



ACT Alliance EU Position Paper Food Security and Climate Change

October 2017

Towards climate resilient agriculture and food systems A critical assessment and alternatives to climate-smart agriculture

Executive Summary

This briefing sets out the ACT Alliance EU position on what we believe are the best solutions to build climate resilient agriculture systems and meet the right to food for all in developed and developing countries. This position is based on our comparative analysis of the currently in vogue 'climate-smart agriculture' framework (CSA) versus the alternative frameworks of food sovereignty and agroecology.

Our analysis aims to assess which framework offers the best potential to build the adaptive capacities of small-scale producers, who play a key role in achieving just, sustainable and climate-resilient agriculture and food systems.¹ It is framed by our values, which are rooted in the fundamental respect for the equality and dignity of all human beings and the understanding that poverty and vulnerability to climate change are primarily the consequence of politically and socially constructed systems that concentrate power in the hands of the few.

Our analysis shows that the climate-smart agriculture framework initially developed by the FAO and now promoted mainly by the Global Alliance on Climate-Smart Agriculture (GACSA), has failed to address the root causes

of climate vulnerability and agriculture-based greenhouse gas emissions.

There are three major reasons for this failure: First, the GACSA-initiative is mainly driven by agri-business interests instead of those of small-scale and family farmers. Second, and partly explained by the dominance of agri-business interests, the Alliance does not give primary consideration to agro-ecological solutions to climate resilience, despite the growing body of evidence showing the potential of these approaches to build climate resilience. Thirdly, the Alliance has failed to tackle the structural causes that underlie both the vulnerability of the world's smallholder food producers to climate change as well as the contribution of the industrial agricultural sector to climate change. Also, GACSA does not attempt to wean the current food system off its dependence on fossil energy.

Based on the analysis in this report, ACT EU Alliance believes that the climate-smart agriculture brand and GACSA, its main promoter, do not provide the guidance and leadership required for the radical transformation needed to fix a broken food system and implement the right to food for all

¹ Globally there are about 500 million small scale producers. In Asia and Sub-Saharan Africa they produce up to 80 per cent of the food consumed and support up to 2 billion people. See IFAD (2010) Smallholders can feed the world, Rome. Most of them lack access to

productive resources (e.g. land, water and seeds), extension and business development services as well as markets. Most of them are producers as well as buyers of food.

while also mitigating and adapting to climate change.

Instead, the principles promoted by the food sovereignty and agroecological movements, which are holistic, ecologically sound, and socially just are the way forward to build climate resilience and transform the agricultural system, both of which are fundamental to achieving the global sustainable development goals outlined in Agenda 2030.

The agricultural production models promoted under the concepts of agroecology and food sovereignty are optimal for both climate change mitigation and adaptation given that they are locally adapted, diverse, use resources sustainably, offer decent livelihoods to smallholders and have the potential to reduce greenhouse gas emissions to a far greater extent than conventional models. Therefore, these principles and models should be supported by climate funds.

We therefore recommend that:

- Any bilateral and multi-lateral climate finance flows should support bottom up, community-driven climate adaptation solutions.
- Climate funds should not support technologies and approaches that increase the dependence of family and small-scale farmers on costly inputs.
- The funds should prioritise support projects in line with principles of agroecology and food sovereignty.
- Climate change mitigation initiatives in the agriculture sector should focus primarily on transforming and phasing-out the industrial agriculture system.²
- National mitigation and adaptation should respect a list of criteria to support transformational change towards agroecology, ensuring food security and sovereignty, restoring ecosystems and biodiversity, as well as defending human rights.

Introduction

Long-term climate change and the associated increase in extreme weather events have come to have a profound impact on all elements of life. How these changes relate to agriculture merits particular attention given that it is the sector at the heart of both the causes of and solutions to global warming.

Higher temperatures, irregular rainfall, increasing incidents of droughts and floods, changing disease patterns and shorter cropping seasons exert an unprecedented pressure on agriculture and food production, with major consequences for food security and rural livelihoods. Vulnerable farming communities, particularly in poor countries, have been hit hardest by climate change, and their capacity to recover from and move forward after weather-induced crises or adapt to long-term weather changes have been stretched, in many cases tragically, beyond endurance. By 2080 hunger caused by climate change could threaten an additional 600 million people.³

At the same time the conventional industrial farming model, marked by mechanised monocropping of so-called high yielding varieties on large plantations using synthetic farming inputs, has been a key driver of catastrophic levels of greenhouse gas emissions, deforestation, soil degradation and water pollution, as well as a rapid decline in agrobiodiversity. Not only does this undermine the adaptive capacity of farming systems, but it also jeopardizes the very basis of human survival on this planet. A fundamental transformation of conventional agriculture production is therefore inevitable.

This paper comes at a time when many countries are formulating their national priorities for climate action under the Paris Agreement. Developing countries have expressed that they will prioritize the agricultural sector.

However, many of the solutions on offer and competing for scarce global and national climate finance do not aim to build the resilience of agricultural systems or meet the right to food in developing countries. Instead, they promote agricultural practices that lock farmers as well as consumers in these countries into the unsustainable agricultural and food system prevalent across the developed world today. In this system, a few crop varieties and livestock breeds

² The Fifth Assessment Report of the IPCC estimates that agriculture, forestry and land use activities contribute just under a quarter of all greenhouse gas emissions. IPCC (2014) Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, 151 pp.

³ UNPD (2008) Human Development Report 2007/2008 - Fighting climate change: human solidarity in a divided world, see http://hdr.undp.org/sites/default/files/reports/268/hdr_20072008_en_complete.pdf

are intensively produced as single commodities, often for export, using large amounts of fossil-fuel intensive fertilisers and pesticides, and patented, transgenic and uniform seed. This system has also led to the consolidation of corporate control over genetic resources, agricultural research and whole food systems, as well as a nutrition transition that is at the root of major new chronic diseases such as diabetes and obesity in developed countries. Furthermore, it has failed spectacularly to feed the world.⁴

It is time to recognise the potentials of small-scale farming systems to feed the world even under climate change. It is estimated that 70 percent of the world population is fed by smallholder farmers, using only 30 percent of productive resources. These kinds of systems should be supported, rather than be pushed aside. This support would include access to and control over productive resources, land rights, and fair market conditions. This may also reverse the trend of migration to cities, especially of young people, leading to losses of labour and skills.

Acknowledgement of smallholder farming

We believe it is vital to acknowledge the enormous potential of small-scale agro-ecological farming systems to contribute to global food security and, sustainable development in a future world constrained by climate change. Evidence has shown that if small-scale farmers have sufficient access to land, water, credit, advisory services and equipment, their productivity per hectare and per unit of energy use is much higher than in large intensive farming systems.⁵ They link food production directly to sustainable rural economic and social development through the creation of decent jobs, entrepreneurial opportunities and secure livelihoods.

Smallholder farmers, especially women, have been the custodians of agrobiodiversity for centuries and have been adapting their agricultural practices to changing climatic conditions in many different agroecological contexts.⁶ It is therefore vital to ensure that policy frameworks build on, enhance and allow to further develop smallholder's skills and knowledge of plant breeding, sustainable production, and livestock-keeping, in collaboration with agricultural research institutes. Key to

enhancing their potential is for food production to remain in the hands of small-scale producers geared primarily towards local and regional markets. Policies must ensure that all food producers have information, resources and power to access and use appropriate techniques, and that productivity gains occur in places where food is desperately needed.

