we're likely to see a regulatory framework for how water is used. This could lead to conflicts, not necessarily riots (though this could happen) but more like legal battles between agricultural and urban users.**
> David Farrell, Group Director, Colors Fruit, South Africa

There are also some grounds for optimism. A recent study from the Stockholm Environment Institute quantified the potential to use both 'green' (water in the soil that stems directly from rainfall) and 'blue' water (river discharge and groundwater) in agriculture. The researchers found that many countries classified as chronically blue water-short in fact have enough blue-plus-green water to produce a standard diet for their populations. Kenya, for example, has plenty of unused or not well-managed green water to benefit from. The report authors say that "Not even by 2050 and under climate change will the country become water-short if both blue and green water [are] managed well".[80]

Of course, **water is not just an issue for the level of the nation state**. As Faisal Islam of DFID Bangladesh pointed out, "Bangladesh only has eight per cent of its water catchment within the country. The rest comes from neighbouring countries, so their approach will be critical to our future". For many individuals, this is grounds for concern. "Some people say that the next world war will be fought over water – and I believe that's likely. We're really starting to see the impacts of water scarcity now." So said one interviewee, a view we heard echoed many times. On a more positive note, the Stockholm International Water Institute asserts that "Arguments [for water wars] ignore massive amounts of recent research which shows that water-scarce states that share a water body tend to find cooperative solutions rather than enter into violent conflict".[81] The scenarios explore both peaceful and aggressive approaches to water availability challenges.

[72] 'Weather Info for All' Initiative, Global Humanitarian Forum, 2009; see http://www.ghf-geneva.org/OurWork/PracticalAction/WeatherInfoforAll/tabid/359/Default.aspx
[73] Institute for Social and Environmental Transition (ISET) *Scaling Up Local and Community Based Actions*, Submission to Nairobi Work Program on Impacts, Vulnerability and Adaptation to Climate Change.
[74] *The State of Food Insecurity in the world*, FAO, 2008.
[75] Ridgwell, A., et al., 2009, *Tackling Regional Climate Change By Leaf Albedo Bio-geoengineering*.
[76] White, Prof. S., and Cornell, D., 2008, *Peak Phosphorus: the sequel to Peak Oil*.
[77] Water Scarcity and Climate Change: Growing Risks for Businesses and Investors', Ceres and the Pacific Institute, February 2009.
[78] *Water in a changing world*, World Water Assessment Programme, 2009.
[79] Tyler, S., and Fajber, L., 2009, ibid.
[80] *Future water availability for global food production: The potential of green for increasing resilience to global change*, Stockholm Environment Institute, May 2009.
[81] See http://www.siwi.org/knowledge/new

How will the world's remaining forests be managed?

Over the next 20 years, if current rates of deforestation continue, primary forest cover in developing countries will decrease by 28% compared to 2005 levels.[82] Whole regions may become deforested due to logging (illegal or legal), land-use change, erosion, lack of water and other climate change impacts.[83] On the flipside, over the same timescale replanted forest cover is projected to increase, especially in Europe and China.

A key factor affecting the future of forests is the extent to which efforts to reduce deforestation by various public and private financing schemes succeed – an issue on which encouraging progress was made at the COP15 conference in Copenhagen in 2009. Variables affecting this are explored in our different scenarios: the strength of international climate change agreements; the effectiveness of governance in forest countries; whether the money reaches the right places and sustains livelihoods; whether energy scarcity leads to pressure on forested areas; and whether forests are genuinely more valuable standing than felled.

A number of our interviewees argued for or against the inclusion of forests in carbon markets, saying that this would be a key determinant of future success in fighting deforestation. Some argued that the benefits of increased protection (by assigning a carbon value) outweigh the risks;[84] others said that there's too much uncertainty around supply and demand to guarantee effectiveness and prevent a flooding of the carbon market. In that case will **we see mechanisms that value forests for more than their carbon?** If not, could we, as one interviewee postulated, even see the bottom fall out this particular market if a technological breakthrough such as algal fuels makes forests' sequestration function obsolete?[85]

[82] New Carbon Finance press release, 22 May 2009; figures extrapolated to 2030 based on constant rate of reduction 2005–2030.
[83] http://www.tropicalforesttrust.com/why-forests-matter.php
[84] New Carbon Finance press release, 22 May 2009.
[85] Project interview; see also http://www.newscientist.com/article/mg20327186.000-craig-venter-programming-algae-to-pump-out-oil.html

role of technology

We know that technology and its deployment must play a significant role in determining the low-income country response to climate change. This section explores the uncertainty around the types of technology that might be available, how they might be distributed and transferred between users. We focus on energy technology here, but also explore possible future developments in agricultural and transport technology, and ICT.

Availability and cost of low-carbon energy technology

The most important technological determinant of the response to climate change, according to those we consulted for this work, is the availability of low-carbon sources of energy in low-income countries.

Today, by and large, low-income economies emit relatively little carbon dioxide from energy generation. So whereas one half of the world is challenged with transforming high-carbon energy systems to low-carbon systems (and increased efficiency of use), **the low-income country challenge is to increase energy supply to enable economic development, by the most carbon- and economically-efficient means possible**.

While, as John Christensen of UNEP's Risoe Centre, reminded us, "There will be no silver bullet technology", there are precedents that we can point to where new technologies have spread more rapidly than most had expected. Mobile telephony has moved out of the executive's briefcase and into the hands of the poor in well under a decade. According to the International Telecommunications Union, in 2003 only one per cent of Bangladeshis and five per cent of Kenyans owned mobile phones. The figures just five years later were 28 and 42% respectively.[86]

> **"In India in the 1990s, it took four years to get a landline. In come the private mobile companies, and now the poorest Indians really use mobiles to their fullest advantage – not just calls, but cash transactions and new business models. Rural India has genuinely leapfrogged the world in optimising the benefits of this technology.**
> Dhananjayan Sriskandarajah, Director, Royal Commonwealth Society

Low-carbon energy sources could spread as rapidly as mobile telephony has, ushering in an 'energy leapfrog' to rival the ICT leapfrog. But every technology develops differently, and the route to either the mainstream or the dead end is dependent on a huge range of factors, from intellectual property law or the availability of investment capital, to local cultural aspirations or the functionality of the technology itself. A recent report from Chatham House provides a sobering dose of reality, concluding from an exhaustive »

[86] http://www.itu.int/ITU-D/ICTEYE/Indicators/Indicators.aspx#

» review of patents and market adoption rates that **"Inventions in the energy sector have generally taken two to three decades to reach the mass market".**[87] **But the next two decades are not ordinary decades**. Action – and, most importantly, funds – to address climate change may accelerate technology adoption. As a recent McKinsey Quarterly article points out, developing economies are likely to install half or more of the capital stock of infrastructure that will be in place in 2020 between now and then.[88]

Three possible energy pathways?

Our interviews and research suggested that in the years to 2030, there are very broadly three possible energy pathways that low-income countries might take. The first is that there is little or no growth in their economies and therefore little or no investment in energy supply or technology. This would represent the total failure of global development efforts, and despite keeping emissions low it would not have positive consequences for dealing with climate change, as the story of our scenario, 'Coping Alone', demonstrates.

The second is that as low-income country economies grow, they follow the energy path established by most developed countries and burn fossil fuels, primarily coal, to generate energy. This could be described as the 'expected pathway'. It is the future that the International Energy Agency (IEA) describes in its 'reference scenario': "In the absence of new initiatives to tackle climate change, rising global fossil fuel use in this scenario increases energy-related CO_2 emissions from 29 gigatonnes in 2007 to over 40 gigatonnes in 2030… The rise in emissions is due to increased fossil fuel use, especially in developing countries".[89] This could happen if, as in our scenario 'Reversal of Fortunes', wealthy countries concentrate on reducing their own emissions and provide less support for low-carbon development elsewhere.

To many of the experts we consulted for The future climate for development, the availability of coal made this a likely future. One interviewee remarked that "China is going to be dependent on coal for at least 20 to 30 years. It's the fundamental underpinning of the economy. It's almost comical that you could push coal to one side", and the same comment was made for many low-income countries with fossil fuel reserves.

The third future energy pathway is one where, by and large, the coal does stay in the ground and instead renewable energy sources are brought to scale. David Croft of Cadbury thinks "There is more creative experimentation around new energy technologies in low-income countries than elsewhere – and that energy development may well leapfrog a generation". This would mean rapid and widespread development of solar power, wind energy (a large wind farm has just been approved in Turkana, north-west Kenya), hydro and a range of other sources such as geothermal or biofuels, depending on local conditions.

Technology take-off?

Our scenarios are not about picking technological 'winners', but they do explore what happens in low-income countries when some key technologies take off or fail to deliver.

For example, the potential of renewable energy, and particularly solar, is a huge feature of our scenario 'The Age of Opportunity'. **Many of our project interviewees argued that solar energy has massive potential in low-income countries**. Adair Turner of the UK Climate Change Committee told us: "I am hopeful about the long-term potential for solar energy and I'm also optimistic about the 'unknown unknowns', with very rapid deployment of solar energy being a possibility". Small and large-scale solar photovoltaic plants are likely to become more and more common, perhaps using new techniques that concentrate the sun's energy to improve efficiency. And concentrated solar power (CSP) also has potential for large-scale energy generation. Gerry Wolff, Coordinator of DESERTEC-UK, says that "There is amazing potential in Africa for CSP… It will see explosive growth. Estimates suggest that, worldwide, there are between nine and 14 GW of generating capacity in the pipeline. When India and China recognise the potential it really will explode".

> **"Currently the upfront investment costs in wind, solar and other renewables are so high; whereas fossil fuel based plants are relatively low. There's not really much thinking about oil prices in the future – it's a short-term mindset that prevails.**
> Project interviewee, Kenya

[87] Lee, B., et al., 2009, *Who Owns Our Low Carbon Future? Intellectual Property and Energy Technologies*, Chatham House.
[88] Farrell, D., and Remes, J., *Promoting energy efficiency in the developing world, McKinsey Quarterly*, February 2009.
[89] *World Energy Outlook, 2009*, International Energy Agency.

Carbon Capture and Storage (CCS) was another technology cited by a number of interviewees as potentially vital in keeping global emissions down, saying that "Carbon capture will have to be near the top of the technology list if we're to avoid high-carbon lock-in". But in 2010 CCS has yet to be deployed at scale, and there are doubts about its potential. Will Day of the Cambridge Programme for Sustainability Leadership asked, "If it can be done, why aren't we doing it? I'd love it to work but it isn't yet, and it uses dramatically more water and 20% more coal. We're betting the global energy mix on having a significant proportion of clean coal. What's our plan B? We can't wait 20 years for plan B and burn coal in the meantime". Another interviewee was similarly circumspect: "CCS is hugely energy inefficient, the scale we would need it at is astronomical, and there are huge opportunity costs from not putting that money into renewable energy". Nonetheless, unless the coal stays in the ground, CCS is one area where rapid technological advances will be necessary – if by no means guaranteed.

There are of course numerous other energy generation, efficiency, storage and modification technologies which might yet change the energy picture. Nuclear energy and algal biofuels are just two of those suggested by our interviewees and research, and both make an appearance in at least one scenario.

How will energy systems be organised?

Most developed countries have a small number of centralised power grids that link large power stations up to homes, factories and offices. But a new pattern is emerging in some areas of off-grid electricity and micro-grids supplying just a few thousand or fewer users. This may prove to be the most effective way of generating the energy needed for development. Some people we spoke to for this project suggested that **decentralised energy solutions may well be more economic in low-income countries where there is no infrastructural lock-in – and these could even transfer back to high-income countries over time**. One interviewee argued that "Getting excited about solar systems that power one reading light is patronising. Micro-schemes have, in practice, often been too small, focussing on individual homes rather than mini-grids. But people's willingness to pay for good energy in rural areas is high, especially if the supply is guaranteed. This could be a base-of-the-pyramid model".

Decentralised micro-grids are ideally suited for small-scale renewables. Walt Patterson of Chatham House goes further: "On the supply-side, we need to move away from fuel-based electricity supply to technology-based electricity supply, where you generate electricity from local ambient sources, without using fuel of any kind. That sort of local power will be completely free from fuel-price risk. **I can foresee a time when buildings become so energy-efficient and so effective at providing energy that the need to measure electricity disappears**".

Technology transfer: the ultimate goal or a misnomer?

Today, most research and development is funded by governments and businesses far away from low-income countries. According to a recent Chatham House report, "Companies and institutions in OECD[90] countries will determine the speed of diffusion of the most advanced energy technologies in the next decade… the United States, Japan and Germany are clear leaders in energy innovations. Much has been made of the fast growth in innovation capacities in emerging economies such as Brazil, China and India. But these countries have no companies or organisations in the top 10 positions in any of the sectors and sub-sectors analysed".[91]

Mechanisms for transferring technology to low-income countries will therefore be crucial to ensure that they have a range of appropriate options for energy generation at their disposal. The United Nations Framework Convention on Climate Change (UNFCCC) has a framework for the transfer of technology, but there is widespread acceptance that it has yet to have an impact on the scale required. Only two per cent of projects funded through the Clean Development Mechanism are in Africa, with the vast majority in China and India. There is a lack of funds: "If there were more funding of low-carbon projects in low-income countries, if the scale went up, because of new sources of funds e.g. international transportation, there would be greater transfer" said Ramon Arratia, European Sustainability Director at InterfaceFLOR. On the other hand, a negative spiral is equally possible – a poor, fractured economy leads to this outcome in our scenario 'Coping Alone'.

There is a risk attached to the very idea of 'technology transfer' that Dhananjayan Sriskandarajah of the Royal Commonwealth Society points out: "How much ability to develop a low-carbon future is in the hands of low-income countries themselves? Relying on the benevolence of others hasn't proved successful in the past 50 years". Indeed, some interviewees argued that high-income countries are currently exporting the worst technologies – the built environment being a prime example of this.

Instead, could there be a greater role for low-income countries in developing their own technology? Andrew Adwera from the African Centre for Technology Studies in Kenya believes that "The idea of technology transfer is less useful. We need to look first to technologies that already exist in low-income countries. Most communities have their own technology that they use to solve challenges in their own settings. We have to look first to the grassroots, and think about the human side of it". Mike Harrison of DFID Kenya sees signs of this happening already: "There's a huge number of individual initiatives, and we will continue to see lots of these being successful. Water harvesting, community Jatropha plantations, micro-generation… could these create some kind of momentum and change the game completely?"

[90] Organisation for Economic Co-operation and Development.
[91] Lee, B., et al., 2009, op. cit.

The need for geo-engineering

Geo-engineering – the large scale manipulation of the environment to tackle climate change – falls broadly into two categories: attempts to take carbon dioxide out of the atmosphere on a large scale (for example by seeding the ocean with chemicals that use carbon dioxide in a chemical reaction), and attempts to alter radiative balance (for example by deploying giant mirrors in space to reduce the amount of heat from the sun reaching the lower atmosphere).

These approaches are not under serious policy consideration at the moment. Nonetheless, there is debate about their appropriateness. Some believe that because we already have a destabilising effect on the climate, we had better become experts at controlling it on a large scale, and that some form of geo-engineering is inevitable. Others believe that the complexities of large-scale climate control and the risk of unintended side effects mean that geo-engineering could not only backfire but also divert attention from more mundane practical approaches. But could geo-engineering become a serious policy option one day in the future?

In three of our scenarios it makes an appearance on the political table.

It's not all about energy…

Energy is by no means the only area where technology must be expected to develop: it is no exaggeration to say that the nature of all technology will need to change in response to climate change. Low-carbon technologies will prosper, and energy-intensive technologies will either change radically or fail. There are three types of technology that have particular relevance for how low-income countries respond to climate change.

Transport technology

It is highly likely that cities in low-income countries will continue to grow quickly, and at the same time demand for personal mobility will increase. Satisfying that demand with petrol-fuelled cars, and investing in the necessary road infrastructure, risks locking those cities in to a high-carbon future. Alternatives to oil-based fuels are possible but come with their own challenges. The biofuels route taken by Brazil, using ethanol from sugar cane, places greater pressure on land that could be used for forests or food production. The electrification route being explored by China, with plans to boost production to 500,000 hybrid or all-electric cars by 2011, means greater demands on grid electricity supply and could mean more coal-fired power stations, as happens in our scenario 'Coping Alone'.[92]

Cities might instead choose to invest in public transport infrastructure and even, as they grow, design out much of the need to travel, by planning mixed-use residential, manufacturing and retail areas. As Professor Young Ku from the National Taiwan University of Science and Technology remarked,[93] **"Developing countries could skip the car era and move to the next generation of transportation"**. While this could be a positive development, the extent to which the future cities of the low-income world will be willing and able to plan in this fashion is very uncertain. Faisal Islam of DFID told us that "In Bangladesh there is no coherent approach to public transport. A recent World Bank study on bus reform in Dhaka showed that the sector is driven by politics, complex incentives and pay-offs. Cost is the principal constraint to low-carbon development. It will not be integrated into the planning process in the near future unless there is a deliberate attempt to incentivise it".

Developments in international transport technology will also have a major impact, albeit indirectly. For some low-income countries tourism makes a major contribution to the economy. Aviation, included in the European Emissions Trading Scheme from 2012, may become prohibitively expensive in a carbon-constrained world and overall volumes could decline dramatically, despite increased wealth and desire to travel in middle-income countries such as China. If shipping costs increase, exports from low-income countries would also become more expensive and make some economic activity less viable. As far as aviation is concerned, incremental improvements in efficiency are expected by 2030,[94] whereas for shipping there is scope for much greater improvements, for example changing hull designs, reviving the use of wind power and even using hydrogen as a fuel.

Agricultural technology

The concurrent challenges of climate change and population growth will ensure that the next 20 years will be a period of radical change for agriculture. **Many of the changes will be in process and practice, and facilitated by sharing knowledge, but technology will undoubtedly also have a major role to play**. Biotechnology developments, including Genetically Modified Organisms, will be deployed to varying degrees in different locations and could boost yields and reduce dependence on high-carbon artificial fertilisers, but may also increase the power of multinational companies and potentially displace the rural poor. Water-efficient technologies such as hydroponics could be more widely used, especially in urban areas. Fertiliser and irrigation systems that use GPS (i.e. Global Positioning System – a satellite-based system of positioning) could greatly reduce the amount of wasted agricultural inputs. Methane and nitrous oxides are the key greenhouse gases in agriculture, so many new technologies are likely to focus on reducing these emissions. For example, additives to livestock feed currently being developed could limit bacteria growth in the stomachs of ruminants and substantially reduce methane production. Biogas technology, which converts biological waste into energy, is considered by many experts to have significant potential in low-income countries.[95]

Information and Communications Technology (ICT)

In the next 20 years, computer processing power and bandwidth will increase exponentially and online networks will become ever more complex and inclusive. This could have far-reaching impacts. ICT could play a significant role in transport, helping to reduce transport demand by substituting telephony or videoconferencing for physical journeys, or to coordinate

[92] *New York Times* http://www.nytimes.com/2009/04/02/business/global/02electric.html?_r=1
[93] Quoted in *Climate Futures*, 2008, Forum for the Future.
[94] Anderson, K., et al., 2007, *Aviation in a low carbon EU*: A research report by the Tyndall Centre, University of Manchester', Report prepared for Friends of the Earth.
[95] Brown, V. J., 2006, Biogas: *A Bright Idea for Africa*, in *Environmental Health Perspectives*, May 2006, 114(5).

transport systems to maximise efficiency. As with mobile telephony, rapid adoption of these technologies is by no means unlikely in low-income countries and could be well underway in 2030.

