
Adapting to the Effects of Global Warming

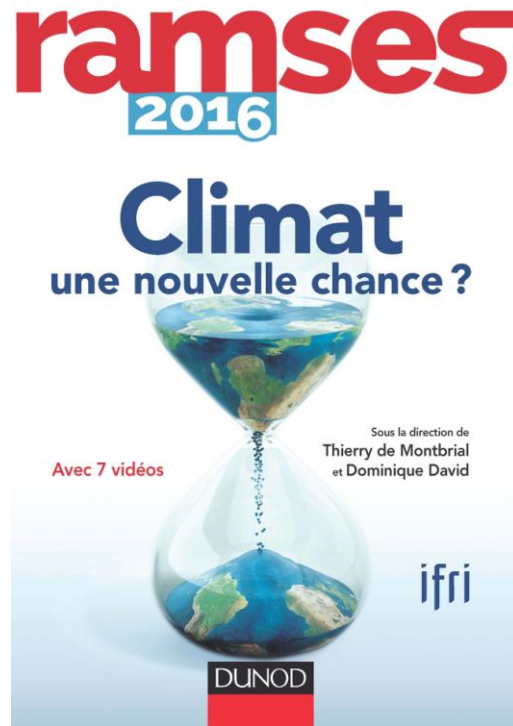
**Mitigating the predictable warming,
but first of all protecting against the inevitable**

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Adaptation issues started to gain momentum from the Copenhagen conference in 2009. Up until then, international negotiations had focused on mitigation policies. However, the increase in weather events and the inadequate efforts to hold back global warming now make adaptation a key issue in discussions around the Paris agreement.

Changes in rainfall patterns, melting snow and glaciers, effects on runoff and water resources, changes in ecosystems, extinction of species or impacts on crop yields: the effects of climate change are many and are already visible today. These changes on a global scale call for our societies to develop strategies to prepare for the effects of global warming.

According to the Intergovernmental Panel on Climate Change (IPCC), adapting to climate change means adopting an adjustment process to the current or expected climate, as well as to its effects. Therefore, the objective is to mitigate or avoid adverse consequences, to exploit the beneficial effects of global warming, and even to seize opportunities. Adaptation to global warming also requires dealing with the many uncertainties related to the assessment of the expected effects of long-term climate changes, to the extent projections will materialize at the local scale and final to the real adaptability of our societies in the future.

> > Adaptation measures: focusing on no regret actions

Behaviour change in response to the effects of climate change must involve all social actors, taking into account the diversity of the potential effects of global warming and the range of possible measures. These measures can be physical – such as upgrading protective dikes –, or institutional – like crisis management mechanisms or the initiation of specific regulations. They may include stricter building standards to deal with increased summer temperatures, or the tightening of the technical standards for critical infrastructure, for example setting up capacity obligations to meet winter demand peaks. The adaptation decisions may also target research or the awareness of the public and policy-makers to facilitate accountability and decision-making.

Whether it is reactive measures introduced in response to a major weather event (such as the evacuation of a flooded area and the resettlement of people in safer areas) or proactive actions (such as the Climate Plan adopted in France after the heatwave of 2003), the costs of adaptation measures are substantial. They were revised upwards in December 2014 by the United Nations Environment Programme, which estimates that they could reach \$ 150 billion per year in 2025-2030, and between \$ 250 - 500 billion dollars in 2050 for all developing countries (including \$ 50 billion for Africa alone), estimates two to three times greater than those of the IPCC. These amounts could even be considerably higher if the 2°C limit was exceeded.

If the cost of adaptive actions can be assessed, the value of their long-term benefits is more complex to measure, as the uncertainties associated with climate change are strong, affecting the mobilisation and action of actors. These uncertainties lead to a focus on so-called "no regret" adaptation measures, i.e. actions reducing the vulnerability to climate change whilst having immediate benefits, or flexible and reversible strategies that can be changed in the future. The challenge is therefore to avoid the pitfalls of "maladaptation".