Also, many communities are already implementing environmentally sound climate adaptation strategies, such as low-cost infrastructure solutions to harvest water and restore soils.

It is time to acknowledge the important role of small-scale farmers for climate resilient agriculture and food systems through a radically different attitude and perception: Small-scale farming should be considered and supported as an attractive and future-oriented livelihoods approach rather than being a “no-better-solution” to sustain poor people in rural areas. Global and European climate finance instruments should thus prioritise funding for solutions that protect and promote the rights and livelihoods of small scale farmers, pastoralists and indigenous peoples, while protecting biodiversity and environmental integrity.

It is not smallholder systems that need to phase out and transit, but industrial agriculture systems all over the world. This will require a shift in investments to support the regeneration of ecosystem functions⁷ and the safeguarding of agrobiodiversity. Such a change can only take place if these countries acknowledge that conventional agricultural production and marketing practices contribute to global resource depletion and climate change, and are ecologically, socially and economically unsustainable.

Agriculture and climate change: Conflicting challenges

Climate change is posing huge, diverse and potentially conflicting challenges to the future of agriculture and food systems in different parts of the world. Those areas worst afflicted by hunger such as sub-Saharan Africa, South Asia and Central America, are also disproportionately affected by slow onset climatic changes.

⁴ Tittone, P. (2013) Farming Systems Ecology: Towards ecological intensification of world agriculture, Wageningen University. This report concludes that conventional agriculture cannot feed the world. Out of the total world production of cereals, coarse grains, roots and tubers, pulses and oil crops, around 2.8 bn tonnes are produced in developing countries, against 1.8 bn tonnes in developed countries, see page 4.

⁵ IAASTD (2009) Agriculture at a Crossroad. International Assessment of Agricultural Knowledge, Science and Technology for Development. Global Report.

⁶ Today's crop varieties and animal breeds owe their existence to 3000 million years of natural biological evolution and to careful selection and nurturing by our farming and herding ancestors during 12 000 years of

agriculture. CGIAR data shows that there are between 250 000 to 300 000 species of plants in existence, of which between 10 000 and 50 000 are edible. However, of these, only between 150 and 200 are used as human food. Three species – rice, maize and wheat – supply almost 60 percent of the calories and protein humans derive from plants. FAO (undated) Harvesting Nature's Diversity. Biodiversity to Nurture People, see <http://www.fao.org/docrep/004/v1430e/V1430E04.htm>.

⁷ Ecosystem functions are those biological, geochemical and physical processes and components that take place within an ecosystem. These functions provide many benefits such as clean water and air.

The agriculture sector is also a major emitter of greenhouse gases.⁸ In industrial agriculture these emissions are generated mostly when clearing of forests and grassland for more extensive production and by the growing number of industrial-scale plantations producing feed, food, and energy biomass for export. Industrial agricultural systems also generate greenhouse gas emissions due to their dependence on agrochemical inputs based on fossil fuel-generated energy. They also emit powerful greenhouse gasses, primarily due to the overuse of nitrogen fertilisers and the destruction of soil structure.⁹

New international climate finance instruments are currently being put in place to spend billions of dollars.¹⁰ Yet, the amount allocated to agriculture, forestry and land use is only a tiny fraction of the total amount of finance mobilised.¹¹ This presents both the challenge of increasing investments in the sector overall, and ensuring that these finances are being used to shift fossil-fuel intensive, polluting and unjust agricultural systems towards more just, diverse and sustainable systems that can successfully and continuously adapt to climate change and enhance mitigation. However, there is a real risk that public finances are not only being wasted on false solutions or 'business as usual' approaches, but that they could have negative impacts on livelihoods, land rights, biodiversity, climate change and resilience of farming systems.¹²

Agriculture at a crossroads

The constraints and shortcomings of industrial agriculture, which is consuming and destroying natural resources and agrobiodiversity on an unprecedented scale, are increasingly becoming obvious in the light of climate change. Despite this, the governments of many developing countries, encouraged by donors and corporate giants, still aspire to 'catch up' with this model, inspired by the yield increases of the Green Revolution. The livelihoods of producers in this model will remain insecure due to the volatility of global commodity markets and the concentration of market power in a few global input companies and the retailers that dominate agricultural supply chains.¹³

What global food security really needs

Fortunately, a paradigm shift is slowly emerging across both developed and developing countries, led by social movements at the forefront of initiatives such as community-supported ecological farming, pesticide free towns and cities¹⁴, transition networks of local communities addressing resource limits, local food networks, and the slow growth movement. In the global South, initiatives such as Participatory Guarantee Systems for self-controlled certification of organic farming; permaculture and many more are also emerging. These initiatives are creating local and regional supply chains, based on more natural and regenerative types of agriculture. Their aims are supported by the scientific findings of emerging

⁸ "Agriculture currently represents approximately 10 per cent of total EU greenhouse gas emissions. The Commission foresees that non-CO2 emissions from agriculture will represent one third of total EU GHG emissions by 2050." However, this may be considered a very low estimation or rather narrow definition of agriculture. If the GHG emissions from EU feed imports, which are causing deforestation to expand soybean and palm plantations, were counted for example, this figure would be much higher. The figure also does not include CO2 emissions related to the transport of agricultural products, the production of synthetic fertilizers and food processing. See also: http://actalliance.eu/wp-content/uploads/2016/05/Agriculture-and-climate-Letter_FINAL13-05-2016.pdf

⁹The calculations of the GHG emissions of agriculture differ depending on the scope of activities being measured. The IPCC Fifth Assessment Report (2014) estimates that the agricultural sector is the largest emitter of non-CO2 greenhouse gasses (56 per cent in 2005) and contribute, together with the forestry and land use sectors just under a quarter of global greenhouse gas emissions; see https://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_summary-for-policymakers.pdf. However, when looking at the whole food system, organisations such as GRAIN has calculated that the contribution is closer to 35-57 per cent of global greenhouse gas emissions. The FAO's Natural Capital Impact ranking (2015) show that the EU ranks among the top four countries whose agricultural practices have the largest negative impact on 'natural capital'. In the case of the EU, the largest impact of its agricultural activities are on GHG emissions and natural resource depletion. When calculating the GHG emissions of the EU's agricultural system, it is important to take account of the spill-over effect of outsourcing production to the South.

¹⁰ Developed countries as agreed in Copenhagen at the UNFCCC 2009 committed to jointly mobilise 100bn USD per year by 2020. Figures cited on the European Commission Economic and Financial Affairs website

(http://ec.europa.eu/economy_finance/articles/international/2015-10-09_climate_finance_en.htm), show that the EU and its Member States have delivered on climate finance providing 14.5 billion in 2015 including grants and loans by public development banks. For example,

the EU External Investment Plan aims at mobilising 3.1 bn Euros and the EU budget guarantee for the EIB External Lending Mandate has been expanded to cover 5.3 bn Euro. The Africa Trust Fund also provides 1 bn Euro. And there are other funds, like the Emergency Trust Fund for Africa that covers relocation and resettlement measures. The EU Food Security and Nutrition Policy also covers EU and Member States project that relate to improving smallholders (climate) resilience.

