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Address
Future of Food: Journal on Food, Agriculture and Society
Specialized Partnerships in Sustainable Food Systems and Food Sovereignty,
Faculty of Organic Agricultural Sciences,
University of Kassel,
Nordbahnhofstrasse 1a,
D- 37213 Witzenhausen,
Germany.

Telephone: + 49 5542 98 -1627
Fax: + 49 5542 98 -1604

Email: *managingeditors@fofj.org*

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Editorial

Nature-based climate adaptation solutions and a fresh perspective on the role of farmers are key to improving food security

Dr. Martin Frick is the Senior Director for Policy and Programme Coordination in the United Nations Framework Convention on Climate Change. He is a member of the Editorial Board of the Future of Food: Journal on Food, Agriculture and Society.

Agriculture and food systems are strongly influenced by the adverse effects of climate change. At the same time, they hold a great potential for greenhouse gas mitigation. An holistic, people-centred approach that seeks sustainable solutions for climate action encourages farmers to apply nature-based solutions.

Just as the overall costs of climate change will be higher at 2°C than at 1.5°C of global warming, the costs for providing food security are expected to rise significantly once the 1.5°C mark is passed. To reduce future climate risks, the International Panel on Climate Change (IPCC) has called for increased ambition in both climate mitigation and adaptation in its latest report (reference).

Agriculture and food systems, given their cross-cutting nature, offer ample opportunities for both climate mitigation and adaptation. On the one hand, agriculture emissions alone contribute 14% of total greenhouse gas emissions (IPCC, 2014), and this number rises if other steps in the food chain are included. These emissions could be considerably reduced if we address food waste, overproduction and food value chains properly and if we transform our food system towards healthier diets with less red meat and sugar consumption (EAT-Lancet Commission, 2019).

On the other hand, climate change undermines the production of major crops like wheat, rice and maize. Climate variability causes more complex, frequent and intense floods, droughts and storms and threatens to reverse the gains made in improving crop yields and fighting hunger and malnutrition.

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Climate variability and extremes are key drivers of the recent rise in global hunger and among the main causes of severe food crises. This is particularly true for countries whose agricultural systems are highly sensitive to variations in precipitation and temperature patterns, as well as for regions where a large share of the population depends on agriculture (FAO, IFAD, UNICEF, WFP and WHO, 2018).

Climate change affects availability, quality, access and distribution of food, yields and cultivation areas, pests, food prices and supplies, and thus It has considerable consequences for sustainable development, human health and poverty eradication (IPCC, 2018). As such, the effects of climate change contribute to increased inequality and add to the challenge of fulfilling the central promise of the United Nation's 2030 Agenda for Sustainable Development of leaving no one behind.

We need to prioritize and accelerate actions for the poorest and most marginalized people, including women and girls, vulnerable groups and indigenous people. The primary focus, therefore, should be to increase food security by promoting sustainable climate adaptation measures. Such nature-based adaptation solutions create several benefits and present cost-effective solutions to the challenges posed by a changing climate.

Nature-based solutions sit at the centre of ecosystem management, disaster risk reduction, climate change adaptation and development planning. Agroforestry, for example, has several benefits for climate change-affected communities – if properly adapted to the local context, it has the potential to increase resilience to climate hazards while also fighting poverty and hunger.

A study by Thorlakson and Neufeldt (2012) for example, analysed the opportunities provided by farmer-managed agroforestry projects in Kenya's Nyando District, to reduce vulnerability to droughts, floods and climate variability. They found that agroforestry improved farm productivity and household wealth, as farmers could gain additional income through fruit and seedlings and could reduce soil erosion while increasing soil fertility at the same time .

The opportunities of nature-based solutions have also been recognized by the UN General Assembly through the recent adoption of the UN Decade on Ecosystem Restoration (2021-2030), underlining that restoring ecosystems is a key measure to accelerate the achievement of climate resilience in accordance with the principles and goals of the 2030 Agenda for Sustainable Development (UN Environment, 2019).

In addition, the mitigation benefits of nature-based solutions are substantial, especially if combined with measures to improve soil health and fertility given the increased potential of carbon sequestration. The way mitigation activities are designed and implemented, however, needs to be people-centred to ensure that the people doing the farm work are the ones who receive the benefits. This requires a paradigm shift with regards to the role of farmers: They are the ones who manage the land and thus generate crucial benefits for the broader society.