The synergies possible from combining electricity networks and communications networks could be particularly interesting. The extension of mobile phone networks has often gone hand in hand with the extension of power grids. In future, smart meters have the potential to increase energy efficiency substantially. Smart grids could help to manage supply and demand of energy on a larger scale, and increase the efficiency of entire systems. Nick Hughes, Director of Signal Point Partners suggested that "The mobile network platform could be used in lots of ways, for example to collate data on individual carbon emissions reductions achieved through small-scale interventions and therefore enable small projects to be aggregated".

the business response to climate change

Many of our interviewees were adamant that the world simply cannot respond to the scale of the challenge posed by climate change without the private sector on board. Its potential in this field – as yet largely untapped, with some notable exceptions – is vast, but the nature of its response is far from certain.

Will future business engagement with the climate change agenda be limited to compliance? Or will risks to operations and supply chains provide the most impetus for change? Could consumer – or investor – pressure drive a revolution? Or will businesses seize the opportunities presented by a climate-changing world?

How closely will business engage with climate change, and what will this depend on?

Today, many missed opportunities on climate change engagement are put down to regulatory uncertainty. This currently hinders investment, but as Chris Burgess at Vodafone said, "Carbon markets will be absolutely key – the single most important thing which will drive investment in technologies and investment in mitigation and adaptation is a realistic carbon price".[96] Carbon-intensive energy generation is currently seen by many low-income country governments as the most cost-effective way to deliver opportunities for income generation and poverty reduction, so a transition to a low-carbon economy will depend at least in part on incentives (such as Clean Development Mechanism [CDM] flows or other technical and financial support) being available for public and private sectors in low-income countries to generate growth through alternative forms of energy. The certainty with which both the CDM[97] and the voluntary carbon markets develop will therefore be pivotal. Currently the limited take up of CDM opportunities in low-income countries is attributed to the lengthy, complicated verification process, which can be particularly difficult for smaller, riskier, more innovative proposals.[98] If subsidies on fossil fuel energy generation are removed, this will also be a key galvaniser for business in some countries.

> **"What's the role of business? It needs to be enabled. Business can't act without a context, for example a global deal, a credit market, regulation – and it might continue to play at the margins without this enabling environment.**
> Jeremy Oppenheim and Chloe Lamb, McKinsey & Co.

But policy is not the only key to the future of business. Consumers, investors, and – probably most importantly – new business opportunities will all play a vital role in determining how business responds to climate change. Many leading companies »

[96] Project interview.
[97] http://unfccc.int/kyoto_protocol/mechanisms/clean_development_mechanism/items/2718.php
[98] Project interviews.

» already recognise the fundamental nature of climate change and sustainability more broadly to their ability to operate – and their number can only increase.

Could consumers lead the way?

For many businesses, it is likely to be their customers who stimulate the drive for positive engagement on climate change. **Where consumers go, business will follow – although the reverse holds true too, with big companies – particularly retailers – able to create demand as well as respond to it**. There is a steady trickle, fast becoming a stream, of consumers in higher-income countries demanding 'climate-friendly' products and services. In the future, impeccable sustainability credentials – including a low carbon footprint – may simply become standard, and taken for granted.[99] As climate messages reach further into lower-income countries, this demand may well be replicated, especially amongst the burgeoning middle classes.

The key thing about consumer demand is that it is felt all the way along the supply chain. A growing number of multinational companies are demanding verified information on sustainability impacts from their suppliers – a recent example of which is the world's largest retailer, Wal-Mart, developing its sustainability 'scorecard'.[100] As life cycle analysis (LCA) tools[101] become mainstreamed and easier to use, the demand for transparency from businesses is likely to continue to increase, and impact suppliers in many low-income countries.

Will mainstream investors see climate change as a significant issue for business?

As consumers wield their financial power, so will investors, with growing investor attention paid to businesses' response to climate change – a variable that our online consultation said would be key to business action. Opinions differ on how significant this scrutiny might become. Investors have already collaborated on initiatives such as the Institutional Investors Group on Climate Change[102] and the Carbon Disclosure Project[103] and recent research has indicated that government policy is causing investors to integrate climate change into their analysis.[104] However, Chris Burgess of Vodafone argued strongly that "Mainstream investors don't yet see climate change as a significant issue – for those outside the businesses where carbon is a significant part of operational or capital cost (i.e. oil, gas, cement etc.), it is just not on the radar. It's only the ethical investment community that's interested".

> **"The science comes out, policy is set, then investment decisions are made, inevitably with a few years' lag. But science is moving so fast now – whilst businesses are planning on mild carbon pricing, things could happen to disrupt this – for example arctic ice melt. This could mean either that we throw away the market, and opt for emergency measures, or else introduce more scarcity into the carbon system to enable more urgent business responses.**
> Abyd Karmali, Managing Director, Global Head of Carbon Markets, Merrill Lynch

Will the direct impacts of climate change on business operations be the impetus for engagement?

In the coming years many businesses – and therefore investors – will be forced to pay attention to climate change because of its effects on their infrastructure, supply chains, workforce and broader operations. Already many are dealing with impacts that may be climate related. Whilst no one extreme weather event can be attributed to climate change, their increasing frequency has been significant for many businesses. For example, the main mobile phone provider (Aventel) in Mexico lost its main optical fibre lines in a hurricane.[105]

Less easy to quantify, but with no less impact, may be the indirect effects of climate change. When it comes to doing business in low-income countries, Hugo Douglas-Dufresne, Engineering Executive at James Finlay Kenya pointed out that "Population growth and other problems – in conjunction with climate change – may well lead to serious social unrest and crime. This is the sort of thing that makes businesses unlikely to invest in the first place".[106] Nick Hughes of Signal Point Partners reinforced the point: **"Business people don't like uncertainty. Climate change creates another layer of risks for investment in low-income countries"**.

Could fragile supply chains make global sourcing a thing of the past?

Business practices seen as 'normal' today are by no means certain to continue in the future. **Long, complex supply chains may become a thing of the past, and some of our interviewees described how supply chains could shrink and regionalise over the next two decades**, a trend that features heavily our scenarios 'Coping Alone' and 'Reversal of Fortunes'. Why might this happen? High oil prices or a high carbon price could increase the cost of transport, leading to greater reliance on goods produced regionally or locally.[107,108] Protectionist measures in response to resource supply shortages could also have a similar impact.[109] Climate-related or security risks (such as severe weather events, collapse in availability of local resources, increased piracy or terrorism) may also lead to changes in corporate supply chain strategies. Such changes could include limiting single-sourcing (leading to a reduction in demand for any one supplier) and/or promoting rapid flexibility (e.g. developing the capacity to change suppliers quickly in response to shocks).[110] There is evidence that supply chains are already being affected by climate change. The Financial Times recently reported that manufacturers are abandoning global supply chains for regional ones in a big shift brought about by the financial crisis and climate change concerns.[111]

[99] *Retail Futures*, Forum for the Future, 2007.
[100] http://www.worldchanging.com/archives/010158.html
[101] http://www.forumforthefuture.org/projects/streamlined-life-cycle-analysis
[102] 'Climate change: investors taking note (slowly)', Climate Change Corps, *Climate News for Business*, 2009.
[103] https://www.cdproject.net/en-US/Pages/HomePage.aspx
[104] 'Climate Change: Do investors discount carbon?' Ethical Corporation, see http://www.ethicalcorp.com/content.asp?ContentID=5680
[105] Evelia Rivera Arriaga, quoted in *Climate Futures*, 2008, Forum for the Future.
[106] Project interview.
[107] In the IEO2009 reference case, the price of light sweet crude oil in the United States (in real 2007 dollars) rises from $61 per barrel in 2009 to $110 per barrel in 2015 and $130 per barrel in 2030.
[108] The *Financial Times* recently reported that manufacturers are abandoning global supply chains for regional ones in a big shift brought about by the financial crisis and climate change concerns. http://www.ft.com/cms/s/0/65a709ec-850b-11de-9a64-00144feabdc0.html
[109] *Climate Futures*, Forum for the Future, 2008.
[110] Project interviews.
[111] http://www.ft.com/cms/s/0/65a709ec-850b-11de-9a64-00144feabdc0.html

Alternatively large companies may help existing suppliers to increase resilience in the face of climate change and other external pressures. An early example of this (though not framed in climate change terms) is Cadbury's Cocoa partnership,[112] which aims to secure the economic, social and environmental sustainability of around a million cocoa farmers and their communities in Ghana, India, Indonesia and the Caribbean. Other factors that may make the maintenance of global supply chains in the future more likely include breakthrough low-carbon transport technologies or unexpectedly low oil and carbon prices.

> **If you strengthen supply chains for middle-income people you potentially cut the poorest people off from the possibility of engagement. If a business introduces environmental conditions to supply chains, there's the possibility that people at the bottom of the chain will suffer as they have no capacity to respond.**
> Natasha Grist, Research Fellow, Overseas Development Institute

[112] **http://www.cadbury.com/ourresponsibilities/cadburycocoapartnership/Pages/cadburycocoapartnership.aspx**

What are the new business models we could see in low-income countries?

Will companies be able to identify those often-elusive business models that hit the sweet spot of profitability and sustainability at the base of the pyramid, i.e. the billions of poor who are currently unserved or underserved by the organised private sector? **Innovative models, which include the poor as producers, entrepreneurs, employees and consumers, and thus create access to markets and opportunities that have formerly been unavailable, will be rewarded**, and already many businesses are today demonstrating successful models for the future.[113] Mobile phones and microcredit are hugely successful and oft-cited examples. In a different field, Toyola Energy Limited in Ghana produces energy-efficient cooking stoves and lanterns. Over the past three years it has supplied about 35,000 households with its products and offset 15,000 tonnes of CO_2 emissions.

In the financial services sector, Basix provides rainfall insurance to farmers in India, indexed to local independent weather stations. With a customer base of over 1.5 million, it has also extended microcredit worth over Rs 2,000 crore (US$450m).[114] **Affordable goods and services that also reduce carbon emissions and help the poor adapt to the effects of climate change will surely be in increasing demand**. Will we see scaling up of offers such as these in the future? And which businesses will be offering them? ICT companies, such as Cisco, IBM and Google are looking at the opportunities in sustainable energy generation, bringing their network management expertise to bear on this complex – yet potentially fruitful – problem. The clean slate of many low-income countries in this area may allow more creativity than the fixed infrastructure of high-income countries, and we could even see successful models transfer back to wealthier nations.

Other change may come in the wake of resource constraints and a rising price of carbon, which will be prohibitively expensive for some traditional business models. As Ramon Arratia of InterfaceFLOR argued, we are **likely to see more and more businesses providing services and a "slow, but common movement, to meeting people's needs/wants without selling them products"**.

The ability of business to seize the opportunity agenda and the role of the public sector in enabling this to happen are key variables. For low-income countries, the overall principles by which businesses engage will be vital – will sustainable value creation have a positive feedback on the broader economy, or will the profits escape the countries themselves, draining resources but not replenishing them?

[113] **UNDP, 2008, *Creating value for all: Strategies for doing business with the poor*, Growing Inclusive Markets Initiative.**
[114] **Comeault, J., et al., 2009, *Business Innovation to fight Climate Change and Poverty – Policy Note*, Working document, Growing Inclusive Markets initiative, UNDP.**

four scenarios for 2030

This section describes four scenarios, which explore the possible future context for low-income countries. They are designed to challenge current thinking and provide a tool for considering the future.

Scenarios are not predictions, and no one scenario is designed to be more likely than another. They are explorations of different possible future worlds, a result of 'evidence-based imagination'.

We structured our ideas around nine areas, discussed in the previous section, which will play a key role in shaping the future:

- the global political context;
- global economies;
- low-income country politics;
- demographics in low-income countries;
- attitudes to climate change in low-income countries;
- use of natural resources;
- the role of technology;
- the business response to climate change.

The ninth area is the direct impacts of climate change. These impacts do not vary across the scenarios – we discuss the same four major climate related events in each – but the way the world responds to them does.

To develop the scenarios, we set a baseline in each of the other eight areas by describing its state in 2010, and then set three time horizons: 2015, 2022 and 2030. We asked what might change under each area by 2015, and identified four possible worlds that could result. We then used the eight areas to explore the different worlds that could emerge by 2022 from each of those four 2015 worlds. We repeated the process to take us to 2030.

In this way, we generated a 'tree' of possible worlds, starting from the trunk of 2010, leading to a branching of possible futures in 2030. Then we described each 2030 world briefly, and chose the most distinct, challenging and internally coherent four worlds to build up into full scenarios. This process was underpinned by a series interdisciplinary workshops and a wide consultation process with over 100 experts – from development professionals to climate scientists and business leaders.

Comparing the scenarios:	1. The global political context	2. Global economies	3. Low-income country politics
Scenario 1: Reversal of Fortunes	Low-income countries present a united front against 'climate colonialism'. Countries that refuse to sign the global treaty on carbon reductions are threatened with sanctions and even military intervention.	Many economies are hit badly by dislocation in global patterns of trade as the world takes tough action to reduce greenhouse gas emissions.	Significant development gains begin to unravel. Countries make strategic land grabs from less stable neighbours. Some nations break up completely.
Scenario 2: Age of Opportunity	A strong global deal on climate change focuses on ensuring good development outcomes: funding supports infrastructure, governance and energy supply.	Global growth is hampered by resource shortages but leapfrog economies in low-income countries buck the trend, benefitting from widespread availability of low-carbon energy.	In an era of devolved (i.e. decentralised) governance, many local communities thrive and become more powerful but other areas fall under the control of local mafia and warlords.
Scenario 3: Coping Alone	Attempts to coordinate a global response to climate change have been abandoned. Countries work alone or in regional blocs to adapt to climate change.	China dominates a stagnant and regionalising economy. Low-income countries have been hit by high oil prices, a collapse in export markets and declining aid budgets.	Some states collapse faced with high oil prices, climate impacts and food shortages. Others unite to share resources and boost influence.
Scenario 4: The Greater Good	The debate about climate change has been subsumed into more general concern about resource depletion. Regional blocs manage food, energy, biodiversity and even population. China is the dominant power.	Efforts to manage resources globally mean heavy intervention from governments. Bilateral resource deals predominate.	Low-income countries with valuable resources have bargaining power but those with few natural resources struggle. China's dominance makes many low-income countries question the democratic model.

4. Demographics in low-income countries	5. Attitudes to climate change in low-income countries	6. Use of natural resources	7. Role of technology
There is an urban boom across Africa and Asia. Africa has more than 100 cities with a million or more inhabitants, many living in huge slums. The global population is 8.3 billion.	There is intense anger and resentment towards the developed world. The 'Elephant Movement' campaigns for high-income countries to repay their 'carbon debt' to Africa.	Learning from past mistakes, the world has introduced tight controls to protect natural resources. The UN Security Council monitors forest protection by satellite; countries that ignore their obligations face sanctions.	There is heavy investment in low-carbon technology after years of neglect. The UN tries to coordinate geo-engineering initiatives.
Populations have stabilised in countries with good governance and a low-carbon economy. Elsewhere unplanned megacities have grown up. The global population is 7.9 billion.	Increasingly, people reject high-carbon Western lifestyles as old-fashioned and uncivilised. Cultural confidence in low-income countries is high and Westerners look to these countries for inspiration.	A focus on technology means 'softer' resource management issues such as forestry are neglected. Smallholder cooperatives are the dominant agricultural model, and are quick to adopt climate-friendly agricultural methods.	A revolution in renewable energy generation and widespread, cheap broadband internet has boosted delivery of water and services like health and education. The best new buildings are 'energy neutral'.
Rapid population growth with hundreds of millions of climate refugees. Many of Africa's rural poor now live in sprawling megacities in dire conditions. The global population is 8.7 billion.	There is widespread anger and protest as climate change impacts hit the vulnerable. Religious groups mobilise climate action ranging from violent protests to support for slum dwellers.	Systematic degradation of ecosystems is caused by mismanagement and climate impacts. Many low-income countries suffer severe food shortages. Vegetarianism is a global moral movement.	High oil prices drive rapid advances in alternative energy, but low-income countries are slow to see the benefits. 'Nuclear offshoring' becomes common; richer nations build nuclear plants in low-income countries and export most of the energy giving the host country a share.
State-sponsored family planning and limits on numbers of children are on the rise. Refugees flee states left outside resource deals. The global population is 8.3 billion and growth is slowing.	Many resent the West's responsibility for historic carbon emissions. There is acceptance of the need to act, but increasing anger over draconian policies aimed at optimising resources.	Large centralised operations manage natural resources for the common good. Vegetarian diets are common and enforced in some areas. Insects have replaced meat and fish as the main source of protein for millions.	There is a focus on maximum efficiency and huge centralised power generation in this highly networked world. 'Smart dust' – microscopic networked computers – monitors the global environment.

8. Business response to climate change	Number of 'low-income' countries (43 in 2010)	Prognosis for future climate change	
Global business shrinks and focuses on core markets, largely pulling out of low-income countries.	**42**	The world has been on a very high emissions pathway and "will be highly unlikely" to keep warming below 4˚C by the end of the century.	scenario 1: reversal of fortunes p38
Cheap labour and low-carbon energy drive investment in low-income countries. Local business also thrives as markets develop rapidly.	**20**	High and middle-income countries are bringing their emissions under control, and keeping global warming below 2˚C still looks just about possible. This is a world that looks to the future and can imagine prosperity despite climate change.	scenario 2: age of opportunity p48
Shortening supply chains has stimulated local enterprise, but the availability of energy limits economic and business development in low-income countries.	**59**	The world is on a high emissions trajectory, with little hope of avoiding a minimum 3˚C temperature rise before the end of the century, though most low-income countries still emit very little greenhouse gas as their economies have grown so slowly.	scenario 3: coping alone p58
Business acts decisively to combat climate change and secure resources. The boundaries between state and business blur.	**40**	Politicians continue to state their confidence that the planet will experience less than 3˚C of warming, but scientists are less optimistic.	scenario 4: the greater good p68

scenario 1:
reversal of fortunes

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summary

This is a fraught world where the urgent need to cut carbon dominates international relations. Drastic measures to decarbonise the global economy spell crisis for many industries and no country is immune to the pain. Having rapidly developed – mostly on carbon-intensive pathways – many low-income countries of the 2010s are now middle-income. They speak with a strong, united voice on the world stage, holding wealthier nations to account for the problems of climate change. These new emerging economies are the least resilient and are suffering the most, and with the world focussed on cutting carbon there is little money in the pot for aid.

timeline

2014
China, US and the EU all miss emissions reductions targets set in 2012. US President Obama and the EU President describe it as “a near miss” and reconfirm their commitments to targets.

2015
UN admits that the Millennium Development Goals have been missed but commits to rolling them over to 2025 with a renewed effort.