¹¹ The total amount of climate finance allocated to agriculture, forestry and land-use remains disproportionately small (6-8 USD billion) when compared to the total amount of climate finance mobilized globally (391 USD billion) in 2014 but data is limited outside of overseas development flows (Buchner et al., 2015) in FAO (2016).

¹² Climate funding is opaque because different financing sources use different delivery channels and instruments, varying definitions of climate finance, and different systems and methodologies for reporting. In recognition of this this, the UNFCCC COP 21 includes a commitment to develop modalities for the accounting of financial resources. Also, the OECD DAC has developed the "Rio markers" for indicating which ODA projects include climate mitigation or adaptation. However, Adaptation Watch found rampant misreporting of ODA-related projects directed towards climate action. Many of these were only tenuously linked to climate change. To complicate matters further, Also, several EU Member States seem to be increasing climate finance largely through non-grant, non-ODA financial mechanisms, such as loans, guarantees and equity, where reporting standards vary widely and it is often impossible to obtain sufficient detail to verify for accountability. The CONCORD Aidwatch 2016 report concludes that the drive to find additional resources for development and climate finance presents opportunities, but that the risks of these opportunities are not adequately assessed, which can easily lead to a rush headlong into insufficiently mitigated risks (CONCORD Aidwatch 2016: 24-25).

¹³The recent announced takeover of Monsanto by Bayer ("MonBayer") is a further expression of the ability and desire of agribusiness corporations to control the world food system, on the heels of the recent mergers between DuPont and Pioneer and Syngenta and ChemChina

¹⁴ www.pesticide-free-towns.info

disciplines such as agroecology and integrated land-use and landscape management.

How can global food security be ensured in a changing climate given that poverty, inequality, and environmental degradation are the main drivers of food insecurity and climate vulnerability? Successful adaptation strategies must put environmental protection and socio-economic rights at the core of all interventions and actions to disseminate new technologies and practices.

Such a justice and equality lens will ensure that adaptation strategies address issues such as gender equality, land rights, farmers' rights, biodiversity protection and - most importantly - fair and equal access to and control over resources. They should focus on providing smallholder and family farmers, women farmers, vulnerable landless population and farm workers¹⁵ with access to improved capacity, information, resources and power¹⁶

Guiding principles for a climate resilient agriculture system: Agroecology and food sovereignty

In 2008, the world's hitherto most comprehensive "International Assessment of Agricultural Knowledge, Science and Technology for Development" (IAASTD) called for a fundamental transformation of food and farming systems, based on the principles promoted by the concepts of agroecology and food sovereignty.¹⁷ These two interconnected concepts constitute a holistic approach to agriculture and food systems. They aim to address the systemic and institutional inequalities in agricultural markets that have made farmers vulnerable to climate impacts in the first place, and work with nature to improve total farm output while building the resilience of agricultural landscapes to climate change.

¹⁵ See for example, agricultural workers trade unions such as www.effat.org or www.iuf.org

See for example, FAO (2014) Family Farmers: Feeding the world, caring for the earth; see <http://www.fao.org/docrep/019/mj760e/mj760e.pdf>; Grain (2014) Hungry for land: small farmers feed the world with less than a quarter of all farmland; see <https://www.grain.org/article/entries/4929-hungry-for-land-small-farmers-feed-the-world-with-less-than-a-quarter-of-all-farmland>; and new study by Twin-Cities (2016) which says that smallholder systems produce more than half of the planet's food calories and convert more than 70 percent of the calories produced directly into the food that people eat; see <http://twin-cities.umn.edu/news-events/ione-researchers-produce-first-ever-map-farming-households-across-world>.

¹⁷ Beck, A., Haerlin, B., Richter, L. (2016) IAASTD at a Crossroad: IAASTD findings and recommendations for future farming, Foundation on Future Farming, Berlin, page 5; see http://www.globalagriculture.org/fileadmin/files/welttagarbericht/English Brochure/BrochureIAASTD_en_web_small.pdf

The concept of agroecology

Agroecology is a term used to describe a scientific discipline, a set of agricultural practices, as well as a social movement, informed by farmers' knowledge and practices that respect and sustain their natural resources.¹⁸ It continues to gain ever wider acceptance and endorsement by a growing range of scientists, international organisations and farmers' movements.¹⁹

As a set of agricultural practices, agroecology aims to enhance agricultural systems by mimicking natural processes, creating beneficial ecological interactions and synergies among the many components of an agroecosystem. It puts emphasis on maintaining and improving natural soil fertility for plant growth, particularly through the addition of organic matter and the creation of good conditions for soil microorganisms. Furthermore, emphasis is given to on-farm and local nutrient and energy cycles, rather than the use of external inputs; integrating crops and livestock; diversifying species and genetic resources; and focusing on interactions between species. Agroecology is highly knowledge-intensive, based on techniques that draw on the knowledge, experience and experimentation of farmers. It aims to build climate-resilient agricultural systems, rather than climate-smart plants, through a holistic focus on locally adapted solutions to soil structure building, plant breeding, agrobiodiversity and landscape management.²⁰

Agroecology also has tremendous potential to contribute to women's empowerment and gender equality. The patriarchal character of most societies accords men a much more visible and recognised role in and contribution to agriculture than that accorded to women. Yet women are the custodians of agricultural knowledge and play a vital role in food security. Given that learning and sharing are at the core of agroecology, their contributions are highly valued in agroecological systems. These systems also provide them with a space to meet regularly and take collective action to address issues of concern to them, including demanding greater equality.

¹⁸ See IIED (2014); FAO (2014 ii); Francis et al.(2003). An overview of various recent scientific publications has been published by Swissaid (2015) Fabio Leppert: Agrarökologie – A Swissaid Positionspapier, see https://www.swissaid.ch/sites/default/files/150216_Position_Agrookologie_DE_2.pdf;

¹⁹ The first FAO Agroecological symposium was held in 2014 with the support of the French, Swiss, Senegalese, Costa Rican, Japanese, and Brazilian governments, as well as the European Commission; see http://www.fao.org/about/meetings/afns/en/?fb_locale=es_ES; Different regional agroecological symposium have also been held and in 2016 the FAO created the Agroecology Knowledge Hub. See http://www.fao.org/about/meetings/afns/en/?fb_locale=es_ES.

²⁰ Various studies demonstrate the effectiveness of agroecological production methods in building the resilience of agricultural systems to climate change. These are examined in the IPES-Food (2016) Report of the International Panel of Experts on Sustainable Food Systems; see <http://www.ipes-food.org/how-to-leave-industrial-agriculture-behind-food-systems-experts-urge-global-shift-towards-agroecology>.

Since women generally are still responsible for feeding their families, the diversity inherent to agroecology responds to their need to produce a variety of nutritious food. Additionally, the use of local resources such as manure, local biomass and local seeds helps women, who usually have less access to financial resources than men, to reduce the cost of production.

Research has shown that diversified agroecological farming systems have great potential to contribute to both climate mitigation and adaptation.²¹ A recent report of the International Panel of Experts on Sustainable Food Systems (IPES) reviewed the latest scientific evidence on the outcomes of industrial versus agroecological production models against various economic, social and ecological criteria.²²

The findings of this comprehensive comparison show that diversified agroecological systems outperform industrial agriculture in many of the criteria, but especially when it comes to food security, environmental protection, adequate nutrition and social equity. The report also shows that intensive production can also be sustainable.