To ensure that mitigation and adaptation measures improve local people's food security and overall livelihood situation in an equal and sustainable manner, it is helpful to apply holistic thinking and an integrated approach, as suggested in the 2030 Agenda. This means, taking environmental, social and economic perspectives into account to develop strong climate action policies that offer sustainable agricultural choices. It requires an approach beyond silos, and suggests working across sectors and ministries, involving local decision makers like mayors and farmers' associations and cooperatives, the health sector, soil experts and meteorologists. One way to achieve such integrated thinking would be to apply the landscape approach, that considers the relationships between different sectors, e.g., the expansion of agriculture and the emissions from deforestation. Furthermore, the Koronivia Joint Work on Agriculture could serve as a global policy forum addressing high-level questions related to science and implementation, coordination, synergies and experience exchange (UNFCCC, 2019).

A transparent dialogue with farmers is required to ensure the inclusion of their knowledge and expertise. Such an approach would reflect recognition of the interconnectedness of human and ecosystem well-being, because healthy land and water ecosystems are the basis for resilient food systems.

References

EAT-Lancet Commission (2019). Healthy Diets from Sustainable Food Systems. Food, Planet, Health. Summary Report. Retrieved from *https://eatforum.org/content/uploads/2019/01/EAT-Lancet_Commission_Summary_Report.pdf*

FAO, IFAD, UNICEF, WFP and WHO (2018). The state of Food Security and Nutrition in the World 2018. Building climate resilience for food security and nutrition. Rome: FAO. Retrieved from *http://www.fao.org/3/I9553EN/i9553en.pdf*

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Intergovernmental Panel on Climate Change IPCC (2018): Impacts of 1.5°C of Global Warming on Natural and Human Systems *https://www.ipcc.ch/site/assets/uploads/sites/2/2019/02/SR15_Chapter3_Low_Res.pdf*

Intergovernmental Panel on Climate Change (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]. Geneva, Switzerland.

Thorlakson, T. and H. Neufeldt (2012). Reducing subsistence farmers' vulnerability to climate change: Evaluating the potential contributions of agroforestry in western Kenya. *Agriculture & Food Security* 1(15), doi:10.1186/2048-7010-1-15

UN Environment (2019, March 6). New UN Decade on Ecosystem Restoration to inspire bold UN Environment Assembly decisions. Retrieved from *https://www.unenvironment.org/news-and-stories/story/new-un-decade-ecosystem-restoration-inspire-bold-un-environment-assembly*

UNFCCC (2019). Issues related to agriculture. Retrieved from *https://unfccc.int/topics/land-use/workstreams/agriculture*

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Africa's future: Demarginalizing urban agriculture in the era of climate change

Bright Nkrumah*[1]

[1] School of Social Sciences, University of KwaZulu-Natal, South Africa

* Corresponding author: *bright.nkrumahup@gmail.com* | +27 78 927 0007

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Abstract

Africans are migrating to cities. With the continent's cities projected to double in population by 2050, the issue of food insecurity in urban areas is increasingly becoming a major concern. To sustain this urban explosion, the question of how to maintain constant food supply to urban residents remains an urgent priority since these locations do not always get access to adequate food. There has, however, been little work on examining urban agriculture (UA) as an alternative means of reducing hunger in Africa, especially in the face of climate change. Some city authorities have argued that UA must be shifted to rural areas since they constitute a public health nuisance. The paper, however, is based on the hypothesis that food production in locations with high demands mitigates against climate change and addresses Africa's food insecurities by exploiting new avenues for cultivation. To this end, an extensive literature review was conducted, resulting in the identification of different degrees of opposition from policy-makers and urban authorities, who usually underrate the actual contribution and value of UA to urban food security. It is recommended that, considering the increasing recognition of urban farming, planners and policy makers must collectively design interventions to enhance urban food production.

