May 2017 C 2017/2

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联合国粮食及农业组织
Food and Agriculture Organization of the United Nations
Organisation des Nations Unies pour l'alimentation et l'agriculture
Продовольственная и сельскохозяйственная организация Объединенных Наций
Organización de las Naciones Unidas para la Alimentación y la Agricultura
منظمة الأغذية والزراعة للأمم المتحدة

CONFERENCE

Fortieth Session

Rome, 3-8 July 2017

The State of Food and Agriculture: Climate change, agriculture and food security

Executive Summary

Climate change threatens agriculture and food security, while agriculture itself contributes to climate change. Low-income countries and poor farmers are particularly at risk. Agriculture has to both adapt to climate change and contribute to mitigation. This requires changes in agricultural practices as well as improvements in livelihood options for poor farm households. Changes in the broader food system are also called for. Policies and institutions are needed that align agricultural development, food security and climate objectives. They must be supported by adequate financial resources, which must be used strategically to ensure maximum impact.

Suggested action by the Conference

The Conference is invited to:

a) Note that climate change poses a major and growing threat to food security.
b) Underline the urgency of action to adapt to climate change in the agriculture sectors and to maximize the sectors' contribution to climate change mitigation.
c) Stress the importance of realizing the Paris Agreement commitments relating to food and agriculture through broad transformative policies on agriculture, rural development, food security and nutrition.
d) Emphasize the need for international support to developing countries to design and implement integrated policies that address agriculture and climate change.

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I. Introduction[1]

1. Agriculture – including crop and livestock production, fisheries, aquaculture and forestry – depends directly on natural resources and climatic conditions and is affected more than any other sector by climate change. The negative impacts of climate change on agriculture and agricultural production pose a serious and growing threat to food security, not least for the almost two-thirds of the world's extremely poor who depend on agriculture for their livelihood. Agriculture is also a major source of man-made greenhouse gas emissions but has a unique potential for contributing to stabilizing the world's climate by managing crops, land and livestock in ways that reduce GHG emissions and increase carbon sequestration in plant biomass and soils.

2. In adopting the goals of the 2030 Agenda on Sustainable Development and the Paris Agreement on Climate Change, the international community took responsibility for building a sustainable future. But meeting the goals of eradicating hunger and poverty by 2030, while addressing the threat of climate change, will require a profound transformation of food and agriculture systems worldwide. Unless action is taken now to make agriculture more sustainable, productive and resilient, the impacts of climate change will seriously compromise food production in regions that are already highly food insecure. Delaying the transformation of the agriculture sector will force poorer countries to fight poverty, hunger and more severe climate change at the same time.

II. Climate change, agriculture and food security - the linkages

3. Climate change profoundly affects the conditions under which agricultural activities are conducted. In every region of the world, plants, animals and ecosystems have adapted to prevailing climatic conditions. As those conditions change, they will be affected in different ways. The impacts of climate change will range from yield reductions and increased yield variability to displacement of crops and the loss of agrobiodiversity and ecosystem services (Box 1). In many regions, agricultural production is already being adversely affected.

Box 1

Summary of climate change impacts on agriculture

- Increased frequency and intensity of extreme climate events such as heat waves, droughts and floods
- Decreased availability of fresh water resources, leading to water scarcity in arable areas
- Sea-level rise and coastal flooding, leading to salinization of land and water, and risks to fisheries and aquaculture
- Water and food hygiene and sanitation problems
- Changes in water flows impacting inland fisheries and aquaculture
- Temperature increase and water scarcity affecting plant and animal physiology and productivity
- Beneficial effects on crop production through carbon dioxide "fertilization"
- Detrimental effects of elevated tropospheric ozone on crop yields
- Changes in plant, livestock and fish diseases and in pest species
- Damage to forestry, livestock, fisheries and aquaculture
- Acidification of the oceans, with extinction of fish species

[1] This document is based on: FAO. 2016. *The State of Food and Agriculture 2016. Climate, agriculture and food security*. Rome (http://www.fao.org/3/a-i6030e.pdf). For more detailed analysis and discussion, readers are invited to consult this report.

