Submission to the UNFCCC under Workstream 2 of the Ad Hoc Working Group on the Durban Platform for Enhanced Action (ADP): Item 8: Implementation of all the elements of decision 1/CP.17, ((b) Matters related to paragraphs 7 and 8. (ADP)

Ambition in the agriculture sector

Overview: Agriculture and the climate change challenge

Agriculture plays a central role in providing global food security and ensuring rural livelihoods for two-thirds of the developing world and 40 percent of the world's population; it is undoubtedly a unique sector. Linkages between agriculture and climate change are complex, and international rules that address climate and agriculture will impact food security and sovereignty at the global, regional, national and local levels. Yet, climate change is already having devastating and costly impacts on the global food and agriculture system and national budgets that support agriculture. These impacts are set to intensify in the coming years, both through extreme climatic events such as droughts, floods, fires, tornadoes and hurricanes, but also the slow-onset effects of global temperature rise, rainfall variability and changes in soil moisture.

The financial and political burden of these climatic changes will fall most heavily on developing countries, many of which have limited budgets and large rural populations that depend largely on rain-fed agriculture. These climatic changes are already beginning to force governments to prepare for and avert food crises and ensure national stability in a world where global food trade will continue to become more unreliable as price and supply volatility increases in the context of climate change. The principle of Common but Differentiated Responsibility (CBDR) and equity are therefore not only inherent and central to the convention itself, but essential tools in assessing the nature of the impacts and costs involved for the sector as a whole.

The cost of non-action on emissions reductions threatens global food security worldwide for every country—severely impairing agriculture's ability to adapt and dramatically increasing the costs for meeting adaptation needs each year that we delay. The recent U.S. agriculture and climate adaptation report warns of "unprecedented challenges to U.S. agriculture" in the face of climate change. It states that "the continued degree of change in the climate by midcentury and beyond is expected to have overall detrimental effects on most crops and livestock" in the United States, and that production

1. Ecumenical Advocacy Alliance[1] is an international advocacy network of churches and Christian organizations, with members representing Catholic, Evangelical, Orthodox and Protestant traditions. As an alliance of over 80 churches and church-related organizations located around the world with members and constituents in the tens of millions, we are called by our faith to stand for justice, peace and a sustainable world. www.e-alliance.ch.

2105 FIRST AVENUE SOUTH MINNEAPOLIS, MINNESOTA 55404 (612) 870-0453 FAX (612) 870-4846 IATP.ORG
1100 FIFTEENTH STREET NW 11TH FLOOR WASHINGTON, D.C. 20005 (202) 222-0749

results over the next 25 years "will be mixed."[2] These changes to U.S. agriculture will in turn impact food prices and global food trade worldwide. The challenges of adaptation—both agronomic and economic—for developing countries will be all the greater, hence the need for CBDR, equity and approaches to address loss and damage, to guide UNFCCC Parties in their deliberations and decisions.

Much more needs to be understood about the impacts of climate change on agriculture and food systems, and the effectiveness of various agriculture practices (region by region) to cope with climate change. However, assessing and addressing agriculture adaptation needs and costs without setting clear and ambitious targets for emissions reductions overall and in other sectors is equivalent to filling the only remaining water we have in a large bucket with a hole at the bottom. Direct, clear and immediate action must be taken to raise mitigation ambition from 2013 to 2020, particularly in reducing emissions from fossil fuels through the energy, transport and industrial sectors.

Raising mitigation ambition in the agriculture sector

Annex I countries, totaling 17 percent of the world population, are responsible for 52 percent of CH_4 and N_2O emissions from manure management, 30 percent of CH_4 emissions from enteric fermentation and 26 percent of global N_2O emissions from soils,[3] the last category being disproportionately high due to the use of lagoons for manure management in large-scale confinement operations.[4] Globally, New Zealand, Ireland and Australia ranked as the top three emitters for per capita agriculture production in 2005, while the OECD outpaced the entire world.[5]

According to the Intergovernmental Panel on Climate Change (IPCC), these emissions increased by nearly 17 percent between 1990 and 2005.[6] 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 from cattle, poultry and swine farms and manure application to soils in North America.

In agriculture, therefore, developed countries should commit to a workplan on enhancing mitigation ambition for direct reductions of nitrous oxides and methane in their agriculture production processes. On the demand side, they should make a concerted effort to reduce excessive meat consumption. A workshop in 2013 should be held to "catalyse the implementation of, initiatives and actions to rapidly, cost-effectively, urgently, and equitably reduce" these gases from developed countries' agriculture sectors.

