Comments on HLPE v0 *Food Security and Climate Change*

Submitted by the Institute for Agriculture and Trade Policy (IATP), Minneapolis, MN.

Communications to: Doreen Stabinsky, doreenstabinsky@gmail.com

Preface

We welcome the draft report and thank the HLPE for this opportunity to comment on the first draft. It is important that the HLPE has been asked by the CFS to support work on climate change. The CFS has an important role to play in development of policy options and actions to be taken with regard to climate change impacts and food security. The CFS has a unique mandate that places it in a strategic position vis-à-vis the climate negotiations as they interact with food security and agriculture. The UNFCCC is not equipped to play this role, and can and should rely on the other parts of the UN system, including the CFS, which have capacity on food security.

We support the document's conclusions that programs and policies to address climate change must be developed in concert with and as part of efforts to reduce poverty and enhance food security. We are also happy to see that the document clearly recognizes the contributions of small-scale farms to global food security and their vulnerability to climate change. We also welcome the emphasis on the role of women in food production and household and community food security.

Overall, we have two major concerns, in addition to the more specific comments that follow. First, the report is still very far from ready, and we are hope there is time still to deliver the substantive report that is urgently needed from the HLPE to inform the CFS work in this area. It is crucial that the HLPE make a substantive and credible contribution to the debate. Unfortunately, the report is surprisingly weak. It lacks both substantial peer-reviewed references and definitions of key terms. Perhaps more seriously, the V0 report does not provide a sufficiently comprehensive perspective on the causes of climate change, including the agricultural practices that must change to control greenhouse gas emissions. While the primary focus of CFS work is rightly on vulnerable peoples confronting food insecurity, this should not limit the scope of CFS work to exclude the policies and actions elsewhere in the world's food systems that damage the interests of those vulnerable people.

Our second concern is that the report lacks an overall organizing framework – a means to understand how the problems are conceptualized and that directs governments and policy-makers towards appropriate solutions. We recommend three elements of a framework:

- Policymakers must recognize the urgency of the situation. Temperature increases of 2.5-5 °C this century pose serious threats to lives and livelihoods across the planet and seriously threaten to reduce agricultural yields, even in the short term, over the next several decades. While it may be extremely difficult to contain warming to 2 °C, the report should not communicate complacency on this point – policymakers and governments should be apprised of the significant threat to crop production and concomitant impacts on global food security that will result from their lack of action.
- Low-cost, no-regrets adaptation options such as agroecological production methods and agroforestry offer multiple benefits to lives, livelihoods, natural resource management, etc. No-regrets options that increase system resilience and productivity, which provide these multiple

benefits to producers regardless of the climatic changes experienced, should be given more attention by policymakers and scientists. Their transmission should be enabled through both traditional extension as well as farmer-to-farmer mechanisms.

- Agriculture is a significant source of greenhouse gas emissions, particularly from industrial agriculture and the modern food system. Much more must be done to reduce N_2O emissions from synthetic fertilizer production and use and CH_4 from unsustainable modes of animal production and industrial manure management systems.

1. The report must reflect the urgency of the current situation. It must focus on the threats climate change poses to food security.

In the past several years, climate change-related events have affected crop production around the world. Heat waves in Russia[1] and the U.S. Midwest[2]; drought in Texas[3] and the Horn of Africa; floods in Thailand[4] and Pakistan[5] – overall, climate-related natural disasters have increased dramatically in recent years, in particular cyclones and floods (http://www.grida.no/graphicslib/detail/trends-in-natural-disasters_a899#). These climate-related natural disasters are the most visible impacts, yet they are but the tip of the iceberg. In a recent study published in *Science*, Lobell et al. (2011) find there has already been a 3.8% reduction in wheat yields and a 5.5% reduction in maize yields globally since 1980. These are changes that have occurred with a mere 0.74 °C of warming over the past century.

