Climate change affecting species

September 30 2014, by Kanina Foss

The Global Change and Sustainability Research Institute (GCSRI) and the Wits Rural Facility (WRF) hosted a top climate change scientist, Professor Camille Parmesan, who delivered a talk to staff, students and

school learners in Acornhoek on 23 September 2014.

Parmesan is one of the lead authors of the 2014 Intergovernmental Panel on Climate Change (IPCC) report that received a Nobel Peace Prize. She is also the second most highly cited author in the top 20 authors in climate change science of the previous decade, and two of her papers are also in the top 20 most cited papers of the previous decade.

Parmesan gave an overview of the changes that we have been seeing in wildlife and wild plants in response to climate change throughout the world, and suggested possible solutions for conservation managers on the ground who are having to cope with the challenges of climate change.

She spoke about her joint research published in the 5th IPCC Assessment Report that recognised the need for big numbers to get policy makers to recognise that climate change was already affecting wild species.

According to Parmesan, a lot of the initial climate change research was terrestrial-based because scientists were looking at trends in mean annual temperatures over the previous 50 years which showed that the areas that were heating up the most were the land-based areas. Many scientists did not expect marine systems to even be responding yet and were primarily looking at species in high latitudes for initial indicators of response.

However, working with marine scientists, instead of looking at absolute temperature change, Parmesan started studying velocity of climate change – the placement of mean annual temperature isotherms and how those isotherms have shifted over time in the last 50 years.

"When you do that you get a very different picture of what the change has been in terms of climate. Suddenly the oceans and a lot of the land are changing at about the same rate. In the marine tropics we're getting

some of the fastest changes in the entire world," she said.

This has important implications for marine species. "If you're a tropical marine species, because the temperature gradient is so shallow in the ocean, it doesn't change very quickly and you have to move a long way before you get into a different temperature regime. If the temperature warms up just a little bit and you're a fish who's trying to maintain that exact same temperature, you have to physically shift a lot further than you do for the equivalent temperature change on land."

Parmesan shared the results of meta-analyses showing that anywhere from 40 to 60% of species are exhibiting some kind of significant response to climate change, either by changing their distribution or by changing their phonologies – the timing of principally spring events.

"Terrestrial systems are changing at about 6.1 to 17km per decade, but in marine systems you are getting range shifts of up to 75km per decade, so marine systems seem to be tracking the isotherm shifts rather than the absolute level of warming," she said.

"These are averages and in those averages there are a lot of zeroes; about a third to 40% of the species aren't changing, they're stable. But what's interesting is that if you look at the extremes – the species that are moving the most – you get much bigger change. Atlantic cod has moved over 200km in a decade, and in the terrestrial systems you have just as rapid change – the purple emperor has shifted over 200km in less than five years."

What are the conservation implications? According to Parmesan, the next step is to ascertain what parts of the land and sea we can expect species to be moving through most rapidly, and what areas we can expect to be more stable, so that conservation managers might begin to create corridors in the former, and parks and refugia in the more stable areas.

Provided by Wits University