Introduction

The objective of this paper is to address a burning issue: the contribution of urban agriculture (UA) to improving Africa's food security in the era of climate change. Africa is often seen as the world's fastest urbanising region with the percentage of urban residents estimated to rise from 11.3% in 2010 to 20.2% by 2050 (Saghir & Santoro, 2018). Yet, besides population explosion, the stability of the region's food systems may be threatened due to climate change (Serdeczny et al., 2017). The contribution of UA in improving the living conditions of Africa's urban dwellers has for decades either been ignored or, at best, seen as having merely a minor role to play in alleviating chronic hunger (Conceição et al., 2016; Tibesigwa & Visser, 2016). Undeniably, agriculture has been perceived as an activity deserving to be confined to rural areas (Padgham et al., 2015). What is more, UA has been seen to constitute a public health nuisance (Asomani-Boateng, 2002). To this end, urban residents who participate in self-grown food have been harassed or at least been unsupported, even in moments of food scarcity (Badami & Ramankutty, 2015).

Yet, in stark contrast to earlier debates and theoretical confusions on the relative significance of UA, substantial evidence now shows the various ways in which UA impacts on the regional, national and urban economies (Reynolds, 2015; du Toit et al., 2018). Consequently, the position of some planners and urban officials are slowly but steadily shifting, especially as the potential benefits of UA for environmental management and food security become better understood in policy circles (Lindley et al., 2018). It is, however, imperative to add that in the Af-

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rican context, UA is not an undifferentiated activity. The nature of UA and the challenges it poses tend to differ based on social contexts (Smart et al., 2015). The paper will, where applicable, highlight some of these differences and how they impact on urban farming without overlooking the general importance of UA.

Based on theoretical exposition, the paper's cardinal proposition is that UA (in)directly contributes to various aspects of the continent's urban economy, livelihood and food security. Even though scholars have provided various definitions of urban agriculture, the core concept at the heart of all these definitions is the recognition that it encompasses gardens and farms in inner city areas. While some urban residents are able to produce their own food, and thus, are able to reach food security, others find it expensive and difficult to access arable land to cultivate crops (Benis & Ferrão, 2017). Climate change, however, seems to threaten the food security situation of many urban farmers (Materechera, 2018). Climate change may be defined as changes in the pattern of weather, as well as other changes in the oceans and land surfaces (Chaudhury et al., 2013). Such changes may either be induced by the sun's radiation, changes in the composition of the atmosphere or land use (Girardet & Bree, 2009).

Also, with the continent's rapid urbanization, demand for fresh products will inevitably increase, especially as urban dwellers generally buy approximately 90% of their food through urban markets (Tumushabe, 2017). It was in this light that the Food and Agriculture Organisation (2007) mooted that inadequate food intake and malnutrition in the region can be halved if both adults and children carry out urban horticulture. To this end, UA can address one of the continent's most puzzling and underserved issues: resolving the food insecurity situation of the region's growing urban population (Smart et al., 2015). To efficiently unlock the potential of UA, suitable policies must be adopted to deal with the constraints that arise from farming in cities (Pribadi & Pauleit, 2015). Moreover, such policies must be backed by strong institutional capacity to ensure that the sector functions well at all levels of the continent's urban economies (Specht et al., 2016). To be exact, urban officials must adopt strategies to address negative ecological changes. Also, given that farm lands act as breeding grounds for diseases, including bilharzia and malaria, cities need to build or strengthen capacity to address changes in disease ecologies (Barthel et al., 2015).

The structure of the paper is as follows: subsequent to the introduction, the next section sets out a working definition of UA and provides its key features in the continent. The section further provides a conceptual framework for understanding the contribution of UA in Africa. The third section argues that, while UA is a useful avenue for addressing chronic hunger, its contribution is threatened by several factors at the local, national and regional levels. This part highlights the policy environment and institutional frameworks within which UA operates, and the lack of political will on the part of urban authorities to promote this practice. Section four examines two case studies that underscore some of the practical challenges faced by urban farmers. Section five serves as the conclusion. It sets out recommendations and policy options to better enhance immediate and long-term UA.

Urban Agriculture: what and why?