2. USDA 2013. Climate Change and Agriculture in the United States: Effects and Adaptation. http://www.usda.gov/oce/climate_change/effects_2012/CC%20and%20Agriculture%20Report%20(02-04-2013)b.pdf.

3. P. Smith et al. 2007. Policy and technological constraints to implementation of greenhouse gas mitigation options in agriculture. Agriculture, Ecosystems and Environment 118: 6-28.

4. "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.

5. http://www.garnautreview.org.au/pdf/Garnaut_Chapter7.pdf.

6. http://www.ipcc.ch/publications_and_data/ar4/wg3/en/ch8s8-es.html.

Mitigation of nitrous oxides and methane

> *The livestock sector emerges as one of the top two or three most significant contributors to the most serious environmental problems, at every scale from local to global. The findings of this report suggest that it should be a major policy focus when dealing with problems of land degradation, climate change and air pollution, water shortage and water pollution, and loss of biodiversity.*[7]

The livestock sector produces 40 percent of the world's methane, 65 percent of the world's nitrous oxide and accounts for an estimated 18 percent of human-caused greenhouse gas emissions.[8] Methane and nitrous oxide emissions from animal waste generate greenhouse gases that are 25 and 300 times more potent than carbon dioxide. Feedstock used for industrial livestock production is not only a major driver of deforestation but also contributes to nitrous oxide emissions from corn and soy fields, and takes away land from food crop production.

Industrial livestock systems are likely to suffer large economic losses[9] and require more energy-intensive and costly adaptation methods. Climate change will heavily impact 1.) the ability to rely on large quantities of feed-grain production, availability of feedgrain, and its price; 2.) pastures and forage crop production and quality; 3.) animal health, growth and reproduction; and 4.) disease and pest distributions.[10] Given these systems' existing stress on livestock (bred for limited genetic variation and greater production), environmental health and natural resources (land, water and biodiversity), further intensification of these already stressed systems will not only be costly and challenging for adaptation, but will further exacerbate climate impacts.

A paradigm shift is needed and the transition can begin now with developed countries playing a leadership role. ADP Workstream 2 provides an opportunity in the next seven years for developed countries to lead and demonstrate how highly polluting industrial agriculture systems can transition toward agroecological approaches that respect rural farming communities (their land, water and way of life), contribute to climate change mitigation and make agro-pastoral systems more resilient to climate change by restoring biodiversity.

Table 1 shows comparative figures of non-CO2 (methane and nitrous oxide) agriculture emissions from a sample group of countries per region, including per capita emissions and meat consumption. On a per capita basis, it is evident that meat consumption is highest in OECD Pacific, North America and Western European countries, while Africa and Asia lag far behind. It is also clear that per capita non-CO2 agriculture emissions overall and per capita livestock emissions are highest (with the exception of Latin American countries) in the OECD Pacific, North America and Europe. African countries have some of the lowest overall and per capita agriculture emissions in the world. The high emissions in Latin America are also associated with livestock and feed exports.

7. FAO 2006. Livestock's Long Shadow: Environmental Issues and Options, pg. xx ftp://ftp.fao.org/docrep/fao/010/a0701e/a0701e00.pdf.

8. http://www.worldwatch.org/global-meat-production-and-consumption-continue-rise-1.

9. $12.4 million annualy for swine producers based on the Canadian Global Coupled Model (CGC) projections for 2040 and associated with changes in dry matter intake (DMI) (USDA 2013).

