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Verschuuren, Jonathan

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# The Paris Agreement on Climate Change: Agriculture and Food Security

Jonathan Verschuuren\*

## I. Why Focus on Agriculture and Food Security?

In the coming few decades, the world is facing three related problems.

First, agriculture contributes to climate change to a considerable extent. In its Fifth Assessment Report, the IPCC's Working Group III concludes that the AFOLU sector (agriculture, forestry and other land use) is responsible for just under a quarter (~10 – 12 GtCO<sub>2</sub>eq/yr) of anthropogenic GHG emissions.<sup>1</sup> Usually, a distinction is made between non-CO<sub>2</sub> emissions, in particular methane (NH<sub>4</sub>) emitted by livestock and rice cultivation, and nitrous oxide (N<sub>2</sub>O) caused by the use of synthetic fertilizers and the application of manure on soils and pasture. Methane and Nitrous oxide have 25 times and 300 times stronger impact on the climate than CO<sub>2</sub> respectively. CO<sub>2</sub> emissions from agriculture are mainly caused by deforestation and peatland drainage. Emissions from agriculture have been rising on a yearly basis since 1990, although with important regional differences (they went down in Europe and up in Asia).<sup>2</sup> So far, these emissions have not been addressed under the UNFCCC

and the Kyoto Protocol, partly because of a lack of political will, because of fear of negative impact on food production, and because of regulatory difficulties.<sup>3</sup> It is, for example, difficult to measure emissions at the individual farm level since a variety of factors determine the amount of emissions (such as the diet of individual animals, soil composition, weather systems of individual regions, the way in which fertilizer is applied, etc.).<sup>4</sup> In addition to emissions, removals are relevant as well since crops and other vegetation absorb CO<sub>2</sub> from the air.

Second, agriculture is also among the sectors that will suffer the largest negative impacts of climate change, for which, consequently, huge adaptation efforts are needed.<sup>5</sup> In its 5<sup>th</sup> Assessment Report, the IPCC finds that for the major crops in tropical and temperate regions (wheat, rice and maize), climate change without adaptation will negatively impact production with local temperature increases of 2°C or more.<sup>6</sup> In fact, the IPCC finds that climate trends have already negatively affected wheat and maize production for many regions,<sup>7</sup> which has led some to comment that even the Agreement's goal of 1,5°C will be insufficient to stop productivity loss in agri-

\* Professor of European and International Environmental Law at Tilburg University. This is a shortened version of a paper presented at the Australian Centre for Climate and Environmental Law Conference 'The Legal Implications of the Paris Agreement' (University of Sydney, 11 February 2016). This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 655565.

1 P Smith et al., 'Agriculture, Forestry and Other Land Use (AFOLU)' in *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press 2014) 816.

2 Smith et al., above note 2 at 823.

3 See in more detail my chapter 'Climate Change and Agriculture under the United Nations Framework Convention on Climate Change and Related Documents' in: M J Angelo, A DuPlessis

(eds.), *Research Handbook on Climate and Agricultural Law* (Edward Elgar 2016).

4 Hugh Saddler and Helen King, 'Agriculture and Emissions Trading: The impossible dream?' (The Australia Institute Discussion Paper 2008) 102.

5 J R Porter et al., 'Food Security and Food Production Systems' in *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press 2014) 513.

6 Porter et al., above note 6 at 488.

7 Ibid. at 491. In some high-latitude regions, individual locations also benefit from climate change. It is expected that the majority of locations will experience negative impacts while some locations benefit from climate change. Overall, there will be a steady decline of the world's food production because of climate change. Ibid. at 505.

