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2. Climate change and agriculture under the United Nations Framework Convention on Climate Change and related documents

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1. INTRODUCTION

Agriculture contributes to climate change to a considerable extent.² Agriculture is also among the sectors that will suffer the largest negative impacts of climate change, for which, consequently, huge adaptation efforts are needed.³ At the same time this sector faces the challenge of feeding a growing world population that is getting richer, leading to a tremendous increase in demand for agricultural products between now and 2050.⁴ Yet agriculture has only played a marginal role in the United Nations Framework Convention on Climate Change (UNFCCC)⁵ and the

¹ 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.

² 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 GtCO₂eq/yr) of anthropogenic GHG emissions mainly from deforestation and agricultural emissions from livestock, soil and nutrient management. P Smith *et al.*, 'Agriculture, Forestry and Other Land Use (AFOLU)' in Ottmar Edenhofer *et al.* (eds), *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.

³ JR Porter *et al.*, 'Food Security and Food Production Systems' in Christopher B Field *et al.* (eds), *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.

⁴ According to the IPCC, all aspects of food security are potentially affected by climate change. Porter *et al.* (n 3) 488.

⁵ United Nations Framework Convention on Climate Change (9 May 1992), (1992) 31 ILM 849, entered into force 21 March 1994.

Kyoto Protocol.⁶ Because emissions from agriculture have been rising on a yearly basis since 1990,⁷ and because the increase in demand for agricultural products (both for food and for biofuels) will cause emissions to rise further, agriculture can no longer be ignored in international negotiations.⁸ The Paris Agreement, though, is not expected to drastically change the role of agriculture in the international legal framework on climate change mitigation and adaptation.

This chapter critically assesses the current and potential role of the UNFCCC and related documents, most importantly the Kyoto Protocol, in addressing the combined challenges of reducing greenhouse gas emissions and adapting to changing climate while increasing productivity for the agricultural sector. The chapter first focuses on mitigation, next addresses adaptation and then briefly looks ahead by reviewing the Paris Agreement, which was finalized at the UNFCCC's COP21 in December 2015.⁹

2. AGRICULTURE IN THE UNFCCC AND THE KYOTO PROTOCOL: MITIGATION

Greenhouse gas emissions attributed to the agricultural sector originate from a variety of sources. The UNFCCC and related documents do not deal with all of these emissions in an integrated, sector-specific way. First of all a distinction is made between CO₂ emissions and non-CO₂ emissions. Non-CO₂ emissions are methane and nitrous oxide emissions from livestock and the use of fertilizers, respectively. These can be fairly easily calculated or estimated at national levels (for instance by measuring methane emissions per animal or nitrous oxide emissions per unit of arable land),¹⁰ provided

⁶ Kyoto Protocol to the United Nations Framework Convention on Climate Change, UN Doc FCCC/CP/1997/7/Add. 1 (10 December 1997), (1998) 37 ILM 22, entered into force 16 February 2005.

⁷ Smith *et al.* (n 2) 823.

⁸ According to the IPCC's WGIII, 'lack of an international agreement that supports a wide implementation of AFOLU measures can become a major barrier for realizing the mitigation potential from the sector globally'. Smith *et al.* (n 2) 859.

⁹ Paris Agreement under the United Nations Framework Convention on Climate Change, FCCC/CP/2015/L.9 (12 December 2015), not yet entered into force.

¹⁰ Peter Wehrheim and Asger Strange Oleson, 'Land Use, Land Use Change and Forestry – How to Enter the Climate Impact of Managing Biospheres and Wood into the EU's Greenhouse Accounting' in G van Calster *et al.* (eds), *Research Handbook on Climate Change Mitigation Law* (Edward Elgar 2015) 304.

uniform emission factors are used.¹¹ At the individual farm level these emissions are much more difficult to measure, 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, and so on).¹² CO₂ emissions from agriculture are even more difficult to estimate because both the emission and the removal of CO₂ affects crops and other vegetation, as it is absorbed from the air. Therefore for practical and political reasons, 'agricultural emissions' under the UNFCCC only includes methane and nitrous oxide emissions.¹³ These are called non-land emissions; emissions associated with the application of fertilizer and manure on soils are the only soil-based emissions included in the UNFCCC process.¹⁴ Greenhouse gas emissions from soils through tillage, cropland and grazing land management, or the conversion of land into agricultural land are not considered part of the agricultural sector but are instead part of the LULUCF sector (Land Use, Land Use Change and Forestry).¹⁵ Because this approach risks fragmenting opinion on the contribution of agriculture to climate change, with double counting and inconsistencies, the IPCC in its 2006 guidelines decided to combine its assessments of emissions from agriculture and LULUCF.¹⁶ The IPCC, now under AFOLU (Agriculture, Forestry and Other Land Use), reports on emissions from grassland, cropland, forest land, settlements, wetlands, other land, harvested wood products, liming and urea application, direct and indirect N₂O emissions from managed soils, emissions from biomass burning, enteric fermentation, manure management, rice cultivation and other agricultural activities.

¹¹ Andrew Macintosh and Lauren Waugh, *An Introduction to the Carbon Farming Initiative: Key Principles and Concepts* (ANU 2012) 15.

¹² Hugh Saddler and Helen King, *Agriculture and Emissions Trading: The Impossible Dream?* (Australia Institute 2008) 102.

¹³ *Ibid* at 307.

¹⁴ *Ibid.*

¹⁵ *Ibid.*

¹⁶ HS Eggleston *et al.* (eds), '2006 IPCC Guidelines for National Greenhouse Gas Inventories' (*IGES*, 2006), accessed 10 October 2016 at <http://www.ipcc-nggip.iges.or.jp/public/2006gl>.

3. MITIGATION OBLIGATIONS FOR AGRICULTURAL EMISSIONS UNDER THE UNFCCC AND THE KYOTO PROTOCOL

3.1 Mitigation Policy and Reporting Requirements

The basic commitments in the UNFCCC are not restricted to specific sectors and therefore apply to agriculture. All parties must have (and report to the COP) national inventories of anthropogenic greenhouse gas emissions and policies that address emissions by their sources and removal by sinks of all greenhouse gases not controlled by the Montreal Protocol.¹⁷ The commitment to sustainably manage, conserve and enhance sinks and reservoirs specifically mentions biomass.¹⁸ For Annex I parties, more stringent formulations apply. These states have to adopt national policies and measures on limiting greenhouse gas emissions and protecting sinks and reservoirs,¹⁹ and they have to report

... detailed information on its policies and measures ... as well as on its resulting projected anthropogenic emissions by sources and removals by sinks of greenhouse gases ... with the aim of returning individually or jointly to their 1990 levels these anthropogenic emissions of carbon dioxide and other greenhouse gases not controlled by the Montreal Protocol.²⁰

The Kyoto Protocol further expands the reporting obligation for Annex I parties, to mandate estimates to be made of changes in carbon stocks since 1990.²¹ Later, this was expanded even further to include changes in greenhouse gas emissions by sources and removals by sinks in agricultural soils and land-use changes.²²

The reports, annually submitted under these provisions, provide a wealth of information on current trends in agricultural emissions, as well as the policies within Annex I countries that are in place to address these emissions in the Annex I countries. Tens of thousands of pages are produced every year. It is impossible to give a full survey of the content of these reports, so this section will briefly summarize the two most important types – national inventory submissions and national communications – and give some examples from their content, focusing on Annex I countries

¹⁷ Arts 4(1)(a) and (b) UNFCCC.