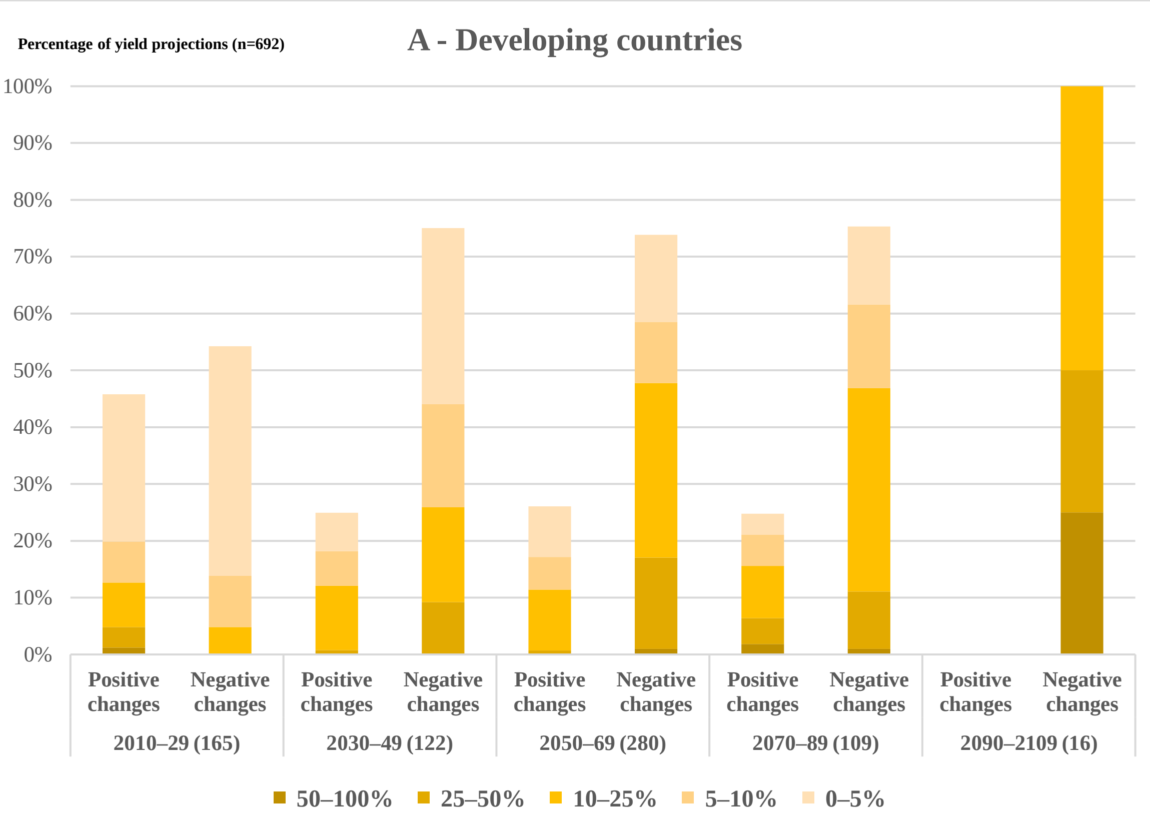
4. Numerous studies have attempted to assess impacts of climate change on productivity and production in different agricultural sectors and subsectors in different locations, at different times and for different future climate change scenarios (see Box 2). The majority of them point to mostly negative impacts which will worsen with increased temperatures if climate change is allowed to progress. They also show that negative impacts are likely to be much more pronounced at lower latitudes and that most of the cost in terms of lost production and productivity will be suffered by developing countries and countries with already high levels of poverty and food insecurity.

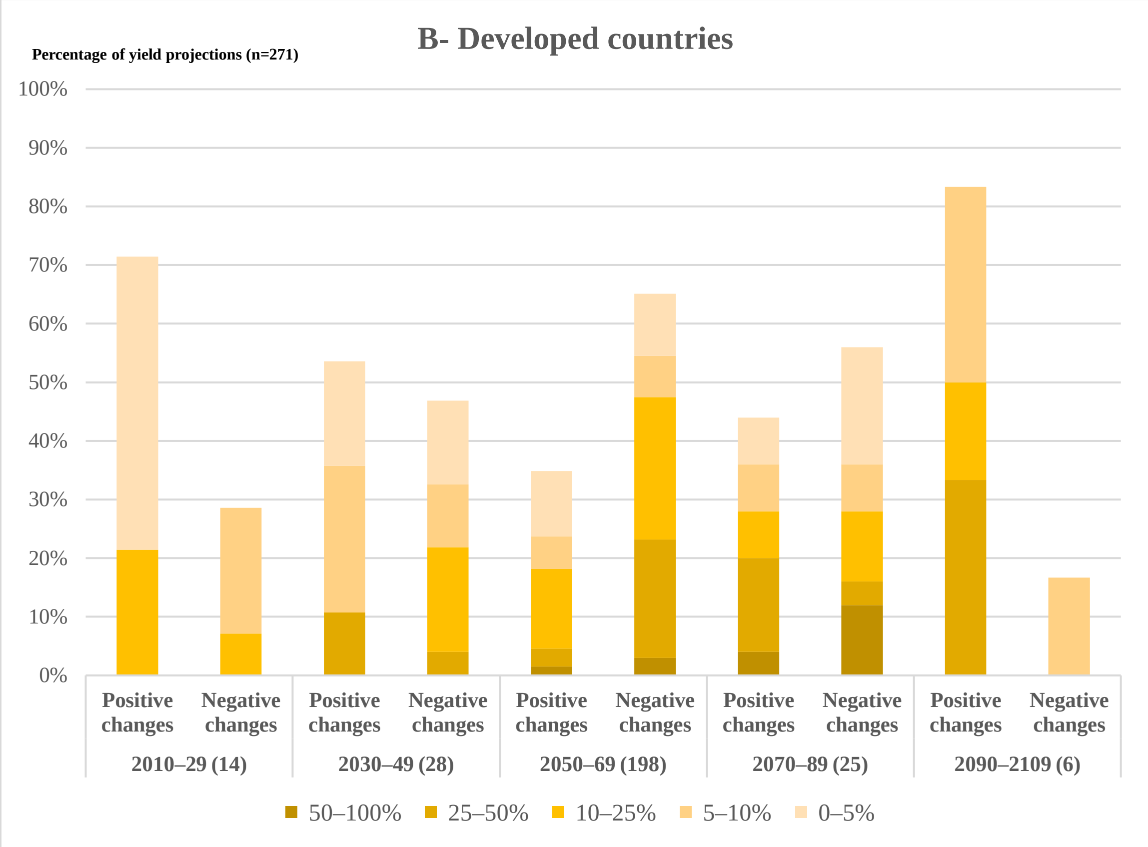
Box 2

Impacts of climate change on crop yields

The Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) surveyed a large number of studies projecting impacts on crop yields at different points in time and for different geographic locations. According to the survey, in the medium term – up to around 2030 - positive and negative projections of impacts on crop yields seem to counterbalance each other at the global level; however, after that the balance becomes increasingly negative. Developing countries seem to be particularly at risk of declining yields as a result of climate change. Indeed, for the developing countries, most projections for crop yield impacts are negative, and the share and severity of negative outcomes increases further in the future (Figure 1-A). In comparison, projections for developed countries show a much larger share of potential positive changes (Figure 1-B).

