



Regional rivalry and climate migration possible ‘within our lifetimes’

Droughts, floods, changing agriculture and rising sea levels. The list of climate change impacts goes on, but what exactly can we expect within our lifetimes?

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‘We have developed scenario narratives for the different futures for Europe which combine plausible changes in socio-economic conditions with projections of changes in climate,’ said Dr Paula Harrison, from the University of Oxford, UK, and project leader of IMPRESSIONS, an EU-funded research project which is looking at the impacts of high-end climate change.

Climate change will affect water resources, agriculture, biodiversity and the global flow of goods and services. Couple this with a growing population, and there could be significant impacts upon Europe’s economy and society.

‘In the worst-case scenario ... many countries could struggle to maintain living standards and end up with extremely high levels of inequality,’ said Dr Harrison. ‘This is a real doom and gloom scenario where there is antagonism between regions and a disintegration of social fabric.’

Without significant action, certain regions may also become particularly vulnerable to other social factors, such as the mass movement of people. Normally, migration is driven by famine, economy and war, but droughts, heatwaves and food shortages could cause numbers to increase.

As pressure mounts on resources, migration could also result in other socio-economic ripple effects, such as countries closing their borders, which isn’t too hard to imagine in light of Europe’s current refugee challenge.

'Climate change could make migration stressors worse, depending upon the socio-economic context that evolves,' said Dr Harrison.

However, it's not all doom and gloom. The project believes there is another possible scenario where societies make a big effort to meet sustainable development goals, limiting the impact of climate change.

The Issue

World nations are meeting in Paris at the start of December to try to come to the first ever binding agreement on greenhouse gas emissions.

The objective is to reduce emissions by enough to keep global temperature increases to two degrees Celsius above pre-industrial levels.

The United Nations event, called COP21 to denote that it has been going for 21 years, follows a 2009 conference in Copenhagen where governments failed to reach a deal.

The EU's vision for the Paris meeting was set out in the [Paris Protocol](#), part of its Energy Union package which aims to tackle climate change through the transition to a low-carbon, climate-friendly economy, while also securing Europe's energy supply.

The goal of the project is to be able to present these scenarios to policymakers in order to give them a better understanding of the implications of global warming.

Warning

The United Nations Framework Convention on Climate Change warns that, to avoid the most severe effects, the increase in global temperature should be below two degrees Celsius, otherwise the implications could be grave.

'We need to look more at what the climate might look like above two degrees Celsius and then think about long-term infrastructure,' according to Professor Richard Betts, from the University of Exeter, UK. His team has analysed the situation as part of HELIX, an EU-funded project he coordinates which provides insights into the possible impacts of global warming.

Projecting the future is all about estimating probability and likelihoods, but we know that a warming world will increase evaporation and change rainfall patterns, he said.

'The greater the global climate change, the greater the impacts and the greater risks for a particular region,' said Prof. Betts. 'Even if we can't predict what will happen precisely, we can still hedge our bets on the range of outcomes we have to adapt to.'

Solutions will vary from one region to the next. For example, Badalona, the third most populated city in Catalonia, is dependent on tourism, which requires a lot of clean water. But they may have limited reserves in a warmer climate. Simultaneously, they are susceptible to flash floods because of high slopes in the upper part of the city which have serious environmental, social and economic effects.

'We need different types of adaptation strategies to cope with climate change. For instance, structural solutions, when you are facing floods, have the potential to store water and release it later,' said Dr Rafaela Matos, from the Laboratório Nacional de Engenharia Civil in Lisbon, Portugal, and project coordinator of the EU-funded BINGO project, which aims to provide the public and decision makers with tools to cope with all climate projections.

The project is also looking at how climate change could affect water in five other locations around Europe – the Wupper river basin in Germany, the Troodos mountains that include Mount Olympus in Cyprus, the Tagus river in Portugal, the Veluwe region in the Netherlands, and Bergen in Norway.

Despite the general idea that the north is becoming wetter and the south becoming drier, it doesn't mean that higher-latitude countries will escape unscathed. Surprisingly, Bergen faces water quality problems due to warmer winters and less precipitation, causing lower water levels in their lakes, the city's main water supply.

'We don't reuse water enough in Europe. If you look at Israel, they have more than 75 % reused water because they have to do this. The second is Australia with 25 %. In Portugal we only have a target of 10 % and we are still far from it,' said Dr Matos.

Coastal Cities

Another pressing water issue is rising sea levels. By 2025, the global sea level rise will have increased by 3.2 centimetres, while the projected rates show an acceleration that could reach 0.82 metres by the end of the century, according to the Intergovernmental Panel on Climate Change's [Fifth Assessment Report](#).

A sea level rise of 0.82 metres will have dramatic consequences because it will mean much higher storm surges, exacerbating coastal flooding and erosion.

'With present levels of adaptation, we will be facing very serious risks in the future,' said Dr Agustín Sánchez-Arcilla, from the Polytechnic University of Catalonia, Spain, and project coordinator of RISES-AM-, an EU-funded project promoting coastal sustainability under future high-end climate scenarios.

'For a rich country like the Netherlands, a number of solutions may be viable, but for other countries like the Maldives, a case study in the project, they will not be able to afford many of those solutions and may have to retreat.'

With climate change causing such a diverse range of impacts across all aspects of society, it's pivotal that global leaders take the appropriate action when they meet in Paris this month. If they don't, researchers believe we will see a very different Europe, starting at our coasts.

'Unless we act now, some cities will have to start a serious ordered plan for retreat, which will be far more expensive than a combination of climate mitigation and coastal interventions,' said Dr Sánchez-Arcilla.

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