10. Ibid.

Table 1

COUNTRY	NON-CO_2 GHG EMISSIONS FROM AGRICULTURE IN 2010 (MT CO_2 EQ)	PER CAPITA NON-CO_2 EMISSIONS FROM AGRICULTURE (TONS CO_2 EQ)	PER CAPITA N_2O EMISSIONS FROM AGRICULTURAL SOILS (TONS CO_2 EQ)	PER CAPITA EMISSIONS FROM LIVESTOCK (TONS CO_2 EQ)	PER CAPITA MEAT CONSUMPTION (KG)
OECD Pacific					
Australia	96.5	4.33	0.71	2.73	117.6
New Zealand	37.1	8.49	2.91	5.59	142.1
North America					
Canada	69.2	2.03	0.97	0.88	96.3
United States	454.9	1.46	0.78	0.64	124.8
Europe					
France	102.7	1.63	0.86	0.77	88.6
Ireland	18.3	4.10	1.59	2.51	100.7
Germany	60.3	0.73	0.44	0.30	83.3
Ukraine	27.2	0.60	0.32	0.26	38.6
Latin America					
Argentina	145.4	3.60	1.84	1.59	88.6
Brazil	644.1	3.30	0.89	1.22	80.8
Uruguay	25.9	7.69	3.38	3.98	68.4
Asia					
India	732.3	0.60	0.18	0.18	5.2
Indonesia	246.8	1.03	0.14	0.12	10.0
Philippines	44.0	0.47	0.09	0.20	Not available
Viet Nam	72.9	0.83	0.16	0.23	34.9
Africa					
Egypt	35.1	0.43	0.20	0.16	22.3
Gambia	0.9	0.52	0.17	0.17	8.7
Ghana	8.7	0.36	0.07	0.08	9.9
Kenya	26.3	0.65	0.27	0.36	15.4
Malawi	12.8	0.86	0.66	0.09	5.1
South Africa	34.1	0.68	0.15	0.41	46.2
Tanzania	50.1	1.12	0.21	0.35	9.5

Data Sources: FAOSTAT; U.S. Environmental Protection Agency; U.N. Development Programme (population numbers)

Curbing excessive meat consumption in developed countries

A key driver of industrial meat production and its exports is excessive consumption of meat in developed countries. Industrial concentrated animal feeding operations (CAFOs) are major contributors to agriculture emissions—where housing as many cows or pigs as possible can be the norm. The large manure lagoons that are generated from these operations then contaminate soil, water and even the food system as antibiotics and dangerous chemicals (arsenic, mercury, etc.) are added to animal feed to keep stressed and crowded animals alive for human consumption. The polluted soils and waters also contaminate fish, food crops and destroy healthy bacteria and our ecosystem's ability to fight disease.

While transforming industrial meat production is important, the demand for meat must also be addressed. Table 1 demonstrates that per capita meat consumption in developed countries (with the exception of Argentina and Brazil) is several orders of magnitude greater than that in developing countries. In 2007, while the world per capita average of meat consumption was 38.7 kg/year, the United

State's consumption alone was 125.4 kg/year, followed by Australia at 121.2 kg/year and New Zealand at 115.7 kg/year.[11] However, European meat consumption is also significant, and increased by 50 percent during the period between 1961 and 2007.[12] The increase in European meat consumption seems incongruent with decreasing agricultural emissions in Europe. In fact, while European agriculture production emissions may be going down on European soil, European meat consumption and demand is contributing to agriculture emissions elsewhere. According to the PBL Netherlands Environment Assessment Agency, around 12 million hectares of land outside of Europe is attributed to European livestock production,[13] for example, through the import of animal feed from Latin America.

Anthony, et al. 2007 proposed a working global target of per capita 90g per day with no more than 50g per day coming from red meat from ruminants (cattle, sheep, goats) given that the global average was 100g per person at their time of writing.[14] A new study by UNEP-led Global Partnership on Nutrient Management (GPNM) and the International Nitrogen Initiative (INI)[15] has also recently recommended lowering "personal consumption of animal protein among populations consuming high rates (avoiding excess and voluntary reduction)" to address the numerous problems associated with the production of livestock.

Davidson 2012 (Woods Hole Research Center) demonstrates how changing dietary habits in developed countries can be matched to IPCC's AR5's representative concentration pathways for global emissions reductions.[16] Using the FAO's projections of meat consumption of developed and developing countries through 2030, Davidson's research demonstrates that parity between developed and developing countries can be achieved (increase in per capita meat consumption in the global south and reduction of excessive meat consumption in the global north) that would in turn significantly reduce nitrous oxide emissions from the livestock industry. The major impediments towards this shift are not technical, but political.

Important steps can be taken in the next seven years in developed countries where excessive industrial meat consumption is leading to rising health and environmental costs that government budgets must help meet. For instance, hospitals in the U.S. are already changing the food they serve on their menu, including meat-free days to create better health and reduce healthcare's climate footprint.[17] Much more thought can go into how excessive consumption can be curbed without infringing on people's preferences for food through education, health advisories and smart government policies (including internalizing the cost of meat and feed production).

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11. http://www.economist.com/blogs/graphicdetail/2012/04/daily-chart-17, see full chart based on FAO data: http://www.scribd.com/doc/91840616/Meat-Consumption-Per-Person.

12. Westhoek et al. 2011. The protein puzzle: the consumption and production of meat, dairy and fish in the European Union. PBL Netherlands Environment Assessment Agency.