Figure 1 - Projected changes in crop yields owing to climate change - percentage share of positive and negative projections





Note: Number of estimates of change in crop yield for each period is shown in parentheses.
Source: Calculations by FAO based on data compiled for: Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge, UK and New York, NY, USA, Cambridge University Press, pp. 485-533.

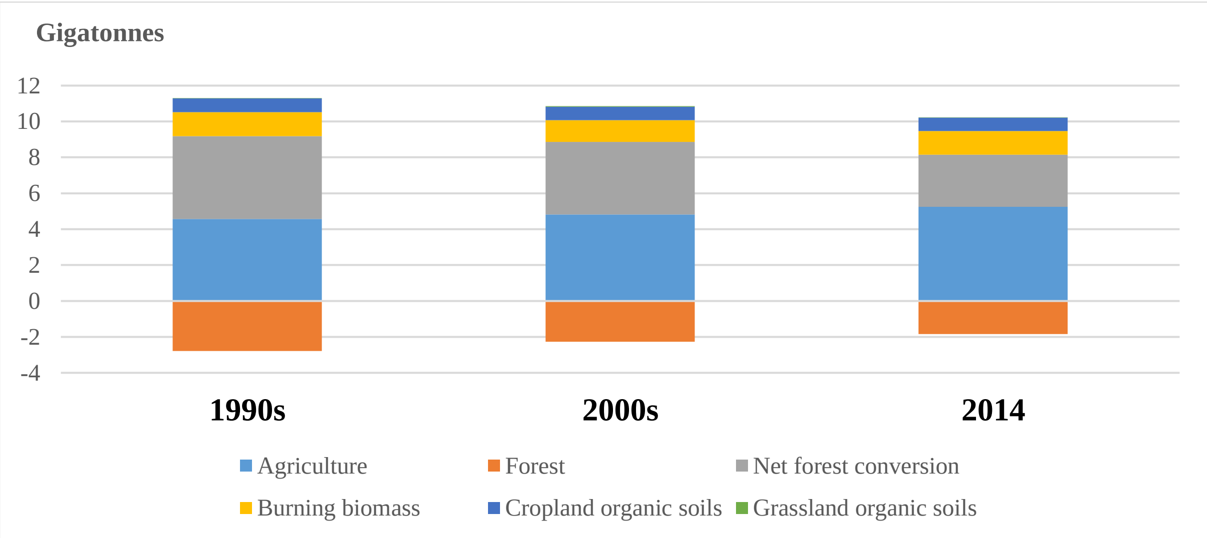
5. Lower productivity in agriculture resulting from climate change will have serious negative implications for livelihoods and food security. Food supply shortfalls may lead to major increases in food prices. The areas most affected would be those with already high rates of hunger and poverty. Among the most vulnerable will be those who depend on agriculture for their livelihood and income, particularly smallholder producers in developing countries.

6. While climate change is not the only driver of poverty and food insecurity, its impacts are expected to be substantial. In the absence of climate change, and with continuing economic progress, most regions are expected to see a decline in the number of people at risk of hunger by 2050. However, results from a modelling exercise simulating the impact of climate change suggest that, by the year 2050, under a high emissions scenario, more than 40 million more people could be at risk of undernourishment than there would be in the absence of climate change.[2] This is likely a conservative estimate because it is based on a "business-as-usual" assumption of economic growth and does not account for the impacts of extreme events, sea-level rise, melting glaciers, changes in pest and disease patterns, nor does it consider other factors that are expected to change with climate especially after 2050.

[2] Wiebe, K., Lotze-Campen, H., Sands, R., Tabeau, A., van der Mensbrugghe, D., Biewald, A., Bodirsky, B., Islam, S., Kavallari, A., Mason-D'Croz, D., Müller, C., Popp, A., Robertson, R., Robinson, S., van Meijl, H. & Willenbockel, D. 2015. Climate change impacts on agriculture in 2050 under a range of plausible socioeconomic and emissions scenarios, *Environmental Research Letters*, 10(08): 1–15.