culture.<sup>8</sup> Negative yield impacts for all crops past 3°C of local warming without adaptation are to be expected, even with benefits of higher CO<sub>2</sub> and rainfall (both positively affecting plant growth).<sup>9</sup> There is high confidence that irrigation demand will increase significantly in many areas (by more than 40% across Europe, USA, and parts of Asia).<sup>10</sup> A wide range of adaptation measures is considered necessary. According to the IPCC effective adaptation of cropping could be critical in enhancing food security and sustainable livelihoods, especially in developing countries.<sup>11</sup> Adaptation of cropping includes altering cultivation and sowing times, crop cultivars and species, and marketing arrangements.<sup>12</sup> When focusing on water availability, switching to more appropriate crop varieties (drought-resistant, salt-resistant, low water demand), improved irrigation efficiency, reduced demand for irrigation water, and reusing wastewater to irrigate crops are important adaptation measures.<sup>13</sup>

Third, we live in a world that is increasingly food-insecure. Between now and 2050, there will be a sharp increase in the demand for agricultural products. It has been calculated that global food production needs to increase by 40% to meet growing demand, mainly because of population growth (the world's population will grow from 7 billion today to 9 billion in 2050) and because of a rise in global calorie intake by 60% due to greater affluence, particularly in countries like China and India.<sup>14</sup> Climate change negatively impacts food production, so it is expected that the rise in production will be difficult to achieve. It is expected that by 2050, 56% of crops in Sub-Saharan Africa and 21% of crops in Asia will be negatively affected by the consequences of climate change, for instance because of shifts in water availability, temperature shifts and changes in the occurrence of pests.<sup>15</sup> To make things worse, under a business-as-usual scenario, a rise in agricultural production would lead to a further increase of greenhouse gas emissions from agriculture.<sup>16</sup> Roughly in the same period of time, however, global greenhouse gas emissions have to sharply decrease to meet the UNFCCC's goal of a less than 2°C rise of global temperature. Firm mitigation policies could, therefore, negatively affect food production. The IPCC noted that, although feedbacks between greenhouse gas reduction and food security are not completely understood,<sup>17</sup> large-scale biomass supply for energy, or carbon sequestration in the AFOLU sector provide important mitigation measures, but at the same time have potential implica-

tions for food security.<sup>18</sup> Research indicates that the large-scale use of bioenergy is threatening food security in Africa because productive lands for sustainable food production are used to produce biofuels.<sup>19</sup> The 2007/2008 global food price spikes are believed to have been partially caused by the rise in biofuel production.<sup>20</sup> Conventional agriculture will also face price increases from emission caps or pricing mechanisms placed upon the use of fuels and fertilizers, as agriculture is a heavily energy dependent sector not only in the developed world, but also increasingly in Latin America and Asia.<sup>21</sup> This shows that climate policies and agricultural policies have to be carefully aligned so as to prevent negative side effects of climate change mitigation on food security and vice versa.

## II. Agriculture in the Paris Agreement on Climate Change

Agriculture was hardly specifically mentioned in the various versions of the Negotiating Text for the Paris Agreement on Climate Change, nor in the final text that was adopted at COP21.<sup>22</sup> The only mention was in the provision on mobilizing finance where states

8 See, for example, the blogpost by Bruce Campbell, director of the CGIAR Research Program on Climate Change, Agriculture and Food Security, coordinated by the University of Copenhagen: *Climate Change: Half a Degree Will Make a World of Difference for the Food We Eat* <[http://www.huffingtonpost.com/bruce-campbell-phd/climate-change-half-a-deg\\_b\\_8756428.html](http://www.huffingtonpost.com/bruce-campbell-phd/climate-change-half-a-deg_b_8756428.html)> accessed 1 February 2016.

9 Porter et al, above note 6 at 505.

10 Ibid. at 251.

11 Ibid. at 514.

12 Ibid.

13 Ibid. at 255.

14 Bruce Campbell, Wendy Mann, Ricardo Meléndez-Ortiz, Charlotte Streck and Timm Tennigkeit, *Agriculture and Climate Change: A Scoping Report* (Meridian Institute 2011) 1.