> > **Adaptation as a national strategy**

Since the early 2000s, several countries have publicised their general approach to adaptation, developed practical answers to the current and future effects of climate change, and published national plans. In many OECD countries, the incorporation of adaptation has become mandatory in planning and sustainable development policies. Based on an evaluation of the risks related to climate change and on climate change scenarios, these strategies aim to mobilise a large number of actors: local and national government, the private sector, or even civil society. The measures taken concern the management of natural ecosystems, water resources, flood and coastal erosion risks; handling of the problem of overheating of buildings in urban areas; and the management of health risks. Hence, government programmes based on a long-term vision for sustainable flood and coastal erosion management have been launched in the United Kingdom (*Making Space for Water*), in the Netherlands (*Ruimte voor de Rivier* [Room for the River]) and in Germany. Similarly, the French adaptation plan has helped to integrate the rise in sea level in the zoning of coastal risks, to strengthen the system for the heatwave plan, and agricultural insurance against climate risks.

In the United States, it was not until the Obama administration that adaptation took on a national dimension with the creation of an inter-institutional working group, co-chaired by the White House Council on Environmental Quality, and responsible for co-ordinating federal adaptation activities. Since 2009, a presidential decree requires all public bodies to assess the climate risks that their activities incur and to specify the appropriate measures to deal with them. Hence, federal institutions must submit annual strategic sustainability plans, setting mitigation but also adaptation objectives. Emphasis is also placed on scientific research to assess vulnerability to climate change.

Mexico, which is particularly affected by the consequences of global warming, is making significant efforts in terms of adaptation, and has been for several years. Extreme weather events, like tropical cyclones, floods, and droughts, have caused many deaths and economic

losses estimated at \$ 1.5 billion per year over the period 2000-2012. The long-term adaptive trajectory (by 2030) presented by the Mexican government, a major component of the Intended Nationally-Determined Contribution submitted for the Paris conference, relies on strengthening the adaptability of poor communities, which are the most vulnerable to climate change¹, and on improving the climate resilience of ecosystems with a target of 0 % deforestation in 2030.

Adaptive actions must firstly be carried out locally: in contrast to CO₂ emission reduction policies, adaptation efforts primarily benefit the most exposed populations (residents of coastal towns, devastated areas, etc.). In its Communication on the strategy for adaptation to climate change in 2013, the European Commission is relying on systematic integration of adaptation issues by the Member States at both local and national levels. It is widening the scope of the Covenant of Mayors for local and sustainable energy² to adaptation issues (*Mayors Adapt*), with a view to supporting local adaptive activities and providing an exchange platform for good practices and population awareness. At the forefront of the adaptation planning actions, several American cities, such as Philadelphia, are committed to initiatives for improving green infrastructure, building roads made up of permeable pavements to capture rainwater, or fighting against urban pollution associated with rainy weather.

>> Sectoral adaptation: the case of energy

Adaptation to climate change is not only borne by the public sector. It represents a fundamental challenge for companies, particularly those in the energy sector. While the link between energy and climate change historically results from the predominant contribution of fossil fuels to greenhouse gas emissions, climate change also has serious implications for the energy sector. Beyond the potential effects on the supply and consumption of energy, the entire chain is exposed, particularly because of the lifespan of energy infrastructure. Moreover, few studies have explored the impacts of global warming on renewable energy production (hydropower, solar, wind, etc.).

Climate change also requires energy companies to ensure the continuity of energy supply in all weather conditions. Several companies from OECD countries are now developing their strategies according to the new climate deal. A report by the Observatoire national sur les effets du réchauffement climatique³ (National Observatory on the Effects of Global Warming) has shown that some French companies are now fully committed to implementing measures intended to make their facilities less sensitive to global warming and to improving their resilience in the face of extreme weather events which are difficult to predict – taking into account, for instance, the experience feedback from the Fukushima disaster. Already faced with the challenge of reducing greenhouse gas emissions, the energy sector will therefore have to carry out another revolution: that of adapting to new climate constraints.

1. According to the OECD (2013), 68 % of the population affected by natural catastrophes in Mexico is poor.

2. The European Commission launched the Covenant of Mayors after adopting the Climate and Energy package in 2008 in order to support the efforts made by local authorities in implementing policies in favour of sustainable energies.

3. "Les entreprises et l'adaptation au changement climatique", Observatoire national sur les effets du réchauffement climatique (ONERC), April 2014.

>> **An economic and social development issue**

The degrees of vulnerability to global warming vary between countries and regions. If adaptation is a challenge for both developed and developing countries, populations marginalised economically, socially, culturally, politically, or institutionally are particularly sensitive to climate change and to certain adaptation and mitigation strategies. The exposure of African countries and small island states to the increased risks of rising sea levels, coastal erosion, and extreme weather events, has serious effects on the health and malnutrition of their populations, and may destroy key economic sectors such as tourism, agriculture, or fishing. Therefore, it is populations of developing and the least developed countries which are looking for capacities to prepare for climate change, in terms of energy services, infrastructure, and agricultural technologies.