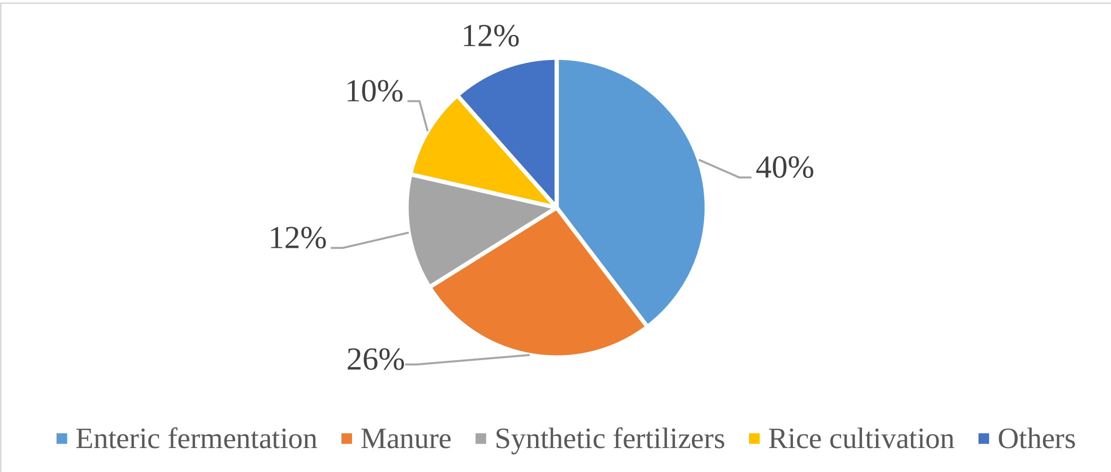
7. Agriculture is not only affected by climate change; it also contributes to climate change by emitting significant amounts of the three major GHGs: carbon dioxide, methane and nitrous oxide. About 21 percent of total annual man-made GHG emissions originate in “agriculture, forestry and other land use” (AFOLU), according to the IPCC classification of sources of emissions. The largest share of the AFOLU emissions today is caused by agricultural production, followed by deforestation (Figure 2). Smaller amounts of emissions come from losses of carbon from organic soils (often due to inappropriate agricultural practices) and the burning of biomass (e.g. savanna fires). Forests also mitigate climate change by removing carbon from the atmosphere through forest growth (as illustrated by the negative values in Figure 3). Within the broader category of agricultural production, the main sources of emissions are enteric fermentation in ruminant livestock, the use of organic and nitrogen fertilizer and rice production in flooded rice fields (Figure 3).

Figure 2 - Annual average net emissions from AFOLU in CO_2 equivalent



Source: FAOSTAT

Figure 3 - Sources of global GHG emissions from agricultural production in CO_2 equivalent - 2014



Source: FAOSTAT

8. The AFOLU category does not account for GHGs emitted in the pre- and post-production stages of modern food supply chains. This includes the production of inputs such as synthetic fertilizers, which is energy-intensive; emissions resulting from fossil energy use (e.g. for powering farm machinery); and post-production transportation, processing and retailing. If emissions caused by direct and indirect energy use by the agri-food chain were included, the AFOLU share of total emissions would increase by one-third.

9. To counter the risk of worsening food insecurity, societies at large need to take decisive action, today, to mitigate climate change. Future food security will depend mostly on emission reductions from other economic sectors; however, agriculture has a significant potential for reducing GHG emissions and sequestering carbon and must also contribute to climate change mitigation efforts. Changes are also needed in the broader food systems, including minimizing food losses and waste and reducing demand for emission-intensive food products. At the same time, agriculture and the populations who depend on it need to adapt to current or expected climate change, to minimize its harmful effects.

10. Agriculture must build resilience to the impacts of climate change, while contributing as much as possible to mitigation efforts. Three areas of action are critical: i) adapting to climate change in small-scale agricultural production systems; ii) reducing emissions and increasing carbon sequestration in primary agriculture; and iii) reducing emissions in broader food systems. These will be discussed in the following sections.

III. Adapting to climate change in small-scale production systems

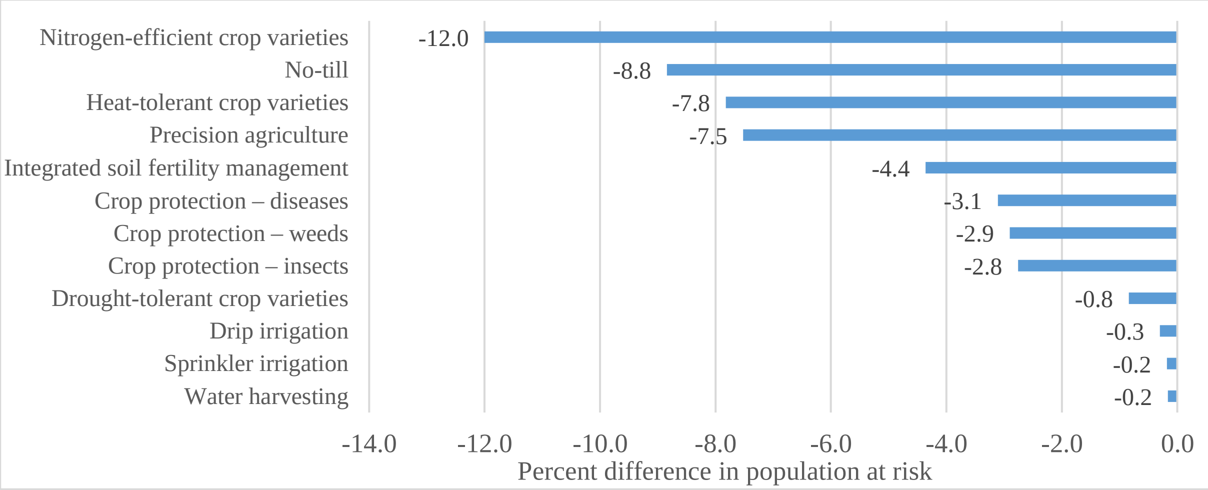
11. Most of the world's poor and hungry are rural people who earn a meagre living either directly from agriculture or from activities which depend on it. In 2010 some 900 million of the estimated 1.2 billion extremely poor lived in rural areas and about 750 million of them worked in agriculture, mostly as smallholder farmers.[3] The sheer number of smallholder farmers justifies a special focus on the threats posed by climate change to their livelihoods. Smallholder agricultural producers are highly vulnerable to climate change. Enhancing their resilience to the effects of climate change is particularly important. This involves building more resilient production systems as well as more resilient livelihoods of vulnerable populations.