15 Ibid. at 2.

16 Ibid. at 3.

17 Smith et al., above note 2 at 837.

18 Ibid. at 816.

19 Ibid. at 854.

20 ICTSD-IPC Platform on Climate Change, Agriculture and Trade: *Considerations for Policymakers* (International Centre for Trade and Sustainable Development 2009) 2.

21 Ibid.

22 This section is based upon the negotiating texts and the final agreement, all of which are available through <<http://paristext2015.com/>> accessed 1 February 2016.

are called upon to support the integration of climate objectives into other policy-relevant areas and activities “such as agriculture”.<sup>23</sup> In the final Agreement Negotiating Text by the Co-chairs, all references to “agriculture” had disappeared.<sup>24</sup> As a consequence, the Agreement, as adopted at COP21, does not refer to agriculture at all.

In the full text proposals which aimed to set adaptation goals, “maintaining food security” was mentioned,<sup>25</sup> but in the final Agreement Negotiating Text by the Co-chairs, this reference had disappeared, only to reappear in the draft COP Decision’s preamble.<sup>26</sup> The latter reference did survive the negotiations in Paris at COP21, so that the preamble to the Paris Agreement on Climate Change now states: “Recognizing the fundamental priority of safeguarding food security and ending hunger, and the particular vulnerabilities of food production systems to the adverse impacts of climate change”.

Food production regularly also emerged as a topic in the full Negotiating Texts as a limiting factor to mitigation actions (similar to Art. 2 UNFCCC, see section 2.3 above). In the final version of the Paris Agreement on Climate Change, only one such reference survived. Article 2 has the main objectives of the Agreement, one of which is: “Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production”.<sup>27</sup>

Given the contribution of agriculture to climate change and the impact of climate change on agriculture, it is disappointing that so little attention is paid to agriculture in the Paris Agreement on Climate change that sets the tone for the coming years.

The European Union opted for a much firmer approach toward agriculture. In the run-up to the Agreement, the European Commission announced that it would encourage “climate friendly and resilient food production, while optimising the sector’s contribution to greenhouse gas mitigation and sequestration.”<sup>28</sup> For example, it proposed to include cropland and grazing land management in its policy from 2020, developing instruments to do so before 2020. The EU even proposed to focus its future climate change instruments on all agricultural activities, such as enteric fermentation, manure management, rice cultivation, agricultural soils, prescribed burning of savannahs, field burning of agricultural residues, liming, urea application, other carbon-containing fertilisers, cropland management and grazing land management and “other.”<sup>29</sup> As a consequence, the EU proposed to fully include agriculture in the Paris Agreement on Climate Change in two ways: as a source of greenhouse gas emissions, and as a means of CO<sub>2</sub> absorption and sequestration. This would mean that the agricultural sector has to undergo a drastic transition from conventional farming to farming using climate smart agricultural practices.

The fact that the Paris Agreement on Climate Change does not pay attention to agriculture, does not mean that the document will not be important for the sector. Article 4 states that a balance needs to be achieved between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century, in order to hold the increase in the global average temperature well below 2 degrees Celsius above pre-industrial levels.<sup>30</sup> Recent research shows that a 1.5 to 2 degree target roughly implies a transition to net zero carbon emissions worldwide to be achieved between 2045 and 2060.<sup>31</sup> This automatically implies that drastic mitigation actions are needed to reduce emissions from agriculture and land use, as this sector is responsible for almost 25% of the global emissions (as was shown above). Many of the provisions on adaptation and finance aim at giving increased support to developing countries to meet their adaptation needs, both through greater emphasis on providing financial resources and through the transfer of technology and

23 FCCC/ADP/2015/1, 40 (version 11 June 2015) (under 101bis).

24 Co-chairs, Non-paper of 5 October 2015, <<http://unfccc.int/resource/docs/2015/adp2/eng/8infnot.pdf>> accessed 1 February 2016.