2018
At a rally in Arusha, activists talk of creating a pan-African ‘Elephant Movement’ that “will not forget the Western world’s responsibility for colonialisation, climate change and the oppression of the cradle of humanity”.

2020
Time Magazine declares “the decade of Africa” and predicts that by the middle of the century most of the world’s goods will be produced in the continent.

2021
World Bank lists only 21 countries as low-income, down from 43 in 2010.

2022
UN publishes review of Millennium Development Goals that shows considerable progress since 2015.

2023
China announces that five per cent of its goods are produced in Africa.

2024
Niger river flowing at a historic low, affecting industries that have been built along it and triggering regional drought.

2025
Eighth IPCC Assessment Report shows that world has been on a very high emissions pathway and “will be highly unlikely” to keep warming below 4˚C by the end of the century.

2026
COP34 in Istanbul, with most delegates arriving overland or participating virtually. Symbolism of conference in “bridging the East/West divide” and agreement on long-term goal of removing greenhouse gas emissions from the atmosphere.

2027
Global carbon rationing introduced. Nikkei and Dow Jones Indices experience most turbulent 12 months ever.

2028
Olympics cancelled for first time since World War II because of insufficient carbon credits to fund building of stadia or travel.

2029
The Elephant Movement wins the Nobel Peace prize. China proposes largest ever attempt at seeding rain-clouds across Africa.

2030
Three high-income countries are re-classified as middle-income countries, 42 countries listed as low-income.

1. global political context

Climate politics divides the world as low-income countries present a united front against 'climate colonialism'

Climate change and the 2026 Istanbul Treaty dominate global politics.

Despite a succession of treaties designed to reduce emissions, the Eighth IPCC Assessment Report in 2025 showed that the world is still on a high emissions pathway.

This has come about for two reasons. Firstly and most importantly, developed countries have failed to hit their own targets, relying on technologies such as nuclear power that were very slow to come on stream. Politicians talk of 'near-misses' of targets, but many near-misses add up and the world is a long way from hitting global targets on reducing greenhouse gases (GHG). Secondly, many low-income countries were excluded from early agreements, and their emissions have grown as their economies developed (often through investment from the developed world).

The emissions of low-income countries are now significant enough that their cooperation is needed in order to meet global GHG reduction targets. Many of these countries have joined together to create a united front against the high-income countries, which they blame for causing climate change, using the language of 'climate colonialism'. Some have even withheld vital resources (such as agricultural commodities) to secure commitments from high-income countries. They argue that their economies are still too fragile for carbon reductions, and that they have a right to emissions in order to grow.

High and middle-income countries made many concessions to get low-income countries on board in a series of tense, urgent negotiations in the run-up to the 2026 Istanbul Treaty. They have **removed trade barriers and farming subsidies**, and signed up to an equitable deal based on contraction and convergence at a level of 0.7 tonnes of CO_2e per capita by 2060. The deal also aims to remove GHG from the atmosphere using 'Greenhouse scrubber' technology.

Some in low-income countries view the deal optimistically and argue that climate change politics might finally bring development gains. Others worry that it is far too late, and that much of sub-Saharan Africa is doomed by extreme temperature rise.

Under the Istanbul Treaty, 'carbon default' (failing to meet commitments on carbon emissions targets) is treated as seriously as failure to comply with a Security Council resolution. Non-signatories are threatened with sanctions and even military intervention.

2. global economic context

Economic dislocation as tough action to reduce greenhouse gas emissions is finally taken

The world sees climate change as an economic problem. **Globalisation means that nowhere is immune to the radical changes working through the system as countries are forced to decarbonise their economies**. All countries are suffering from dislocation as different industries work out how to function in a world with very different possibilities for their supply chains. A number of once wealthy countries were badly affected by high carbon price shocks and resource constraints such as chronic water shortages – and are now classified as middle-income. The reverberations from this striking economic transformation have been felt around the world.

Low-income countries have become an increasingly important part of the global economy. Many were able to grow their economies in the 2010s and 2020s, partly because manufacturing economies such as China chose to source more goods from countries with lower wages and no emissions restrictions. Countries with their own fossil fuel reserves were particularly suitable for this off-shoring and have received assistance to develop their infrastructure to meet the needs of their trading partners.

Other low-income countries benefited from rising commodity prices and used budget surpluses to develop their infrastructure. This made the investment climate for multinational corporations more attractive.

However, as the world economy reshapes around the need to radically decarbonise, **it is a time of crisis for these newly developing countries:** the economies of most are too fragile to cope with such shifts. Global supply chains, forced to decarbonise, are pulling out of low-income countries, many of which are losing the economic ground that they had gained.

Those countries that were unable to develop in the 2010s and 2020s arguably have less to lose. But with all the world's attention focussed on carbon reduction, there is little left in the pot for aid. High and middle-income countries argue that the flipside of dropping trade barriers is getting rid of large aid budgets; and so on the whole low-income countries are left to fend for themselves.

Some argue that this new world order is better for low-income countries in that they are finally being treated as equal trading parties, and need to exploit their comparative advantages in the way other countries do. Others contend that this is a thin gloss on a desperate situation and that, because high-income countries are responsible for climate change, they should take the responsibility for clearing it up and continuing aid. To a large extent such discussion is academic: **there is little money to go round, and even countries that have made aid commitments are failing to honour them**.

3. low-income country politics

Significant development gains begin to unravel

Countries have fared differently over the past two decades. Central and South Asia grew quickly due to their proximity to China, and Tajikistan and Vietnam were declared middle-income in the early 2020s. Many countries in Africa benefited from foreign direct investment that created infrastructure, jobs, education and health services.

Although the Millennium Development Goals were rolled over from 2015 to 2022, considerable progress was made, particularly on primary education and empowerment of women. In some countries there has been political reform and improved governance as a result of these development gains, with a well-educated cadre of ambitious young politicians sweeping aside some of the incumbent leaders. Some states have set up highly centralised economies and technocratic bureaucracies.

But now, forced to decarbonise their economies radically, many countries face massive dislocation. Energy is in short supply and this has far-reaching impacts on business, government and communities. Political unrest is widespread. Those with less reliance on fossil fuels are better positioned; those still dependent on foreign aid are hit hard by budget cuts. Historians compare the scale of change with the collapse of the Soviet Union in the 1990s: just as then, economies are rapidly restructuring, but with huge social costs.

In this period of dislocation, some of the more developed and politically stable low-income countries are taking advantage of governance vacuums in neighbouring countries to make strategic land grabs to secure resources and farmland. Where instability threatens its investments, China provides security support to national governments. Many are concerned by this development and go so far as to talk of Chinese 'empire-building'.

Appeals to international bodies such as the UN to recognise and protect borders are proving unsuccessful. Campaigners point out that some countries are spending more on defending their borders than on energy production, but the Security Council says that the focus on GHG reductions has to remain at the forefront of international cooperation and that border disputes should be considered a domestic issue for the countries affected.

More than one country in Africa has completely fractured as a result of political instability, with old colonial borders completely erased. For some this is a positive movement, redolent of 'self-determination' and trumpeted as the final erasing of the 'colonial legacy'. Others point to the human rights difficulties of large numbers of people living across borders or in states where they are not recognised as citizens.

4. demographics

An urban boom across Africa and Asia

The world's population is growing more slowly and stands at 8.3 billion. The biggest impact on growth has come from increases in living standards and a decline in the average family size. Some carbon finance has also been directed at population policies combining education with access to contraception.

Urbanisation has accelerated. Across Africa and Asia smallholdings have been replaced by larger farms, many owned by multinational companies. This displaced populations and created an unprecedented urban boom. Africa now has more than 100 cities with populations of over a million (up from 33 in 2010). Huge slums have developed, but urbanisation has also brought improved education and access to health facilities, leading to improvements in maternal and infant mortality rates.

Governments invested in utilities like energy and sanitation for cities but far less capital is available now to maintain them. As a result, infrastructure is falling into disrepair and populations are disgruntled. Overcrowding exacerbates this and violent unrest is frequent. Despite improved access to health facilities, epidemics in slum areas remain common.

Furthermore, the fact that many African and Asian cities are built on the coast and have grown quickly without adequate planning means that they are poorly adapted for climate change impacts. The heavily urbanised corridor stretching from Abidjan to Lagos is starting to suffer the impacts of sea-level rise, and this is expected to worsen in the coming decades; people living there are wondering where they will go.

5. attitudes to climate change in low-income countries

Intense anger and resentment towards the developed world

The pan-African 'Elephant Movement' is the largest and most powerful grassroots movement the world has ever seen. It has been very vocal in blaming high-income countries for climate change. It picked the elephant as its symbol to represent the memory of the West's sins against Africa (including colonialism and climate change) and Africa's place in history as the birthplace of humanity.

The movement is a powerful force uniting Africans, informing even the least educated about climate change, and giving politicians a mandate to adopt a tougher stance as they go into climate talks. Its leaders campaign for high-income countries to repay their 'carbon debt' to Africa, and argue that this more than outweighs the financial debt that Africa has to the North. The movement supports community or individual lawsuits against companies and governments for damages related to climate change, leading to a boom in time-consuming litigation. In recent years some have accused the Movement of commercialising and selling out; this isn't helped by the popularity of Elephant Movement t-shirts with students in Europe and the USA.

The impact of climate change on low-income countries has caused widespread, deep resentment towards high-income countries. Some countries are resentful that they didn't benefit from the development boom, others that they developed on a conventional high-carbon track and have been left high and dry. As far back as the mid-2020s tourists were being made to feel increasingly unwelcome in low-income countries, even though governments knew this would damage their economies. Now that carbon rationing – whereby people producing more than their fair share, or ration of carbon, must buy credits from those producing less than their ration – has been introduced in many countries, this has almost put an end to global tourism.

As the 2020s progressed there were several large South-South conferences in which representatives from the Elephant Movement met veterans from the Alliance of Small Island States (some no longer able to live in their home countries) and representatives of South Asian governments to try and agree a common position to bargain with high-income countries. Although these conferences were often fraught affairs – with rifts between low-income countries that had done better or worse from development and therefore had different economies and levels of emissions – it proved possible to agree negotiating tactics.

With the world on a high emissions pathway, people in many low-income countries know they face a future which is at best highly uncertain and at worst extremely bleak. Climate refugees grow in number daily, and campaigners in low-income countries call for high-income countries like Canada to surrender land for refugee settlement.

6. use of natural resources

New, tighter resource controls – learning from past mistakes

In the wake of the Istanbul Treaty the cost of carbon has been so high that the oil price has become largely irrelevant in decision-making for both businesses and governments.

The effects of climate change have been exacerbated in many countries by rapid economic development with poor environmental controls. Without effective laws to protect natural resources, certain countries experienced localised ecosystem collapse. Forest protection was included in some early global treaties, but with limited success due in part to corruption. **Now the UN Security Council actively monitors forest protection using satellites, and has the power to recommend sanctions for those in breach**. Countries such as Gabon, Cameroon and Cambodia are legally obliged to re-forest.

Water stress is a big problem throughout Asia and Africa. Most countries are finding that their infrastructure and farming patterns are not resilient enough to cope with the unpredictable rainfall that they are experiencing. Where industrialisation has occurred, its infrastructure is not designed for current circumstances, and is heavily reliant on irrigation systems which are now difficult to run.

Many dams have been built along the Mekong River with little consultation between countries, leading to regional tensions, particularly over the impact on fish migration patterns. This is affecting people's livelihoods and food security through the region.

A high carbon price makes fertilisers expensive and intensive agriculture less productive. The near-total collapse of the wheat harvest in 2030 has caused famine across sub-Saharan Africa, but there is little energy or enthusiasm in the North for offering support. The World Food Programme not only has very little food in storage to distribute, but is also struggling to fuel its planes to distribute the food.

The combination of climate change impacts, water stresses, lack of cheap fertilisers, and increased population, means that food security is a critical global problem, particularly across Africa and Asia.

China has come forward with a proposal for the largest ever attempt at seeding rain-clouds across Africa – unprecedented outside of its own borders – largely to protect its own investments there.

7. role of technology

Heavy investment in low-carbon technology after years of neglect

Despite economic growth and significant electrification of rural areas, low-income countries were slow to exploit renewable energy sources. They continued to invest in high-carbon technology throughout the 2010s and 2020s and little low-carbon technology was developed or transferred from high-income countries. Investors focussed on high returns from oil and coal resources: hundreds of coal-fired power stations were built, often owned ultimately by foreign investors.

As a result **low-income countries are struggling with lots of 'white elephant' energy installations that they can no longer afford to use because of carbon emissions penalties**. This means that many countries that had got used to electricity are now without it again, particularly in rural areas.

Under the Istanbul Treaty there is a global fund to roll out low-carbon energy technology aggressively. Geo-engineering solutions are being seriously considered: the United Nations Office of Geo-engineering (UNOG) is trying to coordinate this to avoid unilateral action, although it has recently warned that a serious lack of funds is holding its efforts back. The 'Paint the Slums White' campaign is a low-tech geo-engineering solution supported by NGOs across Africa, which is designed to reflect sunlight back into space, thereby reducing the level of global warming. The Elephant Movement has backed this as an example of Africa taking care of itself.

Countries that invested in hydropower (for example Nepal and Democratic Republic of Congo) have found export markets for their electricity, but in some places this has been beset by corruption and in others it has led to border conflict. The main problems arise when rainfall is scarce and power production falls: in many cases future climate change impacts were poorly factored into business plans. Where contracts state the need to provide a certain level of power to neighbouring countries, politicians are faced with the choice of starving the domestic market and causing civil unrest, or damaging relations with neighbouring countries.

8. business response to climate change

Global business shrinks and focuses on core markets

Business growth has reversed and few multinational companies are now left operating in low-income countries.

Much of the infrastructure that supported the boom in corporate investment was hastily constructed and has proved not to be resilient to climate impacts, impacting on risk profiles and making assets difficult to insure. Increased insecurity in many countries and global financial instability have also lessened the appeal to investors.

On top of this, carbon rationing under the Istanbul Treaty has made staff reluctant to seek overseas postings as these use all their travel allowances: companies can often secure the energy needed for production, but it is harder to create the pleasant living environment that expatriates demand. Furthermore, many companies have found that carbon quotas make it uneconomical to operate over long distances.

The legacy of several years of development in both human and financial capital means that in some cases local staff have taken over the businesses. **Entrepreneurs are filling gaps where products have disappeared**, offering alternatives such as 'Afri-Cola' and 'McBurgers'.

Elsewhere, economic restructuring is rife with corruption. In some nations – particularly where the export of low-carbon energy to neighbouring countries is a large part of the economy – companies exert huge influence over policy.

Stronger governments have nationalised some of the larger companies and have adopted a model of state capitalism. This is welcomed by many: they argue that climate change is the result of 'weak' democratic models coupled with laissez-faire capitalism.

Doing well…
- countries that industrialised using renewable resources, particularly hydro – although hydro has its own problems with unpredictable rainfall;
- countries that haven't been affected by internal resource-sharing conflicts;
- countries with strong centralised governments;
- countries that can exploit lower-carbon (e.g. overland) supply chains – and particularly those with products now exempt from trade barriers and distorting subsidies.

Doing less well…
- countries that based development on fossil fuels;
- countries that didn't manage to develop at all in 2020s, and still have economies based heavily on subsistence farming, which is the sector hardest hit by direct climate change impacts.

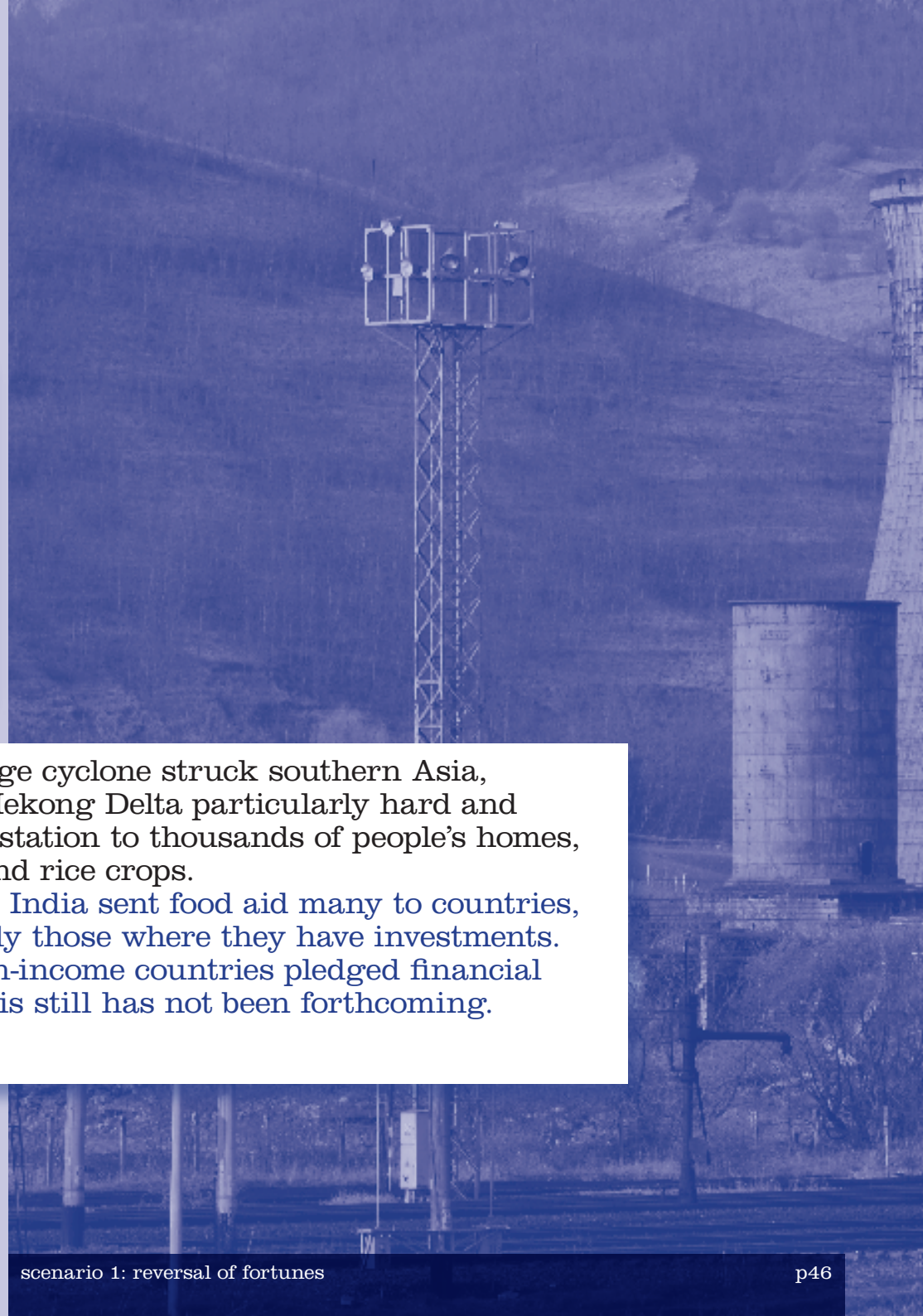
climate change impacts – how does this world react?

In 2016 drought hit Uganda, Kenya and Somalia, resulting in the worst famine for decades across the Great Lakes region.