Making production systems more resilient

12. Addressing the challenges posed by climate change will require innovation in farming systems. Introducing sustainable agricultural practices can bring about significant improvements in food security, as well as resilience to climate change. The wide adoption of practices such as the use of nitrogen-efficient and heat-tolerant crop varieties, zero-tillage and integrated soil fertility management would boost productivity and farmers' incomes, and help lower food prices. By one estimate, the number of people at risk of undernourishment in developing countries in 2050 could be reduced by 12 percent through widespread use of nitrogen-efficient crop varieties alone (Figure 4).

[3] Olinto,P., Beegle, K., Sobrado, C., and Uematsu, H. 2013. *The state of the poor: where are the poor, where is extreme poverty harder to end, and what is the current profile of the world's poor?* Economic Premise, Number 125. Washington DC, World Bank.

Figure 4 - Scenario for 2050: reduction in the number of people at risk of hunger, relative to the baseline scenario, after adoption of improved agricultural technologies



Source: FAO. 2016. The State of Food and Agriculture 2016. Climate change, agriculture and food security. Rome, based on Rosegrant, M.W., Jawoo, K., Cenacchi, N., Ringler, C., Robertson, R., Fisher, M., Cox, C., Garrett, K., Perez, N.D. & Sabbagh, P. 2014. *Food security in a world of natural resource scarcity: the role of agricultural technologies.* Washington, DC, IFPRI.

13. The benefits of some of the above practices are not limited to reducing hunger, but also include greenhouse gas mitigation. For example, no-till agriculture can also reduce losses of soil organic carbon, while nitrogen-efficient varieties can reduce emissions associated with fertilizer inputs.

Making livelihoods more resilient

14. Farmers can further enhance their resilience through diversification of farm activities and sources of income. This can reduce the impact of climate shocks on income and provide households with a broader range of options when managing future risks. One form of diversification is to integrate production of crops, livestock and trees – for example, some agroforestry systems use the leaves of nitrogen-fixing leguminous trees to feed cattle, use manure to fertilize the soil, and grow pulses to provide extra protein during periods of seasonal food insecurity.

15. For farm households with limited options for on-farm diversification, livelihood diversification through non-farm rural employment or migration to cities may form an alternative adaptation strategy. Adaptation through sustainable intensification and agricultural diversification may have to be combined, therefore, with the creation of off-farm opportunities, both locally and through strengthened rural-urban linkages. Gender issues may need to be addressed as social norms often prevent women from pursuing off-farm activities. Social protection, education and active labour market policies are needed to mitigate many of the risks associated with diversification and migration.

Trade as an adaptation mechanism

16. The fifth assessment report of the IPCC (AR5) concludes that Climate Change could result in substantially lower production in lower latitude areas, whereas higher latitude areas are expected to be less adversely affected or to even benefit from changes brought about by Climate Change. Therefore, climate change is likely to exacerbate existing imbalances between the developed and developing world. These regionally very different impacts suggest that trade could help ease potential shortfalls in low-latitude areas and, at the same time, provide new markets for additional supplies in high latitude areas. Trade could play a stabilizing role for potentially lower productivity and higher price volatility by making available supplies from food surplus areas to food deficit

regions[4]. Trade could therefore assume the role as an adaptation mechanism to climate change and, importantly, become a contributor to food security in countries adversely affected by Climate Change.

17. An efficient international trading system is important for both climate change adaptation and mitigation to address the far-reaching impacts on global production patterns and patterns of international trade in food and agricultural products. Trade restrictions, such as tariff and non-tariff barriers, which limit the response of global agricultural production to changes in demand and supply under climate change, should be minimized. Climate change underscores the need to help developing countries deal with food and energy price increases, as well as volatility in food supplies.

IV. Mitigating climate change in agriculture

18. Agriculture can contribute to climate change mitigation through reduced emissions from agricultural production and through enhanced carbon sequestration – carbon sinks – in soils and plants. There are many feasible and promising approaches to climate change mitigation in the AFOLU sector, and the technical potential is considerable. However, different options carry different costs in different regions (see Box 3). Two complementary goals to be pursued for mitigation are reducing the intensity of GHG emissions per unit of output and creating carbon-rich landscapes. Frequently, but not always, mitigation actions carry co-benefits in terms of adaptation.