Estimates for the amount of warming that will happen in the next century are from 2.5-5 °C (see UNEP's emissions gap report, UNEP 2010). By 2050, warming could already be 2 °C globally – double the warming we have now. As continents warm more quickly than oceans, large land masses such as the African continent are expected to see increases 1.5 times the global average, or 3 °C by 2050. This would almost certainly dramatically increase the already significant effects of climate change on food production in the next three decades. Lobell et al. (2008) say it succinctly: *"Food production [is] clearly threatened by climate change in the relatively near term."*

The report already accepts that a temperature rise by 2100 "of the order of 4 degrees" is more likely than 2 °C (pg 34) without driving home the impact this will have on world food security as a whole due to massive upheaval in farming systems. Nor does it call for a radical overhaul of production, distribution and consumption patterns and the policies that help make agriculture a large emitter. Indeed, the authors seem to indicate that because climates are always changing, agricultural adaptation will continue as it has always been, yet failing to indicate that the rate and magnitude of change we will experience this century has no historical precedent. Yet, a rise of even two °C can be averted if governments begin to take appropriate action now.

Thus, the HLPE report must convey the urgency of the situation, and the importance of governments reaching an understanding of what climate change means for agricultural production in the very near

[1] Most sources report a 40% or more reduction in wheat yields due to the heat wave.

[2] U.S. corn yields were eroded by an estimated one billion bushels by a wet spring, a mid-pollination heat wave in July, and extensive dryness in some areas during the period of grain filling. http://www.accuweather.com/en/weather-news/2011-us-corn-yield-impacted-by/56266

[3] Texas agricultural crop losses topped $7 billion in 2011 due to the drought and excessive heat. http://www.agriculture.com/news/livestock/texas-drought-losses-topped-7-billion_3-ar23112

[4] Up to 25% of the Thai rice crop was lost due to flooding. http://www.reuters.com/article/2011/10/28/us-thailand-rice-idUSTRE79R0QF20111028

[5] Damage by flooding to over a million acres of sugar, wheat and rice production was estimated at over $2.9 billion. http://www.bloomberg.com/news/2010-08-12/wheat-stocks-sugar-cane-rice-crops-ruined-by-pakistan-s-worst-flooding.html

term, and what they intend to do about it. The authors seem to downplay the direct threat that climate change plays to food security, calling it merely "a threat multiplier." This characterization is not only incorrect but also dangerous. It distracts attention from serious consideration of the direct threats posed by climate change.

2. If the four pillars of food security are to serve as an organizing frame for analysis, they must be defined and used consistently and accurately.

Each of the four terms used to define the pillars of food security is complex in its own right, and liable to give rise to some debate. This makes it all the more important for the HLPE project team to define each term in this paper. A logical place to start with defining the terms would be to use FAO documents. We have found a useful, concise source in FAO (2006), while Erickson (2007) also provides a helpful definition for the first three pillars:

> ***Food availability****: The availability of sufficient quantities of food of appropriate quality, supplied through domestic production or imports (including food aid).* (Erickson: production, distribution, exchange)
>
> ***Food access****: Access by individuals to adequate resources (entitlements) for acquiring appropriate foods for a nutritious diet. Entitlements are defined as the set of all commodity bundles over which a person can establish command given the legal, political, economic and social arrangements of the community in which they live (including traditional rights such as access to common resources).* (Erickson: affordability, allocation, preference)
>
> ***Utilization****: Utilization of food through adequate diet, clean water, sanitation and health care to reach a state of nutritional well being where all physiological needs are met. This brings out the importance of non-food inputs in food security.* (Erickson: nutritional value, social value, food safety)
>
> ***Stability****: To be food secure, a population, household or individual must have access to adequate food at all times. They should not risk losing access to food as a consequence of sudden shocks (e.g., an economic or climatic crisis) or cyclical events (e.g., seasonal food insecurity). The concept of stability can therefore refer to both the availability and access dimensions of food security.*

Some of the places in the document where the pillars are used incorrectly include, but are not limited to:

- P. 2. Access is not merely about incomes, markets and prices. Entitlements, as originally defined by Sen (1982), are essential to understanding access. None of the discussions of access in the draft explain the basic concept of entitlements, nor do they write about access with this understanding in view. One of the reformed CFS's founding precepts is the right to food. Any discussion of access should underline the importance of access to food in the realization of the right to food.
- The discussion of nutritional quality under the section on availability in chapter 1 is more accurately a question of utilization. However, it is unclear why traits such as chalk, amylase content and gelatinization temperature are addressed in a discussion of impacts on food security.
- The hot spots discussed in chapter 2 are not directly relevant to the access pillar. The hot spots research attempts to determine where major crops will experience a reduction in growing period length, i.e., where production will diminish or cease in the coming decades, overlaying

that with some components of vulnerability, in regions of interest to the CG centers. This discussion is more appropriately considered under the pillars of availability and stability.

