Climate Change, Food Security and Nutrition. FAO. April 2015

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Dear facilitator and FAO , please accept this submission with respect climate change food security and nutrition. There is nothing more important for all the world as this particular issue.

I include some content from my recent presentation for the Seventh International Conference on Climate Change Impacts and Responses Conference 10 April 2015.

Conclusion

We are in an already committed global climate change world food security emergency situation.

This is clear when we connect the science of already committed global climate change and the science of impacts of global climate change on crop yields, and this requires immediate measures for climate change mitigation and adaptation.

Please note that the IPCC does not make conclusions on dangerous interference with the climate system.

Recommendation

I strongly recommend that the FAO issue a statement in support of the IPCC AR5 best case emissions scenario RCP 2.6 with respect to world food security , and that the FAO conduct an environmental health risk assessment of the up-to-date research on committed global climate change and world food security.

This is clear when we connect the science of already committed global climate change and the science of impacts of global climate change on crop yields, requiring immediate measures for climate change mitigation and adaptation.

Please note that the IPCC does not make recommendations, and while it provides information on risk and a great deal of information for the performance of a risk assessment, the IPCC assessment is not itself a risk assessment.

Climate change commitment

This emergency food security situation is made necessarily far worse by the grossly inadequate response of climate change policy- which is the greatest ever policy failure. This policy failure commitment presently endangers billions of people alive today and all future generations.

Policy commitment

The most up-to-date calculation of the combined national United Nations pledges on emissions is from Climate Action Tracker (approved by climate change experts).

'Limiting warming to the globally agreed goal of holding warming below a 2°C increase above pre-industrial in the 21st century means that the emissions of greenhouse gases need to be reduced rapidly in the coming years and decades. The unconditional pledges or promises that governments have made, as of early 2015, would limit warming to 2.9 to 3.1°C above pre-industrial levels'. (Climate Action Tracker 2014)

This policy commitment, however, is considerably higher than 3°C because this is only a realized warming by 2100. The full committed equilibrium warming long after 2100 will be another 75% (IPCC AR5 "For the RCP4.5 and RCP6.0 extension scenarios with early stabilization, it is about 75% at the time of forcing stabilization" (IPCC 2013, WG1, Ch 12 , p. 1103), making the full equilibrium commitment 5°C or more.

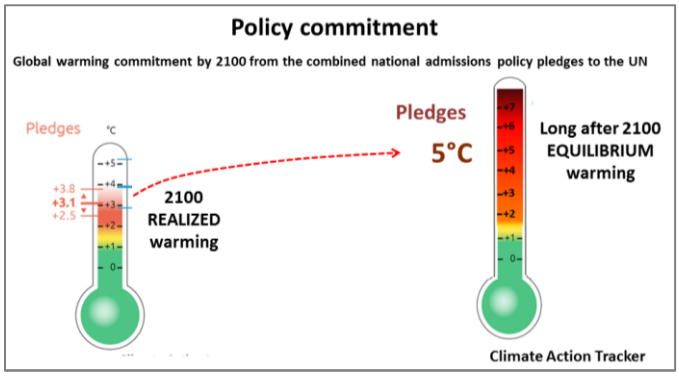
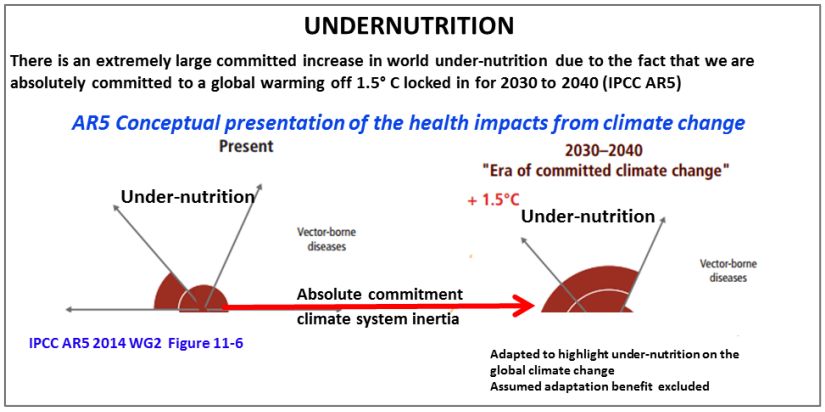


Figure 3: Climate Change Commitment by Climate Change Policy Source: Adapted from Climate Action Tracker

There is not the slightest indication that the December 2015 United Nations Paris Conference of the Parties (COP21) will change this situation.