Over the last decades, efforts to achieve a universally acceptable definition of UA have not been entirely successful. Many scholars have, however, attempted to define this practice as any farming activity taking place on (peri)urban fringes, intra-urban areas of towns or built-up areas of cities (Barthel et al., 2015; Barthel & Isendahl, 2012). Others have, however, defined it as any agricultural practice on the fringes of or within a metropolis, city or town which raises or cultivates, processes, and distributes (non)food products (Moustier, 1999; Bryld, 2003). The variations in definitions demonstrate the intrinsic problems associated with the conceptualisation of urban space. The definitions specifically signify the diversity and peculiarity of UA and thus, the range of policies and actors affected by it.

While rigid conceptions which place extreme emphasis on rural-urban binaries or urban-peri-urban dualisms may be useful to some degree, they often overlook key interaction that make urban and rural spaces mutually constitutive and interdependent (Davis et al., 2017). To this end, just as the recognition of the diversity of UA is vital, so is the perception of UA as a dynamic concept. To enhance the capacity of UA in Africa, urban authorities and policy makers must understand that UA is not an isolated phenomenon, especially as the practice is diverse and inextricably linked with rural and (peri)urban activities (Barthel & Isendahl 2012).

Despite the fact that researchers have not been generally successful in framing a categorization that clearly captures the unique features of UA, classifications can be established by relying on a range of attributes, such as land tenure issues, sources of labour, kinds of crops, scale of cultivation, gender and motives of practitioners, and most importantly, the physical location of the activity (Byker et al., 2010). The decision to embark on UA is also determined by the market value of the goods produced, growth conditions of the crop, and resource availability (Hallsworth & Wong, 2015).

The choice of crop to be cultivated in cities is manly determined by whether it is being raised for market sale, or subsistence, or household consumption (Asrat & Simane, 2017). Whereas other food crops are produced in cities, some scholars argue that urban farmers favour a variety of vegetables in addition to herbs and fruits (Smart et al., 2015). For example, even though fruits and vegetables from UA are vital commodities of export in Lagos, many farmers in Ndola and Chingola in Zambia's Copperbelt province cultivate carrots, cabbage, and lettuce which have high demand by migrants (Akinmoladun & Adejumo, 2011; Smart et al., 2015).

UA is shaped by several variables at the city, national and regional levels. In order for UA to have both immediate and long terms impact on Africa's economies, urban authorities must establish the right policy framework to address several factors at the city level which (in)directly impact on UA. These include the specific terms of land tenure, the manner within which land is made available for agricultural purposes in urban areas, the extension service support for agriculture, and inadequate access to water and land (Sorensen et al., 2015). For instance, UA can be greatly stifled by overly restrictive land-use regulations, particularly those regulating unused urban spaces. Similarly, government policies on irrigation and water supply infrastructure development can affect the economic and physical access to water for urban farmers. To be exact, the pricing policies of national water will determine who has more access to water in cities. Ultimately, the urban poor will have a challenge in raising crops, particularly in the absence of natural aquifers due to neoliberal economic policies which advocate for market-oriented water management regimes (Wong & Ribero, 2013).

Like water, the connection between UA and land policies can (in)directly affect city food production (Smit, 2016). For instance, the quantity of self-grown food can be enhanced by polices that allow cultivation on unused state land or polices that seek to spare fertile urban landscapes from industrial development or urban sprawl. Also, UA practices can be influenced by economic ideology that shapes the macroeconomic policies of a country (Säumel et al., 2016). Besides providing property owners the ability to use their land as collateral for credit, policies guided by a neoliberal philosophy tend to enhance the land rights of private individuals since this property rights structure is perceived to contribute to more efficient use of land. Yet, urban farming can be undermined by titling (usually preferred by proponents of neoliberal economic policies), as they can dramatically increase the value of land, thereby making it more attractive for other enterprises (Materechera, 2018).
Similarly, based on their vision that shape their strategies and core values, non-governmental organisations (NGOs) may have a stake in urban food cultivation. While international NGOs may sometimes reflect the ideological bent of their donors, they can still help leverage resources and provide experience from other locations around the region and beyond to improve local UA (Hall et al., 2017). They can work directly with urban farmers by exploring (inter)national and local markets for farm produce, helping them to secure farm inputs and fertile lands. Ideally, local organisations are well placed to contribute to urban food security through land reform by advocating and lobbying national governments on these matters.