—→ Scientists claimed it was 60% likely to be attributable to climate change, leading to rioting at the US embassy in Nairobi. Food aid was received but some African politicians referred to it as ‘reparation’ rather than ‘aid’.

In 2025 a huge cyclone struck southern Asia, hitting the Mekong Delta particularly hard and causing devastation to thousands of people’s homes, livelihoods and rice crops.

—→ China and India sent food aid many to countries, particularly those where they have investments. Other high-income countries pledged financial aid, but this still has not been forthcoming.



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Glaciers in the southern slopes of the Himalayas are melting as a result of climate change, accelerated by the Asian 'brown cloud' of dust and smog. In the years up to 2030 this has caused increased water flow, but also the expectation of future shortages.

—→ Tension is starting to rise throughout the region, and this is boiling over into local conflicts. Attempts are being made to draw up a regional treaty on water, but governments are being pressured by China, which has invested heavily in many countries, to accept terms that are currently unacceptable.

Maize yields have been steadily decreasing in southern Africa, which is attributed to the changing growing conditions caused by climate change.

—→ Despite developments in agricultural technology and wide deployment of genetically modified crops, the pace of change in the climate has outstripped any gains made through these technologies.

scenario 2: age of opportunity

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summary

This is a world where low-income countries have received huge amounts of development assistance as part of a strong climate change deal. They play a growing role in the world economy and are spearheading a low-carbon energy revolution, leapfrogging the old high-carbon technologies in pursuit of a clean future. Cultural confidence in these countries is high: their politicians take a prominent place on the world stage, and increasingly people reject high-carbon Western lifestyles as uncivilised. In many states power has devolved to regions and communities; in some countries this has brought positive change, but in others large areas have fallen under the control of local mafia and warlords.

timeline

2010
Football World Cup in South Africa focuses the world's attention on the impacts of climate change in sub-Saharan Africa.

2011
One country in Africa is condemned for opening up new oil fields, just as Ecuador signs agreement not to exploit its own.

2012
China brokers global deal that awards hefty loans to low-income countries to invest in electricity infrastructure, generation and capacity building and provides incentives for private sector to invest heavily.

2013
Global economy grows at fastest rate since 2007. Russia mounts huge diplomatic effort with alliance of fossil fuel nations to win compensation for unburnt fossil fuels.

2014
WTO rules that carbon taxes do not count as barriers to trade.

2015
Electricity storage breakthrough wins Nobel peace prize.

2016
Carbon price established and a Climate Relief Tax – based on the principle of a Tobin Tax – is agreed by the international community.

2017
Oil price hits $200/barrel.

2018
IBM earns more from solar energy than from business services.

2019
North Africa supplies five per cent of Europe's electricity using concentrated solar power.

2021
Global production of solar cells hit by serious shortfall in production of silicon.

2022
Barclays Bank establishes second HQ in Nairobi.

2023
China GDP growth dips below global average for first time.

2024
First African Olympics held in Kenya.

2026
High-speed rail links open linking Hanoi to Shenzhen and Dhaka to Delhi via Kolkata.

2027
Turkey joined by Tunisia and Morocco as EU accession states (to be completed 2032).

2028
Lagos sends separate delegation to United Nations; Nigeria's formal complaint is rejected.

2029
Indian Prime Minister announces "China will never be the world's number one economy"

2030
Alliance for Rural Electrification announces that the goal of electricity for all could be achieved as early as 2040.

1. global political context

A strong global deal on climate change focuses on ensuring good development outcomes

The world has changed significantly since 2010. For example, after supplying Europe with solar electricity for over a decade, Turkey, Tunisia and Morocco are due to join the European Union in 2032. Large city-regions and subnational regions have emerged as political entities to rival nation states. China's power is beginning to wane, as the country struggles with a stagnating economy, water shortages and political unrest. Meanwhile, sketchy or non-existent governance arrangements persist across large areas, leaving large populations effectively lost to the international community and hit hard by climate change, with high incidence of conflict, disease and famine.

All of this follows several ambitious interventions to deal with climate change. The first, called simply the Climate Settlement, was brokered by China and the G77 in 2012 and directed climate finance funds into development assistance. **In return for long-term commitment from low-income countries to limit emissions, finance from high-income countries was channelled into developing infrastructure, governance and low-carbon energy supply** in low-income countries. Much was spent jointly with business or to improve the climate for business investment. China's burgeoning renewable energy manufacturing sector was one clear beneficiary, finding new subsidised markets for its goods in Asia and Africa.

The deal included compensation for unburnt fossil fuels, a modified Clean Development Mechanism that accounted for avoided future emissions, and some funds for climate change adaptation. Less was spent on major projects and more on local and home-grown initiatives. As the global economy began to boom, overseas development aid from high-income countries – including climate funds – was boosted far above the 0.7% of GDP that was pledged at Monterrey back in 2002.

The international community came together again in the wake of the East African famine in 2016 and put in place a Climate Relief Tax of 0.05% on international currency and commodity transactions (based on the principle of a Tobin tax). This raises billions of US dollars per year for climate adaptation and emergency relief. At the same time, an escalating carbon price was agreed. This has ushered in a transformation in economies in high and middle-income countries. Services are replacing products, energy efficiency is big business and economies are becoming more localised. But low-income countries that relied on fossil fuels for export or for home use are now suffering as the world moves away from carbon, excluded by the new rules of international trade.

High and middle-income countries are bringing their emissions under control, and keeping global warming below 2°C still looks just about possible. This is a world that looks to the future and can imagine prosperity despite climate change, albeit prosperity from which half a billion people are still excluded.

2. economic context

Global growth is hampered by resource constraints but leapfrog economies in low-income countries buck the trend

Global growth is hampered by resource shortages and the cost of dealing with climate change impacts – a far cry from the early 2010s. These conditions have hit China hard, with greatly increased production costs and political unrest ending 'fifty golden years of growth'. Some countries and regions continue to suffer extreme economic and social dislocation as they struggle to transition out of the fossil fuel economy.

Leapfrog economies buck the trend. These countries, city-regions and sub-nations have effectively leapfrogged high-carbon development and the consumer-driven aspirations of the West, just as they leap-frogged fixed line telephony and went straight to mobile. Local energy grids and low-carbon energy sources have been deployed effectively, fostering local development and a new generation of entrepreneurs. Microfinance institutions partner with businesses to provide loans for individuals and communities, not just for small businesses but also for infrastructure, amenities and consumer goods. Lower transaction costs and near-ubiquitous access to the internet have also played a part in economic development. This is a new model of development, and many low-income countries now measure the success of their economies not with GDP growth but with progress on the Human Development Index.

The Climate Relief Tax helps to stabilise the world economy, dampening international currency and commodity transactions by taking 0.05% of their value to fund climate change initiatives.

Export markets have been transformed by the carbon costs of transport. Innovation in low-carbon shipping technology has helped maintain trade in non-perishables, but air freight is much less economically viable. In practice low-income country economies have moved away from exporting heavy unrefined raw materials and sell more low-weight, high-value products – anything from flowers to electronic components to services delivered over the internet. Multinational companies often situate research facilities in low-income countries where designing products with minimal resources has a long tradition. China's economic stumble has provided an opportunity for leapfrog economies to develop their manufacturing exports.

The tourism industry has shrunk for most countries. Caribbean nations have been hit hard. The Southeast Asian industry remains buoyant as it develops low-carbon rail links to India and China. Globally, cultural exchange breaks, lasting several months and linking communities, are beginning to replace holidays for many people, reflecting the shift in values taking place in high-income countries.

3. low-income country politics

In an era of devolved (i.e. decentralised) governance, many local communities thrive while others enter a downward spiral

Huge sums of money have been channelled to low-income countries over the past 20 years. Around half have seen benefits, and half have not.

Countries already on a path to improvement in 2010 invested money from the Climate Settlement in capacity building and governance. The extra money reinforced development and created a virtuous circle, attracting private sector investment. These more developed low-income countries – many now firmly in the 'middle-income' bracket – are becoming more integrated in the global economy.

In these countries, communities and businesses have become more autonomous, and in some areas the nation state looks to be in decline. **Decentralised growth around local energy grids and almost-free ICT has empowered local communities**. Women often take the lead in organising neighbourhoods, creating energy cooperatives or starting social enterprises.

Greater local autonomy has enabled some areas to cope better with the pressures of climate change, including migration and increased risks of conflict. In some places communities have bypassed corrupt governments, but in many cases where power has been devolved so has corruption.

This new pattern of development means less coordination between different centres of power and less influence for governments on the international stage and a very complex picture has emerged. It is often difficult to know who to negotiate with – state, city or regional government, local communities, businesses or NGOs – or how to disburse funds. This has been an impediment to some major infrastructure projects, such as the delayed Third Pole Glacier Management Scheme in Southern Asia.

Even in generally well-run countries, there are often large areas beyond the control of the authorities. The tools of local empowerment are easily misused, often by mafia, ideologues or warlords. The most common type of conflict now is a more serious form of 'cattle raid', in which militia from marginal zones launch looting attacks on cities and farmland. Business is beginning to develop markets and access resources in these marginal zones, and humanitarian agencies are very active. More often than not, however, communities develop their own solutions to problems such as water purification, using the internet as a critical link to the outside world.

In some countries, the financial flows of the 2010s have had counterproductive effects. Where governance systems were especially poor and corruption prevalent, development money has helped to entrench elites and corrupt systems. For example, in some countries revenues from renewable energy projects are directed into private hands, and the price to consumers is kept artificially high.

4. demographics

Population growth is slower than projected

Population growth has slowed substantially and stands at 7.9 billion, the low end of projections from earlier in the century. Patterns of demographic change follow global political and economic divisions: countries that have managed the transition to a low-carbon economy well, and where advances in energy and business have supported improvements in governance, saw their populations stabilise first. Here, even the speed of urbanisation has slowed, and the phenomenon of de-urbanisation seen in Europe and the USA in the 20th century, and Brazil in the 2010s, is apparent in some low-income countries.

Where governance remains poor, population growth and urbanisation have in general been more rapid, creating vast, unserviced, sprawling megacities and attendant social problems. Even here though, low-income countries have been able to capitalise on the demographic dividend – with millions of people of working age becoming available for low-cost labour just as cheap electricity has started to come on tap.

Environmental refugees are increasing in number. Most displaced people originate from marginal and poorly governed areas, and head for cities or more prosperous areas in the leapfrog countries. There is limited capacity to cope with extra numbers and poor coordination across regions. This is a particular problem in central Asia. Refugees from the 2016 East African drought still live in camps in the Democratic Republic of Congo, Ethiopia and Tanzania 14 years later.

5. attitudes to climate change in low-income countries

Cultural confidence in low-income countries is high, high-carbon Western lifestyles are rejected

There is renewed cultural confidence in many low-income countries: the Mali Film Festival is covered in media as much as Cannes; Kinshasa is a new cultural capital of Africa and the centre of a booming music industry; and the network of universities in Hanoi has emerged as an academic power to rival those of the developed world. Associated with this new cultural confidence is a **growing rejection of Western-style high consumption lifestyles and a resurgence in traditional beliefs and values**, which are seen as more sustainable. Media debate in low-income countries often caricatures Western lifestyles as old-fashioned and uncivilised. As citizens of high-income countries turn away from high-carbon behaviour such as meat eating and air travel, they look to the leapfrog economies for inspiration in how to lead low-carbon lifestyles.

Attitudes to climate change in low-income countries are complicated and ambivalent in 2030. On the one hand, climate change is associated with the huge investments from overseas that in many areas kick-started economies and had a beneficial effect on development. On the other hand, there have been many losers in low-income countries in the transition to a post fossil fuel economy. The impacts of climate change are intensifying and, although the prognosis for the future is far better than it could have been, many people's livelihoods are being destroyed, and resource shortages are growing. Consequently, anger at those seen as responsible – the West and the 'fossil fuel nations' – is rising. In some countries there is a backlash against companies that have made large profits but have been unwilling to extend their activities to the poorest rural areas. It is worth noting that most authorities, even at regional level, find it almost impossible to control public debate through the media. Even remote and rural communities are saturated with internet-based media. The consensus is that civil society in most low-income countries has benefited from this: even where governance is generally poor, people can easily see how conditions are in other, more fortunate regions.

6. use of natural resources

Technology focus means 'softer' resource management issues such as forestry are neglected

Smallholder cooperatives, supported by microfinance loans and investment from global private finance, have become the dominant agricultural model. Many participate in global sourcing networks organised using collaborative software to dynamically match supply and demand. The software coordinates supplies as well as local information on yield, weather conditions and so on. Businesses – many of them multinational food companies – use the networks to distribute new technology and wider enviro-nmental information, build capacity, and help with climate change-related measures.

The cooperative model has been an effective means of quickly rolling out new climate-friendly agricultural methods such as biochar using waste material, reducing fertiliser use and better feeding regimes for ruminants (to reduce methane emissions). It has had the advantages of working within existing land ownership models, therefore gaining acceptability with local politicians. It has had some impact on food security, but the simple fact that land is a finite resource means that supply is a constant worry everywhere, including in high and middle-income countries.

Lack of agricultural land means floating farms, combining aquaculture, horticulture and renewable energy generation, are now common in places like Tonle Sap in Cambodia, Lake Victoria in East Africa and along the Niger river. Desalinated water from coastal concentrated solar power plants is used to irrigate crops in otherwise arid areas.

Increased wealth – and parallel increases in consumption – in many low-income countries places more pressure on land and consequently on forest. The success in reducing emissions from electricity supply means there is less popular support to protect forests as carbon sinks, and consequently they suffer from human incursions as well as direct climate change impacts. Pressure on forests from biofuel crops remains a serious problem and biodiversity has declined significantly across the world.

The overwhelming focus on low-carbon energy technology means that other, **softer ways of reducing emissions have received less money over the years – for example, sustainable forestry management and sustainable biomass production**. Although electrification has sometimes reduced reliance on biomass, population growth means that pressure on this vital natural resource remains.

Economic growth and widespread penetration of technology has created great demand for certain minerals, such as platinum used in fuel cells, uranium for nuclear reactors and zinc used in new battery technologies. Countries with these resources are able to take advantage of spiralling costs. Many mineral rights were bought up by China and other middle-income countries in the early part of the century, and leapfrog economies are now either buying these back or nationalising them.

Local availability of electricity has enabled groundwater lifting and filtration and so improved the management of water resources locally. However, it has also increased access to deep aquifers, which are now being depleted at an alarming rate.

7. role of technology

A revolution in renewable energy generation

The 2010s saw a revolution in low-carbon energy supply. A strong economy during a time of high carbon and oil prices directed large amounts of private sector money into renewable energy technology. This led to a rapid series of technological breakthroughs, for example in the efficiency of energy storage and solar cell production.

Big business has been quick to exploit the opportunity, rapidly bringing the new technologies to scale, tapping into base-of-the-pyramid markets and working with public sector finance to improve power grid infrastructure. By 2018, IBM was making more money from its solar energy business than from its business services. Now in 2030 a range of different, increasingly efficient and reliable, renewable energy technologies are deployed. Massive wind farms operate alongside concentrated solar power plants; tidal turbines and wave converters take energy from the sea; solar photovoltaic cells and nano-solar paint, which generates electricity, are commonplace around the world. A mixture of decentralised microgeneration, microgrids, portable generators and grid extensions gives communities and businesses unprecedented access to low-carbon electricity.

In 2010 very little of the world's solar generating capacity was installed in low-income countries; now it is 40% of a much higher global total. In 2030 the Alliance for Rural Electrification announced that the goal of electricity for all could be achieved as early as 2040. This has helped to improve delivery of other utilities such as water, and services such as health and education. **Access to broadband internet is almost ubiquitous and practically cost-free**. Problem areas remain though: places that have little or no government, that suffer from conflict and that rely on local supplies of fossil fuels, still lack internet access despite the best efforts of some multinational companies.

New buildings in low-income countries increasingly incorporate energy efficiency and generation into their design. The best are 'energy neutral', and cities in low-income countries are beginning to look very different from older cities like Shanghai or Sao Paulo. Transport challenges still abound though. Growth in electricity supply has been outstripped by demand for personal transport, and most cities are still congested with oil-fuelled vehicles, despite attempts in urban planning to design out car use.

8. business response to climate change

Business thrives in low-income countries as markets develop rapidly

In the most successful low-income countries, there has been a business revolution. **Many multinational companies moved operations to low-income countries** (particularly the more politically stable) in the 2010s and 2020s as cheap labour coincided with increased availability of low-carbon energy. In 2030, it still makes financial and carbon sense for much business activity to be based in low-income countries. Even as labour costs grow, transport costs are coming down due to major advances in efficiency.

Even more marked has been the growth of local business in low-income countries. Huge numbers of people use mobile phone-based micropayment systems that, together with capital from micro-finance companies, make 'base-of-the-pyramid' businesses more viable. Markets for consumer goods have developed quickly. What individuals or families can't afford, communities buy and share.

Many of these companies have increasing influence in the global economy, following the pattern set by Tata and others in the 2000s. New approaches, products and services are developed and make significant headway in global markets. Much activity has been stimulated in particular by the development of decentralised grids and community economies.

The major role big business plays in low-income countries can present challenges to governments. Where governance is poor, multinational companies act with virtual autonomy and their power makes taxation and accountability a difficult question. In these areas, business often collaborates with local mafia to protect markets and supply chains. The main – very strong – counter to this is the 'enforced transparency' that has come with ubiquitous access to the internet. People can find out the details of every aspect of a company's operations, including the fertilisers they use or applications employed in manufacture. If trust is breached – for example if a company is blamed for contaminating water – the web-based mob-like response can be so powerful it can bring a business to its knees.

Doing well…

- countries located near major markets (for example China); they can export more cheaply, attract tourists and export renewable energy;
- countries with lots of renewable resources such as wind and sunshine and with little in the way of fossil fuel resources;
- countries that had already begun to improve their governance in 2010;
- countries with mineral resources needed for renewable technologies and ICT;
- countries with well-established smallholder mixed farming.