¹⁸ Art 4(1)(d) UNFCCC.

¹⁹ Art 4(2)(a) UNFCCC.

²⁰ Art 4(2)(b) UNFCCC.

²¹ Art 3(4) KP.

²² Art 3(4) KP.

since the most detailed requirements apply to them. The most important reports are national inventory submissions and national communications.

National inventory submissions consist of the National Inventory Report (NIR) and the Common Reporting Format (CRF). NIRs contain detailed descriptive and numerical information while the CRFs contain summary, sectoral and trend tables for all greenhouse gas emissions and removals.²³ Individual chapters within the submission are devoted to agriculture and to LULUCF, and are (partly) submitted separately because the specific methodology for these categories was developed after the Kyoto Protocol was signed. The EU's 2014 National Inventory Report (dealing with emissions from 1990–2012) includes almost 300 pages on agriculture and LULUCF (more than on any other sector, including energy).²⁴ The report shows that direct soil emissions of nitrous oxide have been reduced, as well as indirect methane emissions from cattle, caused by the decreasing use of fertilizer and manure. Declining cattle numbers in most EU Member States could also play a part, owing to production quotas²⁵ and legislation aimed at reducing nitrates in soil and water.²⁶ Australia, for example, reports that emissions from agriculture decreased by 1 percent between 1990 and 2012, but had increased by 3.3 percent between 2011 and 2012.²⁷ Their 2012 NIR report indicates that these variations were not caused by legislation:

From 2002 until 2010 livestock populations declined in response to the prolonged drought conditions which occurred over extensive areas of southern and eastern Australia. Since late 2010 better seasonal conditions have seen farmers begin to rebuild their herds. Between 2011 and 2012, emissions from enteric fermentation increased by 2.0%.²⁸

²³ All reports are available online through UNFCCC 'National Inventory Submissions 2014', accessed 10 October 2016 at http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/8108.php.

²⁴ European Environment Agency (EEA), *Annual European Union Greenhouse Gas Inventory 1990–2012 and Inventory Report 2014* (EEA 2014) Technical Report No 09/2014.

²⁵ Under the EU's Common Agriculture Policy, the milk quota system led to a strong reduction of animal numbers in the dairy sector, and as consequence also to a reduction of GHG emissions from agriculture.

²⁶ *Ibid* at 529. From the various legal instruments that apply to livestock keeping, the Nitrates Directive (Council Directive 91/676/EEC of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources [1991] OJ L375/1) is considered to have had the largest impact on greenhouse gas emissions from agriculture. This directive aims at reducing water pollution caused by nitrates from agricultural sources.

²⁷ Australian Department of the Environment, *National Inventory Report 2012: Volume 1* (Commonwealth of Australia 2014) 257.

²⁸ *Ibid*.

National communication reports (NCs) detail any policies and measures the country has adopted and their mitigation impact.²⁹ The NCs submitted by Annex I countries in 2014 are in striking contrast to the accompanying NIRs, as far as agricultural sector information is concerned. For each of the Annex I states, the NIRs contains extremely detailed information on all agricultural sources of emissions, including those associated with land use under LULUCF. In the NCs however, policies and measures receive little attention or are almost absent. The Netherlands' report, for example, explicitly states that no sectoral reduction targets will be imposed on methane and nitrous oxide until 2020. Instead the agricultural sector 'is expected to take cost-effective measures that contribute to emission reductions of greenhouse gases on a voluntary basis,' for instance through adapted cattle feed.³⁰

The EU's NC primarily focuses on future impacts of a yet to be fully redesigned Common Agriculture Policy (CAP), especially regarding the second pillar of the CAP, aimed at rural development.³¹ However the first pillar of the CAP, aimed at market and income support, states that 'no comprehensive quantified estimates of the impact of current and future actions on greenhouse gas emissions are available.'³²

3.2 Sector Specific Mitigation Commitments

Comparing the reports on agricultural emissions with those on policies to reduce those emissions demonstrates that under the Kyoto Protocol no sector specific commitments were adopted, nor was LULUCF fully included under the general emission reduction commitment of Article 3(1).³³ Annex A to the Kyoto Protocol lists greenhouse gases that are particularly relevant for agriculture (that is, methane and nitrous oxide). Agriculture is also listed under the sectors and source categories to which the protocol applies ('enteric fermentation, manure management, rice cultivation, agricultural soils, prescribed burning of savannas, field burning of agricultural

²⁹ All reports are available online through UNFCCC, 'Submitted National Communications', accessed 10 October 2016 at http://unfccc.int/national_reports/annex_i_natcom/submitted_natcom/items/7742.php.

³⁰ Netherlands Ministry of Infrastructure and the Environment, *Sixth Netherlands National Communication under the United Nations Framework Convention on Climate Change* (Min I&M 2013) 72.

³¹ European Commission, *Sixth National Communication and First Biennial Report from the European Union under the UN Framework Convention on Climate Change* (European Commission 2014) 375.

³² *Ibid* at 374.

³³ Wehrheim and Oleson (n 10) 307, 309.

residues and other’).³⁴ Taking mitigation measures that specifically target the agricultural sector, however, is left to the discretion of the Annex I Parties to the Protocol. The Protocol explicitly mentions ‘promotion of sustainable forms of agriculture in light of climate change considerations’ as an element of national mitigation policies in Annex I countries that need to be ‘implemented and/or further elaborated.’³⁵ However, promoting sustainable forms of agriculture is a rather general aim that does not necessarily lead to a large reduction of greenhouse gas emissions. For non-Annex I states, Article 10 of the Kyoto Protocol ‘reaffirms existing commitments’ under Article 4(1) of the UNFCCC by stating that they shall ‘(f)ormulate, implement, publish and regularly update national and, where appropriate, regional programmes containing measures to mitigate climate change . . . (i) Such programmes would, inter alia, concern . . . agriculture . . .’³⁶

In most countries, agriculture is not included in binding mitigation schemes. The EU’s emissions trading system (ETS), for instance, does not include agricultural emissions.³⁷ Including farming in an ETS is difficult because of the measuring problem mentioned above. Usage of uniform emission criteria could solve this problem, but also diminishes the incentives for farmers to change their individual behaviour.³⁸ Exceptions do exist. California’s Cap-and-Trade Regulation (2012) includes projects that are eligible to generate carbon credits, like avoiding methane emissions from installation of anaerobic digesters on farms and carbon sequestration in rural forestry.³⁹ Australia’s Carbon Farming Initiative Act (2011) allows farmers to obtain tradable carbon credits for a range of agricultural emissions avoidance projects, such as avoidance of: methane emissions from livestock’s digestive tracts; methane or nitrous oxide emissions from decomposition of livestock urine or dung; methane from rice fields

³⁴ Annex A KP.