13. Ibid.

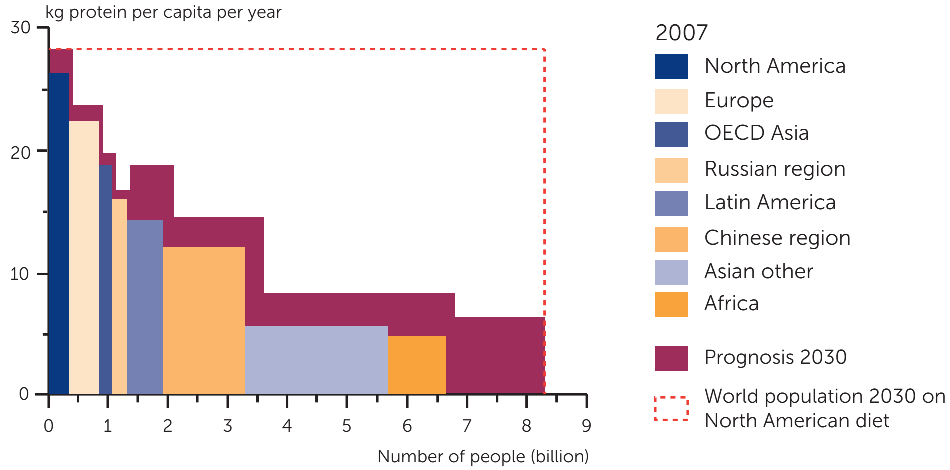
14. Anthony et al. 2007. Food, livestock production, energy, climate change, and health. The Lancet, October 6-12.

15. http://initrogen.org/uploads/rte/ONW.pdf.

16. Davidson 2012. Representative Concentration Pathways and Mitigation Scenarios for Nitrous Oxides. Environmental Research Letters, 12 April.

17. http://www.noharm.org/lib/downloads/climate/Addressing_Climate_Change.pdf.

Global intake of animal protein per region



Source: Based on FAO (2006, 2010). Reproduced from Westhoek et al. 2011

The fallacy of soil carbon sinks as mitigation ambition

UNFCCC discussions on agriculture's mitigation potential have had the 2007 IPCCC report as the backdrop. Experts had asserted that 90 percent of the mitigation potential in agriculture lay in soil carbon sequestration, 70 percent of that in developing countries—yet a large percentage of the farming population in developing countries are small-scale producers. Since 2007, new research has emerged and findings[18] are demonstrating that a reliance on soil carbon sinks will be unviable in a warming planet. Feedback loops of rising temperatures and changes in soil moisture will affect soil nutrients and release CO_2 from soils, rather than sequester it. It is already well known that extreme events (fires, droughts, floods) and other land use–change practices will make any potential sequestration highly uncertain and temporary at best.

In spite of what proponents of soil carbon markets claim, scientists including Head of Research, Climate Change, Agriculture and Food Security (CCAFS) program of the CGIAR note, "the practical potential of different options remains in debate. For example, sequestration of carbon in the soil is cited as having the largest potential for agricultural mitigation at a sufficiently high carbon price, but in practice, this will be limited by the total soil carbon stock,reversibility of the flux, and induced changes in fluxes of CH_4 and N_2O…"[19]

The UNFCCC secretariat should compile a robust set of the latest peer-reviewed scientific articles on the impacts of climate change on agriculture soils, so that decision-making on agricultural mitigation is based on accurate data and assumptions about mitigation potential. While adding soil organic material will remain a critical endeavor in the creation of healthier soils and agriculture adaptation,

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18. Hopkins, F. et al. 2012. Warming accelerates decomposition of decades-old carbon in forest soils. Proceedings of the National Academy of Sciences of the United States of America (PNAS), May. Accessed at: http://www.pnas.org/content/early/2012/06/07/1120603109.abstract.
Schmidt M. W. I. et al (2011) Persistence of Soil Organic Matter as an Ecosystem Property. Nature, Vol. 478, 6 October pgs. 49-56.
Powlson D.S. et al (2011), Soil carbon sequestration to mitigate climate change: a critical re-examination to identify the true and the false. European Journal of Soil Science, February 2011, 62, 42–55.
Johnston, A.E. et al 2009. Soil organic matter: its importance in sustainable agriculture and carbon dioxide fluxes. Advances in Agronomy, 101, 1–57.