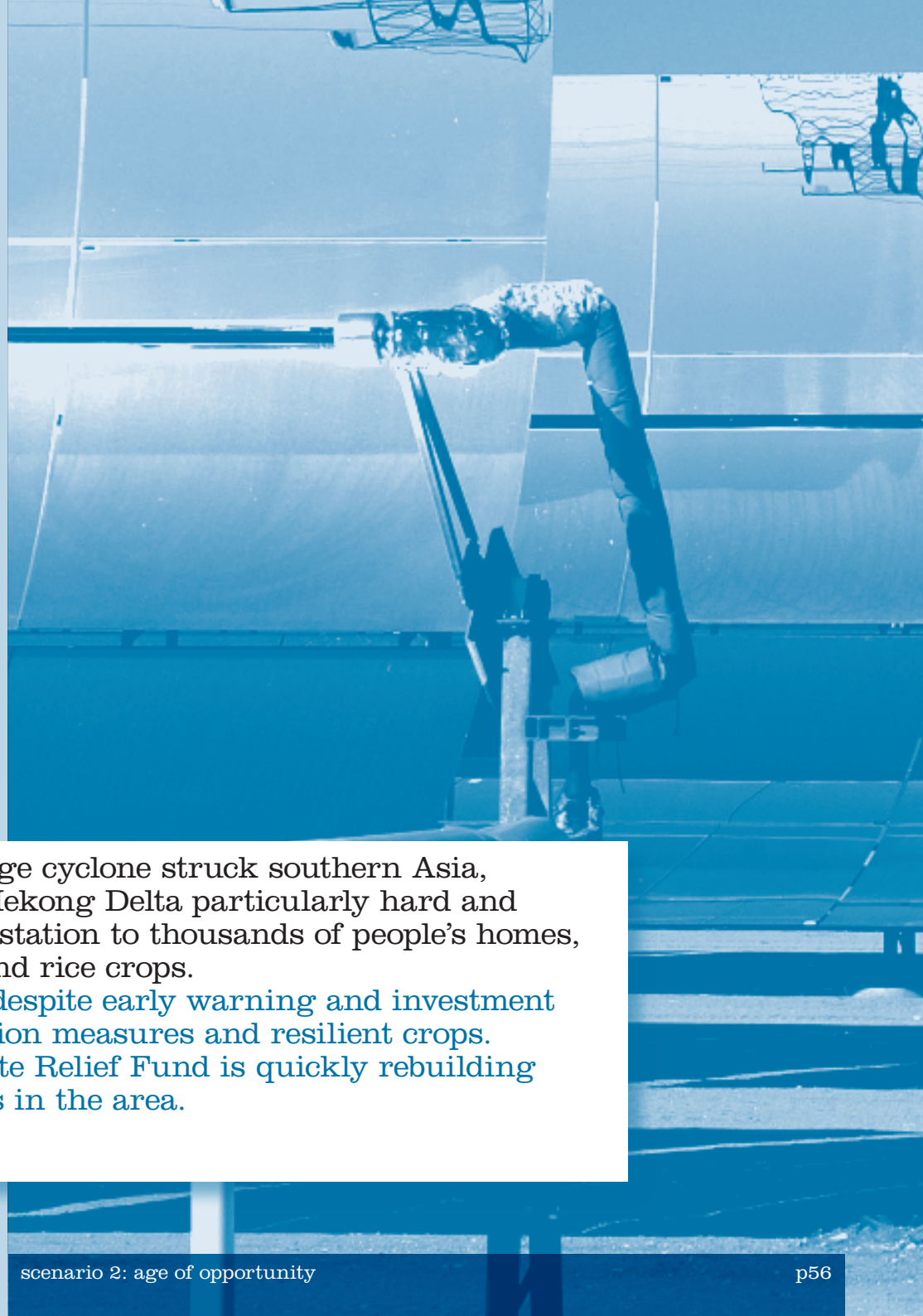
Doing less well…

- countries not able to overcome governance problems and make use of aid in the 2010s;
- countries with large fossil fuel resources, despite compensation payments for not burning those resources;
- countries far away from major markets, or with small populations.

climate change impacts – how does this world react?

In 2016 drought hit Uganda, Kenya and Somalia, resulting in the worst famine for decades across the Great Lakes region.

→ Scientists claimed it was 60% likely to be attributable to climate change. Humanitarian aid was not enough to avoid tragic loss of life. Refugees flooded into neighbouring countries, sparking conflict. In the wake of the disaster, a Climate Relief Tax was implemented by the international community.



In 2025 a huge cyclone struck southern Asia, hitting the Mekong Delta particularly hard and causing devastation to thousands of people's homes, livelihoods and rice crops.

→ This was despite early warning and investment in adaptation measures and resilient crops. The Climate Relief Fund is quickly rebuilding livelihoods in the area.

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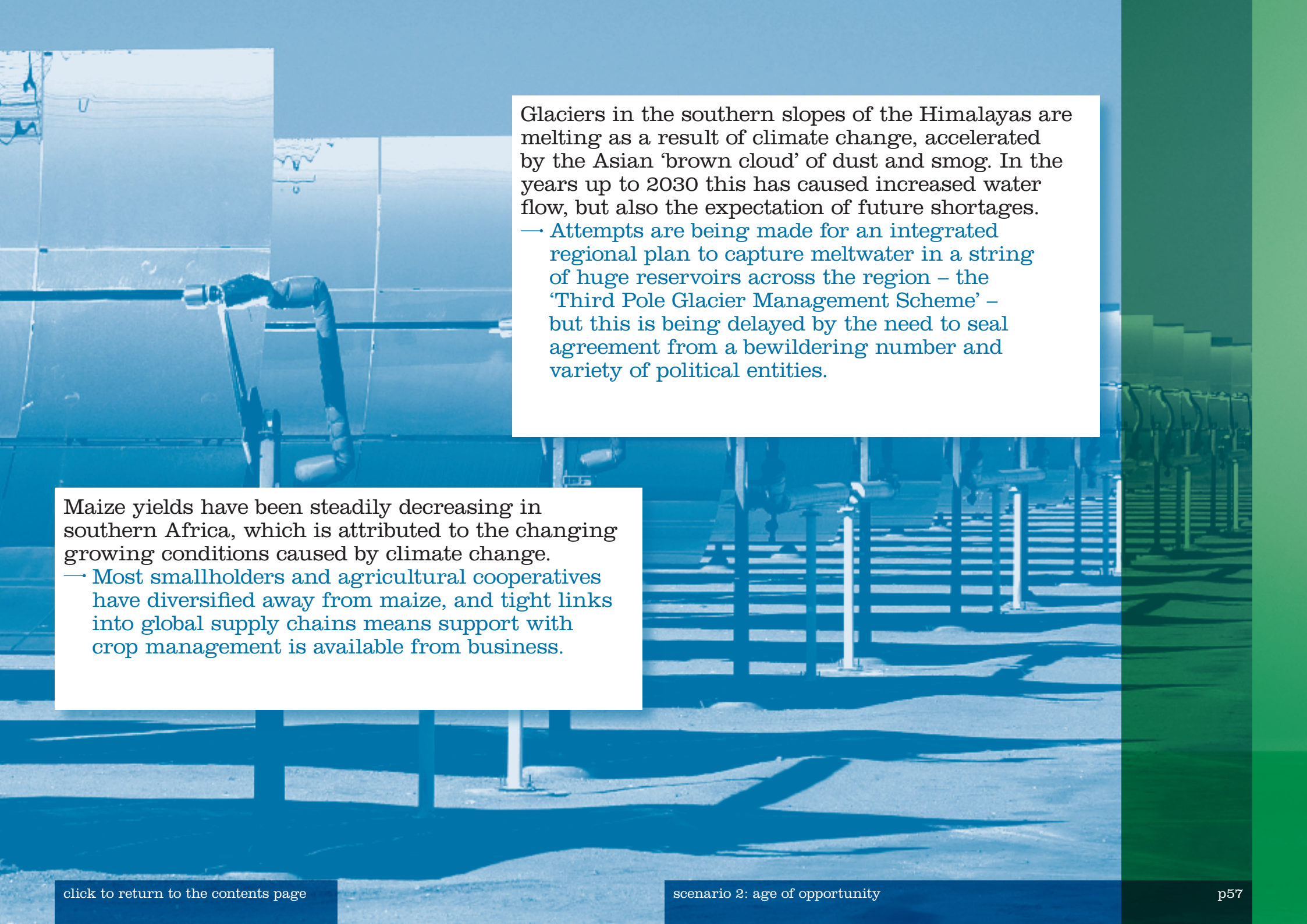

Glaciers in the southern slopes of the Himalayas are melting as a result of climate change, accelerated by the Asian 'brown cloud' of dust and smog. In the years up to 2030 this has caused increased water flow, but also the expectation of future shortages.

—→ Attempts are being made for an integrated regional plan to capture meltwater in a string of huge reservoirs across the region – the 'Third Pole Glacier Management Scheme' – but this is being delayed by the need to seal agreement from a bewildering number and variety of political entities.

Maize yields have been steadily decreasing in southern Africa, which is attributed to the changing growing conditions caused by climate change.

—→ Most smallholders and agricultural cooperatives have diversified away from maize, and tight links into global supply chains means support with crop management is available from business.

scenario 3:
coping alone

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summary

This is a world in which low-income countries feel increasingly abandoned. Two decades of high oil prices and economic stagnation have driven the global community apart. Attempts to coordinate action to reduce carbon emissions have been dropped. Regional blocs now focus on their own concerns, such as food security, resource shortages and adapting to climate change. Low-income countries face all these problems with few resources and limited support from wealthy nations; some states have collapsed. New models of business and governance are starting to emerge from the shadows of increasing inequality.

timeline

2015
Serious conflict breaks out in the Middle East.

Although the focus of the conflict is region-specific, many of the big world powers – with the notable exception of China – get involved.

The UN declares progress against the Millennium Development Goals 'unsatisfactory' and more ambitious targets are set for 2030.

2016
The price of oil exceeds $410 per barrel for three months. There are food riots on four continents.

2017
China introduces a strict fuel credit system to encourage rapid reductions in oil use in its cities, and announces its intention to support a move towards electric vehicle economies in low-income countries where it has strong ties.

2018
World Bank warns of the struggle faced by low-income countries with globalisation officially 'in reverse'.

2019
UN declares a state of emergency as three low-income countries are officially declared collapsed states.

2020
A peace deal in the Middle East is agreed, but the threat of renewed conflict persists and world efforts are directed at keeping relative stability in the region.

There is debate about how much climate change is exacerbating tensions, with water conflict a key concern in the Tigris/Euphrates and Nile watersheds.

2021
Zambia's first female president elected.

UN Secretary General calls on high-income countries to "reignite their spirit of common humanity" and increase their spend on aid in those countries worst hit by the turbulent economic times of the previous decade.

2022
Brazil is declared a high-income country. Commentators cite smart natural resource use and a strong regional position as key. Kenya, Uganda, Tanzania, Burundi and Rwanda announce the formation of the East African Union with a common currency.

2023
The Pacific members of the Alliance of Small Island States becomes a single nation.

2024
The World Bank classifies 59 countries as low-income, up from 43 in 2010.

2025
Eighth IPCC Assessment Report shows that the world has been on a high emissions pathway and "will be highly unlikely" to keep warming below 3°C by the end of the century. China is declared the world's 'largest economy'.

2026
At the 2026 UN COP34 conference in Istanbul there is a great sense of urgency but little is agreed at a global level. Low-income countries demand massive funding for adaptation to climate change but are in a relatively poor bargaining position.

South Asian Association for Regional Cooperation holds 40th Anniversary meeting where the 'SAARC Declaration for regional food security' is signed by all member states.

1. global political context

Attempts to coordinate a global response to climate change have been abandoned

Prolonged open conflict in the Middle East in the early 2010s – and the fear of escalation into nuclear warfare – pushed climate change to the margins of the geo-political agenda throughout that decade. Oil prices rocketed and remained high, suppressing demand and reducing oil-based carbon emissions. The high price stimulated low-carbon innovation but this was offset by the unrestricted use of coal and other carbon-intensive fuels.

The world is now on a high emissions pathway, with little hope of avoiding a minimum 3°C temperature rise before the end of the century. Despite this, most low-income countries still emit very little GHG as their economies have grown very slowly. The Pacific members of the Alliance of Small Island States, which in 2023 unified as a single nation, estimate that climate change has cost them over 40% of their GDP.

Climate change casts a shadow over global politics, but attempts to coordinate a response at the global level are seen as a waste of valuable time, and have been all but abandoned. Most countries are working either alone or in regional blocs, focussing on adaptation and resilience, with a few looking at large-scale geo-engineering solutions.

The EU Emissions Trading Scheme and a similar scheme in China limp on. The Clean Development Mechanism became defunct in the 2020s. Countries instead focus their efforts on cost-cutting energy efficiency measures. Geo-engineering to remove GHG from the atmosphere is a serious prospect, with a number of states running pilot projects. Countries affected by the Middle East war have received a lot of financial aid. But with developed countries cutting overall aid budgets, funds have been diverted away from low-income countries in Africa and Southeast Asia. The 'politicisation' of aid is a hot topic. Many low-income countries argue that despite promised climate adaptation payments (agreed in the early 2010s) they haven't seen any extra cash, as it's just been bound up with general development assistance.

2. global economic context

China dominates a stagnant and regionalising economy

Persistently high oil prices and the impacts of climate change have forced the global economy into stagnation and slow decline. Many low-income countries have been hit hard – particularly those that are highly dependent on oil such as Nepal, Cambodia, Tanzania, Malawi and Zambia. Oil-producing countries have seen the most growth – though it has been poorly distributed across society.

Regionalisation has emerged as a strong economic trend. This was initially a response to the oil price but is now proving successful for many low-income countries, and is an increasingly popular ingredient of economic strategies. There's a mix of economic models in different parts of the world, with Latin America pioneering models focussed on regional economic integration, a common currency, social welfare and mutual aid.

High oil prices have boosted the GDP of oil-producing countries and generated substantial revenue for sovereign wealth funds. These now have a huge influence over the global economy, and a number are pursuing investment strategies in renewable energy technologies, looking forward to a post-oil era.

China is the major economic powerhouse; the rapid electrification of its economy and unparalleled access to non-Middle East oil reserves means it can ride out global turbulence with relative ease. Debt-ridden US and EU economies have waned.

China operates a strict fuel credit system to encourage rapid reductions in oil use in its cities. Its emissions have nonetheless grown as it remains highly reliant on coal – particularly to power electrified transport. China supports a move towards electric vehicle economies in many of the low-income countries where it has strong ties, selling the relevant technology on favourable terms in order to scale up production and bring down unit costs, and supporting the development of suitable infrastructure through concessional loans to governments.

The economies of low-income countries are still largely based on subsistence farming and are highly dependent on aid. However, aid budgets have still not fully recovered to the levels seen before the 2010s. The major world economies are focussed on repaying debt from adapting to climate change themselves, and there is a struggle to keep aid payments at a meaningful level.

In low-income countries high oil costs coupled with limited transport innovation mean export-orientated markets only exist for a minority of high-value, processed products; the flower trade of East Africa and palm oil income for Southeast Asia are long gone. Local manufacturing and regional trade is gradually increasing, but progress is slow given the difficulty of reliable energy supplies.

3. low-income country politics

In an era of huge turbulence, some states collapse whilst others unite to share resources and boost influence

The Middle East conflict has destabilised much of west and central Asia. Low-level conflict is still rife as rivals fight for access to diminishing water resources.

For low-income oil-producing countries, high and volatile oil prices led to a massive increase in revenue. In most countries, the influx of capital has not been invested in public services and has widened the gap between the rich and poor, leading to civil unrest in many places. Some oil-producers, however, pay oil revenues directly to their citizens – which proved both immensely popular and good for development. Nearly all African low-income countries have had to stop subsidising energy tariffs, with both positive and negative effects on governance in different countries. Without this long-held point of leverage, governments face more pressure for accountability in other areas.

High oil-prices, climate impacts and food shortages have ushered in an era of 'creative destruction' for many low-income countries. Some states have collapsed; big business – for example mining industries – dominates areas of the economy that are still functioning, protecting natural assets, workforces and infrastructure. The Pacific members of the Alliance of Small Island States united as a single state in 2023, driven by frustration at their lack of political clout and a need to share resources – including inhabitable land.

Some countries and regions – remarkably, often those hardest hit by the troubles (and political neglect) of the 2010s and early 2020s – have seen their corrupt elites flee in what can only be described as a revolution in governance. The new governments – often with a notably high female representation – have made good progress rebuilding their capacity to feed themselves, to stabilise society and to begin re-attracting investment. 'For the people' is the guiding principle of development in these areas. This has nearly always been in the context of increased regional trade and collaboration; for example, East Africa has introduced a common currency. Examples of regional and national progress on these fronts are held up as signs of hope in an otherwise bleak world.

4. demographics

Rapid population growth and urbanisation, with hundreds of millions displaced

The population of the world has reached 8.7 billion, well above projections from earlier in the century.

It is impossible to know exactly how many climate refugees there are – estimates range from 340 to 700 million – but the huge numbers are a source of considerable tension, particularly in South and Southeast Asia, North Africa and the Pacific. It is not always easy to identify when forced migration is caused by climate change, or by other factors. **Refugees seek 'climate change' rather than 'conflict' status, as this is more likely to gain them sanctuary in the developed world**. The highest historical emitters are under increasing pressure to take responsibility for their climate 'sins', and accommodate those whose land has been lost because of rising sea levels or other demonstrable climate impacts.

In Africa there are now twice as many people living in cities as in 2008. Millions of rural poor have left the land to live in sprawling unplanned mega-cities, driven by a combination of devastating climate impacts on farmland and soaring costs of fertilisers and transport to market. Typically they live in dire conditions, with major health problems. Some community-level activity, such as urban agricultural cooperatives, provides a safety net for the lucky few.

In some low-income countries where progress on governance is being made, 'charter cities' – new settlements founded with a charter to establish rules of governance, minimise resource use and so on – are amongst the fastest growing urban areas.

5. attitudes to climate change in low-income countries

Widespread anger and protest as climate change impacts hit the vulnerable

For a long time, media headlines in low-income countries were dominated by health, security and economic issues, and coverage of climate change was complex and heavy with jargon. But shifts in weather patterns and a devastating impact on agriculture have driven climate change up the political agenda. Grassroots initiatives use mobile phones to share information: using aggregated data on trends and adaptation, smallholder farmers can learn what is best to plant and when, and a bewildering variety of mobile application programmes offer advice on managing future crops. However, actual behaviour change – in terms of both crop choice and technology adoption – is often slow, as people fear the risks of changing to novel crops and production methods.

Now public knowledge and understanding of climate change have increased, there is intense anger in low-income countries that more has not been done to support them. In particular, the fact that they have received so little help to adapt to climate change, when high-income countries have understood the need for this for so long, is interpreted as a deliberate suppression of low-income countries to maintain the global order. Public protest is common, but public and media scrutiny of the actual action taken by low-income country governments at regional and global negotiations is variable.

A fatalistic attitude prevails in many regions, and many look to religion for help. Religious groups play a key role in involving citizens in climate action, though different faiths and sects take very different approaches: sometimes violent protest; sometimes lifestyle movements; and sometimes grass-roots support initiatives for rural or slum populations. Missionary work abounds. Fundamentalist groups are also on the rise and some are taking direct, violent action at international summits.

6. use of natural resources

Systematic degradation of ecosystems through mismanagement and climate impacts

With poverty and political stability taking up governments' attention, management of ecosystems and biodiversity has not been a high priority for many low-income countries, and ecosystems have become more fragile through persistent degradation and overexploitation.

Throughout the 2010s there was little money available to provide incentives for alternatives to deforestation. Certain countries, like Brazil, have their own strategies to stop deforestation and receive substantial bilateral funding to support their efforts. Others continue to clear forest, following traditional patterns of economic growth. In some poorly governed countries, forests have been taken over by multinationals and converted to agricultural land for biofuels and food. The long-term impacts of this – desertification, knock-on impacts on water catchment areas, ecosystem collapse and shrinking carbon sinks – become more evident daily and create growing panic in political circles.

Today some businesses – especially in the agricultural sector – are working to protect the natural resources on which they depend, such as the forests that surround their productive land and help regulate the local rainfall. Businesses increasingly recognise that they rely on these types of 'ecosystem services' for their own viability, but action is very much ad hoc and yet to reach scale.