³⁵ Art 2(1)(a)(iii) KP.

³⁶ Art 10(b)(i) KP.

³⁷ Wehrheim and Oleson (n 10) 313. Emissions from agriculture have been included in the Effort Sharing Decision (Decision 406/2009/EC of the European Parliament and of the Council of 23 April 2009 on the effort of Member States to reduce their greenhouse gas emissions to meet the Community’s greenhouse gas emission reduction commitments up to 2020 [2009] OJ L140/136), which means that agricultural emissions, together with emissions from other non-ETS sectors, are subject to an overall reduction target for each Member State. Individual Member States are free to choose how and where they are achieving this overall target. As a consequence, the extent to which agricultural emissions are cut following domestic policies and measures varies significantly among the Member States.

³⁸ Macintosh and Waugh (n 11) 15.

³⁹ Smith *et al* (n 2) 865.

or plants; methane or nitrous oxide from the burning of savannahs or grasslands, methane or nitrous oxide from the burning of crop stubble in fields, crop residues in fields or sugar cane before harvest, and methane or nitrous oxide from soil, as well as through sequestration offsets projects.⁴⁰ New Zealand's ETS requires farmers in certain sectors (meat processors, dairy processors, nitrogen fertilizer manufacturers and importers, and live animal exporters) to report biological emissions of methane and nitrous oxide that are produced on-farm. The original plan to require them to surrender allowances under the ETS was dropped in 2012.⁴¹

The clean development mechanism (CDM) includes projects aimed at reducing agricultural emissions, but only to a limited extent.⁴² In 2013 a mere 2.5 percent of the registered projects were related to agriculture.⁴³ Only projects aimed at methane avoidance, biogas projects and agricultural residues for biomass are accepted under the CDM. As a consequence, the IPCC concluded that finance streams coming from agriculture projects are marginal from a global perspective.⁴⁴

Within the frameworks of the UNFCCC and Kyoto Protocol, not much attention is paid to mitigating greenhouse gas emissions from agriculture. The focus remains on adaptation, and is further discussed below. In 2008 the Secretariat of the UNFCCC published a technical paper on mitigation challenges and opportunities in the agriculture sector, in which it gave an overview of mitigation practices and identified the relative mitigation potential of each of these practices, as well as methodological challenges and possible technical barriers to their implementation.⁴⁵ The report was discussed at a workshop of the UNFCCC's Ad-Hoc Working Group on Long-Term Cooperative Action in 2009,⁴⁶ but did not lead to many concrete actions. The workshop concluded, however, that nationally appropriate mitigation actions (NAMAs) should be implemented across

⁴⁰ Macintosh and Waugh (n 11) 15; Celeste Black, 'Linking Land Sector Activities to Emissions Trading: Australia's Carbon Farming Initiative' in Larry Kreiser *et al.*, *Critical Issues in Environmental Taxation Volume XI – Carbon Pricing, Growth and the Environment* (Edward Elgar 2012). See further Chapter ____ of this volume.

⁴¹ Climate Change Response (Emissions Trading and Other Matters) Amendment Act 2012 (New Zealand).

⁴² See Donald F Larson, Ariel Dinar and J Aapris Frisbie, *Agriculture and the Clean Development Mechanism – Policy Research Working Paper 5621* (World Bank 2011).

⁴³ Smith *et al.* (n 2) 864.

⁴⁴ *Ibid.*

⁴⁵ FCCC/TP/2008/8 (21 November 2008).

⁴⁶ FCCC/AWGLCA/2009/CRP.2 (7 April 2009).

the agricultural sector, as 70 percent of the economic potential for mitigation exists in developing countries.⁴⁷ If financial support is generated, either under the Green Climate Fund, bilaterally or through private investors,⁴⁸ developing country Parties to the UNFCCC and the Kyoto Protocol will be enabled to scale up mitigation (and adaptation) activities in the agricultural sector.⁴⁹ A recent compilation of information on NAMAs by the UNFCCC's Subsidiary Body for Implementation actually shows that developing countries, such as African countries working together as the African Group, strongly focus on mitigation measures in the agricultural sector.⁵⁰

3.3 Technology Transfer for Mitigation

Common but differentiated responsibilities, as laid down in Article 3(1) of the UNFCCC, constitute a basic principle of international climate law. Various requirements in the UNFCCC and the Kyoto Protocol employ this principle, most notably the provisions on transferring mitigation technologies to developing countries. Article 4(1) of the UNFCCC generally requires all Parties to:

[p]romote and cooperate in the development, application and diffusion, including transfer, of technologies, practices and processes that control, reduce or prevent anthropogenic emissions of greenhouse gases . . . in all relevant sectors, including the . . . agriculture . . . sector[s].⁵¹

Developed Country Parties, particularly Annex II states, are even required to 'take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies and knowhow to other Parties, particularly developing country Parties.'⁵² Although this provision imposes a legally binding duty upon developed states, implementation is generally lacking. As a consequence, the topic of technology transfer has gained much attention. In 2007 the Bali Action Plan identified technology development and transfer as a priority area.⁵³

⁴⁷ *Ibid* at 2.

⁴⁸ Mihoko Kawamura and Kenji Utsunomiya, *NAMA Finance Study Examples from the UNEP Bilateral Finance Institutions Climate Change Working Group* (UNEP 2012).

⁴⁹ *Ibid.*

⁵⁰ FCCC/SBI/2013/INF.12/Rev.3 (19 January 2015) 4–6.

⁵¹ Art 4(1)(c) UNFCCC. See also Art 10(c) KP.

⁵² Art 4(5) UNFCCC.

⁵³ FCCC/CP/2007/6/Add.1 (14 March 2008).

In 2010 a Technology Mechanism was established ‘to facilitate the implementation of enhanced action on technology development and transfer, to support action on mitigation and adaptation, in order to achieve the full implementation of the Convention’.⁵⁴

Despite these recent international developments, developing countries still have difficulty obtaining clean technologies from developed countries, mostly because of the less attractive international investment conditions in these countries and the lack of technical capacity and training systems.⁵⁵ The protection of intellectual property rights could be another potential barrier to technology transfer.⁵⁶ Polarized debates between some developed and developing countries have prevented meaningful discussions about intellectual property rights from taking place under the UNFCCC.⁵⁷ However, the WTO’s IPR law, as laid down in the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS), actually favours greater access to agricultural technologies and practices, while at the same time protecting intellectual property rights.⁵⁸ Nevertheless, transferring technology to developing countries – in practice – still is problematic.⁵⁹

3.4 Relationship to Food Security

We live in a world that is increasingly food-insecure. Between now and 2050, the demand for agricultural products will increase sharply. Global food production needs to increase by 40 percent 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 a 60 percent rise in global caloric intake (due to greater affluence, particularly in countries like China

⁵⁴ FCCC/CP/2010/7/Add.1 (15 March 2011).

⁵⁵ Smith *et al.* (n 2) 1236.

