

## On uncertainty

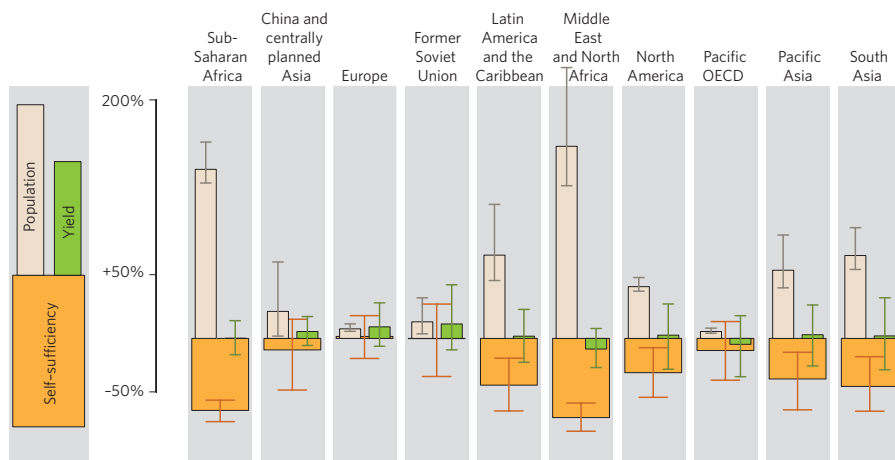
Words of caution on communication.

A recent entry on The Huffington Post about the fate of the world's coral reefs (<http://go.nature.com/fuqhFU>) has stirred up a discussion in the blogosphere on the communication of uncertainty. The post reports on a new study by the World Resources Institute entitled *Reefs at Risk Revisited* (<http://go.nature.com/DWxbtt>), which finds that all of the world's coral reefs could be gone by 2050, in which case 500 million people's livelihoods worldwide would be threatened.

Over on The Bensch (<http://go.nature.com/pey6vi>), Randy Olson bemoans the reporting of such results with all of their qualifiers, caveats and uncertainties. Olson declares — à la late legal-eagle Johnny Cochran — that “if uncertainty is conveyed, credibility will fade.” He gives a stern warning to science communicators about the perils of entering the minefield of conveying uncertainty — a task that can, fears Olson, easily add to the junk pile of alarmism. Keith Kloor picks up on this over on Collide-a-Scape (<http://go.nature.com/Tg6Rx1>), and points to the futility of spouting off without offering any solutions. How exactly is it possible to communicate a clear and concise message with just enough wiggle room to remain true to the various uncertainties of climate change, asks Kloor?

This all follows from a debate in the blogosphere on the importance of including qualifiers, spurred by a paper published in *Nature* on the link between human-induced climate change and a recent increase in extreme precipitation in the Northern Hemisphere. Writing on *The New York Times* Dot Earth blog (<http://go.nature.com/u7FIK4>), Andy Revkin says that in trying to convey the message clearly, both scientists and journals behaved as though the work had a “handle with care” sign attached. Unlike Olson, Revkin reckons that the more definite a statement, the less credible it's likely to be. Welcome to the minefield!

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**Figure 1** | Change in crop yields. Mean change (green bars) from 1996–2005 to 2046–2055. Whiskers indicate the range of impacts, which is mainly determined by the effectiveness of carbon dioxide fertilization. Tan-coloured bars indicate projected changes in population. Most regions are likely to experience significant decreases in self-sufficiency (orange bars), because population growth often offsets even increasing crop yields. OECD, Organisation for Economic Co-operation and Development. Figure reproduced with permission from ref. 7, © 2000 Cambridge Univ. Press.

8%. The United Nations Food and Agriculture Organization reckons that a 70% increase in agricultural productivity will be needed by 2050, given that the global population is becoming more carnivorous as it swells<sup>5</sup>. Key, then, to planning for the future, is to find ways of intensifying farming more sustainably — and developing a better understanding of how climate change will impact global agriculture.

Most studies on farming and climate change have focused on specific regions of the world at the end of the twenty-first century. As a result, they have tended to ignore extreme events and indirect impacts such as changes in levels of pests and diseases. Policymakers now want more global research that helps them plan for the next couple of decades, which is technically much harder to generate: the shorter the period of study, the greater the relative influence of natural variability over man-made climate change.

Various other difficulties beset this task. Existing models carry unnecessary uncertainty, particularly in the area of how plants respond to higher levels of carbon dioxide, says Richard Betts, who leads the UK Met Office's climate impacts team. He wishes that modellers could test truly large-scale projections against carbon dioxide response data gathered from huge experimental crop sites — rather than today's five- or ten-metre-wide plots. Similarly, Xavier Cirera and Edoardo Masset of the University of Sussex bemoan the omission of Engel's

law from economic models of the world's future food needs. It describes how food demand increases less than proportionally as a household's income rises. Were this nuance added to the mix, global food demand estimates for 2050 could be 2.7% higher or 5.4% lower, depending on the spread of inequality between and within countries<sup>6</sup>.

Fortunately, new pockets of cash are appearing for this kind of research. At a time of widespread budget slashing, politicians seem to have realized that its outcome is in everyone's interest — embattled, long-serving presidents included. □

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