- The discussion of use in chapter 2 is not at all relevant to food utilization.
- The discussion of stability in chapter 2 does not do justice to the topic.

An accurate definition and use of the four pillars of food security could help avoid inaccurate and controversial statements, such as the assertion on p. 7 that: "The threats to sustainable food security include population growth mostly in today's developing countries with growing incomes in a world where resource constraints are already limiting productivity growth in some places." Population growth and rising incomes are not the causes of food insecurity, nor of climate change. Population growth is symptomatic of other problems, and is most successfully addressed through women's education and empowerment, access to adequate healthcare for both sexes, and livelihood options.

With a clear definition of the pillars within an analytical framework, there would not be a need to separate out each of the pillars for analysis in the rest of the chapters. There would still be a need to use each of the terms correctly each time they are referenced.

3. The document needs a more complex and sophisticated treatment of vulnerability.

Adger (2006), one of the foremost scholars on vulnerability with respect to climate change, notes that vulnerability is a complex state that is not reducible to a single metric, such as income. "It is the multi-level interactions between system components (livelihoods, social structures and agricultural policy) that determine system vulnerability." (Adger 2006) The IPCC definition, quoted in the glossary, says vulnerability is a function of exposure, sensitivity and adaptive capacity, all of which need to be examined in the context of climate change effects on communities and farmers in particular regions. See also the analysis done by the Met Office Hadley Centre and the World Food Programme (2012) on food insecurity and climate change.

"Being poor" is a rather uni-dimensional and ultimately not useful way of defining vulnerability (p. 3); in their analysis the authors seem to ignore the complexities they outline in their own definition. Note that food insecurity and poverty are linked but by no means define the same populations; relatively better-off populations can face food insecurity, as the 2007/2008 food price crisis showed, while some people in relative poverty have reasonably good food security, because they do not rely on income to purchase food.

While understanding the difficulties of capturing the world's complexity in one report, it is not satisfying to have only two huge regions singled out ("sub-Saharan Africa and South Asia") in the identification of vulnerable regions and people. Given the importance of agriculture in many other parts of the world, and the serious threats to agricultural production posed by climate change there (for example, in small island states or the Andean regions whose production is dependent on glaciers for water supply), the report should at least note the extent of vulnerable populations around the globe. A more disaggregated approach would also be useful, distinguishing (even if just for illustrative purposes) among landless wage laborers and urban dwellers, between small-scale and large producers.

A vulnerability analysis should also address countries and populations who depend on food from outside their regions. Which import dependent countries are likely to suffer most and how can they start diversifying their food sources now in order to avoid large-scale food insecurity and fiscal crises? There are lessons here from the food crisis. A critical look at international trade, distribution channels, the market structure for agriculture production and inputs and their rising costs will go a long way in identifying who the vulnerable are likely to be as a result of climate change.

Finally, a global analysis should encompass analysis of the vulnerability inherent in the entire range of agricultural production systems, including high-input agriculture in developed countries, which due to its lack of diversity and dependence on fossil fuels is particularly vulnerable to shocks within and external to the production system. (See for example Lin, Perfecto and Vandermeer 2008) "Modern agroecosystems have weak resilience … transitions towards sustainability need to focus on structures and functions that improve resilience." (Pretty 2006) As an example of the vulnerability of the industrial food system to changing climatic patterns, pests and diseases, wheat production systems globally are currently threatened with a stem rust called Ug99. Climate change will exacerbate these types of widespread threats to the food supply. In contrast, "Eakin (2005) shows for Mexican farmers that diversity is key to avoiding vulnerability and that investment in commercial high-yielding irrigated agriculture can exacerbate vulnerability compared to a [subsistence] farming system based on maize." (as cited in Adger 2006)

4. Given the urgency of the climate threat, immediate action on adaptation is needed. The adaptation chapter (chapter 3) needs to be strengthened considerably, and include discussion of low-cost, no-regrets strategies.

The adaptation chapter needs careful attention. First and foremost, it should review the extensive literature on adaptation and agriculture, in particular the literature on community-based adaptation and disaster risk reduction and the links to food security. The importance of farmer-to-farmer mechanisms as means for transmission of community-based adaptation information should also be highlighted. It would be useful to have references for what has been written so as to know what additional reading to propose.