⁵⁶ Matthew Rimmer, *Intellectual Property and Climate Change. Inventing Clean Technologies* (Edward Elgar 2011) 39–82; Markus W Gehring, Marie-Claire Cordonier Segger and Jarrod Hepburn, ‘Climate Change and International Trade and Investment Law’ in Rosemary Rayfuse and Shirley V Scott (eds), *International Law in the Era of Climate Change* (Edward Elgar 2012) 98.

⁵⁷ Bruce Campbell *et al.*, *Agriculture and Climate Change: A Scoping Report* (Meridian Institute 2011) 39.

⁵⁸ Art 7 of the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS Agreement) (Marrakesh Agreement Establishing the World Trade Organization 1869 UNTS 299, 33 ILM 1197 (1994)) Annex IC.

⁵⁹ Robert W Adler, ‘Climate Change Adaptation and Agricultural and Forestry Law’ in Jonathan Verschuuren (ed.), *Research Handbook on Climate Change Adaptation Law* (Edward Elgar 2013) 242–3. Rimmer, however, argues that the flexibilities of the TRIPS Agreement thought to enable access to agricultural technologies and practices are overrated: Rimmer (n 56) 87.

and India).⁶⁰ Climate change negatively impacts food production, so much that the rise in production will be difficult to achieve. By 2050, 56 percent of crops in Sub-Saharan Africa and 21 percent of crops in Asia will experience negative effects of climate change, including shifts in water availability, temperature shifts and changes in the occurrence of pests.⁶¹ To make things worse, a rise in agricultural production would lead to further increases in greenhouse gas emissions from agriculture.⁶² In roughly the same period of time, however, global greenhouse gas emissions must sharply decrease to meet the UNFCCC's goal of a less than 2°C rise in global temperature.

Firm mitigation policies could, therefore, negatively affect food production. The IPCC noted that, although feedback between greenhouse gas reduction and food security is not completely understood,⁶³ large scale biomass energy supplies and carbon sequestration in the AFOLU sector both provide important mitigation measures, but also have potential implications for food security.⁶⁴ The large scale use of bioenergy threatens food security in Africa because productive lands for sustainable food production are used instead to produce biofuels.⁶⁵ The 2007/2008 global food price spikes are believed to have been partially caused by the rise in biofuel production.⁶⁶ Conventional agriculture will also face price increases from emission caps or pricing mechanisms placed upon the use of fuels and fertilizers, as agriculture is heavily energy dependent not only in the developed world, but also increasingly in Latin America and Asia.⁶⁷

The above indicates why Article 2 of the UNFCCC is an important provision when discussing climate policies for the agricultural sector. Article 2 states that the objective of the Convention, and any related legal instruments that the Conference of the Parties may adopt to prevent dangerous anthropogenic interference with the climate system, has to be 'achieved within a time-frame sufficient . . . to ensure that food production is not threatened . . .'. As a consequence, mitigation policy development has to include food security objectives. The concept of 'climate smart agriculture'

⁶⁰ Campbell *et al* (n 57) 1.

⁶¹ *Ibid* at 2.

⁶² *Ibid* at 3.

⁶³ Smith *et al.* (n 2) 837.

⁶⁴ *Ibid* at 816.

⁶⁵ *Ibid* at 854.

⁶⁶ International Centre for Trade and Sustainable Development (ICTSD) and International Food and Agricultural Trade Policy Council, *ICTSD-IPC Platform on Climate Change, Agriculture and Trade: Considerations for Policymakers* (ICTSD 2009) 2.

⁶⁷ *Ibid.*

does just that: it is an approach to developing technical, policy and investment conditions that will achieve sustainable agricultural development for food security under climate change.⁶⁸ Climate smart agriculture focuses on three targets at the same time: sustainably increasing agricultural productivity and incomes, adapting and building resilience to climate change, and reducing and/or removing greenhouse gas emissions where possible.⁶⁹ So far, most attention for climate smart agriculture has focused on developing countries, but one can expect this concept to emerge as the leading policy approach worldwide.

3.5 Relationship to Trade⁷⁰

The UNFCCC, in Article 3(5), provides that mitigation measures should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade. Similarly, the Kyoto Protocol states that Annex I Parties, in their mitigation policies, should minimize adverse effects on international trade.⁷¹ These provisions are relevant for agriculture, as the food market is a global market that is severely affected by climate change, as just discussed. This is also a market that is heavily influenced by the provision of trade-distorting subsidies in developed countries,⁷² which is important for mitigation as current financial support schemes for farmers may influence the level of their greenhouse gas emissions. A singular focus on production will likely lead to increased use of fertilizers, for example, and may constrain climate smart agriculture by not financially rewarding farmers for switching to agricultural practices aimed at climate change mitigation and adaptation.⁷³

In several countries, income support policies are slowly including climate change factors. In the initial proposals to reform the EU's Common Agricultural Policy, the European Commission suggested earmarking 30 percent of direct payments for farmers who apply agricultural practices beneficial to the environment (through crop diversification, maintenance of permanent pasture, the preservation of environmental reservoirs and landscapes, and so on). In addition, the Commission proposed giving increased financial support to agri-environment-climate projects

⁶⁸ FAO, *Climate Smart Agriculture Sourcebook* (FAO 2013) ix.

⁶⁹ *Ibid.*

⁷⁰ For more detail on international trade law, see Chapter 10 of this volume.

⁷¹ Art 2(3) KP.

⁷² Adler (n 59) 239.

⁷³ *Ibid* 240.

and organic farming under the EU's rural development policy.⁷⁴ In the final stages of the negotiations, however, these proposals were watered down considerably.⁷⁵ Yet Regulation (EU) 1307/2013 offers a first significant attempt to promote more climate-friendly agriculture, by introducing measures to implement crop diversification, the preservation of permanent grassland and ecological focus areas.⁷⁶ Still, much more rigorous and overarching policies are needed to encourage European farmers to adopt climate smart agricultural practices.

Under the WTO, reducing market distortions caused by income support to farmers has been discussed for years now, albeit without significant progress toward the liberalization of trade in agricultural products.⁷⁷ Global trade in biofuels has caused a number of trade disputes about subsidies and non-tariff barriers.⁷⁸ International trade law also imposes limits on the transfer of technology, as was explained earlier.

Generally, the relationship between the UNFCCC and the WTO is troublesome. Adler describes it as a chicken and egg problem: the UNFCCC and the Kyoto Protocol prohibit climate policies that restrict international trade (using WTO terminology), while within the WTO, officials and negotiators wait for a comprehensive agreement to replace the Kyoto Protocol before addressing the relationship between the climate change regime and trade law.⁷⁹ Campbell *et al.* conclude that, on the one hand, climate change mitigation policies and measures related to agricultural trade remain ungoverned by the UNFCCC, while on the other hand, international

⁷⁴ *Commission Staff Working Document, Principles and recommendations for integrating climate change adaptation considerations under the 2014–2020 rural development programmes*, SWD (2013) 139 Final, 8–9.

⁷⁵ David Baldock and Kaley Hart, 'A Greener Cap: Still within Reach?' (2013), accessed 10 October 2016 at http://www.ieep.eu/assets/1183/Trilogue_Paper_-_April_2013_Final.pdf.