A key factor which can determine whether UA should be shifted to the countryside is the perception of municipal policy makers and planners on the appearance of an ideal city (Appeaning-Addo, 2010). The notion that urban areas are places for business and pleasure may lead to government aversion toward urban horticulture. Other reasons for opposition to UA differ, and they include social concerns, or concerns that crop fields may be used by criminals; administrative concerns, or the lack of provision in zoning laws; and public health concerns, or resident's exposure to pesticides and diseases (Amoah et al., 2007).

Besides the politics of city image, agricultural policies serve as an important tool for achieving desired economic objectives and improving individuals' standards of living. It is expected that subsidy allocation criteria can play a key role in reducing urban poverty (Cofie & Drechsel, 2007). This could be achieved through increased participation of the urban poor in UA as a means of diversifying or supplementing their livelihoods (Davis et al., 2017). Apart from serving as a means of attracting certain targeted groups of (poor) people, state subsidies for agricultural inputs will enhance the viability of UA and the kinds of crops which are cultivated.

Also, environmental and public health concerns may serve as constraints to UA. Public health acts set out the manner in which urban sites are to be utilised in order not to pose a threat to public health. Such stipulations may include, but not be limited to where and how farm produce is cultivated or sold, and whether livestock can be kept within homes (West, 2015). Equally, municipal and national by-laws on the environment may impact on the extent of waste recycling, the use of inorganic fertilizers, and quantity of urban land devoted to horticultural use.

As indicated in in the beginning of this paper, the contribution of UA to food security in Africa could be enormous, especially in a region with chronic hunger and

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widespread poverty. With the continent's urban population explosion and the adverse impact of climate change, an active participation of urban resident in food cultivation will have both immediate and long-term effect (Simatele & Simatele, 2015). Such effects include health and environment improvements, transmission of agricultural knowledge to subsequent generations, income generation, employment creation, food security, dietary and nutrition improvement.

Also, as rural-urban migration is contributing to a decrease in rural agricultural production due to loss of farm labour, it is expected that there will be a significant increase in urban household food demand. It is in light of this development that UA stands to play an essential role in meeting the overall national food self-sufficiency, while improving urban food and livelihood security (Prain & Lee-Smith, 2010). For instance, a disproportionate percentage of residents in Cape Town (South Africa) and Accra (Ghana) increasingly rely on crops cultivated in public spaces for income and food. Income obtained through self-grown food can be used to purchase vegetables, fruits, fish and other food items as a means of complimenting household diets (Nyantakyi-Frimpong et al., 2016). This implies that through increased availability of household incomes, self-grown food contributes to food diversification.

Moreover, given that African cities continue to witness an increase in the number of residents with HIV/AIDS, UA can play an important role in enhancing the nutritional needs of households plagued by this pandemic. With such families often being food insecure, self-grown food can contribute towards reduction of the spread of the disease while enhancing adherence to its treatment (Dyer et al., 2015). UA simply makes it more affordable for such vulnerable households to access food since food cultivated in, around and within urban areas significantly cuts the cost of transportation often leading to reduced prices of food in the local market (Webb, 2011). Further, by supplementing food cultivated in rural areas, self-grown food can stabilise the prices of food on the market. Urban food production can, in addition, prevent a country's excessive foreign exchange loss by reducing its dependence on food imports (Zimmerer et al., 2015). During times when cultivation in rural parts is unpredictably low (due to conflict, transport problems, heavy or poor rain), UA can be a vital tool in cushioning market supplies or high prices, especially as African countries basically depend on crops cultivated in the hinterlands to feed their national population (Meijer et al., 2015).

It must be noted that UA is increasingly becoming an important source of job creation, especially in the absence of formal employment in many African countries (Arku et al., 2012). Self-grown food act as an important means of income generation particularly in the wake of weak manufacturing and industrial sectors. Thus, considering the contradiction between the unavailability of employment opportunities and the mounting urban populations in the continent, UA is specifically an essential source of employment for individuals with low skill levels, and thus, may not successfully compete for formal sector employment (Powlson et al., 2016). Reducing unemployment and increasing labour are key to achieving Sustainable Development Goals, to be exact, that of forestalling poverty and hunger (Goals # 1 and 2). It is, however, instructive to add that farming in cities is not strictly an activity for the poor, but of the affluent as well (Asomani-Boateng, 2002). Besides engaging in large scale UA for profit making, the better-off groups engage in self-food production in order to diversify or supplement their diets. For example, while horticulture is widespread across all income groups in Johannesburg, Webb (2011) found that the rich had larger farm sizes which produce for the market. Further, while different social groups (including the youth) in sub-Saharan Africa engage in UA, the better-off were more inclined towards market-oriented food production (Prain & Lee-Smith, 2010). The paper now turns its attention to focus on some of the major constraints which hinder urban residents from fully unlocking the potential of UA.