Much of the literature on community-based adaptation is published by NGOs who are leading the development of this work. (See for example CARE International no date; Ensor and Berger 2009; IIED no date; The Development Fund 2009; USC Canada no date.) The project team should take careful note of the HLPE mandate to "combine scientific knowledge with experiences from the ground … The HLPE will translate the richness and variety of forms of expert knowledge from many actors … that draw on both local and global sources, into policy-related forms of knowledge." The bulk of literature on adaptation and agriculture to date is found in sources from NGOs who are working on the ground. The report should take care to thoroughly review and cite this body of literature.

One example of what is missing is the concept of resilience. Resilience is a key concept in academic and policy analysis related to disaster risk reduction and adaptation. The authors might find it useful to look at the work being undertaken by the World Agroforestry Centre on agroforestry and adaptation to increase resilience and reduce vulnerability. (For example see Neufeldt et al. 2009, Thorlakson 2011, World Agroforestry Centre 2009)

There are some key questions that need to be addressed with respect to adaptation and food security: how to make production systems and livelihood strategies more resilient? What are no-regrets, low-cost, low-input strategies to improve resilience and adaptive capacities? What are the contributions of agroecological approaches for adaptation for food security? The IAASTD report (McIntyre et al. 2009), the recent report of the Commission on Sustainable Agriculture and Climate Change (Commission 2012), and the recent IPCC Special Report on Extreme Events[6] (IPCC 2011) all emphasize agroecological

[6] For example, the authors of the IPCC SREX report conclude that: "Ecosystem management and restoration activities that focus on addressing deteriorating environmental conditions are essential to protecting and sustaining people's livelihoods in the face of climate extremes (high agreement, robust evidence). Such activities include, among others, watershed rehabilitation, agro-ecology, and forest landscape restoration. Moreover, provision of better access to and control of resources will improve people's livelihoods, and build long-term

methods responsible for increasing water-holding capacity, soil health, and productivity, all contributing to resilience. This evidence should be covered in the HLPE report.

The authors could also look at the FAO training module on adaptation[7] for some ideas about what to include in the report. Lesson Three "**Climate Change Adaptation and Mitigation in Agriculture**" looks at possible strategies including:

- **"people centered" strategies** such as setting up community-based grain banks, helping rural households diversify their sources of income, and social protection schemes;
- **improved water management** practices such as building infrastructure for more efficient irrigation systems and small-scale water capture, storage and use;
- adopting farming practices aimed at **conserving soil moisture, organic matter and nutrients** – such as crop rotation and using mulch stubble and straw;
- using **short-cycle seed** varieties that allow for harvesting before the peak of the cyclone season.

The report should also examine the very important work underway by the CG centers on adaptation, including work to identify climate analogue locations between present and future climates.[8] The role of meteorological services, the need to increase funding and other capacity support for regional and national services, and the importance of early warning systems should be highlighted.

Discussions of adaptation and food security should include treatment of urban and peri-urban agriculture. One response to addressing the food availability and access pillars for urbanizing populations is to consider how to increase food production in the urban and peri-urban areas where people live. These considerations should be included in the report.

The urbanization of populations is mentioned numerous times throughout the document, but with no indication of why people are moving to urban centers. The report might also assess why urbanization is occurring in so many developing countries, from the poorest LDCs to the relative economic giants, such as China and India. In India, agriculture is ever less viable as a sector due to rising input costs and indebtedness, lack of public investment in infrastructure, excessive exposure to risk due to poorly regulated markets, etc. The people who migrate to urban areas do not necessarily find better livelihoods—and they sometimes face greater food insecurity than they did in their villages, buying food at high prices on low wages. Adaptation has to address the viability of agriculture in the face of climate change to prevent distress-related migration to urban areas.

If the report addresses insurance as an adaptation strategy, it should include analysis and discussion of situations where insurance will not be useful, such as for marginal small scale and subsistence farmers who do not have the means to purchase insurance, or where crop or livelihood losses are not due to extreme events but due to slow onset events, such as slow onset temperature rise, slow onset salinization of water supplies, or slow onset loss of productive land due to sea level rise.

5. The direct links between agroecology and adaptation and mitigation need to be recognized and the existing literature on these links thoroughly reviewed.