Many people have become used to dealing with high fuel costs and energy shortages, growing their own fuel crops or devising their own strategies for efficiency.

High oil prices have helped create severe food shortages in many low-income countries, making it more expensive to transport crops, buy fertilisers and use energy for irrigation. There have been terrible famines; sub-Saharan Africa was particularly badly hit. Many countries have banned exports of food, and still more regularly need urgent food aid.

Agriculture and food security are now top of the agenda. Vegetarianism is a global moral movement. Regional food networks have increased in prominence, and provide a still-fragile layer of security in some regions. A key focus of attention is securing appropriate 'climate analogue' crops, from countries whose climate at the beginning of the century is on a par with others' expected climate conditions in the coming decades.

7. role of technology

Focus on alternatives to oil, improving efficiency and food technologies

Technological development has been driven by a soaring and volatile oil price, and led primarily by the private sector.

Most opportunities to increase energy efficiency have been taken. Now, around the world, 'unconventional' oil such as tar sands is being heavily exploited, with the US tapping into difficult Alaskan reserves. Tar sands currently produce over seven million barrels of oil a day. Many cities and regions have built grid electricity supply and rolled out electric vehicles, to reduce demand for fuel. Reliance on coal as a fuel has increased, problematic for climate change as carbon capture and storage technologies have proved too expensive to implement.

Rapid electrification has seen electric vehicles finally become a mainstream commercial reality in many nations, particularly China. Similar efforts have been put into the development of electrified railroad systems. Innovation has also transformed shipping technology: towing kites, streamlined hulls and speed restrictions are standard.

Europe and North Africa have benefitted from a successful concentrated solar power system and direct current energy grid. Biofuels are also big business and have helped drive deforestation, because there is greater concern about displacing food production than about carbon emissions.

Other sources of renewable energy have also developed faster than anticipated and there have been rapid advances in replacements for liquid fuel oils such as algal biofuels (now often grown in purpose-built transparent urban towers). The future for these alternatives looks bright, though a lack of coordinated technology transfer mechanisms, and strengthening intellectual property laws in many high and middle-income countries, means that low-income countries may be slow to see the benefits.

Where energy is available locally, desktop manufacturing is beginning to take off: people use recycled plastics to make all sorts of products using 3-D printers to replicate blueprints available on the internet.

Despite fears about using nuclear power in an unstable world, it is back on the agenda. The phenomenon of 'nuclear offshoring' is increasingly common: high-income countries install nuclear production capacity (and its attendant problems of waste and safety) in low-income countries. The plants are run by high-income country armies and most of the energy is exported in return for a quota of cheap energy for the host country.

Geo-engineering pilots – local and global cooling, carbon sequestration, or albedo-enhancing buildings and crops – are the cause of much heated debate, but they are uncoordinated and often underfunded. There is a feeling of desperation, with an urgent scramble to get carbon out of the atmosphere.

Another major focus on technological innovation is in the agricultural sector, a result of the high priority given to food security. There is growing support for widespread adoption of organic agriculture; this started partly as a result of the rising cost of chemical inputs such as fertilisers, but is now also seen to support the need to reduce carbon emissions and increase resilience to climate impacts on agriculture.

Land-based carbon sequestration (i.e. long-term storage of carbon in soil, forests or even underground) attracts much interest, and many argue that on a large scale it is the only way to make the carbon reductions necessary. But including it in formal mitigation schemes runs the risk of flooding carbon markets with credits and making prices drop.

8. business response to climate change

Shortened supply chains stimulate local enterprise, but the availability of energy hampers business development

Business has been transformed by the high cost of transport and increasing disruptions to supply chains caused by climate change.

Early business engagement focussed on minimising risk and finding alternatives to oil-based transportation such as biofuels. Supply chains shortened, hitting export-orientated low-income countries hard, and huge underinvestment in Africa has had a serious impact on the economies of many regions. It has become increasingly important for low-income countries to add value to their products in-country. It's also meant in a lot of cases that climate change best practice knowledge – such as how to reduce carbon emissions from operations – is no longer passed down the supply chain, as the effects of high and middle-income consumer demand for sustainability have been lost.

Shortened supply chains have stimulated local enterprise, commonly based on food processing or producing low-value consumer goods for sale. This enterprise is often based on an open-source approach to innovation, where production blueprints are freely available online for anyone to build on.

Another business model that has come to dominate in low-income countries is the RALD: Reverse Auction Local Distribution. People living in remote areas can use mobile phones to submit product requests for anything from seeds to saris to a number of online distribution agencies. These agencies bid with each other for the right to supply the product, and the lowest price (often achieved by aggregating delivery trips) wins. The products will be distributed using any means of transport – from hybrid scooters to piggybacking on larger company trucks – and the payment is split between the agency and the manufacturer.

The factor that limits business development in low-income countries is always the availability of energy. Some areas try to attract investment with tax breaks and attractive resource-swaps, and this is starting to catalyse economic growth. But investors are often only interested where there are robust climate change adaptation and resilience plans in place, having been badly stung by sudden supply chain disruption. Such disruption was widespread and costly, often caused by extreme weather events, such as flooding and periods of drought, as well as unpredictable growing seasons.

Doing well…

- oil exporting nations – especially those that redistributed their oil wealth to their citizens fairly, causing further development gains;
- countries that have organised into strong regional blocs based on integrated trade, mutual support, and often alternative models of development;
- countries that proactively managed a transition to low-input agriculture; early movers that anticipated climate change impacts on soil quality have reaped the most benefits;
- some countries that suffered near-total collapse in the economic and political turmoil of the 2010s and 2020s may benefit in the long term. By 2030, some show a strong, often female-dominated new generation of people-centred government.

Doing less well…

- economically weak, oil-importing nations, hit by high and volatile oil costs with little to fall back on;
- export-orientated economies when supply chains shortened;
- countries with few natural resources, and therefore little political clout in the 2030 negotiations, that have already suffered shortfalls in development and receive little aid from high-income countries.

climate change impacts – how does this world react?

In 2016 drought hit Uganda, Kenya and Somalia, resulting in the worst famine for decades across the Great Lakes region.

→ Scientists claimed it was 60% likely to be attributable to climate change. Humanitarian aid poured in, but there was little money directed towards building long-term resilience.

In 2025 a huge cyclone struck southern Asia, hitting the Mekong Delta particularly hard and causing devastation to thousands of people's homes, livelihoods and rice crops.

→ There was little money available for emergency assistance, and huge loss of life resulted.

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Maize yields have been steadily decreasing in southern Africa, which is attributed to the changing growing conditions caused by climate change.

—› Areas such as East Africa and southern Asia focus on developing regional safety nets. In some regions there is a coordinated move away from high-input agriculture to focus on building resilience by improving soil structure using organic production methods. Early movers in this field are most successful as they benefit from higher yields in 2030 – whereas those late to the game are thwarted by ever more severe climate impacts.

Melting of the glaciers on the southern slopes of the Himalayas is driven by climate change, accelerated by the Asian 'brown cloud' of dust and smog. In the years up to 2030 this has caused increased water flow, but also the expectation of future shortages.

—› Conflict over water resources characterises the 2020s and there is low-level conflict around the Himalayas when regional negotiations over access stall. Major nations in the region secure their supplies developing coal-fired desalination plants along their coasts and dams on major rivers.

scenario 4:
the greater good

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summary

This is a world where people understand that economies rely fundamentally on access to natural resources. Climate change is seen as the ultimate resource crunch, but there are equal concerns over water, food and soil depletion. States manage natural resources pragmatically to give the greatest good for the greatest number and are prepared to take draconian action to protect them. Individual liberties and choice have suffered, but most people feel that their future is at least being safeguarded. Those low-income countries with natural resources prosper; those without have little bargaining power. Tensions between rival resource blocs are intense, and sometimes spill over into violent conflict.

timeline

2010
Norway delivers first payments to Guyana in a $250 million deal to protect its forests.

2011
The Corporate 350 Group – formed in response to the weak climate deal agreed in Mexico City in late 2010 – calls for atmospheric CO_2 to be stabilised at 350ppm and makes commitments to develop zero-carbon supply chains by 2020.

2012
The North Sea Ecosystem Partnership, a multinational approach to managing the North Sea as an integrated ecosystem, is launched.

2014
The EU enters into a $1 billion deal to protect forests in Gabon in return for pharmaceutical rights and 'sustainable mining rights'.

2015
The 'Live as One' Foundation announces $2.5 billion resource optimisation programme focussing on agricultural biotechnology and water conservation and purification technologies.

2016
East African famine hits. At the China-Africa Summit, China announces a $50 billion climate loan and investment package for Africa.

2017
Wal-Mart announces a deal with Guatemala, ensuring that it has first option on all fresh produce in return for support to establish renewable energy infrastructure.

2018
China leads the G8 and OPEC towards an agreement to have a controlled run-down of oil stocks over the next 30 years in return for a stable price of $150 a barrel.

2019
The Corporate 350 Group – having grown hugely in membership and influence – renames itself the One Planet Group and refocuses on global ecosystem integrity.

2020
The Soy Farmers' Association of Brazil becomes the biggest private supporter of forest conservation in Latin America, galvanised by studies that show how crucial the Amazon forest is for rainfall for region.

2021
Collapse of many marine fisheries – the North Sea is one of the few to survive.

2022
A leading politician hailed as Africa's great champion of democracy is engulfed in a corruption scandal. Meanwhile, an unelected African president is named Time Magazine's "Person of the Year" in recognition of the impressive development gains made in his country since the Great Drought of 2016.

2025
The South American Alliance announces plans to dedicate the Atlantic Forest zone, spanning Argentina, Paraguay and Brazil, to food production – with plans to produce 150% of the region's food needs by 2035 – and to meet 50% of the region's energy needs through concentrated solar power facilities in the Atacama Desert.

2028
China announces plans to divert 85% of Brahmaputra river flow for hydroelectric power and agricultural irrigation in 2030.

1. global political context

Debate about climate change is subsumed into more general concern about resource depletion

China is now the biggest economy in the world, and it is dominant politically, economically and culturally. English is quickly losing its status as the international language of choice to Mandarin.

The East African drought of 2016 reinforced awareness of the risk that climate change posed to food supplies. Key multinational companies experienced severe disruption to their supply chains and food prices went up around the world. The debate about climate change was transformed: action was no longer seen as a luxury or an expense, but as fundamental to future progress.

However, **climate change discussions, and international relations more generally, were soon overtaken by concerns about resource availability and security**. Many high and middle-income countries began to copy the Chinese strategy of acquiring rights to strategic resources and buying large swathes of land. These deals proved attractive to low-income country governments, which were able to negotiate increasingly favourable terms. The US and the EU tried to insist on democracy and good governance as part of their deals with low-income countries, but China's willingness to invest regardless of these systems saw it become the partner of choice. As bilateral deals came to dominate global politics, multilateral organisations like the UN were marginalised. The World Trade Organisation was disbanded in 2020.

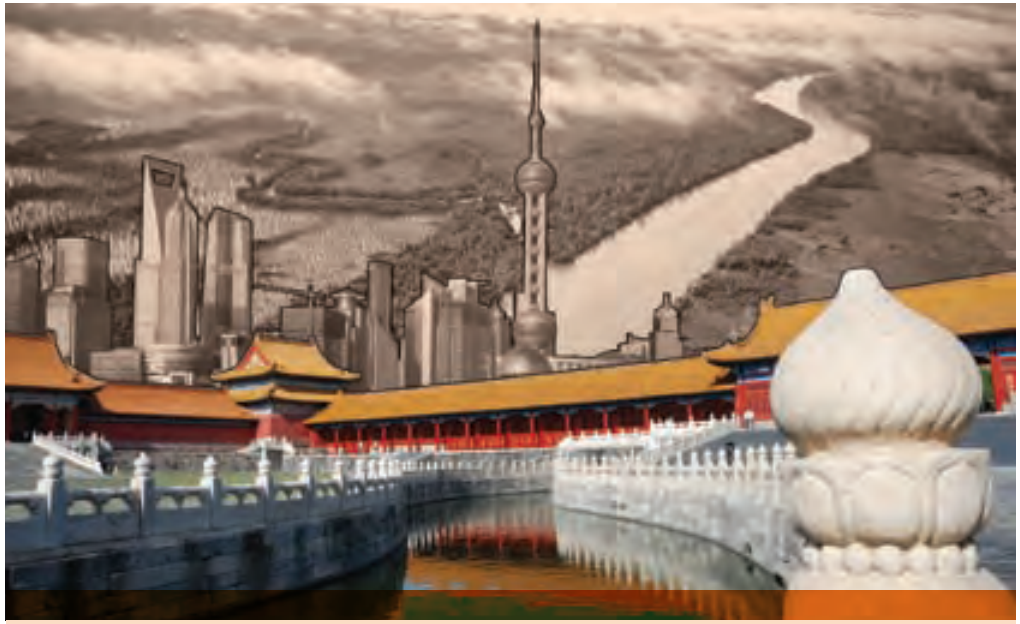
The dominance of the Chinese approach, combined with frustration about the effectiveness of traditional forms of aid, has led to **a much more 'deal-based' system of international interaction between high and low-income countries**. The 'Chinese trade-based model' is credited with transforming the fortunes of a number of low-income countries, though in countries with weaker governance, corruption has undermined the potential for development gains. The model has also transformed international development agencies across high-income countries, which are now much more focussed on resource and trade deals, rather than on aid.

Competition for resources continues to block a substantive global deal to tackle emissions. Instead, action on climate change – and the flow of funds to tackle it – is closely linked to the resource deals. Bilateral agreements encompass protection of carbon sinks and the promotion of low-carbon development in low-income countries. The prevailing mindset is increasingly utilitarian, focussed on creating the greatest good for the greatest number – with the rights of the individual secondary.

Regional blocs now coordinate resource management across national boundaries, with wide-ranging responsibilities including food production, energy generation, biodiversity and even population growth. Tensions between rival resource blocs are intense – particularly where these blocs share the same water resources, as with India and China. This has led to violent conflict in places, but has also provoked calls for a fully global approach to resource management. The need for institutions to oversee and 'optimise' natural resource use and protection around the globe has growing recognition.

Some countries 'free-ride' on this emergent global system. Concern arises particularly about the role of Russia, which continues to exploit its fossil fuel reserves, gambling that a relatively high atmospheric CO_2 concentration will be good for its agricultural production. While this strategy restricts Russian companies' access to carbon-sensitive global markets, Russian influence over many of its energy-poor Asian neighbours has grown considerably.

Politicians continue to state their confidence that the planet will experience less than 3°C of warming, but scientists are less optimistic – the Intergovernmental Panel on Resource Security's Eighth Assessment Report in 2025 recognised the fact that the world was finally on an emissions reduction pathway but cautioned that the impacts associated with historic emissions would still be severe.



2. global economic context

Efforts to manage resources globally mean heavy intervention from governments

In the 2010s, the oil price swung between $50 and $250 a barrel in response to market confusion around remaining supplies and economic cycles. In 2018, as a result of the economic disruption this caused, the G8 – led by China – and OPEC agreed to a controlled run-down of stocks over the next 30 years in return for a stable price of $150 a barrel. Such centralised intervention 'for the greater good' would become an ever more common feature of governments' policy in the years to come.

By 2030, although trade in manufactured and consumer goods continues, the **predominance of bilateral deals on natural resource exploitation has led to a loss of faith (and increasing volatility) in commodity markets** – and a disastrous impact on those countries with little 'natural resource' bargaining power. Food-importing states have also suffered badly.

Low-income countries with natural resources to exploit (or protect) have attracted significant inward investment, and experienced rapid development. Initial investments focussed on agricultural, mineral, forest and solar resources (with the rise to prominence of concentrated solar power a particular boon for some low-income countries) but the most successful countries diversified their economies over time. Low-income countries with few natural resources have become increasingly isolated economically, with a stagnant GDP, the mass of population leading subsistence lifestyles. For some a major revenue stream is payment from high-income countries to prevent mass migration of environmental refugees.

Despite unprecedented resource management efforts, the global economy is still struggling with the resource demands of 8.3 billion people, the average per person impact of which is reasonably high due to the economic and social progress of the 2010s and 2020s.

Analysts still talk about a 'globalised' economy, but the need to respect natural geographic boundaries as a means of optimising resource use has driven a regionalisation of economic activity in many parts of the globe. The South American Alliance and the Niger/Volta watershed collaboration have been at the forefront of this.

3. low-income country politics

Countries with valuable resources have bargaining power, while those without resources continue to struggle

The political situation in low-income countries is highly varied. Chinese indifference to the politics of its trading partners has no doubt contributed to the entrenchment of elites in a number of nations. But while some of its 'resource partners' have seen massive social progress, corruption scandals have blighted some of the low-income countries seen by high-income countries as democratic 'champions'.

The democratic model itself is increasingly questioned. Many low-income countries look to China as the success story of recent times, and draconian state intervention in the lives of individuals – such as forced migration for populations living in land re-designated for agricultural use – has sometimes been necessary to protect resources. Command-and-control economies have been better able to embrace (or force through) change.

Food protests are increasingly common as resource constraints bite, and **some low-income countries are starting to question the continued benefit of long-established deals, especially where prime agricultural land is at stake**. Where democracy has matured, opposition parties embrace a 'true independence' platform, promising to renegotiate – or even walk away from – deals that they dismiss as neo-colonialism. It remains to be seen how investor countries will respond if these threats are carried out. Political tension is on the up as key resources become ever more valuable, and threats of military action are not uncommon.

Elsewhere, low-income country governments point to the wide variety of benefits they have been able to negotiate from government and corporate resource partners: from debt relief, through to energy, transport and health infrastructure, business advice and support for small business. Some low-income countries simply appear to have negotiated much better than others, or been lucky with their partners. Collaboration within 'natural' rather than 'political' boundaries is a growing phenomenon, particularly around shared watersheds or river drainage basins. Some commentators are calling for international boundaries to be realigned to better reflect physical geographic features.

Countries with few natural resources struggle in this world. They have little to bargain with and are effectively excluded from commodity markets by high and volatile prices, severely jeopardising their ability to source food. While relief charities continue to operate in such countries, the transition from traditional aid to the 'Chinese trade-based model' has left precious little in aid budgets.

4. demographics

Global population growth slows; refugees flee states left outside resource deals

The global population stands at 8.3 billion, in line with median projections from 2010. A handful of low-income countries have reached middle-income status and seen a corresponding stabilisation of population growth and greater social equality. Elsewhere, in particular where living standards have not improved or have declined, populations have grown quickly. State-sponsored family planning and public health initiatives – and restrictions on numbers of children – are also on the rise.

The necessity of optimising natural resources has accelerated trends towards urbanisation across the world, and by 2030 it is increasingly used to justify the forced relocation of communities. The greatest number of displaced people come from land designated for agricultural production. While some are granted space in hastily built planned settlements, others are moved around between temporary residences. The potential for violent resistance is huge.