Agroecological methods can increase both the productivity of land and its resilience to environmental stresses such as droughts and floods, which can reduce the risk of disasters. Moreover, ecological agricultural production methods reduce greenhouse gas emissions by storing more carbon in soils and avoiding the use of fossil-fuel intensive agrochemical inputs such as synthetic fertilisers.²³

The concept of food sovereignty

Food sovereignty is a political concept which frames agricultural production within a much wider socio-political context. The idea was developed by La Via Campesina, a global peasant movement fighting for the right of peoples and communities to define their own priorities for agricultural, pastoral, labour, fishing, food and land policies.

Promoting the right to food should be the core purpose of these policies, which can only happen if they are ecologically, socially, economically and

culturally appropriate to their specific circumstances and landscapes. The movement aims to bring about a more democratic food system, which is the precondition for achieving the sustainable development, food security, poverty reduction and rural employment. It defines food sovereignty as the right of citizens and sovereign states to determine their own agricultural and food policies in a democratic way, instead of ceding control over these policies to global trade rules, regional trade agreements, and international bodies such as the World Trade Organisation.²⁴

The democratic and rights-based approach promoted by the food sovereignty movement stand in contrast to the undemocratic and unfair rules-based approach which governs the current food and agricultural system, where market power is increasingly concentrated in a few global agribusinesses that dominate the global supply and demand of agricultural commodities and inputs.

The way towards global agriculture systems

The principles promoted by the agroecology and food sovereignty movements can, when taken together, provide a holistic set of criteria to guide the allocation of future climate finance for agricultural adaptation and mitigation, whether national, EU or global. The EU 2020 Biodiversity Strategy and the EU commitment to Policy Coherence for Development, and the EU Food Security Policy Framework already support many of these principles.²⁵

The newly adopted global Sustainable Development Goals (SDGs) call for just and sustainable food systems as well as resilient farming practices which go beyond narrow considerations of enhanced productivity and yields. They commit signatories to take targeted actions to ensure more equal access to and control over land and natural resources; sustain seed diversity; regenerate ecosystems; improve soil quality; regulate financial speculation of food stocks; reduce unsustainable consumption patterns; and promote women's empowerment and gender equality.²⁶

²¹ Krauss et al, 2013; Müller and Aubert, 2013; Muller et al., 2012; Muller et al, 2011; Niggli et al, 2009; Skinner et al, 2014; Gattinger et al., 2013.

²² IPES-Food (2016)

²³ Gattinger, A. and Menzler, M. (2015) Bioboden-gut fürs Klima. Ökologie & Landbau, 2015, 4/2015, p. 22., and Gattinger, A. et al. (2013). FiBL (2015) 100 Argumente für den Biolandbau, Switzerland, see <https://shop.fibl.org/de/artikel/c/allg-grundlagen/p/1440-argumente.html>. FiBL and IFOAM Organics International (2016) The World of Organic Agriculture, Bonn and Switzerland; see <http://www.organic-world.net/yearbook/yearbook-2016.html>. Carbon stocks in ecological managed soils contain on average 3.5 tonnes (12-15%) higher content per hectare than non-organic cultivated soils, according to a global comparative analysis of 74 studies according to FiBL (2012) Enhanced top soil carbon stocks under organic farming; see <http://www.pnas.org/content/109/44/18226.full.pdf>. UNEP-UNCTAD Capacity Building Task Force on Trade, Environment and Development

(2008) Best Practices for Organic Policy, New York and Geneva; see http://www.unep.ch/etb/publications/UNCTAD_DITC_TED_2007_3.pdf.

²⁴ IAASTD Brochure 2016, page 17 (see footnote 17); and Food Sovereignty: A Right For All Political Statement of the NGO/CSO Forum for Food Sovereignty, Rome, June 2002. See also <http://www.foodsovereignty.org>; and <http://www.nfu.ca/sites/www.nfu.ca/files/Principles%20of%20Food%20Sovereignty.pdf>; or <https://www.grain.org/article/entries/491-food-sovereignty-turning-the-global-food-system-upside-down>.

²⁵ See list of indicators proposed by ACT Alliance EU (previously APRODEV) in APRODEV (2014) Discussion Paper on Seed Policies. Brussels. http://actalliance.eu/wp-content/uploads/2016/04/aprodev_pcd_seed_paper_final_18122014.pdf

²⁶ <http://www.un.org/sustainabledevelopment/hunger/>

Internationally, bodies such as UNEP are at the forefront of promoting these goals. In the EU, the former Commissioner for Environment, Janez Potočnik, has drawn on the SDGs to call for 'resource-smart' food systems which are dominated by values such as well-being and health, rather than profit and efficiency.²⁷

Analysis on Climate-Smart Agriculture

This section will first outline how 'climate-smart agriculture' has become the common brand employed by corporate agri-businesses, development finance institutions, and governments to describe agricultural technologies and approaches that are aimed at climate change adaptation and mitigation. It will show how the goals and values promoted by the agroecology and food sovereignty movements are largely absent or underrepresented in the priorities and actions of the Global Alliance on Climate-Smart Agriculture (GACSA).

Introduction to the term "Climate-Smart-Agriculture"

The concept of climate-smart agriculture (CSA) was introduced in 2009 by the FAO to address the interrelated challenges of climate change and food security. Since then, the term has quickly been adopted by a broad range of international development actors such as the World Bank, UN agencies, bilateral development institutions, and more recently, by agribusiness corporations. The FAO defines climate-smart agriculture as practices that aim 'to sustainably increase productivity, resilience (adaptation) and to reduce/remove greenhouse gases (mitigation) while enhancing the achievement of national food security and development goals'.

While these aims are uncontroversial, the FAO has failed to define specific criteria and principles which set strict parameters for the approaches and technologies by which to achieve these aims.

Given this loose definition the term has become a catch-all label which is used by many of its promoters to market technologies and approaches that aim to provide quick fixes and silver bullet technical solutions to address the impact of climate change, rather than transform the dominant agricultural system in line with the principles

embraced by the agroecology and food sovereignty movements.

Even though this is not uniformly the case for all adaptation and mitigation interventions that use the label of climate-smart agriculture, its appropriation by those who dominate the existing food and agriculture system has reduced its value as a guiding concept for a future resilient and just agricultural system. Prior to the UN climate negotiation in Paris in 2015, a broad global coalition of more than 350 environmental, developmental and farmer's organizations openly rejected CSA as a misleading concept for climate change adaptation and mitigation.²⁸

The Global Alliance for Climate-Smart Agriculture

The Global Alliance for Climate-Smart Agriculture (GACSA) is the primary platform promoting the idea of climate-smart agriculture. It was launched during the Ban Ki-moon Climate Summit in September 2014, and endorsed by the UN Secretary General. Its vision is 'to improve food security, nutrition and resilience in the face of climate change by tapping the wealth and diversity of resources, knowledge, information and expertise, from and between its members, in order to stimulate concrete initiatives at all levels'.