Climate system science commitment

Today's global surface temperature increase of 0.8°C is already absolutely committed (or locked in) to increase to 1.5°C by 2030-2040, according to the IPCC AR5, "The era of committed global climate change 1.5°C 2030 to 2040," (IPCC 2014, WG2 Figure 11.6). Most significantly this particular IPCC AR5 reference is linked to a great resulting increase in under-nutrition.



Certainly without a rapid emergency world emissions response, our longer term commitment due to the present extremely high concentrations of atmospheric greenhouse gases, according to the IPCC AR5, is 2° C. (IPCC, AR5, WG 1, 12. 5. 2).

The most damaging single category of climate change impacts to both human population health and crops is *Extreme weather events*. In most of the world where food production is labour intensive, human health impacts of climate change and the crop yield impacts combine to reduce crop productivity even more.

Today

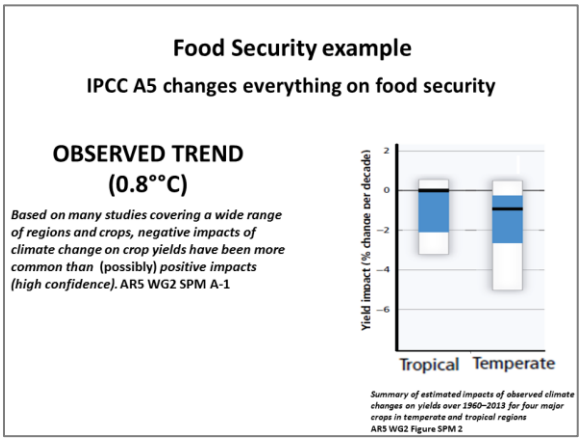
We are already experiencing climate change on food security, including some episodic regional disastrous impacts on food productivity -and we are committed to a much higher degree of global climate change than we already have today causing these impacts. Such disastrous climate change-driven impacts, such as extreme weather events, which are already occurring on all continents, are committed to greatly increase.

'Impacts from recent climate-related extremes, such as heat waves, droughts, floods, cyclones, and wildfires, reveal significant vulnerability and exposure of some ecosystems and many human systems to current climate variability (very high confidence). Impacts of such climate-related extremes include, …disruption of food production and water supply …' (The Fifth Assessment Report of the Intergovernmental Panel on Climate Change, 2014, , Climate Synthesis Report , Longer report, p. 16)

The IPCC (2013-2014) AR5 changed everything that has been reported before on food security. While it has for long been known that the tropical regions would be the most vulnerable to the impacts of climate change on their crop yields (with very small degrees of climate change causing declining crop yields), previous assessments assumed that the temperate northern hemisphere, at least by 2100, was not vulnerable and might even gain by some crop yield increase. Recent research has found that this is not, and is not going to be, the case. Climate change is already having negative effects on most, if not all. major food-producing regions.

'Assessment of many studies covering a wide range of regions and crops shows that negative impacts of climate change on crop yields have been more common than positive impacts (high confidence). The

smaller number of studies showing positive impacts relate mainly to high-latitude regions, though it is not yet clear whether the balance of impacts has been negative or positive in these regions.' (The Fifth Assessment Report of the Intergovernmental Panel on Climate Change, 2014, Working Group 2, Impacts Adaptation and Vulnerability, Chapter 11, Figure 11.6)



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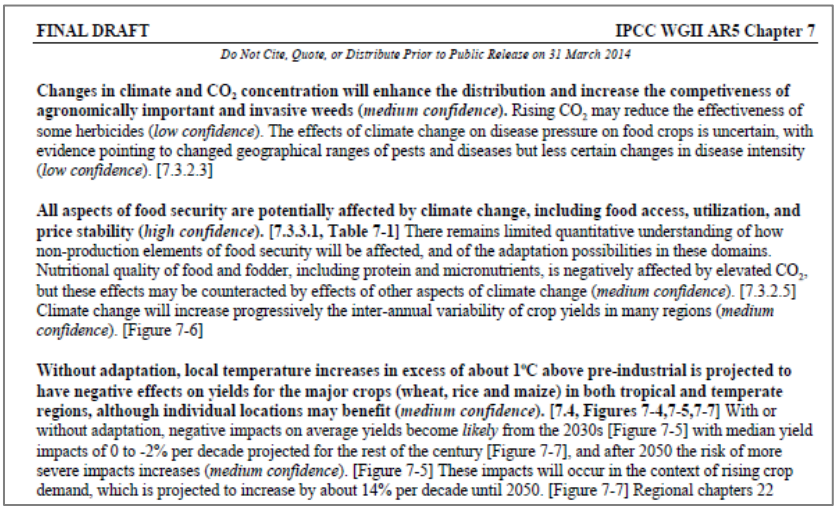
It is therefore not surprising that the IPCC Working Group 2 scientists projected that all major crops in all major food-producing regions would be affected negatively above a local and global (they are the same at 1.0°C from 1850) temperature increase of 1°C. **'Without adaptation, local temperature increases in excess of about 1₀C above pre-industrial is projected tohave negative effects on yields for the major crops (wheat, rice and maize) in both tropical and temperate regions** With or without adaptation, negative impacts on average yields become *likely* from the 2030s with median yield impacts of 0 to -2% per decade projected for the rest of the century , and after 2050 the risk of more severe impacts increases. These impacts will occur in the context of rising crop demand, which is projected to increase by about 14% per decade until 2050. (IPCC, AR5, Working Group 2, Final draft, p. 3).