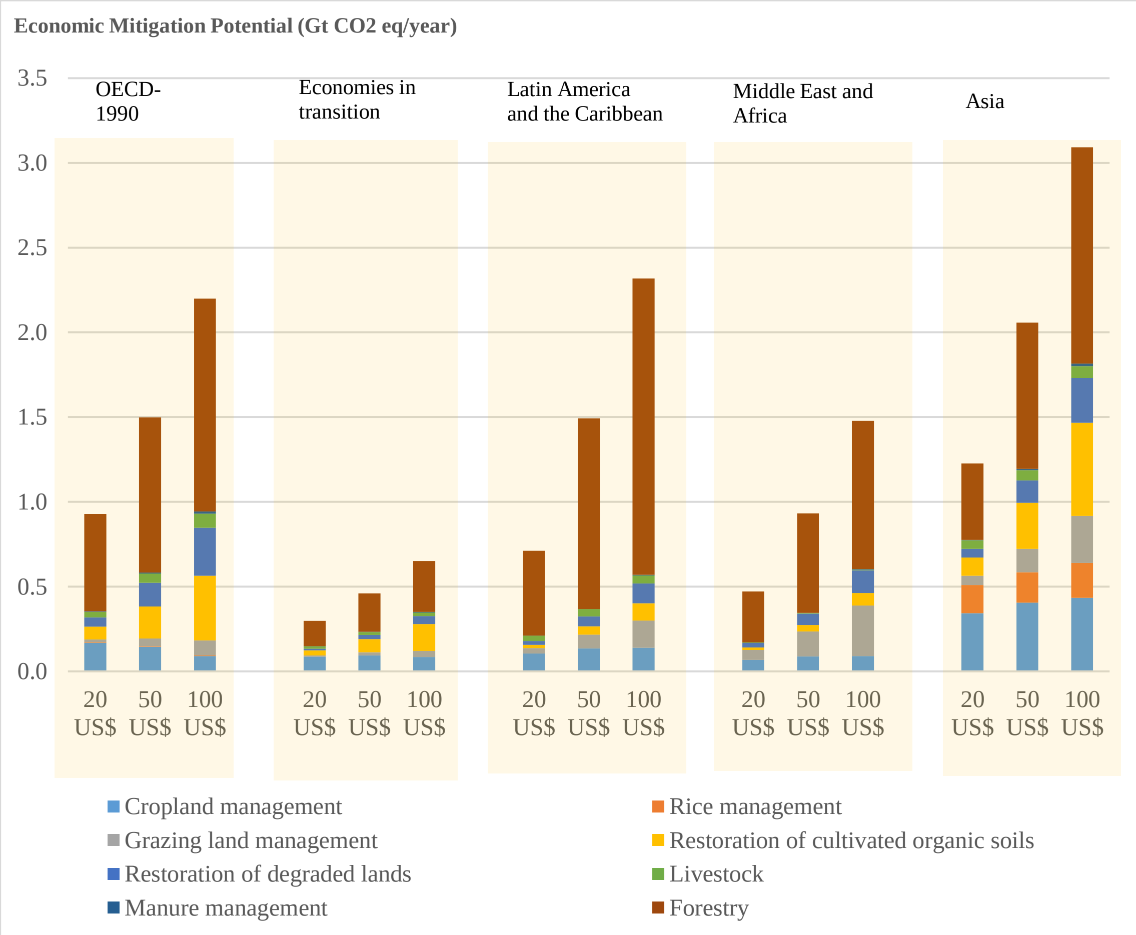
Box 3

Potential and cost of mitigation in agriculture, forestry and land use (AFOLU)

What are the costs and thus the economic potential of different mitigation options? In other words, what is the hypothetical price of carbon that would induce farmers and foresters to apply practices for sequestering carbon and reducing emissions? Based on the combined mitigation potential of forestry and agriculture, estimated in the IPCC’s Fourth Assessment Report, the IPCC suggests an economic potential in 2030 of between ≈3 and ≈7.2 Gt of carbon dioxide equivalent a year at carbon prices of US$20, US$50 and US$100 per tonne, respectively (Figure 5).

[4] Julia, R. & F. Duchin. 2013. Land Use Change and Global Adaptations to Climate Change. *Sustainability*, 5: 5442-5459.

Figure 5 - Economic mitigation potentials in the AFOLU sector in 2030, by region



Source: Smith P., Bustamante, M., Ahammad, H., Clark, H., Dong, H., Elsiddig, E. A., Haberl, H., Harper, R., House, J., Jafari, M., Masera, O., Mbow, C., Ravindranath, N. H., Rice, C.W., Robledo Abad, C., Romanovskaya, A., Sperling, F. & Tubiello, F. 2014. 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, UK and New York, NY, USA, Cambridge University Press.

Forestry could make a significant contribution to mitigation at all levels of carbon prices. At low prices, the contribution of forestry is close to 50 percent of the total from the AFOLU sector; at higher prices the share of forestry is lower. Different forestry options – reduced deforestation, forest management, afforestation – have different economic mitigation potentials in different regions. Among other mitigation options, cropland management has the highest potential at lower carbon prices of US$20 per tonne while at US$100, the restoration of organic soils has the greatest potential. Also the potential of grazing land management and of restoration of degraded lands increases at higher carbon prices. These estimates of economic mitigation potential provide broad indications of how to target interventions in the most cost-effective way, but more detailed assessments are needed in order to properly assess AFOLU's mitigation potential.

Reducing the intensity of emissions in agricultural production

19. Demand for agricultural products is bound to continue increasing due to population growth and rising incomes, but the intensity of emissions per unit of output can be reduced. A key strategy is investment in yield improvements. As crop and livestock productivity has grown over the past decades, emissions intensities have already gone down. Continued improvements in farm management strategies could further increase crop yields and herd productivity, thereby reducing pressures on natural resources, including deforestation. Improved management of nitrogen fertilizer and manure could reduce emissions of nitrous oxide. Reducing on-farm losses can also play a key role in reducing GHG emissions.

Creating carbon-rich landscapes

20. Forests and agricultural landscapes occupy most of the Earth's land surface and are vital to the conservation and restoration of carbon sinks.