GACSA aims to promote the 'three pillars' of climate-smart agriculture as set out by the FAO, namely i) sustainably increasing agricultural productivity, to support equitable increases in farm incomes, food security and development; ii) adapting and building resilience of agricultural and food security systems to climate change at multiple levels; and iii) reducing greenhouse gas emissions from agriculture practices, including crops, livestock and fisheries.²⁹

Despite these stated goals and due to its composition and priorities, the Alliance has so far failed to address the root causes of climate vulnerability and agriculture-based greenhouse gas emissions, or pave the way for more democratic, just and resilient agricultural systems. There are three major reasons for this. Firstly, the Alliance mainly represents agri-business interests while those of family farmers and advocates of a transformed agricultural system are either under represented or not heard at all.

Secondly, and partly explained by the dominance of business interests, the Alliance does not give primary consideration to agroecological solutions. Thirdly, the Alliance has failed to tackle the structural causes that underlie both the vulnerability of the world's smallholder food

²⁷http://ec.europa.eu/research/conferences/2016/food2030/pdf/04.presentation_janez_potocnik_panel3_food2030.pdf

²⁸ See International CSA Rejection letter at <http://www.climatesmartagconcerns.info/english1.html>

²⁹ <http://www.fao.org/gacsa/about/about-csa/en/>

producers to climate change as well as the contribution of the industrial agricultural sector to global warming. Most importantly, GACSA does not attempt to wean the current food system off its dependence on fossil energy, which can partly be explained by the heavy presence of the fertiliser industry in the Alliance.

1-Business interests undermine GACSA goals

GACSA claims to be a public interest initiative, in which the goals of governments, civil society and the private sector are well balanced and through which they seek joint solutions. However, the way in which GACSA presents itself is misleading.³⁰ The Alliance has been set up by a self-appointed group of advocates for climate-smart agriculture³¹ parallel to and without prior consultation with already existing democratic global institutions or agreements that are mandated to promote the right to food and climate change mitigation and adaptation, such as the Committee on World Food Security and the UNFCCC. This has weakened its legitimacy and accountability considerably.

The membership of the Alliance is also prone to conflict of interest. The strong presence of major global fertiliser companies, as well as lobbying organisations for private companies who promote the use of mineral fertilizers and fossil-based energy suggests that they are using the platform to serve their business interests, rather than to find ways in which to transform the fossil-dependent industrial agriculture system.³²

For example, at the second Strategic Committee Meeting of GACSA, the agenda focused exclusively on finding ways in which private sector members can gain access to these markets, especially agrochemical companies who are targeting smallholder farmers in developing countries as new clients for their synthetic fertiliser products.³³

Their heavy presence not only mirrors the unequal power relations in the global food and agricultural

system but may end up undermining the Alliance's stated objectives and the public interest in shifting to a zero-carbon economy.

This may also partly explain why the Alliance hardly mentions the responsibility of the Global North and the extractive industrialised agriculture systems introduced worldwide as the main emitters of greenhouse gases.

2-GACSA fails to address industrialised agriculture

The Alliance does not aim to hold global agribusinesses or industry to account for mitigation actions, yet they are major greenhouse gas emitters and are causing other global environmental problems such as desertification, erosion, biodiversity loss, climate change, over-fertilisation of rivers and acidification of oceans, illegal logging, and water shortages.³⁴ Instead, GACSA primarily targets the agricultural practices of small scale farmers in developing countries.³⁵

GACSA draws the majority of its "success" project examples from the Global South – supporting the paradigm that smallholder traditional agriculture is the main target group to address and to draw into the "modern" way of farming. This paradigm fails to apprehend that industrial agriculture needs as much attention when it comes to adaptation to climate change. Regarding mitigation, the industrial agriculture system should be the primary target group, in order not to overly burden smallholder farmers.

The GACSA approach is still to 'fix' the dominant industrial system rather than transforming it, by continuing to treat the symptoms rather than causes of climate vulnerability and by applying reductionist approaches to solve complex problems.

Proponents of this approach are putting increasing resources and scientific efforts towards the introduction of "modern" technological agriculture

³⁰ See for example IATP (2015) at http://www.iatp.org/files/2015_09_17_GACSA%20statement%20FINAL.pdf, or the Open letter signed by 50 scientists rejecting the concept of climate smart agriculture, September 2014 at http://www.iatp.org/files/2014.09.17_AgroecologyFAOLetter.pdf; or Scientists' Open Letter to FAO DG Graziano da Silva in support of the February 2015 Declaration of the International Forum for Agroecology-24 June 2015; see <https://drive.google.com/file/d/0B0FCnBUG7Lp6TUxMcVQ4NUNqckk/ew>. In response GACSA stated that it will take account other international processes such as FAO CFS, the Multilateral Environmental Agreements and the UNFCCC. However, this intention seems purely declarative, and we could find no evidence to show that the Alliance has created mechanisms to compel members to measure their activities and publicly report how they are implementing the principles espoused by these institutions.

³¹ The US government and UN institutions such as the FAO were key proponents of the Alliance, which is hosted by the FAO and funded by a multi-donor trust fund. It was originally discussed at the third global conference on climate change and food security in South Africa in Dec. 2013.

³² YARA International, the largest global producer of synthetic nitrogen, and Mosaic Company are both GACSA members. Together they

control 24 percent of the global fertilizer market. Yara International is also a member of the GACSA Strategic Committee. Other members of GACSA include the Fertilizer Institute, the International Industry Association, and the International Fertilizer Development Centre; see <http://www.fao.org/gacsa/members/members-list/en/>.

³³ "Identify what can be done now to put CSA products in the market in the future", quoted in "Site-Specific Nutrient Management" of the GACSA Knowledge Action Group which lists smallholders as their target group for the "development of input markets on fertilizers" and the "Application of 'Nutrient Expert' - an interactive, computer-based decision-support tool".

³⁴ IAASTD 2009

³⁵ 'Agriculture in developing countries must undergo a significant transformation in order to meet the related challenges of achieving food security and responding to climate change. Small holders (...) must change, invest and learn'. See FAO (2010) "Climate-Smart" Agriculture: Policies, Practices and Financing for Food Security, Adaptation and Mitigation, Rome; see <http://www.fao.org/docrep/013/i1881e/i1881e00.pdf>.

to smallholder farmers in the Global South, including precision farming, robots and big data, all of which claim to be 'climate-smart', and compete for funding from scarce climate finance resources. In turn, their aims are supported by emerging disciplines such as synthetic biology and geo-engineering.

3-GACSA fails to prioritise agroecological solutions

Core GACSA documents and agendas fail to mention the large body of research showing the potential of agroecological approaches to build climate resilient agricultural systems.³⁶ While individual contributions in GACSA webinars do refer to agroecological and more holistic climate resilient approaches³⁷, these discussions have not led to any systematic attempts to link up with for example the recent FAO initiative on agroecology.³⁸

Importantly, GACSA does not offer a clear definition of what practices and approaches do and do not constitute "climate-smart agriculture". The omission of providing clear-cut criteria is deliberate and has precluded factual and even scientific debates among Alliance members about the costs and benefits of different models of agricultural production and food systems.

