



*International Food and Agribusiness Management Review*  
*Volume 11, Issue 3, 2008*

## **Managing Global Climate Change** **An Executive Interview with David Lobell <sup>1</sup>**

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### **Introduction**

Many of the world's poorest regions could face severe crop losses in the next two decades because of climate change, according to Dr. David Lobell, a Senior Research Scholar at Stanford University in the program on Food Security and Environment.

The average world temperature is increasing slightly says Lobell and a one-degree Celsius increase over time greatly impacts climatic growing conditions. Unfortunately, agriculture is also the human enterprise most vulnerable to changes in climate. Understanding where these climate threats will be is central to our efforts in fighting hunger and poverty over the coming decades. Dr. Lobell outlines some of the challenges that lie ahead and steps researchers are taking to combat the issues.

This televised interview can be seen with RealPlayer on IAMA's website at:  
[http://www.ifama.org/dispatch.asp?page=Executive\\_Interviews\\_2008](http://www.ifama.org/dispatch.asp?page=Executive_Interviews_2008)

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*David, there seems to be a lot of evidence that maybe we are having some global warming. What is the situation?*

**Lobell:** What you see from climate science is that global warming is definitely real - we're past the point of whether the trend is what we could expect just by chance. Certainly on the global scale and even for individual regions, we see warming that is nothing we could expect from just natural variability.

*The change in temperature has gone up but it seems small, only one or two degrees has significant impact?*

**Lobell:** That is right. The changes we have seen so far are less than a degree, about .7 degrees, is impacting many natural ecosystems and agricultural systems throughout the world. But it is not so much the impacts that have happened so far that we are worried about. It is this trend we are on. Looking into the future in 20-30 years we see implications that could be much, much worse than what we have seen already.

*So, if we look 20 years down the road and we did make major changes today, will those trends then turn around?*

**Lobell:** Climate trends don't really turn around until 30 or 40 years after you see the changes in terms of greenhouse gas emissions. The reason for this is that the climate system responds to is really the cumulative amount of greenhouse gas in the atmosphere and each change year-to-year is only a very small part of that cumulative amount. what we do on the energy or the greenhouse gas side of things will not affect climate for the next 30 to 40 years, climate change is really going to be dictated by what we have done up to this point.

*There is going to be some significant changes then in crop response, what is going to happen there?*

**Lobell:** We certainly know that temperatures will rise and we also know that crops are fairly sensitive to temperatures. In most parts of the world what you see is that if the temperature raises the crops production goes down. For a one degree warming, you tend to see anywhere between from 5 to 10% losses in the fields.

So, looking ahead 20 or 30 years we do expect a degree warming, on a global average basis and expect some loss because of that warming. If you go to individual regions you would see possibly more or less than that amount.

*Are crops like corn, for example—which like some hot weather going to see impacts in production?*

**Lobell:** That's right, corn likes hot weather, so there are places like Canada right now which are not very suitable for corn, but will become more suitable. There are places certainly where the crop will become more comfortable in a warmer climate. But throughout most of the US corn-belt, including Nebraska, what we'll see is that a little bit of warming actually reduces the yields of corn. And if you go to places on the margin, like a lot of Africa where corn is grown, it is really quite sensitive to temperature increases.

*So, on a global basis what do you see then for changes in cropping patterns and are these going to change even in Nebraska the types of crops that might be grown?*

**Lobell:** I think what we'll gradually see are a couple of things. One is certainly a lot of effort is being put into adapting different varieties of corn to grow in warmer climates. It won't necessarily be a switch in the types of crops grown but a switch toward advanced breeds of these crops that can withstand higher temperatures. But certainly in many parts of the world you'll see a transition into different crops that are more tolerant of drought or heat and in some parts of the world you will see the warming open up new farm lands that were once too cold to be cultivated economically.

*That leads to a couple of other questions. First, the interaction with crop breeders, is this going to be significant?*

**Lobell:** Yes, it is certainly one of the major ways that we see of getting out of the worst of the impacts—is to try to breed new crops. The breeders and companies that work on this are really going to be a big part of the solution if we are going to breed the crops we need.

*In terms of water use, how does water enter into this?*

**Lobell:** Water use in many parts of the world will become increasingly important not only for climate change obviously, but because of the competition from other sectors. There will also be areas of the world where you will see potentially an increase in the amount of storminess and the flooding of fields and so one of the things, for example, in rice production, people are working on making varieties that are more resistant to flooding for a longer period of time without dying. So it is both on the side of being too dry in some places and too wet in others that we're looking at solving in the future.

*Carbon emissions provides the background for this discussion and it's important that we talk about it. As we look at controlling carbon emissions you say it's going to be a long haul before we see change?*

**Lobell:** One way to think about it is that our activities—the emissions of greenhouse gases are going to have a very big impact on our grandchildren’s generation. But in terms of our generation and our children’s generation we are really looking over the next 30 years at responding to the changes in the climate system which is the result of what we have already done.

So there are these twin challenges of trying to not emit so much that in 50 or more years we will see disastrous effects of climate change, but also trying to think about the next 10-20-30 years and how we deal with the smaller amount of change we expect from what we have already emitted.

***Within that 20-30 year period, are we still going to have wide fluctuations from year to year?***

**Lobell:** Yes, and this is one of the very difficult things about studying climate and noticing when you are in a new climate, the variations from year-to-year are always going to be larger than the average trend. So even if we see, for example, in the last 20 years about a one degree increase, over 20 years that is going to be hard to detect when each year you have swings of a degree. Managing agriculture for variability is always going to be important and the issue now is how we both manage for variability while at the same time managing for a future that is going to be on average warmer.

***What about the human aspect. Humans have essentially created this situation. How are humans going to get us over the problem?***

**Lobell:** Well that’s the big question, I think. Once people really start to deal with this issue, and some are—in parts of the world, I hope we’ll start to see a lot of innovative solutions to the problem. One of the big questions in measuring how this problem will impact us globally is by looking at how quickly economies develop and whether they continue to be on the brink of hunger or develop to a point where minor fluctuations in production are easier for them to cope with because they are at a richer baseline.

***So this is going to put more pressure on areas that are already struggling to feed themselves?***

**Lobell:** That’s what we see. There is a correspondence— most of the poor of the world live in some of the hotter areas of the world. Those are the same areas where crops are already at their limits in terms of temperature thresholds. One of the ironies of climate change is that the communities which tend to be poorer and have the least to do with emissions are going to be on the front lines of dealing with impact of climate change.