Given the emphasis that ***many*** intergovernmental and other bodies (including but not limited to various CG centers, in particular ICRAF (see for example Akinnifesi et al. 2010, Assah 2011, World

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adaptive capacity. Such approaches have been recommended in the past, but have not been incorporated into capacity building to date. [5.3.3]"

[7] http://www.foodsec.org/web/newsevents/news/newsdetail/en/?no_cache=1&dyna_fef[uid]=130063

[8] http://www.cp-africa.com/2012/01/31/climate-analogue-location-in-eastern-and-southern-africa-calesa-project-help-small-scale-farmers-in-kenya-and-zimbabwe-adapt-to-climatic-changes/

Agroforestry Centre 2009); FAO (Niggli et al. 2010, Scialabba and Hattam 2002); WFP; UNEP (Hines and Pretty 2008); UNCTAD (Hoffman 2011, UNCTAD 2010); IPCC (2011); and IAASTD (McIntyre et al. 2009)) have placed on agroecological approaches[9] as essential elements for adaptation in agriculture in both small-and large-scale agricultural systems, and the substantial evidence base that already exists for success of these approaches around the world, the report should provide a serious review of agroecological approaches. Agroecology has been shown to be invaluable for both adaptation to changing climatic patterns, temperature and rainfall variability, and also for increasing the resilience and adaptive capacity of agricultural systems through increasing soil's capacity to hold water (thereby increasing the soil's ability to withstand droughts and floods), improving soil health, building agroecosystem diversity, etc. (For example see Altieri and Koohafkan 2008, Edwards 2007, Eyhord et al. 2007, Hines and Pretty 2008, Holt-Giménez 2002, IFOAM 2009a, Parrot and Marsden 2002, Zhu 2000) Diversity in systems contributes not merely to adaptation, but more fundamentally to increasing system resilience, which is needed in the long run to reduce vulnerability in production systems. (See for example Ensor 2009 and Mijatovic et al. 2010) The report should also provide a more complete explanation of the scientific context for why these particular characteristics are effective (as noted further in point 8 below) in building system resilience.

Agroecological approaches have also been identified as effective in mitigating greenhouse gas emissions, both by preventing emissions or through sequestering carbon. (see for example IFOAM 2009b) By decreasing reliance on synthetic nitrogen fertilizers, agroecological approaches can significantly reduce the greenhouse gas contribution made in the production of fertilizers, which on its own contributes 1.2% of annual global greenhouse gas emissions. (Wood and Cowie 2004) Decreasing reliance on synthetic nitrogen fertilizers is also necessary to address the problem of exceeding planetary boundaries of creating reactive nitrogen, which could have longer term impacts on environmental integrity and food security. (Rockstrom et al. 2009) Ladha et al. (2011) conclude that adding compost is twice as effective at increasing soil carbon concentrations as synthetic fertilizers. Given the well-documented and important contribution agroecology can make to both mitigation and adaptation, it merits serious and detailed attention in the HLPE report.

6. The report should take a wider approach to mitigation (chapter 4).

The report unfortunately replicates the problematic position of the OECD countries in climate negotiations, where developed countries wish to focus on the mitigation potential of the billions of acres of land in developing countries rather than address their own substantial emissions, including from their agriculture. Small-scale producers are critically important for food security, but it is not for them to "address" climate change (p. 9). Rather, small-scale farmers have to adapt to climate change, and merit the support of the international community and their governments in so doing. It is the farms whose practices are exacerbating climate change that have to address the problem, by adopting more sustainable practices.

Moreover, chapter 4 provides no clear articulation of the link between mitigation and food security. If indeed, as is indicated in the introduction to the report, "to help those most vulnerable to climate change, polices and programs that are designed to respond to climate change should be complementary to, not independent of, those needed for sustainable food security," food security should be the focus of

[9] Agroecological approaches that build resilience include, for example: complex systems, use of local genetic diversity, soil organic matter enhancement, multiple cropping or polyculture systems, agroforestry systems and mulching, home gardening. (Ensor 2009)

the analysis, not carbon sequestration. The framing of the chapter should look at the threat of emissions from agriculture.