⁷⁶ Regulation (EU) No 1307/2013 of the European Parliament and of the Council of 17 December 2013 establishing rules for direct payments to farmers under support schemes within the framework of the common agricultural policy and repealing Council Regulation (EC) No 637/2008 and Council Regulation (EC) No 73/2009, [2013] OJ L347/608.

⁷⁷ See Campbell *et al.* (n 57) 38. See also Chapter 10 of this volume.

⁷⁸ Smith *et al.* (n 2) 867. See extensively Gehring, Cordonier Segger and Hepburn (n 56) 84–117.

⁷⁹ Adler (n 59) 239. See on the relationship of the Kyoto Protocol and the WTO, Robert Howse and Antonia L Eliason, 'Domestic and International Strategies to Address Climate Change: An Overview of the WTO Legal Issues' in Thomas Cottier, Olga Nartova and Sadeq Z Bigdeli (eds), *International Trade Regulation and the Mitigation of Climate Change. World Trade Forum* (Cambridge University Press 2009).

trade law may support mitigation measures but has not been designed for that purpose.⁸⁰ They too think it is important that a new international climate change agreement be reached, so that countries have no excuse to apply unilateral or plurilateral measures that could lead to trade disputes. These measures, by some countries, are considered discriminatory by other countries and, therefore, are not covered by the general exception under Article XX of the WTO's Global Agreement on Tariffs and Trade.⁸¹

4. AGRICULTURE IN THE UNFCCC AND THE KYOTO PROTOCOL: ADAPTATION

4.1 The Need for Adaptation

The second pillar of the UNFCCC is adaptation. For agriculture, adaptation is essential. In its Fifth 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, although individual locations may benefit.⁸² Negative yield impacts for all crops past 3°C of local warming without adaptation are to be expected, even with benefits of higher CO₂ and rainfall (both positively affecting plant growth).⁸³ There is high confidence that irrigation demand will increase significantly in many areas (by more than 40 percent across Europe, USA and parts of Asia).⁸⁴ A wide range of adaptation measures is necessary. According to the IPCC, effective crop adaptation is critical in enhancing food security and sustainable livelihoods, especially in developing countries.⁸⁵ Crop adaptation includes altering cultivation and sowing times, crop cultivars and species, and marketing arrangements.⁸⁶ When focusing on water availability, switching to more appropriate crop varieties (drought resistant, salt resistant, low water demand) improves irrigation efficiency and reduces demand for irrigation water. Reusing wastewater to irrigate crops is also an important adaptation measure.⁸⁷

⁸⁰ Campbell *et al.* (n 57) 44.

⁸¹ *Ibid.*

⁸² Porter *et al.* (n 3) 488.

⁸³ *Ibid.* at 505.

⁸⁴ *Ibid.* at 251.

⁸⁵ *Ibid.* at 514.

⁸⁶ *Ibid.*

⁸⁷ *Ibid.* at 255.

4.2 Adaptation Obligations under UNFCCC and the Kyoto Protocol⁸⁸

4.2.1 Adopt adaptation policy: NAPAs

All Parties to the UNFCCC have to formulate, implement, publish and regularly update national and regional programs containing measures to facilitate adequate adaptation to climate change.⁸⁹ Since 2001 the development of such domestic policies has been guided under the UNFCCC through the guidelines for the preparation of National Adaptation Programmes of Action (NAPA), particularly with the aim of assisting the least developed countries in the process.⁹⁰ By 2015, 50 of the least developed countries had submitted their NAPAs, containing detailed priority policies to address their urgent and immediate need for climate change adaptation.⁹¹ Each NAPA reports on the urgent and immediate needs for which further delay could increase vulnerability to climate change or lead to increased costs at a later stage. Almost all primarily focus on agriculture. The Malawi NAPA, for instance, states that Malawi relies on rain-fed agriculture and that droughts have resulted in poor crop yields or total crop failure, leading to serious food shortages, hunger and malnutrition. In addition, floods have also severely disrupted food production. The Malawi NAPA proposes improved early warning systems, improved crop varieties, improved livestock breeds, and improved crop and livestock management practices.⁹² Nepal's NAPA, to give another example, formulates extensive policies to increase communities' resilience in the field of agriculture,⁹³ and proposes very concrete measures to enhance resilience in agriculture and

⁸⁸ See, generally, Jonathan Verschuuren, 'Climate Change Adaptation under the United Nations Framework Convention on Climate Change and Related Documents' in Jonathan Verschuuren (ed), *Research Handbook on Climate Change Adaptation Law* (Edward Elgar 2013). Some paragraphs in s 3.2 are based upon texts from this source.

⁸⁹ Art 4(1)(b) UNFCCC.

⁹⁰ Decision 28/CP. 7, FCCC/CP/2001/13/Add. 4, 7–13.

⁹¹ The secretariat of the UNFCCC makes all of these available through their website, UNFCCC, 'NAPAs Received by the Secretariat', accessed 10 October 2016 at http://unfccc.int/cooperation_support/least_developed_countries_portal/submitted_napas/items/4585.php.

⁹² Malawi Ministry of Mines, 'National Adaptation Programmes of Action, (*Ministry of Mines, Natural Resources and Environment*, 2006) ix, accessed 10 October 2016 at http://unfccc.int/cooperation_support/least_developed_countries_portal/submitted_napas/items/4585.php.

⁹³ Government of Nepal, 'National Adaptation Programme of Action (NAPA) to Climate Change' (2010), accessed 10 October 2016 at http://unfccc.int/cooperation_support/least_developed_countries_portal/submitted_napas/items/4585.php.

food security, such as tree planting around farm lands,⁹⁴ better rain water collection, changing crops (replacing potatoes, moving to short duration crops), implementing drip irrigation, and so on.⁹⁵ Adopting a NAPA is an important prerequisite for developing countries to receive financial aid as further discussed below.

4.2.2 Reporting on adaptation

Some of the reporting requirements mentioned above are equally relevant for adaptation. Under the Kyoto Protocol, Annex I parties have to submit information on their adaptation policies for various sectors (including agriculture) in their national communication; other parties can do so voluntarily.⁹⁶ The NCs indeed pay attention to this. The Australian Sixth NC, for example, reports that research is being carried out to test responses of key Australian crops to increases in temperature and carbon dioxide; monitor ways to manage heat stress in livestock; examine potential new shrub-based forages for livestock; and evaluate the relocation of various crops to northern Australia.⁹⁷ Their Intergovernmental Agreement on National Drought Program Reform also includes measures to better support farmers and their families as they prepare for droughts and other challenges.⁹⁸ According to the NC, the new approach will include: a farm household support payment, promoting Farm Management Deposits and taxation measures, a national approach to farm business training, a coordinated, collaborative approach to the provision of social support services, and tools and technologies to inform farmer decision making.⁹⁹

4.2.3 Cooperation on adaptation

Under the UNFCCC, all parties have the obligation to ‘cooperate in preparing for adaptation to the impacts of climate change; develop and elaborate appropriate and integrated plans for . . . water resources and agriculture, and for the protection and rehabilitation of areas, particularly in Africa, affected by drought and desertification, as well as floods’.¹⁰⁰ This provision also refers to the principle of common but differentiated

⁹⁴ *Ibid* at 69.