FINAL DRAFT IPCC WGII AR5 Chapter 7

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Changes in climate and CO_2 concentration will enhance the distribution and increase the competiveness of agronomically important and invasive weeds (*medium confidence*). Rising CO_2 may reduce the effectiveness of some herbicides (*low confidence*). The effects of climate change on disease pressure on food crops is uncertain, with evidence pointing to changed geographical ranges of pests and diseases but less certain changes in disease intensity (*low confidence*). [7.3.2.3]

All aspects of food security are potentially affected by climate change, including food access, utilization, and price stability (*high confidence*). [7.3.3.1, Table 7-1] There remains limited quantitative understanding of how non-production elements of food security will be affected, and of the adaptation possibilities in these domains. Nutritional quality of food and fodder, including protein and micronutrients, is negatively affected by elevated CO_2, but these effects may be counteracted by effects of other aspects of climate change (*medium confidence*). [7.3.2.5] Climate change will increase progressively the inter-annual variability of crop yields in many regions (*medium confidence*). [Figure 7-6]

Without adaptation, local temperature increases in excess of about 1ºC above pre-industrial is projected to have negative effects on yields for the major crops (wheat, rice and maize) in both tropical and temperate regions, although individual locations may benefit (*medium confidence*). [7.4, Figures 7-4,7-5,7-7] With or without adaptation, negative impacts on average yields become *likely* from the 2030s [Figure 7-5] with median yield impacts of 0 to -2% per decade projected for the rest of the century [Figure 7-7], and after 2050 the risk of more severe impacts increases (*medium confidence*). [Figure 7-5] These impacts will occur in the context of rising crop demand, which is projected to increase by about 14% per decade until 2050. [Figure 7-7] Regional chapters 22

This is shown in the IPCC WG2 2014 graphs from crop projection, which have been simplified for risk by not showing the assumed benefits of adaptation and model results that project above the mean crop yield change.

For food security and environmental health risk from climate change the mean of a wide range of results such as the crop model projections is not valid- worst-case scenarios must be used. Assuming adaptation benefit is invalid, especially in this case when the world climate is now in an unprecedented no-analog state, and the crop models do not capture a number of very adverse effects.