Hence, beyond the environmental damage, climate change overturns the economic structures of many countries. Recurrent droughts in Ethiopia have an estimated cost between 1 and 4 % of GDP⁴, particularly due to their impact on agriculture. Coffee production, which represents nearly a third of Ethiopia's export revenue, is critical for the country to obtain the status of a middle-income country in 2025. Yet, global warming has a direct impact on the shrub which grows at altitude and is very sensitive to the heat. In a strategy adopted by the Ethiopian government in 2011 in favour of a green economy resilient to climate change – a strategy which tries to combine economic development expectations and climate objectives –, priority adaptation measures are mainly identified in agriculture, but also in forestry, energy, transport, industry, and infrastructure. This strategy is starting to bear fruit with the restoration of degraded agricultural lands, but its widespread success largely depends on international support, as investment needs are high (\$ 1 billion per year for the agricultural sector alone).

>> **International co-operation on adaptation**

It was only at Cancun, during the COP16 in 2010, that the parties to the Convention acknowledged that "adaptation must be considered as having the same degree of priority as mitigation", and decided to support international action in favour of this adaptation, in line with the principle of shared but differentiated responsibility. This conference created an Adaptation Committee and formalised a support process for adaptation planning, particularly for countries most vulnerable to climate risk. It was also at this time that the developed countries decided to spread the financial resources from the Green Fund evenly between mitigation and adaptation. This adaptation funding is primarily intended for the most vulnerable developing countries, including the least developed countries, small island states and African countries.

With the approach of the Paris conference, many voices are calling for the adoption of a common approach to adaptation, inspired by the mobilisation that has already been achieved around mitigation. The objective is to set a common and ambitious target in the long term in order to be able to measure progress at a national and then global scale. This approach

⁴. *Climate Resilience in Development Planning, Experiences in Colombia and Ethiopia*, OECD, Paris, 2014.

would centralise global funding for adaptation in the Green Fund – it is estimated that less than 20 % of climate finance has targeted adaptation projects to date. Beyond financing issues, the benefit of this approach would be to create a co-operation framework around exchange platforms about the different experiences and to promote the transfer of technologies between countries.

> > **When adaptation becomes an opportunity cost**

Concerned by the effects of mitigation policies on their rentier economies, the oil-producing countries must also adopt an adaptive trajectory, not only to address climate risks, but also to begin – finally – the economic reforms reducing their dependency on oil revenue. Since 2005, the oil-producing countries, in the *Like Minded Developing Countries* group, regularly assert that the lower trajectory of world oil consumption related to mitigation efforts is reflected by an opportunity cost for their economies, firstly in terms of loss of export revenues.

The 1992 Convention acknowledges this vulnerability of oil-producing countries and calls for the parties to explore "measures regarding financing, insurance, and technology transfer", particularly in countries "whose economy is highly dependent on revenues from the production, processing, and export of fossil fuels". Since the adoption of the Kyoto Protocol, financial support for the economic adaptation of the oil-producing countries has become a sticking point in climate negotiations; with the so-called Annex I countries refusing to compensate the rich OPEC oil-producing countries.

> > **Beyond adaptation**

Despite the implementation of worldwide adaptation efforts, the impacts of global warming will remain significant and will result in losses and damages in many countries. The United Nations evaluated this cost for Africa at 3 % of the annual GDP by 2080⁵. Some progress was made during the Warsaw conference (COP19) in 2013, with the creation of a platform to improve the understanding of overall risk management approaches; but again, the question of financial support must be determined at the Paris conference.

Since it only impacts on the effects of climate change and not on its causes, adaptation has long been perceived as an "inferior" solution. Al Gore even described in in 1993 as "a kind of laziness, an arrogant faith in our ability to react in time to save our skin". Nowadays, adaptation is placed on the same level as mitigation in climate negotiations, but the path will still be long before a full consensus on global commitment to the most vulnerable countries is achieved.

M.-C. A.

5. "Pertes et dommages en Afrique", United Nations Economic Commission for Africa (ECA), May 2014.

FURTHER READING

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