In the guidelines and deliberations issued by GACSA, agroecological and industrial solutions are treated as if they were interchangeable and will have the same 'climate-smart' outcomes. Advocates for the Alliance have stated that they do not want to identify clear parameters that can be used to assess climate-smart practices as it would risk excluding some practices, which they view as complementary rather than contradictory.³⁹ This approach of giving equal weight to truly transformative and 'business as usual' practices is an open invitation to 'greenwashing' high carbon emitting agricultural technologies.

For example, GACSA Practice Briefs present the use of synthetic fertilisers as compatible or exchangeable with the use of organic fertilisers, whereas in fact they have very distinct features that lead to very different impacts on soil health and fertility, greenhouse gas emissions, environmental and natural resource protection, biodiversity, and the social preferences and choices of family farmers.⁴⁰

Furthermore, the focus of the Alliance is on technical solutions such as Integrated Soil Fertility Management and Conservation Agriculture.⁴¹ Some of these can require the use of expensive and fossil fuel-intensive inputs. When these approaches are not accompanied by independent advice on and support for ecological methods to improve soil fertility and tackle plant pests and diseases, they can create or increase the dependence of producers on these expensive inputs, and promote the combined use of low carbon techniques such as no-till with increased use of unsustainable inputs such as herbicides. These technical solutions, while allowing for more efficient resource use, often camouflage the real change needed, namely to reduce inequality, empower family farmers, and regenerate natural resources and ecosystem functions.

The focus on quick fix technical solutions such as genetic engineering of plants to withstand more extreme weather conditions fails to take into consideration the specific agroecological and social contexts in developing countries. For example, genetically engineered seeds usually only perform well when used with chemical pesticides and synthetic fertilizers, which makes this option unsustainable for most vulnerable and poor producers. It also diverts the focus of agricultural research and innovation away from improving the resilience of local seed systems, which have for centuries been the hub of agrobiodiversity.

This has been amply demonstrated by the Water Efficient Maize for Africa (WEMA) project, which has been presented as a climate-smart agriculture success story.⁴² Supported by the seed and chemical giant Monsanto, the project aims to develop and promote hybrid and genetically modified maize varieties among small-scale farmers in sub-Saharan Africa. Public research centres have made their best maize germplasm lines available to the project, with Monsanto 'donating' the drought-tolerant gene, on which they retain cumbersome intellectual property rights. The company also included an additional insect-resistant feature, MON810, even though this variety has already dismally failed both commercial and smallholder farmers in South Africa.⁴³

³⁶ FAO studies have shown the positive impacts and potential of ecological agriculture for climate protection. FAO (ed.) (2011) Organic agriculture and climate change mitigation - A report of the Round Table on Organic Agriculture and Climate Change

³⁷ See the Webinar 2 (May 2016) 'Towards adopting CSA practices as effective adaptation measures against severe impacts of climate change in Vietnam, by Dr Tran Dai Nghia, Director of the Department of Natural Resource and Environmental Economics Studies, Vietnam; and Webinar 4 (2 June 2016) National strategies and local policies in the context of the Agroecology and the related actions undertaken in France; see <http://www.fao.org/gacsa/webinars/en/> for webinars of the Enabling Environment Action Group.

³⁸ <http://www.fao.org/about/meetings/afns/en/>

³⁹ GACSA (2015) Series Document 13: Statement to Civil Society Organizations on Concerns over CSA and GACSA, see <http://www.fao.org/3/a-bc546e.pdf>

⁴⁰ The CSA-Practice guide on "Integrated Soil Fertility Management (ISFM)" recommends the use of 'fertilizer, organic inputs and improved germplasm'. It states that "ISFM focuses in the first place on the germplasm of crops and use of inorganic fertilizers"; see <https://csa.guide/csa/integrated-soil-fertility-management-isfm>.

⁴¹ See sources at the end of this paper for GACSA Practice Briefs

⁴² CGIAR/CCAFS and CTA (2013)

⁴³ African Centre for Biodiversity (2013): Africa bullied to grow defective Bt Maize: the failure of Monsanto's MON810 maize in South Africa; see:

A report by the African Centre for Biodiversity (ACB) argues that Monsanto's GM drought tolerant maize is likely to spell disaster for smallholder farmers as this will not perform predictably under conditions of environmental stress. It also raises concerns that projects like WEMA, under the guise of philanthropy and fighting climate change, are facilitating a takeover of the ownership of maize breeding, seed production and marketing by corporate entities.⁴⁴

4-GACSA fails to address the structural causes of climate vulnerability

GACSA's practice guidelines and other documents make no reference to the structural causes of climate vulnerability. These include among others a lack of access and control over indispensable resources such as land, water, seeds, finance and knowledge; hunger, environmental and soil degradation;⁴⁵ soil degradation resulting from industrial agriculture as well as unsustainable production methods used in many dryland and tropical areas due to the complex inter-relationship between the harsh biophysical environment and socio-economic issues such as population growth and lack of secure land tenure; as well as oligopolistic market structures reinforced by neo-liberal trade regimes.

There are international agreements, guidelines, and conventions in place that aim to address these causes, including on the right to food, the governance of land tenure security, farmers' rights, and environmental protection. These frameworks provide standards and guidelines that should underpin any approach to build the climate resilience of vulnerable populations dependent on agriculture.

Unless climate-smart agriculture approaches adhere to these standards, they may have unintended negative social outcomes such as conflict between small-scale food producers and agro-fuel and forest plantations (used for carbon trading) over land use, the loss of traditional farming knowledge and agrobiodiversity, and increased indebtedness and stress when farmers are told or choose to switch to high cost high-input farming methods.⁴⁶

GACSA publications repeatedly emphasise the lack of access to finance as a key challenge for

small-scale farmers who seek to adapt their practices to climate change. They acknowledge that farmers who adopt an integrated soil fertility management approach, for example, will find it difficult to pay for expensive farming inputs unless they have access to credit facilities. The financing of these practices relies largely on the capital and assets of individual farmer households. Yet, none of the guidelines refer to the risks associated with increased financial dependency, and how to avoid these by pursuing low external input methods.⁴⁷

The WEMA project, which has been displayed as a successful climate-smart agriculture project, is an example of how the failure of climate-smart agriculture projects to adhere to international guidelines and standards such as environmental sustainability increases the vulnerability of smallholder producers to climate change, thus undermining one of the main objectives of GACSA.

By focusing on the introduction of patented hybrid seeds, the WEMA project has neglected the opportunity to provide more support to local seed systems in southern Africa. Instead, smallholder farmers who developed locally adapted maize seeds based on their own knowledge, observation and gradual improvements over time are now dependent on expensive patented seeds that cannot be saved, re-used or exchanged. This, in turn, will contribute to the further loss of agrobiodiversity, which is the foundation of resilient agricultural systems.

<http://acbio.org.za/monsantos-failed-sa-gm-maize-pushed-into-rest-of-africa/>

⁴⁴ African Centre for Biodiversity (2015). Profiting from the Climate Crisis, undermining resilience in Africa: Gates and Monsanto's Water Efficient Maize for Africa (WEMA) Project; see http://acbio.org.za/wp-content/uploads/2015/05/WEMA_report_may2015.pdf

⁴⁵ Soil degradation is perhaps the greatest cause of climate vulnerability in large parts of dryland/Sahelian Africa. Soil degradation may result from industrial agriculture as well as from unsustainable production methods used in many dryland and tropical areas due to the complex inter-relationship between the harsh biophysical environment and socio-economic issues such as population growth and lack of secure land tenure.