19. Vermuelen, Sonja et al. 2012. Climate Change and Food Systems. Annual Review of Environment and Resources 37: 195-222.

emissions reductions from the agriculture sector must come from the real sources of emissions: methane and nitrous oxide gases from agriculture production processes and the expansion of industrial agriculture systems, including for feedstocks, dependent on large inputs of nitrous oxides and conversion of large tracts of land into monocultures.

One of the key assumptions for the IPCC recommendations on soil carbon was that the price of soil carbon would be high in order to drive this mitigation—upwards of $18 USD according to IFPRI. As the science becomes clearer, the validity of soil being a credible "carbon sink" and therefore a carbon "asset" also diminishes. The largest carbon market (the EU ETS) is collapsing—with credits presently valued at about $5 USD/ MtCO2 equivalents[20]—even for credits for genuinely avoided and reduced emissions such as solar power. Meanwhile, newer and more certain evidence of the impermanence and uncertainty of carbon in forests and soils and social concerns related to tenure is making such credits a long-term pipedream for policy makers. The EU ETS recently set new record lows in carbon prices and is desperate to rid the market of oversupply of credits. It has already closed its market for CDM credits from non-LDC countries. The market for CDM credits itself collapsed last fall, with credits devalued by 70 percent last year,[21] and tumbling to a price of 34 cents per ton this January.[22] Attempts to fix the ETS will not curb the volatility in carbon prices inherent in a speculative system. Soil carbon offsets are therefore not only unviable as mitigation, but also as predictable sources for climate finance for developing countries and their agriculture ministries.

Conclusion

Recent research has shown that the window for agricultural adaptability is fast closing and that past agronomic and econometric assumptions about the time for and the costs of loss and damage have been unduly optimistic.[23] Mitigation ambition and action is therefore critically urgent, but it has to be grounded in sound science and where it matters most. This means that real mitigation ambition must be achieved within the next seven years and across key sectors, starting with industry, transport and energy, bound by the principles of CBDR and equity. Agriculture cannot bear the brunt of this mitigation burden. Yet, it has been scientifically clear for some time now that nitrous oxides and methane are the major causes of agriculture emissions. Proponents of an agriculture work program, including in the World Bank and the FAO, have spent the last four years trying to convince developing countries, particularly African members, that soil carbon sequestration might be their ticket to climate finance with a "triple win" for agricultural mitigation and adaptation. Precious time has been lost in the meantime in getting to the real causes of agriculture emissions and supporting developing countries in their adaptation needs. As these misguided diversions delay real mitigation, agricultural adaptation costs and threats to food security continue to rise globally.

Workstream 2 provides an opportunity for developed countries to show leadership and demonstrate how highly emitting industrial agriculture systems can be transformed into resilient and adaptive ones. The submission has highlighted the major entry points for that transition—creating a workplan to address overconsumption of meat in developed countries and helping their industrial livestock and cropping systems make a transition towards more humane, climate-friendly and ecologically resilient production systems. The next seven years are a critical window of time for that transition.

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20. Lewis, Barbara, 2013. "EU's carbon price suffers after Parliamentary vote," Reuters, January 24.

21. http://www.cdmpolicydialogue.org/report/rpt110912.pdf.

22. Clark, Pilita and Blas, Javier 2013. EU Emissions Trading Faces Crisis. Financial Times, January 21. http://www.ft.com/intl/cms/s/0/42e719c0-63f0-11e2-84d8-00144feab49a.html#axzz2LH3TfMza.

23. Ackerman, Frank et al. 2013 "Climate Impacts on Agriculture: A Challenge to Complacency?" Global Development and Environment Institute, Working Paper No. 13-01, February. http://www.ase.tufts.edu/gdae/Pubs/wp/13-01AckermanClimateImpacts.pdf.

Decisions on climate and agriculture that include developing countries and food security cannot be the sole domain of the UNFCCC. The Committee on World Food Security (CFS) is charged with coordination of international policy on food security. Competencies from the UNFCCC, the CFS and both the climate and food security and sovereignty communities are needed in addressing these issues justly and comprehensively. However, transparency and the inclusion of civil society organizations, particularly those on the frontlines of climate change—especially small-scale producer organizations or those working with them—must be critical components of any such discussions and decisions. The CFS is an important space to bring all sectors to the table for debates and policy formation on food security and the climate change discussions on agriculture cannot be in isolation of this forum.

In the meantime, developed countries can create a critical opportunity through Workstream 2 toward a transformative climate and agriculture agenda that helps them reduce their agricultural climate footprint. This in turn can help create a greater global transition towards agroecology and a low-carbon pathway for agriculture.