frontier economics

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JULY 2013

Taken at the flood

A FRAMEWORK FOR ADAPTING TO CLIMATE CHANGE

Some of the wettest English weather (according to the Met Office) since 1766 has been followed by the coldest spring for 50 years. The links between such "extreme weather" and climate change are far from clear, but uncertainty and anxiety have sharpened policy-makers' appetite for a more disciplined approach to decisions about how, how much - and when - we need to adapt. In a year-long project for the Department for Environment, Food and Rural Affairs (Defra), Frontier has been developing the economic framework underpinning the UK's National Adaptation Programme Report, published at the beginning of July.

Extreme weather (in the short term) and climate change (in the long) can both impose economic costs and create economic opportunities. Both threats and opportunities, however, pose difficult questions for governments and businesses: how to decide what to do about these highly uncertain events, when to do it -

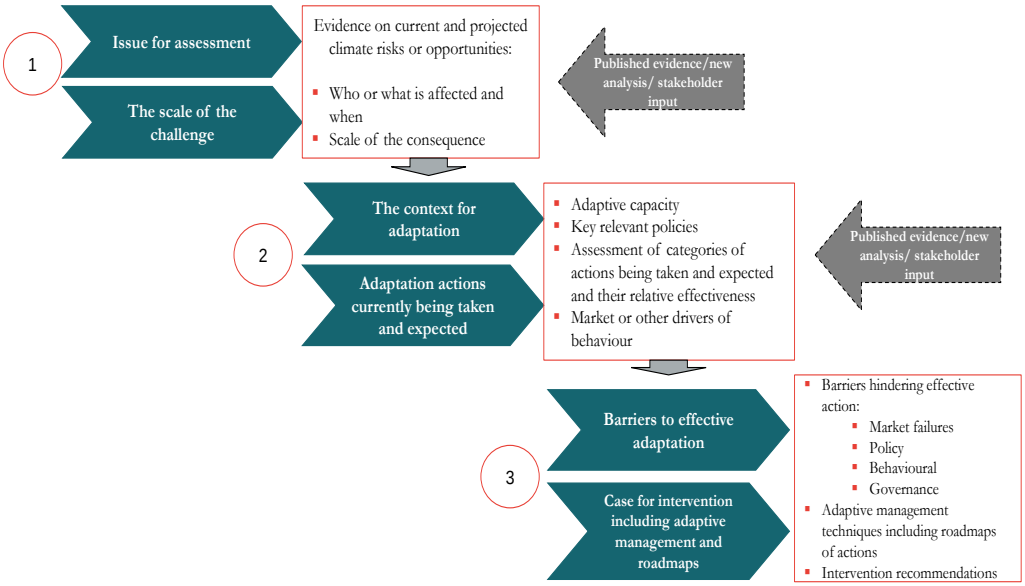
and above all, how to position ourselves now to be able to adapt effectively as and when we know more. To increase its ability to address these questions cost-effectively, Defra commissioned Frontier Economics to lead a project examining "The Economics of Climate Resilience"[1].

FRAMING THE QUESTIONS

The economic framework we developed is illustrated in Figure 1, showing the three stages of our approach:

- estimating the scale of the particular threat under investigation, and its associated economic costs;
- examining our "adaptive capacity", and the influence of policy and market drivers of behaviour;
- identifying the factors that enable adaptation and their mirror image: the obstacles, or barriers, to effective adaptation by different parts of the economy.

Figure 1. Economic framework to assess the extent of appropriate adaptation



We applied this approach to twelve specific areas of policy interest. These were spread across the themes of business, infrastructure, health and well-being, agriculture & forestry and the natural environment. And we involved over 200 different stakeholders in helping us to arrive at our conclusions.

START WITH SCALE

For some threats, we could draw on evidence from plenty of recent and relevant events. Most obviously, even in Britain we have experienced floods that demonstrated their immediate capacity to inflict costly local damage on buildings

[1] Published here:
http://randd.defra.gov.uk/Default.aspx?Module=More&Location=None&ProjectID=18016

and infrastructure, and their potential capacity to inflict knock-on economic damage elsewhere by disrupting transport links and other national networks.

Costing this knock-on damage elsewhere is harder than adding up property insurance claims; it can only sensibly be done in terms of ranges, especially when it comes to non-traded public services as opposed to commercial activity. But just for example, one illustrative calculation we made put the cost of a ten-day disruption to the average activity of a typical hospital's A & E department and broader services at £2 - 3.5m, in terms of services that had to be provided elsewhere, or simply gone without.

Of course, knock-on effects don't stop at national frontiers. The extended supply chain involved in car production makes the international inter-dependence in this industry particularly clear. So in another illustrative example, our calculations put the loss of output caused by flood damage to a critical component supplier, capable of halting production by a UK car manufacturer for 3-6 months, in the range of £600-1,200m.

QUICK ON OUR FEET?

But frightening ourselves with figures doesn't take the analysis very far. The more interesting part of the framework we developed comes at stage 2: the analysis of "adaptive capacity". We used the Intergovernmental Panel on Climate Change's definition of this, slightly amended to support the project's focus on future risks. Adaptive capacity therefore is:

> "...the ability of a system/organisation to design or implement effective adaptation strategies, to adjust to information about potential climate change (including climate variability and extremes), make moderate potential changes, and take advantage of opportunities, or cope with the consequences."