Given the enormous contributions of input-intensive agriculture to global greenhouse gas emissions, particularly from methane emissions from confined animal operations and nitrous oxide emissions both from the production and use of synthetic nitrogen fertilizers, the lack of serious attention to the major sources and approaches to directly reduce these emissions is profoundly troubling. Mitigation efforts in agriculture should focus on the main emissions from the sector. Methane and nitrous oxide, rather than carbon dioxide, are the most important GHGs emitted in the agriculture sector. Moreover, agriculture emissions of these non-CO_2 gases are responsible for the bulk of the global emissions of these gases. Methane emissions from agriculture account for 50 percent of total global methane emissions; nitrous oxide emissions from agriculture account for 75 percent of the global total. (Golub et al. 2009) Attention to mitigation of these gases in the agriculture sector is urgent. (See further discussion of these gases in point 7 below.)

The technologies that are addressed in the chapter should be introduced and discussed in detail first in the adaptation chapter. Resilience-building and soil-conserving technologies are first and foremost about adaptation efforts, and an emphasis on the most vulnerable necessitates that adaptation in the context of food security take priority over any mitigation effort. Any mitigation that results should be seen as a co-benefit, not the other way around.

Indeed, the report should review the most recent literature showing that soil carbon sequestration is not a reliable strategy for mitigation in agriculture, although much hope has been placed on its potential, including by the IPCC. (Smith et al. 2007) Scientific studies conducted since the publication of AR4 strongly indicate that many of the recommended practices, such as reduced tillage, do not in fact increase soil carbon content, but merely prevent more carbon from escaping soils. (See for example DeGryze et al. 2009) Estimates provided so far for mitigation potential are far in excess of what is feasible, particularly when taking into consideration uncertainties associated with biological processes. Moreover, as precipitation patterns change, along with soil moisture profiles, the sequestration potential for any given soil type or agricultural ecosystem will likely diminish. For example, an increase in soil moisture will likely increase soil emissions of nitrous oxide and methane, leading to an actual increase in greenhouse gas emissions from soils, rather than sequestration.

The report contrasts emissions in China with those in France, while completely ignoring the embodied emissions in products consumed in Europe which are produced outside of Europe. For example, while European agriculture production emissions may be going down on European soil, European meat consumption/demand is contributing to agriculture emissions elsewhere. According to the PBL Netherlands Environment Assessment Agency, emissions produced on around 12 million hectares of land outside of Europe can be attributed to European livestock production, for example, through the import of animal feed from Latin America. (Westhoek et al. 2011) Overconsumption in developed countries and what OECD countries can do about it unfortunately remains unaddressed. The current report should tackle the consumption question head on.

Overall, the balance between mitigation and adaptation in the document does not do justice to climate change effects on global food security. Given the figures cited in our first point, adaptation has to be the priority for billions of small farmers, and the global community must invest significant resources to this end. The mitigation efforts in agriculture must prioritize the substantial emissions of input-intensive, greenhouse gas-intensive systems.

7. The greenhouse contributions of intensive animal and crop agriculture are significant and must be specifically addressed in the report.

OECD, CEE and countries of the former Soviet Union, totaling 17 percent of the world population, are responsible for 26 percent of global N_2O emissions from soils, 30 percent of CH_4 emissions from enteric fermentation, and 52 percent of CH_4 and N_2O emissions from manure management. (Smith et al. 2007) The last category of emissions is disproportionately high due to the use of lagoons for manure management in large-scale confinement operations.[10] Globally, New Zealand, Ireland and Australia ranked as the top three emitters per capita for emissions from their agriculture sectors in 2005, while the OECD outpaced the entire world.[11]

According to the IPCC, these emissions increased by nearly 17 percent between 1990 and 2005.[12] Agriculture emissions from North America increased by 18 percent and from OECD Pacific by 21 percent. Increases were attributed to a massive increase in nitrogen fertilizer use in New Zealand and Australia and manure effluent of cattle, poultry and swine farms and manure application to soils in North America.

Canada, New Zealand and the United States have all increased their methane emissions between 1990-2009. Although the EU has decreased its emissions, presumably due to reductions in fertilizer use resulting from their nitrates directive,[13] Australia, Canada and New Zealand have all significantly increased their nitrous oxide emissions above 1990 levels in the period between 1990-2009. The US levels have remained high from 1990 and increased since. The largest consumption of fertilizer per capita (the main source of agricultural N_2O emissions) continues in OECD countries (see table 1). New Zealand, Australia, Canada and the United States all exceed the world average of per capita fertilizer consumption.