25 FCCC/ADP/2015/1, 21 (under 50).

26 Co-chairs, above note 25 at 10.

27 Art. 2(1)(b) Paris Agreement on Climate Change.

28 European Commission, ‘Commission Staff Working Document. Accompanying the Document Communication from the Commission to the European Parliament and the Council “The Paris Protocol – A Blueprint for Tackling Global Climate Change Beyond 2020”’ (SWD 2015) 17 final, 18.

29 European Commission, ‘Energy Union Package. Communication from the Commission to the European Parliament and the Council “The Paris Protocol – A Blueprint for Tackling Global Climate Change Beyond 2020”’ (COM 2015) 81 final, 16.

30 Art. 4(1) and Art. 2(1)(a) Paris Agreement on Climate Change. Note that the draft texts proposed much stricter end goals, such as zero emissions or full decarbonisation by 2050, FCCC/ADP/2015/1, 9-10 (under 17.2).

31 J Rogelj, G Luderer et al., ‘Energy system transformations for limiting end-of-century warming to below 1.5 °C’ (2015) 5 *Nature Climate Change* 519.

capacity building.<sup>32</sup> Given the impact of climate change on agriculture and the dependence of developing countries on this sector, it is beyond doubt that implementation of these new provisions will largely focus on agriculture. Another important new instrument may become the National Adaptation Plan (NAP). Under the Agreement, parties are required to engage in adaptation planning processes and building the resilience of socioeconomic systems, which obviously also include agricultural policies.<sup>33</sup> Other pending changes that are relevant for agriculture are a further integration of the various funds under the Financial Mechanism of the Convention, and a strengthening of the role of the Adaptation Committee.<sup>34</sup>

### III. Outlook

Climate change has a profound impact on agriculture and on food security. At the same time agriculture contributes to climate change to a considerable extent. Fortunately there is also much to gain since the agricultural sector holds significant climate change mitigation potential through reductions of greenhouse gas emissions and enhancement of sequestration: "Agriculture offers a wealth of opportunities to deliver simultaneously on improving agricultural resilience to climate change, increasing food production, and lowering emissions. Many of these opportunities use practices, technologies, and systems that are already available and affordable, but need to be tailored to specific contexts and may require incentives from climate finance to ensure adoption. Some interventions also benefit wider environmental services, farming incomes, and agriculture-based economies."<sup>35</sup> A policy aimed at achieving greenhouse gas emission reductions, adaptation to climate change and an increase in productivity is, therefore, very much needed. "Climate smart agriculture" policies are being proposed, but so far remain underdeveloped.

Unfortunately, the Paris Agreement on Climate Change does not provide a powerful stimulus to adopt and implement climate smart agriculture policies. The Agreement, in this respect, does not change the troublesome relationship between agriculture policies and climate policies that we have already witnessed under the UNFCCC and the Kyoto Protocol. Under the UNFCCC, there is little attention to reducing emissions from agriculture. Most attention focuses on adaptation to climate change in rural areas in developing countries, particularly through the various instruments that finance adaptation projects in developing countries. Yet even in that area progress is painfully slow. Much more concrete action is needed to facilitate the transfer of adaptation technologies and adaptation know-how as well as funds to finance adaptation measures in agriculture to developing countries. For the developed countries, the UNFCCC does not make much of a contribution to addressing climate change and food security issues. This is a pity, as the developed country agriculture sector will play an important role in addressing the increasing global demand for food. Fortunately developed countries, including important players such as the EU, do not have to wait for the UNFCCC process. The EU recently announced its intention to implement an ambitious policy aimed at climate friendly and resilient food production, while optimising the agricultural sector's contribution to greenhouse gas mitigation and sequestration. It is of vital importance that this example is followed and implemented across the globe. Hopefully such initiatives will then be picked up by the international community under the UNFCCC process.

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32 See for example Articles 7, 9, 10 and 11 of the Paris Agreement on Climate Change.

33 Art. 7(9) Paris Agreement on Climate Change.

34 See the decision that accompanies the Paris Agreement on Climate Change, FCCC/CP/2015/L.9.

35 Campbell et al., above note 15 at 92.