⁴⁶ For example, in India, the adoption of high-input green revolution technologies has led to unsustainable levels of personal debts among farmers. This has resulted in very high rates of farmer suicide in those states where there has been a wide adoption of high-input technologies. See for example, Integrated Rural Development of Weaker Sections in India (IRDWSI); www.wedango.in for an account of this tragic phenomenon.

⁴⁷ GACSA (2015) CSA Practice brief 1: Site-Specific nutrient Management: Implementation guidance for policymakers and investors; see <https://cgspace.cgiar.org/bitstream/handle/10568/69016/CCAFSpbNutrient.pdf>

Conclusion

ACT Alliance EU believes that the climate-smart agriculture brand, and GACSA, the platform promoting this label, do not provide the guidance and solutions required for the radical agricultural transformation needed to fix a broken food system while also mitigating and adapting to climate change. The analysis in this position paper has shown this to be the case for the following reasons:

- The climate-smart agriculture term can be used for practices and approaches that are socially and environmentally unsustainable. Without clear environmental and social criteria, the label can be misused to 'greenwash' or lock-in unsustainable and unjust agricultural models rather than transform unsustainable practices. This has been clearly demonstrated by the fact that large agro-chemical companies seeking access to new markets for their synthetic fertiliser products, which make a significant contribution to greenhouse gas emissions, are active members of GACSA.
- GACSA has been set up without prior formal consultations with existing global initiatives and agreements such as the Committee on World Food Security, which are mandated to promote sustainable development, give voice to the family farmers who feed up to 70 per cent of the world, build the resilience of agricultural systems, and address the broken food system. Family farmer interests are not adequately represented, and the Alliance lacks mechanisms to monitor and hold members accountable to its stated goals.
- So far, GACSA initiatives and guidelines have failed to showcase and share the evidence which demonstrates that agroecological farm and landscape management systems in developing countries lead to better social, environmental, and nutritional outcomes than conventional approaches.
- GACSA guidelines focus primarily on improving the agricultural practices of family farmers in developing countries, often by increasing their dependence on fossil-fuel intensive inputs, instead of transforming the fossil-fuel intensive industrialized agriculture system.

The principles promoted by the food sovereignty and agroecological movements, on the contrary, are more holistic, ecologically sound and socially just and therefore better suited to help build the 'common future' envisioned by the Rio Summit on Sustainable Development in 1992 and in 2012, and tackle climate change within the newly adopted goals of the Paris Agreement. The agricultural

production models they promote are optimal for both climate change mitigation and adaptation given that they are locally adapted, resource efficient, and reduce greenhouse gas emissions to a far greater extent than conventional models. Therefore, these principles and models rather than those promoted by the catch-all climate-smart agriculture label, should be supported by climate funds.

Recommendations on climate finance

- Global, regional and national climate finance instruments, such as the Green Climate Fund, EU climate funds, and bilateral aid instruments should support bottom up climate adaptation solutions, driven by those communities most vulnerable to climate change.
- These funds should prioritise support for agroecological production models which show optimal climate change mitigation and adaptation outcomes, and food systems that are based on the right to food principles advocated by the food sovereignty movement and enshrined in international law.
- Climate change mitigation initiatives in the agriculture sector should focus primarily on transforming the industrial agriculture system.
- Climate funds should not support technologies and approaches that increase the dependence of family and small-scale farmers on costly inputs and technology packages that lock them into an environmentally and socially unsustainable agricultural system.