TABLE 1. PER CAPITA FERTILISER CONSUMPTION OF COUNTRIES

COUNTRIES	PER CAPITA CONSUMPTION 2008 IN TONNES	POPULATION IN AGRICULTURE IN %
WORLD	0.02397	40
US	0.05639	2
CANADA	0.07721	2
FRANCE	0.04301	2
GERMANY	0.02327	2
UK	0.02034	2
AUSTRALIA	0.07072	4
NEW ZEALAND	0.18431	8
ARGENTINA	0.03113	8
BRAZIL	0.05266	12
CHINA	0.03780	62
INDIA	0.01911	55
PHILIPPINES	0.00769	35
THAILAND	0.02952	50
KENYA	0.00455	71

Data sourced from : FAO Statistical Yearbook 2010 accessed at: http://www.fao.org/docrep/015/am081m/PDF/am081m00a.pdf

[10] "Liquid manure management systems, such as lagoons, ponds, tanks, or pits, handle a much smaller portion of total manure but comprise 80 percent of total methane emissions from manure." http://uspowerpartners.org/Topics/SECTION6Topic-AnimalWasteMethane.htm

[11] http://www.garnautreview.org.au/pdf/Garnaut_Chapter7.pdf

[12] http://www.ipcc.ch/publications_and_data/ar4/wg3/en/ch8s8-es.html

[13] http://www.airclim.org/acidnews/2011/4/eu-trends-greenhouse-gas-emissions

These trends are significantly worrying, yet many recent prescriptions of where emission reductions in agriculture must come from, including in the draft report, point away from permanent emission reductions of CH_4 and N_2O in the direction of carbon sequestration. In contrast, the UNEP emissions gap report (UNEP 2011) cites Golub *et al.* (2009), who demonstrate that the bulk of the mitigation potential in agriculture resides in significant reductions in fertilizer use in the US, as well as in changes to ruminant production globally.

An evaluation is needed at the global level of national policies and practices that contribute to high agriculture sector emissions, such as policies that encourage the production and overuse of synthetic fertilizers, or those that encourage overproduction, overconsumption and industrialization of animal products, as well as appropriate measures to incentivize changes in production methods. At the same time, an assessment should be made of national policies and international funding for research on and implementation of ecological agricultural practices that reduce or prevent agricultural GHG emissions, such as practices that reduce or eliminate the use of synthetic N fertilizers.

Though the IPCC estimated that agriculture emissions will continue to increase from the developing world, the percentage of people in agriculture in the developing world, particularly Asia and Africa, far exceeds the percentage in OECD countries (see table 1). According to FAO statistics, 40% of the world's population is in agriculture. The large majority of this population resides in and is responsible for the food security of these countries, particularly as dependence on global trade for food becomes particularly unpredictable with rising food prices and erratic supply. Comparing developing countries' emissions versus developed countries (for instance in the case of Chinese emissions versus those of France) is unhelpful in agriculture given the drastically different role this sector plays in these countries.

Much more is at stake for developing countries in constraining emissions growth from agriculture given their dependence on their agriculture sector for livelihoods, food security and overall development, particularly where a large percentage of the country's GDP comes from agriculture exports and where low yields necessitate an increase in fertilizer use. Control of agricultural emissions from developing countries should be enabled through the transfer of ethically, environmentally sound and cost-effective technologies and practices. However the bulk of the responsibility for decreasing emissions must lie with developed countries, particularly methane emissions from intensive feedlot livestock manure lagoons, as well as emissions from the production and use of synthetic nitrogen fertilizers.

8. More generally, the document needs more contextual information from the available science.

The report relies too heavily on already widely disseminated IPCC reports. The section "What do we know about climate change?" would be more useful if it provided a referenced examination of exactly how climate change is expected to affect agricultural production, particularly from a crop and animal physiological perspective, as well as its expected effects on soil moisture content. (For an example of a literature review that contains such information see Stabinsky 2011 and Stabinsky and Lim 2012.) The review of these issues should include not only the predicted effects of extreme events, but also the impacts of slow onset temperature rise, slow onset salinization of aquifers, slow onset loss of productive land due to sea level rise, increase in variability and amount of rainfall in single events and across the growing season, and reduction in the length of the growing period due to increased temperatures and the concomitant loss of soil moisture.