⁹⁵ *Ibid* at 68.

⁹⁶ Arts 10(b)(ii) and 7 KP.

⁹⁷ Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education, *Australia’s Sixth National Communication on Climate Change* (Commonwealth of Australia 2013) 176.

⁹⁸ *Ibid* at 177.

⁹⁹ *Ibid*.

¹⁰⁰ Art 4(1)(e) UNFCCC.

responsibilities, and to the specific national and regional development priorities, objectives and circumstances.¹⁰¹ Consequently, the focus for agricultural adaptation is mostly on developing countries. As described above, the Kyoto Protocol more explicitly states that national and regional programmes containing measures that facilitate adequate adaptation for various sectors are to be formulated, implemented, published and regularly updated.¹⁰²

It was only through a 2011 COP decision that the cooperation process referred to in Article 4(1)(e) UNFCCC began. In this decision, the COP requested the Subsidiary Body for Scientific and Technological Advice (SBSTA) to consider issues relating to agriculture, with the aim of exchanging views.¹⁰³ Such an exchange of views has been initiated, but continues to proceed at a rather slow pace.¹⁰⁴ The process does not have a very ambitious goal ('exchanging views'). By 2014 the SBSTA concluded that it would undertake scientific and technical work in the following areas:

- (a) Development of early warning systems and contingency plans in relation to extreme weather events and its effects such as desertification, drought, floods, landslides, storm surge, soil erosion, and saline water intrusion; (b) Assessment of risk and vulnerability of agricultural systems to different climate change scenarios at regional, national and local levels, including but not limited to pests

¹⁰¹ Art 4(1) UNFCCC.

¹⁰² Art 10(b)(i) KP.

¹⁰³ FCCC/CP/2011/9/Add.1, Decision 2/CP.17.

¹⁰⁴ SBSTA 36 initiated the exchange of views on issues relating to agriculture (FCCC/SBSTA/2012/L.19, 25 May 2012). SBSTA 37 (December 2012) continued its exchange of views on issues relating to agriculture. SBSTA 38 invited Parties and admitted observer organizations to submit to the secretariat their views on the current state of scientific knowledge on how to enhance the adaptation of agriculture to climate change impacts while promoting rural development, sustainable development and productivity of agricultural systems and food security in all countries, particularly in developing countries (FCCC/SBSTA/2013/L.20, 13 June 2013). SBSTA 39 (November 2013), acknowledged with appreciation the rich exchange of views by Parties during the in-session workshop on the current state of scientific knowledge on how to enhance the adaptation of agriculture to climate change impacts while promoting rural development, sustainable development and productivity of agricultural systems and food security in all countries, particularly in developing countries, taking into account the diversity of the agricultural systems and the differences in scale as well as possible adaptation co-benefits, and agreed to consider at SBSTA 40 the report of this workshop (FCCC/SBSTA/2013/L.35, 16 November 2013). All the SBSTA documents as well as the various submissions on the topic of adaptation in the agricultural sector by the Parties and observer organisations are available at: UNFCCC, 'Subsidiary Body for Scientific and Technological Advice (SBSTA)', accessed 10 October 2016 at <http://unfccc.int/bodies/body/6399/php/view/documents.php>.

and diseases; (c) Identification of adaptation measures, taking into account the diversity of the agricultural systems, indigenous knowledge systems and the differences in scale as well as possible co-benefits and sharing experiences in research and development and on the ground activities, including socio-economic, environmental and gender aspects; (d) Identification and assessment of agricultural practices and technologies to enhance productivity in a sustainable manner, food security and resilience, considering the differences in agro-ecological zones and farming systems, such as different grassland and cropland practices and systems.¹⁰⁵

This process will take a few more years, as the SBSTA invited parties and admitted observer organizations to submit their views on issues relating to the elements referred to in (a) and (b) by 25 March 2015, and (c) and (d) by 9 March 2016, for consideration at SBSTA 44 and 45, which will take place in 2016.¹⁰⁶

In 2013 the SBSTA organized a workshop on the current state of scientific knowledge on how to enhance the adaptation to climate change while promoting rural development, sustainable development and productivity of agricultural systems in all countries, particularly in developing countries.¹⁰⁷ The workshop found that adaptation of the agriculture sector is an immediate need and a priority.¹⁰⁸ Developing countries expressed their need for financial support, knowledge and technology sharing, and a strengthened institutional capacity.¹⁰⁹ The UNFCCC and the Kyoto Protocol both outline the need for these services, but the fact that these topics were still being discussed at such a basic level in 2013 underlines the slow progress that has been made. The transfer of technology and financial assistance will be explored in more detail below.

4.2.4 Technology transfer for adaptation

Article 4(1)(c) of the UNFCCC (discussed above) on technology transfer only focuses on mitigation technologies. Article 4(5), however, is relevant both for mitigation and adaptation, and is aimed at implementing the

¹⁰⁵ FCCC/SBSTA/2014/L.14 (Distr.: Limited 14 June 2014) SBSTA 40.

¹⁰⁶ *Ibid.*

¹⁰⁷ Workshop held on 12 November 2013 in Warsaw, documents available through: UNFCCC, 'Workshop on the Current State of Scientific Knowledge on How to Enhance the Adaptation of Agriculture to Climate Change Impacts while Promoting Rural Development, Sustainable Development and Productivity of Agricultural Systems and Food Security in All Countries, Particularly in Developing Countries' (2013), accessed 10 October 2016 at http://unfccc.int/meetings/warsaw_nov_2013/workshop/7887.php.

¹⁰⁸ FCCC/SBSTA/2014/INF.2 (13 March 2014) 8.

¹⁰⁹ *Ibid* at 9.

provisions of the Convention, which obviously also includes the provision to adopt and implement an adaptation policy under Article 4(1)(b). Consequently Developed Country Parties, particularly Annex II states, should take all practicable steps to promote, facilitate and finance the transfer of, or access to, adaptation technologies to Developing Country Parties that will enable the implementation of the UNFCCC's adaptation provisions.¹¹⁰ The Kyoto Protocol also requires the transfer of adaptation technologies, and more broadly includes the transfer of knowledge, practices and processes that are 'pertinent to climate change'.¹¹¹ The IPCC noted that successful implementation of adaptation actions depends on access to technology, among other factors.¹¹² This certainly is true for adaptation in agriculture. Relevant technological adaptation options include: new crop and animal varieties, genetic techniques, traditional technologies and methods, efficient irrigation, rainwater harvesting, conservation agriculture, food storage and preservation facilities, and second-generation biofuels.¹¹³ For developing country farmers, the transfer of these technologies is of vital importance.¹¹⁴ The UNFCCC's Technology Executive Committee (TEC) indicates that (a) transfer of knowledge and (b) know how on agricultural adaptation technologies do not necessarily only have to go from North to South, but that there can also be a South to South transfer.¹¹⁵ Despite some initiatives to enhance agricultural adaptation technology transfer, such as the establishment of Climate Change Technology Transfer Centres in Europe and Latin America,¹¹⁶ the same barriers that make the transfer of mitigation technologies difficult, exist for adaptation technology transfer.¹¹⁷ The increase in patenting adaptation-specific crops, such as drought resistant seeds, is an additional barrier to agricultural adaptation technology transfer. These patents have led to concerns about accessibility of these crops, particularly for developing country farmers.¹¹⁸

¹¹⁰ Art 4(5).