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Resources

- ActionAid** (2015) Caught in the Net: How “net-zero emissions” will delay real climate action and drive land grabs; see <http://actionaid.org/publications/caught-net-how-net-zero-emissions-will-delay-real-climate-action-and-drive-land-grabs>.
- African Centre for Biodiversity** (2013) Africa bullied to grow defective Bt Maize: the failure of Monsanto's MON810 maize in South Africa; see: <http://acbio.org.za/monsantos-failed-sa-gm-maize-pushed-into-rest-of-africa/>.
- African Centre for Biodiversity** (2015) Profiting from the Climate Crisis, undermining resilience in Africa: Gates and Monsanto's Water Efficient Maize for Africa (WEMA) Project; see <http://www.db.zfs-intern.de/uploads/1430856725-ACB-WEMA-Studie.pdf>.
- CGIAR/CCAFS-IRRI Practice Briefs:**
<http://www.fao.org/gacsa/resources/csa-practice-briefs/en/>;
see <https://cgspace.cgiar.org/rest/bitstreams/34456/retrieve>.
- CGIAR/CCAFS & CTA** (2013) Climate-smart agriculture success stories from farming communities around the world, based on: Large-scale implementation of adaptation and mitigation actions in agriculture, Working Paper No. 50, by Cooper PJM, et al., Copenhagen, 2013; see <https://cgspace.cgiar.org/rest/bitstreams/24750/retrieve>.
- Christian Aid** (2015) Climate Resilient Agriculture: what small scale producers need to adapt to climate change. <https://drive.google.com/file/d/0B0FCnBUG7Lp6T1NZYVBhNGtITUE/view>
- Ernstin, Almut & Munnion, Oliver** (2016) Last-ditch climate option or wishful thinking? Bioenergy with Carbon Capture and Storage; see www.boell.de/de/2016/04/29/last-ditch-climate-option-or-wishful-thinking
- GACSA** (March 2015) GACSA Series Document 2: Governance and Structure Version 11: Draft for Endorsement. Addendum to the Framework Document GACSA 1); see <http://www.fao.org/3/a-au668e.pdf>.
- GACSA** (Oct 2015) GACSA Series Document 11: Summary Report Second Strategic Committee Meeting, Rome; see http://www.fao.org/fileadmin/user_upload/gacsa/docs/GACSA_2nd_Physical_Strategic_Committee_Meeting-13-14_Oct_Report.pdf.
- GACSA** (2015) GACSA Series Document 13: Statement to Civil Society Organizations on Concerns over CSA and GACSA, see <http://www.fao.org/3/a-bc546e.pdf>.
- GACSA** (2015) CSA Practice brief 1: Site-Specific nutrient Management: Implementation guidance for policymakers and investors; see https://cgspace.cgiar.org/bitstream/handle/10568/69016/CCAF_SpN Nutrient.pdf.
- GACSA** (not dated) Information brochure; see <http://www.fao.org/3/a-au980e.pdf>.
- Gattinger et al.** (2011): No-till agriculture – a climate-smart solution? Forschungsinstitut für biologischen Landbau (FiBL), Frick, Switzerland on behalf of MISEREOR.
- Gattinger et al.** (2012) Enhanced top soil carbon stocks under organic farming; published by FiBL; see <http://www.pnas.org/content/109/44/18226.full.pdf>.
- FAO** (2010) Climate-Smart” Agriculture; Policies, Practices and Financing for Food Security, Adaptation and Mitigation.
- FAO** (2014) Success Stories on Climate-smart Agriculture. CSA on the Ground; see <http://www.fao.org/3/a-i3817e.pdf>.
- FAO** (2014 ii) Final Report for the International Symposium on Agroecology for Food Security and Nutrition, 18-19 Sept. 2014, Rome; see <http://www.fao.org/3/a-i4327e.pdf>.
- FAO** (2015) Natural Capital Impacts in Agriculture, Supporting Better Business Decision-Making; see <http://www.fao.org/nr/sustainability/natural-capital/en/>.
- FAO** (2016) Investment Action Group. June 2016. Making Climate Finance Work in Agriculture: background note to the Climate Finance session of the Annual Forum of the Global Alliance for Climate Smart Agriculture. Rome. See http://www.fao.org/fileadmin/user_upload/gacsa/AF/SC/GACS_A_IAG_-_Climate_Finance_Note.pdf
- FAO** (ed.) (2011) Organic agriculture and climate change mitigation - A report of the Round Table on Organic Agriculture and Climate Change.
- FiBL and IFOAM Organics International** (2016) The World of Organic Agriculture, Bonn and Switzerland; see <http://www.organic-world.net/yearbook/yearbook-2016.html>.
- Francis C., et al.** (2003) Agroecology: The ecology of food systems, *Journal of Sustainable Agriculture* Vol 22, 99–118.
- Gattinger, A. and Menzler, M.** (2015) Bioboden-gut fürs Klima. *Ökologie & Landbau*, 2015, 4/2015, p. 22.
- Gattinger, A. et al.** (2013) Kohlenstoffspeicherung und Treibhausgasflüsse in Böden unter biologischer und konventioneller Bewirtschaftung – Ergebnisse aus zwei globalen Meta-Analysen. Paper at: 12. Wissenschaftstagung Ökologischer Landbau, Rheinische Friedrich-Wilhelms-Universität, Bonn, 5 -8 March 2013.
- IAASTD** (2009): Agriculture at a Crossroad. International Assessment of Agricultural Knowledge, Science and Technology for Development. Global Report. UNDP, UNEP, UNESCO, World Bank, WHO, Global Environmental Facility, Washington; see <http://www.weltagrabericht.de/fileadmin/files/weltagrabericht/IAASTDBerichte/GlobalReport.pdf>.
- IIED** (2014) Agroecology - What it is and what it has to offer, by Laura Silici; see <http://pubs.iied.org/14629IIED.html>
- IFAD** (2010) Smallholders can feed the world, Rome, see www.ruralpovertyportals.org
- IPCC** (2014): Report Climate Change. Mitigation of Climate Change. Chapter 11: Agriculture, Forestry and Other Land Use (AFOLU); see <https://www.ipcc.ch/report/ar5/wg3/>
- IPES-Food** (2016): From uniformity to diversity: a paradigm shift from industrial agriculture to diversified agroecological systems. International Panel of Experts on Sustainable Food systems; see http://www.ipes-food.org/images/Reports/UniformityToDiversity_FullReport.pdf.
- Krauss, M. et al** (2013) Ist der Biolandbau klimafreundlicher? *Zürcher Bauer*, 6 Sept. 2013, p.4.
- Leippert, Fabio** (2015) Position papers on agroecology, published by Swissaid; see https://www.swissaid.ch/sites/default/files/150216_Position_Agroökologie_DE_2.pdf; and <http://www.climatesmartagconcerns.info/resources.html>.
- Muller, A. et al.** (2011) Mitigating Greenhouse Gases in Agriculture. Diakonisches Werk der EKD e.V. for Bread for the World.
- Muller, A. et al.** (2012) Reducing Global Warming and Adapting to Climate Change: The Potential of Organic Agriculture. Working paper, Forschungsinstitut für biologischen Landbau (FiBL), Switzerland.
- Müller, A. and Aubert, C.** (2013) The Potential of Organic Agriculture to Mitigate the Influence of Agriculture on Global Warming - A Review. In: Bellon, S. and Penven, S. (Eds.) *Organic Farming, Prototype for Sustainable Agricultures*. Springer Science & Business Media, Dordrecht, chapter 13, pp. 239-259.
- Niggli, U. et al.** (2009) Low Greenhouse Gas Agriculture: Mitigation and Adaptation Potential of Sustainable Farming Systems. FAO, Rome.
- Scientists' Open Letter to FAO Director General Graziano da Silva** (2015) in support of the February 2015 Declaration of the International Forum for Agroecology (24 June 2015); see <https://drive.google.com/file/d/0B0FCnBUG7Lp6TUxMcVQ4NUNqckk/view>.
- Skinner, C. et. al.** (2014) Greenhouse gas fluxes from agricultural soils under organic and non-organic management - A global meta-analysis. *Science of the Total Environment*, 468-69, pp. 553-563.
- SWISSAID** (2015) Fabio Leippert: Positionspapier Agrarökologie; see https://www.swissaid.ch/sites/default/files/150216_Position_Agroökologie_DE_2.pdf
- Tittonell, Pablo A.** (2013) Farming Systems Ecology: Towards ecological intensification of world agriculture, published by Wageningen University; see <http://edepot.wur.nl/258457..>

Further reading on agroecology

Altieri, M.A. (2002) Agroecology: the science of natural resource management for poor farmers in marginal environments. *Agriculture, Ecosystems and Environment* 93; p. 1–24.

De Schutter, Olivier (2014): The transformative potential of the right to food, Report submitted by the Special Rapporteur on the right to food to the Human Rights Council

Gliessman, S. (2007) *Agroecology: the ecology of sustainable food systems*, Boca Raton, Florida, CRC Press.

Reganold, J. P. and Wachter, J. M. (2016) *Organic agriculture in the twenty-first century*. Nature plants. Macmillan Publishers. Washington; see www.nature.com/natureplants.

Erb, K.H., and Lauk, C. et al. (2015) Exploring the biophysical option space for feeding the world without deforestation, *Nature Communications*; see www.nature.com/naturecommunications

Further reading on food sovereignty

GRAIN (2005) *Food Sovereignty: turning the global food system upside down*

La Via Campesina (2002) *Food Sovereignty: A Right for All*, Political Statement of the NGO/CSO Forum for Food Sovereignty, Rome.

Peter Rosset (2003) *Food Sovereignty: global rallying cry of farmer movements*. Food First Backgrounder; see <http://www.foodfirst.org/pubs/backgrdrs/2003/f03v9n4.html>

Windfuhr, Michael and Jonsén, Jennie (2005) *Food Sovereignty: Towards democracy in localized food systems*, published by FIAN-International; see <http://www.itpubs.org.uk>.

Further reading on GACSA critiques

ActionAid International (2014) *Clever Name, Losing Game? How Climate-Smart Agriculture is sowing confusion in the food movement*; see <http://www.actionaid.org/publications/clever-name-losing-game-how-climate-smart-agriculture-sowing-confusion-food-movement>

CIDSE (2014) *Climate-Smart Agriculture: the Emperor's new clothes?* Discussion paper; see <http://www.cidse.org/articles/content/articles/climate-justice/food-and-climate/climate-smart-agriculture.html>.

Coordination Sud (2014): *Global Alliance for Climate-Smart Agriculture: A fool's bargain?* http://www.geres.eu/images/actus/Fiche-ACSA_CCD_C2A_EN.pdf

Neufeldt et al. (2013) *Beyond climate-smart agriculture: toward safe operating spaces for global food systems*, *Agriculture & Food Security*; see <http://www.agricultureandfoodsecurity.com/content/2/1/12>