21. The mitigation potential in forestry falls in two broad categories: reducing emissions of GHGs and increasing carbon sequestration from the atmosphere. The former involves reducing or avoiding deforestation. Carbon sequestration from the atmosphere can be boosted by increasing the area under forest cover through planting, seeding and assisted natural regeneration. Carbon stocks in forest can also be maintained or enhanced through activities such as reduced-impact logging, sustained yield management, maintaining partial forest cover and reducing slash-and burn cultivation.

22. Soils represent the world's second-largest carbon pool after oceans. Soils carry a large potential for carbon sequestration, especially through restoration of degraded soils. In addition to sequestering carbon, maintaining and restoring soil health improves fertility for agricultural production and delivers benefits in terms of productivity and food security. While many current agricultural practices contribute to losses of soil organic matter, a number of technical options are available to enhance soil carbon sequestration in agricultural systems. Examples include: reducing fires, overgrazing and soil erosion; recycling crop residues and manure; cover crops, intercropping, agroforestry and conservation agriculture; improved crop varieties.

Searching for synergies between adaptation and mitigation

23. Unlike other economic sectors, where adaptation and mitigation actions are generally independent of each other, in the agriculture sectors the objectives of food security, adaptation and mitigation, are interlinked.

24. Multiple concrete examples exist of how efforts at adaptation and mitigation can go hand in hand. Improvements in crop production and fertilizer management appear to offer the greatest potential for reducing nitrous oxide emissions, while also reducing input costs. Increasing stocks of soil organic carbon improves crop yields and builds resilience to drought and flooding, but also sequesters carbon. Alternate wetting and drying of rice fields reduces methane emissions from paddies, while saving water and producing yields similar to those of fully flooded rice. Farming system diversification and crop-livestock-tree integration could increase farm-scale efficiency, reduce emissions intensity and raise productivity. In the livestock sector, the general adoption of sustainable practices could cut livestock methane emissions while also increasing productivity through better animal feeding, animal health and herd structure management.

25. However, not all mitigation options carry co-benefits in terms of adaptation. Other initiatives are intrinsically driven by a mitigation motive. For example, halting deforestation and forest degradation arguably has the largest potential for climate change mitigation in the agriculture sectors but will require addressing trade-offs as reducing deforestation often comes at a cost to farmers.

V. Overcoming barriers to adoption of more sustainable practices for adaptation and mitigation

26. Uptake of sustainable practices that would increase resilience to climate change and reduce GHG emissions is still limited. Efforts to foster their adoption by smallholders need to be informed by an understanding of the existing financial, institutional and policy barriers. Institutional arrangements that support increased and stabilized returns from agricultural production are essential. Agricultural input and output markets play a central role, but other institutions – such as rural credit and insurance programmes, agricultural extension, land and water tenure arrangements – have all been found to play important roles in supporting, or hindering, smallholders in the transition to systems with higher resilience. Adoption of sustainable practices can also be hampered by the existing policy environment. For example, policies, such as input subsidies, may perpetuate unsustainable production practices rather than promoting resource-use efficiency and reductions in GHG emissions.

27. Smallholders in particular face a broad range of barriers on the road towards sustainable agriculture, such as limited access to markets, credit, extension advice, weather information, risk management tools and social protection. Women, who make up around 43 percent of the agricultural labour force in developing countries, are especially disadvantaged, with fewer endowments and entitlements than men, even more limited access to information and services, and gender-determined household responsibilities.

VI. Beyond primary agriculture - reducing emissions in food systems

28. In addition to primary agriculture, adjustments are required in food systems at large. Reducing food losses and waste and transitioning to more sustainable diets also deliver emissions reductions. About one-third of all food produced in the world is lost or wasted post-harvest, representing an enormous waste of the land, water, energy and inputs used to produce it and unnecessary emissions of millions of tonnes of greenhouse gases. Reducing food losses and waste throughout the food chain would not only improve the efficiency of the food system but also reduce pressures on natural resources and emissions of GHGs. Another critical factor that needs to be considered is the energy use in modern food systems. The energy use and emission-intensity of food processing, conservation and transportation are high and increasing.

29. Dietary patterns strongly influence some of the factors that are driving climate change. Studies looking at the environmental consequences of the consumption of animal-source food using life-cycle assessments generally conclude that alternative diet scenarios whereby those with already high consumption of animal-source products reduce their consumption could contribute to reducing global GHG emissions and help improve human health. Bearing in mind the very large diversity at global level, rebalancing diets to reach nutritional targets could nevertheless bring large benefits in terms of GHG mitigation. Further examination of demographic and social differences, including fast-growing food consumption and changing dietary patterns in developing countries, is needed to inform strategies for promoting optimal diets with improved health outcomes and reduced levels of GHG emissions. Accurate life-cycle assessments of production systems and value chains are needed to assess the mitigation effects of different dietary transitions.

VII. The way forward: policies and financing for climate change adaptation and mitigation in agriculture

30. The importance of a response to climate change – in terms of adaptation and mitigation – in agriculture is widely recognized today, as reflected in the Nationally Determined Contributions (NDCs) submitted by countries as a basis for negotiations at COP 21, which led to the 2015 Paris

Agreement on climate change.[5] They include targets and strategies for addressing the causes and consequences of climate change. The agriculture sectors featured prominently in the INDCs, with 94 percent of all countries including them in their mitigation and/or adaptation contributions.