¹¹¹ Art 10(c) KP.

¹¹² Porter *et al* (n 3) 844.

¹¹³ *Ibid* at 845 (table 14-1).

¹¹⁴

¹¹⁵ *Ibid* at 7.

¹¹⁶ Focusing primarily on scientific cooperation between Europe and Latin America. See Climate Change Technology Transfer Centres in Europe and Latin America (CELA), 'Welcome to CELA', accessed 10 October 2016 at <http://www.cela-project.net>.

¹¹⁷ See s 2.2 above.

¹¹⁸ Campbell *et al.* (n 57) 39.

4.2.5 Transfer of financial resources for adaptation

The UNFCCC stipulates that developed country Parties have to assist developing countries that are particularly vulnerable to the adverse effects of climate change in meeting the costs of adaptation to those adverse effects.¹¹⁹ The main instrument that was created to implement this provision is the Adaptation Fund, established during COP7 in Marrakesh in 2001,¹²⁰ and operating under the Kyoto Protocol. Its aim is to finance concrete adaptation projects in developing country Parties to the Kyoto Protocol, as well as some specific adaptation activities that are not limited to developing countries. The latter is a consequence of another decision taken in Marrakesh, which invites the Adaptation Fund to carry out specific activities relevant for the agricultural sector. These include:

- starting to implement adaptation activities promptly where sufficient information is available to warrant such activities, in the areas of water resource management, land management, and agriculture;
- improving the monitoring of diseases and vectors affected by climate change, and related forecasting, and improving disease control and prevention;
- supporting capacity-building for preventive measures, planning, preparedness and management of disasters relating to climate change, including contingency planning, in particular for droughts and floods in areas prone to extreme weather events; and
- strengthening and, if necessary, establishing national and regional information networks for rapid response to extreme weather events.

The list of projects, funded by the Adaptation Fund, includes many agricultural projects. Examples of these are:¹²¹

- adapting to climate induced threats to food production and food security in the Karnali Region of Nepal (2015);
- enhancing adaptive capacity and increasing resilience of small and marginal farmers in Purulia and Bankura Districts of West Bengal (2014);
- developing climate resilience of farming communities in the drought prone parts of Uzbekistan (2014); and
- climate smart agriculture: enhancing adaptive capacity of the rural communities in Lebanon (2012).

¹¹⁹ Art 4(4) UNFCCC.

¹²⁰ Decision 10/CP.7, FCCC/CP/2001/13/Add. 1, 52.

¹²¹

Projects like these often focus on introducing new irrigation technologies and adapted crop varieties, and usually include technology transfer.

Aside from the Adaptation Fund, two other funds operate under the UNFCCC to finance adaptation projects for the agricultural sector in developing countries. The Special Climate Change Fund (SCCF) and the Least Developed Countries Fund (LDCF) were established during COP7 of the UNFCCC in Marrakesh in 2001.¹²² The SCCF is a general fund, aimed at financing activities, programs and measures relating to climate change in a number of areas, including adaptation and agriculture. The LDCF, as its name already indicates, is specifically for financing projects in the least developed countries, particularly projects related to their NAPAs. Both the SCCF and the LDCF are operated by the Global Environment Facility, a financial organization comprised of governments, international organizations such as the World Bank and the United Nations Environment Programme, non-governmental organizations (NGOs) and the private sector, to fund environmental projects in developing countries.¹²³ The SCCF and LDCF councils have joint meetings, and they both rely mainly on voluntary contributions from Annex I states. As with the Adaptation Fund, many of the projects funded focus on adaptation in the agricultural sector in developing countries. The LDCF project 'Integrating Climate Resilience into Agricultural Production for Food Security in Rural Areas', for instance, aims to enhance adaptive capacity and reduce vulnerability to climate change in a country where 75 percent of the population is employed in agriculture. The project addresses Gambia's inability to effectively predict climate change events, assess potential impacts and deliver short-term alerts or long term warnings, which is considered a major barrier limiting the capacity to adapt to the changing climate.¹²⁴ Another project aimed at helping farming communities prepare for increasing climate variability is called 'Integrating Climate Resilience into the Agricultural Sector for Food Security in Rural Areas of Mali'. Under this project, climate change adaptation strategies are taken into account by national and local agricultural sector planning, and implemented through 'Farmers

¹²² Decision 7/CP.7, FCCC/CP/2001/13/Add. 1, 43.

¹²³ For more information, see Global Environment Facility (GEF), 'Home Page', accessed 10 October 2016 at <http://www.thegef.org>.

¹²⁴ More information on this project is available from GEF, 'The Gambia – Strengthening Climate Change Early Warning Systems', accessed 10 October 2016 at <https://www.thegef.org/project/strengthening-climate-services-and-early-warning-systems-gambia-climate-resilient>.

Field Schools', which help Malian farmers explore new technologies and management methods.¹²⁵

There is considerable debate on the proliferation of funds and its inherent risk of overlap and inefficiency.¹²⁶ That is why under the negotiations towards the Paris COP, integration of the various funds has been high on the agenda. The biggest problem these funds encounter, however, is the lack of available finance. In the 42 NAPAs that were submitted by 2009, urgent adaptation measures had an estimated total cost of around US\$2 billion.¹²⁷ In 2010, the LDCF received total pledges of \$131.5 million, and the SCCF a total of \$49.8 million from Annex I states. Current funding is totally inadequate to address even the most urgent adaptation needs of the least developed countries. It is, therefore, not surprising that the least developed countries raise this issue in every COP, and not without success.

At the Copenhagen and Cancun meetings in 2009 and 2010, developed countries made pledges to provide new and additional resources approaching US\$30 billion for the period 2010 to 2012, with a balanced allocation between adaptation and mitigation and prioritized funding for adaptation in the most vulnerable developing countries, including small island developing states and Africa.¹²⁸ In addition, the developed countries committed to jointly mobilizing \$100 billion per year by 2020 to address the needs of developing countries.¹²⁹

The Green Climate Fund (GCF) was established in Cancun in 2010 to channel these additional funds.¹³⁰ The GCF was officially designated as an operating entity of the UNFCCC's financial mechanism under Article 11 during COP17 in Durban in 2011.¹³¹ The GCF's main goal is to 'promote the paradigm shift towards low-emission and climate-resilient development pathways by providing support to developing countries to limit or reduce their greenhouse gas emissions and to adapt

¹²⁵ More information on this project is available at GEF, 'Mali – Integrating Climate Resilience into the Agricultural Food Sector for Food Security in Rural Areas of Mali', accessed 10 October 2016 at <https://www.thegef.org/project/integrating-climate-resilience-agricultural-production-food-security-rural-areas>.

¹²⁶ Verschuuren (n 88) 27.