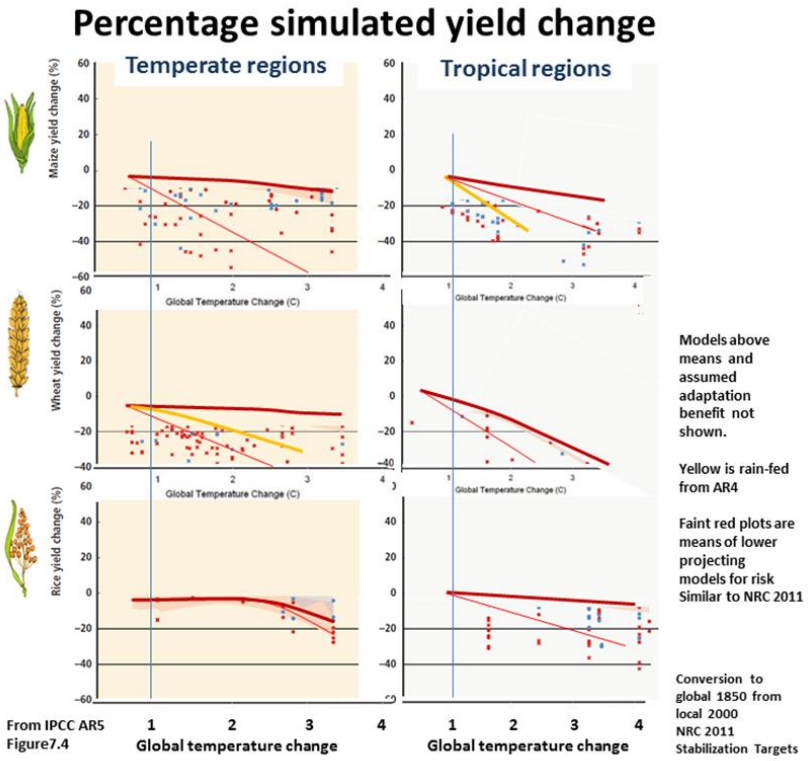


Figure 2: Percentage Simulated Yield Change Source: Adapted from IPCC (2014a), Chapter 7, Figure 7.4

For food security and risk it is essential to bear in mind that the IPCC AR5 crop models still do capture a number of large adverse effects. These projections will certainly not be over-estimates with regard to crop yield declines. It would be assumed for risk, that they will increasingly be under-estimates, as global warming, climate change, tropospheric ozone concentration and extreme weather events increase.

'More difficult to quantify with models is the impact of very extreme events on cropping systems, since by definition these occur very rarely and models cannot be adequately calibrated and tested' (IPCC AR5 WG2 TS 7.2.1.1. p. 6). 'The robustness of crop model results depends on data quality, model skill prediction and model complexity. Modelling and experiments are each subject to their own uncertainties. Measurement uncertainty is a feature of field and controlled environment experiments. For example, interactions between CO2 fertilisation, temperature, soil nutrients, ozone, pests and weeds is not well understood and therefore most crop models do not include all these effects' (IPCC AR5 WG2 TS p.11). 'The rarity of long-term studies of plant diseases and pests is a problem for the evaluation of climate change effects'. (IPCC AR5 WG2 TS p.15).

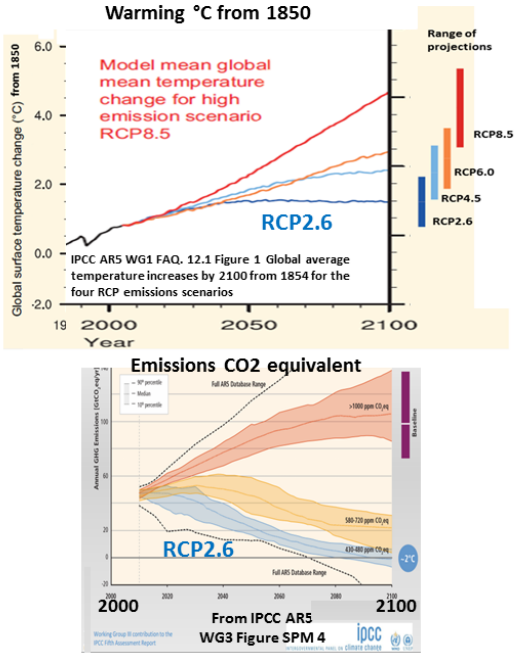
It is therefore vital that important international agencies like the FAO urgently review plans and policies with respect to climate change and food security.

The fact is our only option to avoid committing (condemning) the future to a world food security catastrophe is a rapid reduction of emissions for mitigation. The 2007 IPCC AR4 made it clear that to avoid a warming of 2 to 2.4° C, emissions 'must have reversed by 2015 at the latest'. The only emissions scenario of the IPCC AR5 that does not lead to a surface warming above 2° C by 2100 is the best case emissions scenario RCP 2.6. This scenario requires emissions to stop increasing right away and to be in decline from 2020. It is still just possible to achieve this. But this scenario is not on the agenda or any documents of the UNFCCC for the 2015 Paris climate conference negotiations.

'RCP2.6 is a scenario that aims to keep global warming below 2°C above pre-industrial temperatures' (IPCC 2014, WG3, SPM. 2.1).

The world is in a desperate emergency situation with respect to climate change and food security. In this unprecedented situation, threatening billions of people today and the future of humanity, the relevant and involved United Nations Departments are obligated to explain the emergency and certainly to simply (while most significantly) recommend the IPCC AR5 best case emissions scenario RCP 2.6.

IPCC AR5 RCP emissions & warming projections



In conclusion I appeal to the FAO to at least publish a statement in support of the IPCC AR5 best case emissions scenario RCP 2.6.

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