Movement of people around the globe is on the increase. The problem of illegal refugees won't go away and the threat of resource refugees from states left outside existing resources deals looms large. There is also growth in a more formal flow of people: following chronic brain drain from low-income countries to high and middle-income countries in the 2020s, the United Nations Talent Exchange Programme moves millions of highly trained people around the world on secondment programmes.

5. attitudes to climate change in low-income countries

Understanding is varied, and anger at draconian policies is rising

Awareness of the causes and impacts of climate change is highly varied across low-income countries. It is highest in states that have benefited from the financial flows used to protect carbon assets and promote low-carbon development. Now that climate change impacts are really biting – and threatening the improved quality of life in those countries – there is rising resentment against high-income countries over the impacts of historic carbon emissions.

Where the subtleties of the links between climate change, ecosystem services and resource availability are understood, **there is reluctant acceptance of the resource optimisation agenda**. A worldwide quasi-spiritual movement has emerged called The New Globalists. It helps people to 'understand their place' in nature and, with millions of members around the world, has a major merchandising and commercial arm.

But membership of The New Globalists and similar movements is largely limited to educated and political elites. **Anger about increasingly draconian behaviour change policies imposed and monitored from above is widespread, and growing** (and not only in low-income countries, but across the globe).

Compulsory identity cards, carrying information about personal resource consumption, are common, and companies sell services to citizens to help them live their lives to the optimum without falling foul of the state. There is also a booming black market – not only in illicit goods, but also in ID card manipulation tools.

6. use of natural resources

Resources are strictly managed for the greater global good

Farmers and rural landowners are increasingly seen as ecosystem managers and are paid by governments to optimise 'natural services' – such as biodiversity, watershed management, or food production – for the greater common good. Large centralised operations are preferred and smallholders are ostracised. Where small farms survive, what and when they grow is dictated to them, with severe punishments meted out to dissenters.

Many forests (and other biomes such as peat bogs) have been protected for their value as carbon sinks, water regulators and biodiversity reserves. Others have been sacrificed where they have been designated as optimal agricultural land. For example, the Atlantic Forest zone spanning Argentina, Paraguay and Brazil is under threat from South American agricultural proposals announced in 2025.

Picking the 'optimal' areas for agricultural production is proving increasingly difficult as climate change impacts bite. East Africa was identified in the 2000s as one of the few regions whose productivity might improve as a result of climate change, but the 2016 Great Lakes drought actually saw businesses withdraw from that region, citing climate risk. There is growing fear that regions seen as optimal for agricultural production in the past, now dominated by vast monocultures, might turn out to be much less optimal in the years to come.

Vegetarian diets are common and even enforced in some areas. New types of food have come to the fore too. Farmed grasshoppers – with their signature fine-mesh, mobile 'tents' – are increasingly common. **Insects have replaced animals and fish as the main source of protein for millions of people**.

International treaties are signed on vital global resources such as the Amazon forest. Similar agreements exist regionally, on South American glaciers for example – but Indo-Sino tension prevents agreement on Himalayan meltwater. This region looks ripe for conflict in the years to come given China's decision to divert the Brahmaputra river for hydroelectric power and agricultural irrigation in 2030.

7. role of technology

There is a focus on maximum efficiency and huge centralised power generation in a highly networked world

By the early 2020s, **being able to demonstrate a low-carbon and resource-efficient supply chain was essential for business success**. Awareness that a high-carbon energy infrastructure would be bad for local exports inspired significant government action too, leading to investment in large centralised energy supply solutions, such as offshore wind farms, large hydroelectric plants, nuclear and concentrated solar power stations.

Transport-related emissions were initially tackled through investment in more efficient engines and logistics. Biofuels projects were phased out in response to concerns about food security and the success of centralised low-carbon electrification of road and rail transport. Video-conferencing has come to the fore as an alternative to travel and virtual tourism is an exciting new area for investment.

New building regulations have reinforced investment in energy efficiency. Zero-carbon buildings are the rule in most urban areas across the globe. In many low-income countries this involves reclaiming and reinventing traditional forms of architecture, with a number of designs being embraced by planners across the globe. Rapid urbanisation and new planned cities create a huge market for 'zero-carbon flat-pack' housing solutions that can be constructed quickly and easily.

There have been significant investments in agricultural technology, soil enhancement, water efficiency and desalination. A new sector geared towards the sustainable management of natural resources is thriving.

Waste collection and reprocessing is one of the most fruitful business opportunities. Landfill sites are mined for precious metals. Industrial processes are much more efficient (in terms of water, energy and materials) across the board.

Satellite monitoring of forest resources, and rapid response units tackling deforestation on the ground, are employed across the globe, following the media exposé of logging in Hue Green Corridor in Vietnam in 2018. **'Smart dust' – made of almost microscopic networked computers – is distributed around the world and monitors environmental conditions, resource use and pollution**. This so-called 'New Planet Skin' provides instant feedback and is freely available on the internet, as well as being used by governments and business to enforce policies.

Geo-engineering efforts are focussed on extracting carbon from the atmosphere, rather than modifying temperatures. Despite the nascent nature of such technologies, questions are already being asked about the optimal atmospheric concentration of greenhouse gases to aim for. A number of low-income countries have explicitly called for a return to pre-industrial levels as soon as this is technologically possible, but Russia and Canada – both of whom have seen high-latitude agricultural production expand in recent years – have called such ambitions counter-productive.

8. business response to climate change

Business acts decisively to combat climate change and secure resources

Business has engaged seriously and strategically with climate change. Most multinational companies support aggressive government action, the few exceptions being an isolated old guard of energy and automotive companies. Retail and FMCG (fast moving consumer goods) companies in particular understand the risks that climate change poses to their supply chains, and lobby aggressively while also cutting carbon from their supply chains.

Increasingly, companies recognise not only the threat posed by climate change, but also their dependence on ecosystem services more broadly. For example, detailed studies have shown how the Amazon forest protects rainfall for hydroelectric dams and agricultural interests in the region. Businesses in South America therefore make significant contributions towards forest conservation. The Soy Farmers' Association of Brazil is the biggest private supporter of forest conservation in Latin America.

Keen to secure access to precious raw materials from low-income countries, companies have pushed for more integration between the different stages of their supply chains, taking direct control of the resources they need. They are anxious to demonstrate the low-carbon credentials of their products, so they also finance zero-carbon production and processing facilities in low-income countries. Many forward-looking companies are more than happy to provide the associated investment, seeing the potential to create, and gain a foothold in, new upwardly-mobile markets.

Global retailers, whose presence in low-income countries increases year on year, demand full 'ecosystem integrity' in the goods that they sell. While this drives improvements across all product ranges, over time entire product lines have been dismissed as unsustainable and withdrawn. Any products that utilised valuable agricultural land in what was deemed a sub-optimal manner, for example, have been phased out.

In many low-income countries, business and government work closely to provide essential goods and services. Indeed, throughout the world, the lines between the state and business are blurring. Companies have embraced sustainability accounting, allocating financial value to natural and social resources and transforming the balance sheet. And while growth is still valued, all parties recognise that it must be found within the confines of the broader resource requirements of the political bloc to which they belong.

Doing well…

- low-income countries with the natural assets – and negotiation skills – that enable them to secure lucrative deals to either protect, or exploit, those resources;
- low-income countries located in stable, friendly, and resource-rich geographic boundaries (such as watersheds);
- strong states that are able to maintain popular support while enacting significant resource optimisation strategies.

Doing less well…

- low-income countries with few natural resources to bargain with;
- low-income countries that share watersheds with rival nations or political blocs – especially those located downstream from their rivals;
- low-income countries whose natural resources are considered vulnerable to the expected impacts of climate change.

climate change impacts – how does this world react?

In 2016 drought hit Uganda, Kenya and Somalia, resulting in the worst famine for decades across the Great Lakes region. Scientists claimed it was 60% likely to be attributable to climate change.

→ This figure was denounced as hugely conservative in many prominent scientific circles. Many businesses withdrew from the area, exacerbating local difficulties. Increased awareness that climate change could seriously disrupt global supply chains inspired considerable corporate action to address climate risk.

In 2025 a huge cyclone struck southern Asia, hitting the Mekong Delta particularly hard and causing devastation to thousands of people's homes, livelihoods and rice crops.

→ Neighbouring countries were quick to help those worst affected, but the event exposed the risk of dedicating entire areas to monocultures and single land use.

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Maize yields have been steadily decreasing in southern Africa, which is attributed to changing growing conditions caused by climate change.

→ The use of genetically engineered, drought-resistant varieties is common, as is deployment of sophisticated irrigation technologies, and these techniques are lauded by corporations as crucial in preventing a collapse in yields. However, the viability of food production in large swathes of southern Africa is now being questioned, and agricultural investment is being diverted towards regions that are considered more climate-resilient.

Glaciers in the southern slopes of the Himalayas are melting as a result of climate change, accelerated by the Asian 'brown cloud' of dust and smog. In the years up to 2030 this has caused increased water flow, but also the expectation of future shortages.

→ Indo-Sino tension prevents agreement around this resource, a tension that's been ratcheted up by China's decision to divert the Brahmaputra river for hydroelectric power and agricultural irrigation. While global attention is focussed on a potential Indo-Sino conflict, Bangladesh looks likely to suffer most after India reneged on its promises not to divert any water away from the Ganges above the barrage at Farakka (a few kilometres from the India–Bangladesh border).

what does this mean for development in low-income countries?

This section of *The future climate for development* outlines the key insights we have derived from the horizon scan and scenarios and their implications.

We believe that these seven points are important messages for anyone working in the development field. We developed these messages from consultations with individuals in government, the private sector and NGOs, both in the UK and in low-income countries.

These points are targeted at development organisations, but the scenarios are also relevant more widely: to policy makers in low-income countries, businesses, and governments. We hope that these parties will find strategic challenge and additional insights from the four worlds.

1. climate change is a development issue

Climate change and development should be seen as complementary, not competing, issues: acting on one involves acting on the other

As Lord Nicholas Stern has said, "The two defining challenges of our century are managing climate change and overcoming poverty. And if we fail on one, we fail on the other".[115] Climate change is self-evidently not just an environmental problem: it is a human problem. It is already affecting our food and water systems, the nature of our homes and our cities, and where we can live. Our scenarios depict four possible but radically different futures for low-income countries in a climate-changing world. What is clear in each of them is that climate change and development are inextricably linked, and must be addressed together.

If ignored, climate change has the potential to undermine fundamentally even the best development initiatives

As all the scenarios demonstrate, a huge number of development issues including food security, health promotion, and poverty reduction will all be affected by climate change. Addressing climate change is an 'insurance policy' for all development work.

Taking action on climate change can bring a host of co-benefits for development: these 'win-wins' need to dominate the development discourse in the short-term

Energy security is perhaps the most obvious example of win-win initiatives addressing development and climate change. Many actions to improve energy efficiency and develop new technologies will help create economic prosperity even without taking into account their impacts on climate change. The 'Coping Alone' scenario explores the painful economic consequences of high oil prices for many low-income countries: this risk could be greatly reduced if oil dependency is addressed before a crunch hits. Investment in renewable energy technology could also provide a decentralised system of energy generation, more suited to the needs of the population – a key component of the virtuous circle we see in 'Age of Opportunity'. Other examples abound. Promoting low-carbon transport means reduced congestion, pollution and healthcare costs. Low-input agriculture focussed on maintaining soil quality boosts food security and is likely to be a robust strategy for adapting to a changing climate. All of these examples can also lead to the creation of new jobs.

[115] See http://www.guardian.co.uk/environment/2009/nov/30/stern-monbiot-copenhagen-deal

2. climate change will change the nature of development in the future

The vocabulary around climate change must change to emphasise the opportunity agenda. It must make clear that action to address climate change does not counter development, but is essential for development

'Mitigation' is often taken to imply restriction and sacrifice, and is not a helpful way to frame climate change action in low-income countries. Development in a climate-changing world is not about sacrificing opportunities, but about making smart choices that achieve the kind of co-benefits outlined above.

Many of the 'truths' about development will still hold in 2030

The next two decades are likely to bring radical change. But whatever happens, there will still be a need to focus on some of the fundamental tenets of development with which all development professionals are familiar: building peaceful states and societies; protecting and enhancing the livelihoods of the poor and vulnerable; building governance systems that are capable, responsive and accountable to their citizens. These priorities will remain, and if anything will become even more important, as they will be crucial in helping countries respond to the challenges and opportunities posed by climate change.

But some elements of 'success' may look very different

Our scenarios raise the prospect that the 'goals' of development may be reappraised.

- Today, for instance, it is easy to perceive subsistence agriculture as near the bottom of the development ladder – but there's a strong case for arguing that it adds resilience in some futures, such as 'Coping Alone'.
- In 2010 many regard democracy as the backbone of good development – but the authoritarian governance systems of 'The Greater Good' are a real possibility, and may be an effective strategy for a number of low-income countries seeking to serve the needs of a rapidly growing population with dwindling resources. Arguably, authoritarian governments may be better able to counter groups with a vested interest in the status quo, and achieve more radical action on climate change. Whilst this does not of course allay concerns about such governments acting in the best interests of their citizens in other areas, it is surely a possibility worth anticipating.
- The 'Coping Alone' scenario would require a massive increase in the amount of humanitarian work. All the scenarios are subject to increasing climate change, so will disaster response have to become a much more integrated part of long-term development?
- GDP may no longer be used as a measure of success. In 'Age of Opportunity', it is replaced by the Human Development Index (which measures both social and economic development), and in 'The Greater Good' sophisticated valuation of natural resources is paramount. Enabling this transition to more meaningful measures of success could become an explicit part of the development agenda.

Long-term development strategies must acknowledge uncertainty and build in adaptability, or risk failure

If the bilateral partnerships of 'The Greater Good' take over from the traditional donor approach, how will development organisations need to adapt? Equally, how might the need to engage with more authoritarian governments change a development organisation's approach? Development organisations will need a flexible approach and a readiness to deploy different strategies. To achieve this flexibility it will be important to monitor the global and local context for signs that indicate how events may develop, and consider what strategy would best achieve the organisations' goals in each environment. We can also learn from different approaches in today's world. For example, the decentralised development model that looks successful in 'Age of Opportunity' could emerge from the sort of small-scale approaches already being adopted in places such as Somalia.

3. all development must be 'climate-resilient'

We need to ensure that development is robust for a climate-changing world

This is about improving long-term outcomes for development in a world where climate change will have massive impacts, not only on the environment but also on economies, politics and people – albeit in ways we can't anticipate. The scenarios show the scale of the change that is possible within the next 20 years; it's crucial to keep this in mind and not just assume that today's trends will continue. Decision-making processes must take into account the potential long-term impacts of today's actions because, as the scenarios demonstrate, what looks good now might not make sense in the long run.

We can't predict the future; we can, however, say with a high degree of certainty that at some point in the future the world will transition to a low-carbon economy

When this happens, those countries dependent on high-carbon infrastructure and industry will be at a disadvantage. That disadvantage should not be levied at low-income countries that have historically had to contend with a global imbalance of power and a range of development challenges. We must also recognise that the 'dirty development' path followed by high-income countries is not the only – and certainly not the best – way of ensuring a population's well-being.

That is why low-carbon development is part of a resilient long-term strategy

Low-carbon development is not the only way, nor should it be the only consideration, but it is a vital ingredient in the development mix if low-income countries are to be competitive players in a climate-changing world. This is a long-term perspective, but still an urgent one. We need to move quickly; otherwise options for different development pathways disappear and the cost of low-carbon action will increase.

There is an urgent need for a model of successful, climate-resilient, low-carbon development

Calls for 'alternative' growth paths can be met with scepticism or even derision. This demonstrates the need for an achievable, believable, and aspirational model of successful development in a climate-changing world. Could a paper focussed on the future of low-income countries, do for those countries what the Stern report did to galvanise action in high-income countries?

4. climate change may cause dramatic reversals in countries' fortunes

Climate change may cause serious reversals of fortunes for countries at every level of development

Countries at all levels of development face the real prospect of serious disruption caused by both the direct impacts of climate change and the indirect ones such as economic restructuring. Current low-income countries will not necessarily make a gradual transition to middle-income status as we might assume today – Nepal is just one example of a country very vulnerable to the oil price shocks of 'Coping Alone'. In 'Reversal of Fortunes' some high-income countries suffer heavy economic losses.

It will be crucial to map the potential winners and losers of the future

It will be essential to assess which countries are the most socially and economically resilient – or vulnerable – to climate change in a variety of futures. This will throw up important strategic questions. For example, if certain resources are more important in the future, it may be possible to explore how learning from the 'resource curse'[116] lessons of the past can help ensure a positive future for countries rich in those resources. A similar type of 'resource curse' may equally result from a significant inflow of climate finance – as we see happen in some countries in 'Age of Opportunity'. Either way, a forward-thinking approach may help us avoid the pitfalls of the past. If some countries are shown to be particularly vulnerable in all potential scenarios, then this can be used to direct funds or attention.

The current categorisation of low-income countries may be of limited use in the future

The World Bank classifies low-income countries as those whose Gross National Income (GNI) per capita, calculated using the Atlas method,[117] is $975 or less. Classification based on GNI alone does not capture the various characteristics (such as economic diversity) that will have an impact on how low-income countries are affected by climate change and how they may respond. In addition the current list of low-income countries does not include countries like Pakistan, India or Nigeria, all of which are classed as middle-income countries but still have very large numbers of poor people who are vulnerable to climate change, and may be subject to the some of the pitfalls that appear even in our most positive scenario, 'Age of Opportunity'.

[116] The 'resource curse' refers to the observation that, for countries rich in natural resources the income from these resources is often misappropriated by corrupt leaders and officials instead of being used to support growth and development, and such unfair distribution of wealth in turn fuels internal grievances and causes conflict.

[117] For an explanation of the Atlas method – see http://web.worldbank.org/WBSITE/EXTERNAL/DATASTATISTICS0,,contentMDK:20399244~menuPK:1504474~pagePK:64133150~piPK:64133175~theSitePK:239419,00.html

5. support change from within

Building the strength of civil society in low-income countries brings many positive benefits

Development professionals know that building a strong civil society is crucial in ensuring the efficiency and effectiveness of aid and climate finance because it encourages better governance and development decisions. **In a world where financial and resource flows may ebb and flow** in unexpected ways, the most robust strategy will be to create pressure for accountability from within, rather than from external partners. This will be particularly important if little money is available for traditional development work, as in the underfunded worlds of 'Coping Alone' and 'Reversal of Fortunes'.

It is important to increase public understanding and awareness of climate change in low-income countries

There is an urgent need to communicate the causes and consequences of climate change clearly and accessibly. Governments in low-income countries and their citizens will need a shared understanding of the link between changes in weather patterns and agricultural productivity, deforestation and other carbon-intensive activities, if there is to be social support for climate change action.

Supporting low-income country cooperation at the regional level helps build resilience and independence

Regional economic and political integration is a robust strategy in every scenario for different reasons, including security, resilience in the face of external price shocks, and management of cross-border resources. It makes sense to explore how to support more integrated thinking across borders of low-income countries because this may increase security, strengthen their position in negotiations and reduce the risk of individual low-income countries being exploited unsustainably. Similarly, supporting city networks may be a means to link up countries' economies, providing these economies with a scale and level of impact that they may otherwise lack.