31. The NDCs are a first step in a process of rethinking agricultural and rural development under climate change. The UNFCCC has already established mechanisms, such as the development of National Adaptation Plans, to underpin concerted actions to address climate change. Those mechanisms need to be integrated into broader agricultural and food security and nutrition policies. They also need to be accompanied by appropriate financing mechanisms and levels of funding commensurate with the magnitude of the challenge.

Realigning and integrating policies on climate, agriculture, food and nutrition

32. Policies, market forces and environmental constraints drive the use of inputs and other resources in agriculture, influencing productivity and the degree of conservation or depletion of natural resources. Policy-making for agriculture under climate change should start from an understanding of those drivers and their impacts on farmers' livelihoods and the environment. This is a complex task, and win-win solutions may not always be possible.

33. Policymakers must recognize the need to manage trade-offs and set out concrete measures for better aligning multiple objectives and incentive structures. For example, the gender equity trade-offs of planned actions need to be systematically analysed – a shift to more resilient intercropping systems has sometimes cost women their control over specific crops.

34. One area with a large potential for policy realignment is the redesign of agricultural support measures in a way that facilitates, rather than impede, the transition to sustainable agriculture. In 2015, developed and major developing countries spent more than US$560 billion on agricultural production support, including subsidies on inputs and direct payments to farmers. Some measures, such as certain types of input subsidies, may induce inefficient use of agrochemicals and increase the emissions intensity of production. Making support conditional upon the adoption of practices that lower emissions and conserve natural resources is one way of aligning agricultural development and climate goals.

35. Policies on nutrition, food consumption, food price support, natural resources management, infrastructure development and energy may similarly need to be re-set. To address trade-offs, the process must ensure greater inclusiveness and transparency in decision-making, as well as incentives that provide long-term public and collective benefits. For example, experience shows that forests can be well managed and degradation reversed by involving local communities, supported by legitimate decentralized institutional arrangements developed through consultative processes.

36. Climate change brings new risks. Managing them requires enhanced forms of collective action and systems that assess risks, vulnerabilities and adaptation options. Well-designed social protection programmes, which guarantee minimum incomes or access to food, have an important role to play in helping vulnerable populations cope with the climate-related risks but should be aligned with other forms of climate risk management.

37. In responding to climate change, international cooperation and multi-stakeholder partnerships and alliances are essential. Strengthened regional and international cooperation will be needed in order to facilitate information and knowledge sharing, manage common resources such as fish stocks, and conserve and utilize agrobiodiversity. Cooperation is also needed to close gaps in our knowledge of climate change impacts on agriculture, food security and nutrition, to evaluate the scalability and economic viability of sustainable farming practices, and to assess the ecological footprint of food systems at large.

[5] Once a country has ratified the Agreement, its previously submitted INDC will become a Nationally Determined Contribution (NDC).

Using climate finance strategically to induce transformative change in agriculture

38. Adequate climate financing and agricultural investments are essential to enable the transition to sustainable agricultural practices. However, finance currently available for investment in agriculture falls well short of needs. In particular, smallholder producers in developing countries face major hurdles in accessing credit for investing in new technologies and practices. Female farmers face even greater constraints. The shortfall in finance limits investment in agriculture and food security and, with it, the capacity of smallholders to adapt to climate change.

39. More climate finance needs to flow to agriculture to fund the investment cost associated with the required large-scale transformation of its sectors and the development of climate-smart food production systems. Additional finance from public sources, as well as customized financial products, will be needed in two areas of financing.

40. First, more upfront support is necessary for increasing farm productivity, building capacity to adapt to climate change and reducing the emissions intensity of production. This will require a significant increase in the amount of finance available and more flexible conditions. However, for this to be successful, a second area requires financing - support to the creation of an enabling environment, including through climate-smart incentives and price policies, for farmers that will allow them not only to raise their yields and introduce sustainable practices, but also to market and process their produce. Improving the enabling environment is especially needed for the vast majority of smallholder farmers who otherwise have limited possibilities for investing in productive activities that would improve their livelihoods, productivity and incomes.

41. Although more climate finance is needed, additional funding will also require improving countries’ capacity to make things happen on the ground. Systemic capacity constraints currently hamper developing country access to and effective use of climate finance for agriculture. This “capacity gap” in policy-making and institutional development, which can manifest itself at both funding and receiving ends, hinders support for the transition to sustainable agriculture. Closing these capacity gaps should be made a priority by funders and countries alike.

42. Climate finance can also act as a catalyst to leverage larger flows of public and private funding for sustainable agriculture, provided policies and institutional frameworks that promote transformative change are in place. Climate finance could help address the funding gap by demonstrating the viability of climate-smart agricultural investments, and designing and piloting innovative mechanisms to leverage additional sources of investment. Climate funds – if used strategically to build the enabling environment essential for climate-smart agricultural development, to ensure that public agricultural investment is climate-smart, and to leverage private finance – could become an important catalyst for climate change adaptation and mitigation.

43. By filling the financing gap and catalysing investment, climate finance can strengthen risk management mechanisms, foster development of appropriate financial products, and address the capacity constraints of lenders and borrowers. It is crucial, therefore, to strengthen the enabling environment for climate-smart agricultural investments, mainstream climate change considerations in domestic budget planning and implementation, and unlock private capital for climate-smart agricultural development. Until that happens, the climate financing needed for investment in smallholder agriculture will continue to be inadequate, with serious consequences in terms of loss of livelihoods and increased food insecurity.