Cluster of Adaptation to Climate Change,
Faculty of Social & Political Sciences,
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CLIMATE CHANGE: ITS DANGER FOR OUR PRODUCTION

AND WHY IT ESCAPES OUR PREDICTION

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[I make,among others, use of experience collected with Prof. Yunita T. Winarto, Faculty of Social and Political Sciences (FISIP), Universitas Indonesia, Depok, her students and groups of farmers in Gunungkidul, Yogyakarta (2007-2010), and Indramayu, West Java, Indonesia (2010-present). From that perspective this is a joint presentation.

As agroclimatologist, I am an invited expert in the Universitas Indonesia (UI) Research Team on Response Farming to Climate Change, Cluster for Environmental Anthropology, Center for Anthropological Studies, FISIP, UI. I am also an affiliated professor at the Agrometeorology Group, Department of Soil, Crop and Climate Sciences, University of the Free State, Bloemfontein, South Africa.]

Our planet earth has a unique but complicated climate that presently is changing due to the influence that mankind's activities appear to have on the composition of its atmosphere. There is general and widely held scientific consensus that the observed trends in atmospheric and ocean temperature as well as climate extremes during the last century cannot be explained solely by natural climate processes. From worldwide observations WMO (World Meteorological Organization) concluded a long time ago that our planet is warming up. This has to be considered a fact. The International Panel on Climate Change (IPCC), using collected measurements of carbon dioxide, showed that it has increased from the start of the industrial revolution, but that changes in land use have also played an important role. From 1960 till 2010 the average increase is estimated to have been less than a degree Celsius (0.7 ºC), while it was 0.85 ºC since 1880. The projection for the next 50 years is in the order of one degree Celsius, with the emissions kept within the range of the IPCC scenarios.

It is generally accepted that, if for this century the temperature increase can be limited to 2 ºC, the damages will remain much more limited than when the scenarios give a 4 ºC increase at the end of this century. Quantitative knowledge is helping us to find our way to policies serving the purpose of adapting to the consequences of climate change. In the case of temperature increases, for Arabica coffee in Tanzania and Apples in India, a solution could be to go to higher, still colder grounds, although this disrupts living conditions and biodiversity patterns. But if we think about the lowland tropics, there is no way out apart from crop diversification and finding more heat tolerant varieties. This is abundantly illustrated with rice in Indonesia and elsewhere, as well as maize in Africa and elsewhere. To these effects of global warming, we have to add those from increasing climate variability and more (and often more severe) extreme meteorological and climatological extreme events. Examples from forestry and fisheries complement the picture of large scale upheavals of an endangered production due to these consequences of climate change.

We must further note that since the very end of the previous century, the rate of global warming has reduced by at least half of the rate in the last 50 years of that previous century. This has been baptized "the hiatus", a lack of continuity in the upgoing trend of global temperature. So climate change rates reduce. Is this going to change our thinking? Many explanations may actually be involved, including many oceanic and atmospheric processes. But we have no clue about the ratios of their contributions, while the complexities are enormous. However, we know so much less about how the sea surface temperatures are determined by currents and deep waves than we understand on the atmospheric resultants. And if we look at the predictions of the 2014/2015 weak El-Niño, it appears that the atmosphere sometimes does not want to behave the way we know it. That makes the little that is predictable suddenly also unpredictable.

To give an impression of why even monthly to three monthly climate predictions are so difficult, some more knowledge and understanding must be reviewed. Unpredictable ocean currents and deep waves that are not understood in sufficient detail, create the signals for El-Niño's and La-Niña's to occur. They are very important in these short term climate predictions. Now, it appears that the frequency of such phenomena, and how they follow each other, has changed in recent times! However, we are not able to simulate these actual changes with the models that summarize our understanding, which at this moment is still very insufficient. The combined forces of ENSO and global warming are likely to have dramatic, and currently largely unforeseen, effects on agricultural production and food security. El-Niño's tend to bring drought to countries like Indonesia and Australia, at the west end of the Pacific, while La-Nina's often have the opposite effect. Because of these signaled changes, simple growing season rainfall scenarios are very difficult to derive from existing raw or simplified (outlook fora!) climate predictions.

Vulnerable communities, across the world, are already feeling the effects of a changing climate. These communities are urgently in need of assistance aimed at building resilience to their new situations. They are also in need of undertaking climate change adaptation efforts as a matter of survival and in order to maintain livelihoods. In short: they are in need of what we want to call an urgent "agrarian/rural response to climate change". We need improved climate literacy among farmers and a better trained extension that can guide farmers in further rainfall monitoring and rainfall interpretation. But we also need further agro-ecosystem observations that, with the rainfall distribution, seasonal scenarios and results from on-farm experiments, explain yields and yield differences. This will be illustrated by our work in Indramayu.