6. work with business to catalyse change

Business can be an important vehicle for catalysing low-carbon approaches globally, and may be a vital partner when government-level engagement is difficult

There is huge potential for multinational corporations to export low-carbon best practice from wealthier nations to low-income countries, even when low-income country governments are pursuing high-carbon growth strategies. Development agencies can play a vital role in helping low-income countries to put in place incentives to encourage low-carbon development, such as tax relief: this is a low-risk strategy with high potential gains. Working with business to mitigate climate change risks will also be important.

Partnering with business can unlock new ways of working

Businesses need to respond to (or create) demand, so they are well placed to take a proactive, opportunity-focussed approach to climate change. Partnering with business can therefore be a source of inspiration and innovation and provide a fresh perspective on development initiatives, and many development organisations already take advantage of this. For example, using business principles to focus on the demand for new technologies, rather than just the supply; making sure that citizens are also approached as consumers; and applying a business approach to project evaluation.

7. prepare for the challenges that feature in a range of futures

The four scenarios are very different, but they have several common themes

Many of our interviewees pointed out that certain key issues look set to demand attention whatever future comes to pass, albeit in different ways.

Urbanisation is a key challenge

Much development has been focussed on rural areas, but in many low-income countries it is projected that the majority of people will live in cities by 2030. As cities expand, there is huge potential for early intervention in the design process to maximise sustainability. Cities are already pioneering low-carbon approaches to development, and cities in high and middle-income countries may have a role to play in helping low-income countries to adopt low-carbon growth strategies to manage rapid urbanisation. This would include the design of low-carbon transport systems and housing.

Agricultural skills are important in all scenarios

Food security is a huge issue for the future, and one that will undoubtedly continue to face the world's poorest. At the very least, it is important to focus on maintaining soil quality now to ensure that future investment in agriculture is not futile. The success of measures to avoid emissions and adapt to climate change in low-income countries (and most importantly, synergies between the two) will be highly dependent on agriculture and land use more broadly, especially forestry. For example, improving agricultural productivity takes pressure off forests by reducing demand for additional land. Working on the links between an enhanced REDD agenda (reducing emissions from deforestation and degradation) and agriculture will therefore be key.

Absolute population growth persists in all scenarios

Population cannot remain the taboo subject it currently is in some quarters; development organisations must grapple with the implications of a rapid rise in the population of many low-income countries. Today consumption per capita is, of course, much bigger in high-income (and some middle-income) countries whilst lifestyles in low-income countries are relatively low-impact, but this may not always be the case. It will be important to consider both the growth in absolute numbers and the level of consumption when it comes to ensuring that basic needs can be met in the future.

Persistent and growing inequality is likely

Even in the more positive scenarios there are still huge gaps between the rich and poor. Evidence suggests that high inequality leads to grievances, social dislocation and internal conflict: so continuing investment in social policy will be important.

All scenarios suggest the need to rethink established political boundaries: the region or the city could be the primary point of engagement in the future

There are a number of factors which may see regions and cities gain power at the expense of the nation state. For example if natural resource management assumes the importance of 'The Greater Good', then agricultural zones and watersheds may become political entities. Both the 'Age of Opportunity' and 'Reversal of Fortunes' scenarios see cities and city regions rise in influence. Regionalisation, as seen in a number of the scenarios, could happen for many reasons – as a proactive strategy in turbulent economic times, or a reaction to an extremely high cost of carbon. Development organisations will need to be equipped to plan at this level and build relationships with new power bases which may present different engagement challenges.

All scenarios point to the need to better understand how China and other future global political 'heavyweights' might interact with low-income countries

There is great uncertainty about the future role of China and other rapidly growing economies. Will relationships with low-income countries be 'transactional', and aimed at fulfilling resource needs, or based on long-term sustainability and development goals? Middle-income countries – especially those that have only recently achieved that status – may have more empathy with low-income countries and may therefore champion their needs. However, there is also a possibility that these middle-income countries will choose to focus on their own development rather than on the effects of climate change on low-income countries.

how you can use the scenarios

The most important thing about scenarios is the change they can create. They're designed to challenge current thinking, and expose a range of uncertainties about the future. As such, they are a useful strategic tool to encourage long-term thinking, communicate aspirations, build consensus, and ultimately develop strategies that can be robust in any future.

These scenarios are designed to be applicable to anyone with a stake in how low-income countries develop and respond to climate change in the future. We focussed on the implications for development agencies, but we hope that NGOs, government departments and businesses can all find inspiration and strategic challenge in the four worlds.

The questions outlined below provide a starting point for engaging with the scenarios, and using them to support your own thinking. Often these sorts of questions result in the best answers when there are a variety of people bringing different perspectives to the table. You can use them to bring unexpected combinations of people together – both from within and outside of your organisation – to think through the challenges and possibilities of the future.

For more detailed suggestions of how to use the scenarios please take a look at our downloadable support materials, which include guidance and workshop suggestions tailored for different users.

getting to know the scenarios

Before using the scenarios as outlined on this page, it's vital to get to know them better. There are a few ways you can prepare:

Read through them individually.

Try to imagine your own life in this world – how would it have changed?

Create short stories to explore what other people's lives might look like in this world. You could do this for:

- a business entrepreneur in West Africa;
- a small-scale farmer in South Asia;
- a politician in Latin America;
- a mother of two in an urban slum.

Describe the winners and losers in this world. We've suggested some groups of low-income countries, which will have fared better and worse – you could do this for individual countries.

strategy testing – is your current strategy fit for the future?

Go through the scenarios and explore how your current strategy, unchanged, would perform in all scenarios

- Which scenarios would it succeed in, and why?
- What are the strengths, weaknesses, opportunities and threats for your current plans in each scenario?
- What can you do to seize the opportunities and mitigate the risks you have identified?

generating new ideas – what could you do differently in the future?

Take each scenario in turn and use it as a basis for brainstorming

Consider the following:

- What needs would my organisation be trying to meet?
- How might that be achieved?
- What could the organisation look like?
- What are the policies, skills and processes it would need?

collaborative working – who is a potential partner?

The scenarios can be used as a way to frame discussions with other organisations within and beyond a sector to debate future collaboration. They can help explore common aims and identify differences in approach

Pick out from the scenarios a number of key challenges facing the development sector and ask what collaboration between partners could achieve in addressing them?

- For example, who could you collaborate with to enable climate-resilient development?
- What partnerships could be mutually beneficial?

What next? Core and contingent actions

Armed with your answers to the above exercises, you can map out your 'core' and 'contingent' actions for the future.

'Core' actions are ones that you need to implement now. If you have an answer to one of the above questions that is common to all four scenarios, this indicates a need to change your strategy accordingly.

'Contingent' actions are ones that you might need to implement, depending on how the future unfolds. For example, a new idea might only be relevant in one scenario – but if it's a significant possibility in that world, then it's worth planning for.

So how do you know when to put your 'contingent' plans into action? The best way to do this is to map out the 'signposts' for each of the scenarios that are pertinent to your organisation. Try to list 10 things that you might see if the world is moving in the direction of each of the scenarios. If you start to see these signposts coming to life – in newspaper headlines, or in political talks – then you can return to your contingent action plan and consider if the time is right to begin putting it into place.

Finally, you can look at how you can influence the future, to see your preferred elements of the different scenarios 'come true'.

influencing the future: achieving a vision

Take the elements of each scenario that you like best, and use them to form a new, preferred scenario, or a vision of the best possible future.

- What would need to happen for that scenario to come true?
- Who would need to do what, and when?
- How can you intervene to help?

Supporting materials available

Our downloadable support materials are available from both Forum for the Future's website at **www.forumforthefuture.org/projects/the-future-climate-for-development** and DFID's website at **www.dfid.gov.uk/climatescenarios**

The materials available include:

Slide support pack

This provides a brief overview of the scenarios, why they were created and how they can be used. It includes notes pages if these are required by a presenter, and can be used to introduce a workshop, or just to give people an overview of the work.

It outlines:

- the rationale for the work;
- how the scenarios were developed;
- a description of the scenarios;
- how you can use them.

Posters of the scenarios

If you want to use the scenarios in a workshop environment, or just get people thinking, we recommend providing an easily accessible overview of the main points and characteristics. Our posters do this, and can be printed as handouts, or to be displayed on walls.

Films of the scenarios

Short films of the scenarios are also available to download, and are a great way to really get a feel for the character of each of the worlds.

Cross-impact matrix

If you're interested in the relationships and assumptions that underpin the four scenarios, then you can examine our cross-impact matrix. If you want to build on the scenarios yourselves – or vary some of the parameters – then this is a good place to start.

Workshop agendas

We've developed a workshop agenda that you can use to help your organisation get the most out of these scenarios. You can pick and choose which elements of the agenda you use to fit the time you have available and the people in the room. The agenda is designed to be applicable to any organisation working in this field, including:

- UK government departments;
- country governments;
- development agencies and NGOs;
- business;
- development banks.

If you can't find one that meets your needs, why not get in touch with Forum for the Future and we can suggest how best to tailor the agenda to your requirements.

appendix one
climate change: reflecting uncertainty in the scenarios

In constructing our scenarios, we had to decide whether or not to reflect uncertainty about the environmental impacts of climate change in different scenarios, perhaps having one where climate change proceeds at the pace described by the IPCC reports, one where climate change is slower, and one where it happens faster. We chose not to for four main reasons:

- the climate in 2030 will be determined overwhelmingly by levels of past pollution. Action taken between now and the 2030s is very unlikely to have any impact until after that date. We did not want to suggest otherwise in our work;
- applying this variability risked suggesting that climate change was the only factor determining future responses. Instead, there are a bewildering number of drivers, from available technology to political will;
- by applying climate change as a constant across all of our scenarios we would be able to explore those other determining factors in detail;
- as the project progressed, the low-range estimates from the IPCC looked more and more implausible.

So the four possible future worlds that we describe are different responses to a similar level of climate change (i.e. in line with the Copenhagen Diagnosis). In all of them, climate change is a serious problem, and we have introduced the same significant 'climate-exacerbated' events (based on current projections[118]) to each of our scenarios. Through these events we explore the different impacts and responses that would arise in each scenario:

- in 2016 drought hits Uganda, Kenya and Somalia, resulting in the worst famine for decades across Great Lakes region;
- in 2025 a huge cyclone devastates a portion of the coast of Southern Asia. One of the most seriously impacted areas is the Mekong delta, causing devastation to thousands of people's homes and livelihoods, and resulting in a collapse in that year's rice crop;
- maize yields steadily decrease in Southern Africa, which is attributed to the changing growing conditions caused by climate change.[119];
- the melting of the glaciers in the southern slopes of the Himalayas is being caused by climate change – and accelerated by the Asian 'brown cloud' of dust and smog. In the years up to 2030 this has caused increased water flow, but also the expectation of future shortages.

[118] Allison I., et al., *The Copenhagen Diagnosis, 2009: Updating the World on the Latest Climate Science*, The University of New South Wales Climate Change Research Centre (CCRC), Sydney, Australia.
[119] Lobell, D., et al., 2008, *Prioritising climate change adaptation needs to 2030*, Program on Food Security and the Environment, Stanford University.

appendix two
glossary

Additionality
In the context of the Kyoto Protocol Clean Development Mechanism, the principle that greenhouse gas emission reductions from a project must be additional to those that would have occurred as a matter of course without the project being undertaken.

Albedo
A measure of how much a given surface reflects the sun's radiation. Albedo is quantified as the percentage i.e. the amount of light reflected compared to the total light falling on the surface.

Algal fuel
Fuel derived from algae.

Base-of-the-pyramid model
A business model targeted at the largest but poorest socio-economic group in a society.

Beta version
An officially released version of a product or project which includes most of the product's functionality. The beta version is intended for external testing of the product in order to identify problems, and collect requirements and suggestions from users.

Biochar
Biomass "cooked" by pyrolysis to produce a stable form of carbon. This removes carbon from the atmosphere, which is then stored by burying the biochar underground. Adding biochar to soil has the added benefit of improving soil productivity.

Biomass
Biological material derived from living organisms, such as wood, waste, and alcohol fuels.

Biome
A large geographical area of distinctive plant and animal groups, which are adapted to the climate and geography of that particular environment.

Brain drain
The large-scale emigration of individuals with technical skills or knowledge from a country or region.

CCS
Carbon capture and storage. A means of reducing carbon dioxide emissions by capturing carbon dioxide from sources such as fossil fuel power stations and storing it in some way to prevent it from entering the atmosphere.

Carbon rationing
A scheme whereby each person, organisation or country is attributed a proportion of the overall amount of carbon dioxide (or equivalent) that can be emitted globally. Under emissions trading schemes, those who emit more than their share of carbon must buy credits from those emitting less than their ration.

Carbon sequestration
The removal and storage of carbon from the atmosphere in carbon sinks (such as oceans, forests or soils) through physical or biological processes, such as photosynthesis.

Carbon sinks
A natural or manmade reservoir that accumulates and stores some type of carbon-containing chemical compound for an indefinite period.

CDM
Clean Development Mechanism. An arrangement under the Kyoto Protocol allowing industrialised countries with a greenhouse gas reduction commitment (called Annex 1 countries) to invest in ventures that reduce emissions in developing countries, in order to gain credits towards their own emissions reduction targets.

Climate-resilient
The term used in this report to refer to development that is robust in the context of climate change. Similar terms in use elsewhere include 'climate-proofed' and 'climate-smart'.

CO_2
Carbon dioxide.

CO_2e
Carbon dioxide equivalent. The universal unit of measurement used to indicate the global warming potential (GWP) of each greenhouse gas. Carbon dioxide (CO_2) is used as the reference gas against which the other greenhouse gases are measured, since it has the smallest GWP.

CSP
Concentrated Solar Power. A system that uses mirrors and/or lenses to concentrate the energy from sunlight onto a small area. The concentrated light is then used as a heat source for a conventional power plant.

Contraction and convergence
A framework for reducing greenhouse gas emissions based on a principle of global equity. Contraction means that global emissions fall, while convergence means that per capita emissions across the globe converge, so that the emissions of low emitters may be permitted to rise to meet the falling emissions of high emitters.

COP15
Fifteenth Conference of the parties to the United Nations Framework Convention on Climate Change.

Decarbonise
Reduce or eliminate carbon emissions.

Ecosystem services
The benefits that people obtain from ecosystems. These include both resources, such as clean drinking water, and processes, such as the decomposition of wastes.

Emissions pathway
The way that the level of greenhouse gas emissions resulting from human activities changes over a particular period of time.

Future-proofing
Designing something to be able to be resilient to future developments, including both avoiding negative consequences and taking advantage of opportunities.

Futurists
Those who look to and provide analysis of the future in a formal and/or systematic manner.

G77
Group of 77. A loose coalition of developing nations, designed to promote its members' collective economic interests and create an enhanced joint negotiating capacity in the United Nations.

G8
Group of Eight. A forum for the governments of France, Germany, Italy, Japan, the United Kingdom, the United States, Canada and Russia.

Geo-engineering
Large-scale engineering of the environment, deliberately manipulating the Earth's climate to counteract the process of climate change and/or its effects.

GHG
Greenhouse gases: gases that emit and absorb radiation in the Earth's atmosphere, affecting temperature.

Horizon scan
The systematic examination of potential threats, opportunities and likely future developments, including (but not restricted to) those at the margins of current thinking and planning. Horizon scanning may explore novel and unexpected issues as well as persistent problems or trends.

Human Development Index
A scale that measures the level of development of a population, produced by combining three development variables (life expectancy, education and GDP) into a single indicator.

ICT
Information and Communications Technology.

IPCC
Intergovernmental Panel on Climate Change.

Leapfrogging
A term used in this report to refer to the possibility that developing countries might be able to skip some of the 'dirty' stages of development experienced by industrialised countries. Leapfrogging may also refer to specific sectors, for example leapfrogging in the energy sector refers to low-income countries bypassing the use of high-carbon energy sources, moving straight to low-carbon sources of energy.

LCA
Life cycle analysis. The investigation and evaluation of the environmental and social impacts of a given product, service or process throughout its lifetime, including production, use and disposal.

Lock-in
The inability or extreme difficulty of deviating from a particular path or trend.

MDGs
Millennium Development Goals. Eight international development goals that all 192 United Nations member states and at least 23 international organisations have agreed to achieve by the year 2015.

ODA
Overseas Development Aid. Monetary aid earmarked and channelled by industrialised countries to developing countries, to assist in the development of political, social and economic infrastructure.

OPEC
Organisation of the Petroleum Exporting Countries.

Peak oil
The global peak in oil production, which occurs when the amount of oil produced worldwide reaches a peak and starts a permanent decline.

ppm
Parts per million. A way of specifying very small relative quantities. The expression "1 ppm" means a given substance exists at a relative proportion of one part per million parts examined.

REDD
Reducing Emissions from Deforestation and Degradation. An international mechanism that uses direct monetary or other incentives to encourage developing countries to reduce the emissions of greenhouse gases from deforestation and forest degradation.

REDD plus
Extension to the REDD agenda agreed internationally as part of the Bali Action Plan.

Scenario
Detailed descriptions of different possible ways that the future might play out. Scenarios are a structured way of asking a lot of 'what if' questions about the future of a particular interest area. Scenarios do not answer these questions definitively, but explore possible answers and what implications these may have.

Siloed/silo
In policy, if different fields or areas of work are siloed, they are cut off from each other and dealt with as separate issues, in different departments. This can have the effect of ignoring important interactions between different issue areas and reducing cooperation on cross-cutting issues.

Single-sourcing
The purchasing policy of using only one supplier for a particular component, product or service.

SOE
State-Owned Enterprise. A legal entity created by a government to undertake commercial activities on behalf of an owner government, and usually considered to be part of the state.

Tobin tax
A proposed tax on all short-term conversions of one currency into another, to manage exchange rate volatility.

Twitter
Social networking website that allows users to send and receive short messages in a one-to-many format.

appendix three
participants in the project

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Wendwossen Kebede	VSO (Voluntary Service Overseas) Ethiopia
Whitney Kakos	Cafédirect
Will Day	Cambridge Programme for Sustainability Leadership
Vicky Pope	Met Office
Zegeye Asfaw	Hundee
Zenebe Gebgreegziabher	Ethiopian Development Research Institute

…and all the delegates at the Young Commonwealth Climate Change Summit on 28th October 2009.

Thanks also to all those who participated in the online consultation.

We hope you find this report a stimulating and useful read.

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how might low-income countries respond to climate change over the next two decades? and how can looking to the future in this way improve decision-making today?

The future climate for development is a report by Forum for the Future, supported by the UK's Department for International Development.

It addresses the above questions by way of a 'horizon scan', which examines the key issues that will affect low-income countries over the next 20 years, and four scenarios, which explore how these issues may play out in different ways, highlighting the challenges and opportunities that low-income countries might face. The scenarios are a practical tool, and can be used to 'future-proof' current strategies, prioritise areas for work and inspire new ideas.

This work is designed for anyone who has a stake in the future of low-income countries, including NGOs, businesses, policy makers and low-income country governments. The report outlines seven key implications for development organisations, but is also applicable to a wide range of stakeholders.

Visit
www.forumforthefuture.org/projects/the-future-climate-for-development to find out more and watch the scenario films.

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