Nowhere does the report note that while climate science is imprecise and in some areas speculative, many of the practices we know can mitigate greenhouse gas emissions or improve carbon capture are also practices that make sense because they encourage more sustainable water use, better

management of soil health, etc. There are some important gains for ecology that are likely to be better for climate, and worth adopting on their own merits.

9. Substantial sections and conclusions of the report lack even basic citations.

The HLPE has an explicit mandate to use and include both scientific and other kinds of knowledge. Yet given the nature of the information provided, the lack of reference to peer-reviewed literature does not make sense. In some places, assertions are given without any context or explanation. For example, the report declares the importance of supporting the creation of market-based mechanisms in agriculture, with no prior examination of arguments for and against, nor review of significant ongoing problems with the European Emissions Trading Scheme and why temporary emission reductions of volatile carbon might not be a safe planetary emission reduction strategy.[14] Similarly, the insistence on public-private partnerships needs context and explanation. The document should serve as an objective review of the range of evidence available, acknowledging the challenges where they arise.

One specific use of the evidence is particularly troubling: the treatment of the conclusions of Ladha et al. (2011). From the abstract of the article, we learn that in soils not treated with synthetic nitrogen fertilizer, soil organic matter (soil organic carbon and soil organic nitrogen) decreases. In soils treated with synthetic nitrogen fertilizer, the rate of soil organic matter loss decreases, relative to untreated soils. In soils treated with organic matter (i.e., manure), soil organic matter increased, on average, by 37%.

The report notes only one conclusion of Ladha et al. (2011), creating a highly misleading impression. The report cites Ladha et al. saying "long-term experiments showed that synthetic fertilizer N significantly reduces the declining rate of soil organic carbon in agricultural soils." The authors decided not to mention the fact that treating soils with organic, rather than synthetic fertilizers, increased soil organic matter (compared to merely reducing the rate of soil organic matter loss) on average by 37%. That they would leave out the most significant conclusions of the paper, in a chapter that dealt specifically with soil carbon sequestration, is inexplicable.

10. The report should include discussion of international cooperation on crosscutting issues related to food security and climate change.

The HLPE report on climate change offers an important opportunity to continue the rethinking on regulating agricultural trade from a food security perspective that began with the 2011 HLPE report on food price volatility. While appreciating the report has to stay focused on climate change, from a food security perspective, climate change does not occur in isolation, but in a context in which there are multiple causes of insecurity. This context must be acknowledged more explicitly than it is in the current draft, building on the existing HLPE work.

International agriculture trade rules must be revisited in light of food security and climate change. The Special Rapporteur on the Right to Food has outlined various starting points for this process. The changed context, from the relative glut of commodities in the mid-1990s to the relatively greater scarcity today has also been discussed by FAO, among others. The food price crisis showed the inadequacies of existing trade rules, and highlighted the need to rebuild confidence in trade as an instrument for food security.

Multilateral intellectual property rights (IPR) disciplines are moving in the wrong direction to foster learning and adaptation across boundaries on plant varieties, agriculture biodiversity and agriculture

[14] http://www.guardian.co.uk/environment/2011/apr/28/overhaul-europe-carbon-trading-scheme

inputs. The IPR provisions in most bilateral and regional trade treaties exacerbate these concerns. Increased cooperation amongst nations, public and private sector entities and food producers needs to take place to ensure the dissemination, distribution and creation of practical knowledge to adapt to climate change.

International investment policies that help facilitate large scale conversions of land to non-agricultural use or for agricultural production while displacing people should be stopped until strong, enforceable and democratically agreed regulations are put in place. The Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security (VG) have just been finalized under the auspices of the CFS. The authors should invoke the VG recommendations and push for their adoption into law as a preliminary step towards responsible investment.

REDD (plus plus): Very little assessment has been done of whether REDD programs are contributing to or further jeopardizing the food security of forest-based and dependent communities. Yet with very little assessment from a food security perspective, donor and World Bank-led initiatives for REDD are moving forward. REDD and REDD plus initiatives should be evaluated for their impacts on food security, both with regards to tradeoffs for direct investment in food security programs that create agriculture resilience and for the likely effects of REDD programs on food security and resource tenure.

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