¹²⁷ See LDC Expert Group, *The Least Developed Countries: Support Needed to Fully Implement National Adaptation Programmes of Action (NAPAs)* (UNFCCC 2009) 17.

¹²⁸ FCCC/CP/2010/7/Add. 1, 16.

¹²⁹ FCCC/CP/2010/7/Add. 1, 17. This paragraph was taken from Verschuuren (n 88) 27.

¹³⁰ *Ibid.*

¹³¹ Decision 3/CP.17, FCCC/CP/2011/9/Add.1, 55.

to the impacts of climate change'.¹³² The fund will do so by 'channeling new, additional, adequate and predictable financial resources to developing countries' and by catalyzing 'climate finance, both public and private, and at the international and national levels'.¹³³ So far, the status of pledges and contributions made to the GCF are a bit disappointing. By November 2015, a total amount of US\$10.2 billion was pledged to the fund, with actual contracts signed covering about half of this amount.¹³⁴

4.2.6 Adaptation Committee

The 2010 Cancun Agreements established the Adaptation Committee to promote the implementation of enhanced action on adaptation in a coherent manner under the Convention, and to function as the overall advisory body to the COP on adaptation.¹³⁵ So far the Adaptation Committee mainly functions as a coordinating body, aimed at aligning the adaptation related activities by the various bodies that operate under the UNFCCC and the Kyoto Protocol. Judging by its yearly reports, the Adaptation Committee has not yet specifically focused its attention on agriculture.¹³⁶

5. AGRICULTURE IN THE PARIS AGREEMENT

Agriculture specifically was hardly mentioned in the various versions of the Negotiating Text for the Paris Agreement or in the final text that was adopted at COP21.¹³⁷ The only mention was in the provision on mobilizing finance, where states are called upon to support the integration of climate objectives into other policy-relevant areas and activities 'such as agriculture'.¹³⁸ In the final Agreement Negotiating Text by the Co-chairs,

¹³² The Transitional Committee delivered its final report to the COP in Durban, FCCC/CP/2011/6 58.

¹³³ *Ibid* at 58.

¹³⁴ See GCF, 'Pledge Tracker', accessed 10 October 2016 at <http://www.green-climate.fund/contributions/pledge-tracker>.

¹³⁵ Decision 2/CP.17, FCCC/CP/2011/9/Add. 1, 19.

¹³⁶ Reports on 2012, 2013, 2014 and 2015 at UNFCCC, 'Documents – Adaptation Committee', accessed 10 October 2016 at http://unfccc.int/adaptation/groups_committees/adaptation_committee/items/7584.php.

¹³⁷ This section is based upon the negotiating texts and the final agreement, all of which are available through Deconstructing Paris, 'Welcome to Deconstructing Paris', accessed 10 October 2016 at <http://paristext2015.com/>.

¹³⁸ FCCC/ADP/2015/1, 40 (version 11 June 2015) (under 101bis).

all references to ‘agriculture’ had disappeared.¹³⁹ As a consequence, the Paris Agreement, as adopted at COP21, does not refer to agriculture at all.

‘[M]aintaining food security’ was also mentioned in the full text proposals¹⁴⁰ but in the final Agreement Negotiating Text this reference, too, disappeared, only to reappear in the draft COP Decision’s preamble.¹⁴¹ The latter reference did survive the negotiations in Paris at COP21, so that the preamble to the Paris Agreement 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 also regularly emerged as a topic in the full Negotiating Texts as a limiting factor to mitigation actions (similar to Article 2 UNFCCC, see Section II above). In the final version of the Paris Agreement, only one such reference survived. Article 2 provides 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.’¹⁴²

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, which sets the tone for the coming years.

The European Union opted for a much firmer approach toward agriculture. In the run-up to the Paris 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’.¹⁴³ For example, the EU proposed including cropland and grazing land management in its official policy from 2020 onward, developing the instruments to do so before 2020. The EU even proposed focusing its future climate change instruments on *all* agricultural activities, to include enteric fermentation, manure

¹³⁹ Ad Hoc Working Group on the Durban Platform for Enhance Action, ‘Non-paper, Note by the Co-chairs’ (5 October 2015), accessed 10 October 2016 at <http://unfccc.int/resource/docs/2015/adp2/eng/8infnot.pdf>.

¹⁴⁰ FCCC/ADP/2015/1, 21 (under 50).

¹⁴¹ Ad Hoc Working Group (n 140) 10.

¹⁴² Art 2(1)(b) Paris Agreement.

¹⁴³ 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.

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.¹⁴⁴ With such a wide consideration of agriculture, the EU was actually suggesting that agriculture should be fully included in the Paris Agreement, both as a source of greenhouse gas emissions and as a means of CO₂ absorption and sequestration. This approach would have the agricultural sector undergo a drastic transition from conventional farming to farming that employs climate smart agricultural practices.

Though the Paris Agreement does not mention agriculture much, the document is still important for the sector. Article 4 states that, to keep the increase in global average temperature well below 2° C, a balance needs to be achieved between anthropogenic emissions by sources and removals by sinks of greenhouse gasses in the second half of the 21st century.¹⁴⁵ It is obvious that this automatically implies that drastic mitigation actions are needed to reduce emissions from agriculture and land use. 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 capacity building.¹⁴⁶ 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. Under the Agreement, parties are required to engage in adaptation planning processes and building the resilience of socio-economic systems,¹⁴⁷ which could lead to the creation of a National Adaptation Plan. Further integrating the various funds under the Financial Mechanism of the Convention, and strengthening the role of the Adaptation Committee are also actions the parties could take.¹⁴⁸

¹⁴⁴ 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.

¹⁴⁵ Arts 4(1) and 2(1)(a) Paris Agreement. 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).

¹⁴⁶ See for example Arts 7, 9, 10 and 11 Paris Agreement.

¹⁴⁷ Art 7(9) Paris Agreement.

¹⁴⁸ See the decision that accompanies the Paris Agreement, FCCC/CP/2015/L.9.

6. CONCLUSION

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 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.¹⁴⁹

A single 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 have been proposed, but so far remain underdeveloped.

The UNFCCC unfortunately does not provide a powerful stimulus to adopt and implement climate smart agriculture policies, and there is little attention to reducing emissions from agriculture. The current framework focuses on adapting rural areas in developing countries to climate change, particularly through financial instruments. Yet even in that area progress is painfully slow. Much more concrete action is needed to facilitate the transfer of adaptation knowledge and technologies, as well as funds to finance adaptation measures in developing countries. For developed countries, the UNFCCC does not make much of an attempt to address climate change and food security issues. This is a pity, as the developed country agriculture sector plays a major role in addressing the increasing global demand for food. Fortunately developed countries, do not have to wait for the UNFCCC process. The EU, for example, recently announced its intention to implement an ambitious policy for climate friendly and resilient food production that will optimise the agricultural sector’s contribution to greenhouse gas mitigation and sequestration. Following this example is vitally important across the globe. It is to be hoped that these initiatives will be adopted by the international community under the UNFCCC process.

¹⁴⁹ Campbell *et al.* (n 57) 92.