This definition gives some pretty clear pointers to the characteristics associated with strong adaptive capacity:

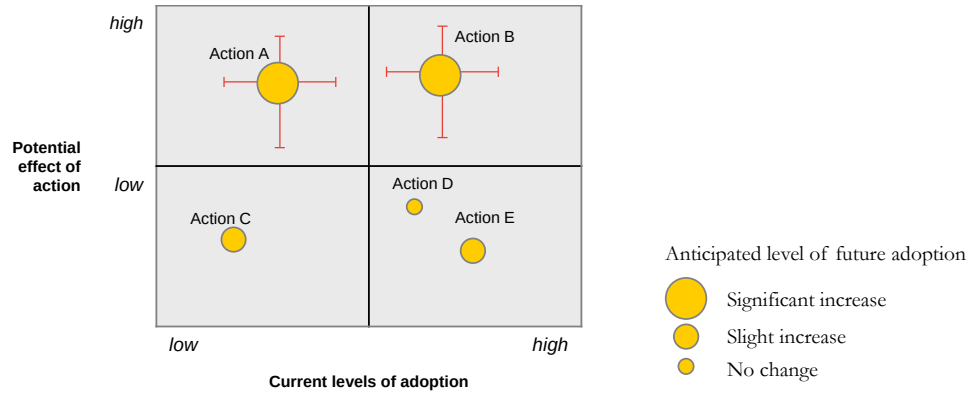
- **leadership**: organisations that are strongly led, with clear planning procedures, accountabilities; and co-ordination structures;
- **understanding**: organisations that keep themselves well-informed, with in-house capability to monitor, prepare and respond;
- **independence**: organisations that are not heavily dependent on others in making effective adjustments to climate risks;
- **access to networks**: organisations that, while too small or too inter-dependent to be able to develop adaptive capacity on their own, are well plugged-in to organisations that do;
- **previous experience**: organisations that have had to adapt to similar changes or threats in the past; and finally
- **consistent policy signals**: organisations that operate in a stable, consistent and supportive policy and regulatory environment.

As Figure 1 shows, at this stage we took a closer look, in the twelve areas on which we were focused, at the actions organisations were already taking to adapt. These fell into three categories: first, actions to build adaptive capacity, by

increasing understanding and some or all of the other elements above; second, actions to reduce vulnerabilities - by, for example, increasing flood defences or diversifying suppliers; and third, actions to exploit opportunities - by, for example, becoming flood defence suppliers.

To take a closer look, we subjected the actions taken to the kind of analysis portrayed in Figure 2. Each circle represents a different category of actions, ranging from physical design measures to the organisational changes needed to build adaptive capacity. The lines out from each circle illustrate the variability in adoption and effectiveness seen in each.

Figure 2. Framework for the assessment of adoption and effectiveness of adaptation actions



Underlying this analysis is the importance of good cost-benefit analysis to determine - in advance - which actions are "effective". Figure 2 illustrates the likelihood of significant adoption of ineffective policies as well as low adoption of some effective strategies. And it is those divergences that we focus on at the third stage of the approach framed in Figure 1.

THE WRONG KIND OF BARRIERS

The characteristics associated with strong capacity show us where to look for weakness, and for the barriers to capacity development:

- a lack (or confusion) of information, particularly likely amongst smaller businesses;
- a lack of effective information networks for such businesses and communities;
- the fragmentation of decision-making responsibility either within organisations, or between mutually dependent ones;
- poor understanding of inter-dependencies in supply chains; and
- inconsistent government policies, sending conflicting messages.

The UK's first National Adaptation Programme is intended as a wake-up call. Identifying the obstacles to the development of strong adaptive capacity is a critical output of the analysis that Frontier undertook to support it. The key message of this analysis is not that we should be putting all our eggs in one policy basket - climate development, and indeed socio-economic and technological

change, make for far too an uncertain future. While at some stage an incremental approach may prove inadequate, and wholesale transformation be needed, for now the message of our work is simple. We should be doing more to enhance our ability to act as we learn, and to ensure that this adaptive capacity is not limited to a few well-managed organisations.

Accounting for uncertainties and learning over time are essential to robust decisions. Organisations with strong adaptive capacity will develop the kind of risk-based roadmaps we have developed as part of this work. These enable management to take a cross-sector view, identify appropriate actions and plot implementation over time, and incorporate monitoring, review and modification as more information comes to light.

Our report contains a series of policy recommendations for government, to:

- **develop the necessary evidence base,** including evidence about the interdependencies across infrastructure sectors and within supply chains;
- **identify accountable organisations to develop and implement cross-sector responses to key risks such as flooding**, with "roadmaps" that involve stakeholders in monitoring and modification over time;
- **integrate climate change risk into small business support networks** - for example, through "champions" who have the skills, experience, knowledge and resources to guide and advise others;
- **deliver a user-friendly source for businesses and communities at high flood risk** - a "one-stop-shop" of information which must cover actions to prepare, respond and recover;
- **incorporate climate change into regulatory and policy reviews,** avoiding policy conflicts where possible; and
- **undertake an audit of groups vulnerable to climate change risks,** and integrate voluntary groups within plans for climate change preparedness, response and recovery at a local level.

TIME FOR SOME DIY?

The analytical approach we have taken, and outlined in this bulletin, can be effectively applied at the level of the single business or public service. And despite the advances at the policy level, the proliferation of barriers to the development of adaptive capacity that we have identified suggests that forward-looking organisations would be unwise to rely on a top-down infusion of capability from government. So Frontier has developed a range of toolkits to help organisations and communities work through the case for adaptive action and assess what to do. It is a methodology that we believe will be useful not just for policy-makers, but for businesses struggling to build weather and climate risks into their long-term plans as well.

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