Everyone eats: Understanding challenges facing urban agriculture

Generally, the use of lands in Africa's cities is determined by official responses to the barriers erected by unrestrained urban growth, especially in the area of increasing urban population and the spatial extent of the city (Asrat & Simane, 2017). Unlike urban growth in Western countries which is accompanied by improved infrastructure, Africa's urbanisation is expanding without a proportionate socio-economic transformation such as adequate transport system, greater housing supply, expanding services and job creation (Dossa et al., 2015). The average poverty rate for Africa stands at approximately 41%, with a large percentage of urban residents living with limited access to adequate housing, employment, sanitation and clean water (World Bank, 2018). Against this backdrop, urban authorities pay less attention to issues concerning food production as compared to the more visible aspects of urban life such as infrastructure, housing, education and health issues (Lwasa et al., 2015). While the contribution of self-grown food cannot be underestimated, it is still perceived by some authorities as unsuitable for the Africa's urban land use (Meijer et al., 2015). To this end, policies regulating urban devel-

opment and land use planning have over the years continuously overlooked the prospect of UA as an efficient means of ensuring urban food security and sufficiency (Dossa et al., 2015). This constraint is exacerbated by the conversion of agricultural lands in (peri)urban areas into industrial sites, the scale of urban sprawl, and the pattern of urban growth and urbanisation (Pribadi & Pauleit, 2015).

Without a clear policy direction, attitudes of officials towards crop cultivation in (peri) urban area range from illegality and in some cases, tolerance with legislative support (Akinmoladun & Adejumo, 2011). For instance, while it is excluded from Kenya's urban land use system, UA has received considerable legal backing in Zambia, Ethiopia and South Africa (Ogato et al., 2017). Yet, in other cities such as Bulawayo and Harare, UA is generally excluded from official urban planning polices and thus, there is no legislative instrument backing it (Barthel et al., 2015). Nonetheless, starting from 2002, urban officials from these cities have begun extending considerable leverage to urban farmers on condition that such activity must be practiced in a systematic or well-structured manner (Barthel & Isendahl, 2012). Consequently, UA is only interrupted when there is an outbreak of disease, or the land in question is required for eminent domain or development project (Cofie & Drechsel, 2007). A further hindrance to UA is that in most African countries, this practice often lacks adequate infrastructural and institutional support. To be exact, urban authorities tend to tailor their state-sponsored horticulture support services and development policies mainly towards the agriculture sector in rural areas, further reflecting the general lack of political will for this activity (Dossa, 2015). Also, key reasons for yield or harvest losses are diseases, pests and extreme weather conditions including storms or droughts. The Intergovernmental Panel on Climate Change (2018) has projected that by 2050 extreme weather conditions will exacerbate due to climate change. Clarke (2018) has projected that a rise of 2°C of the global temperature by 2100 will drastically destabilise the continent's food cultivation systems. Because urban surroundings are usually about 2° to 3 °C warmer, cities can typically provide more favourable conditions than rural areas in temperate conditions. This prolongs the growing, thereby enhancing the overall output and makes an integration of crop cultivation in cities more attractive (Du Toit, et al., 2018).

Nonetheless, through the use of pesticides, organic and chemical fertilizers, UA is known to pollute the environment (Reid & McKenzie, 2016). This, notwithstanding, UA is a means of protecting and promoting biodiversity in African cities. Urban indoor farms or the production of vegetables and other plants in containers, aquaponic and hydroponic systems does not only prevent the leakage of pesticides and fertilizers into the environment but forestalls crop contamination (Reynolds, 2015). Equally, urban environments are generally highly polluted by transport, domestic activities and industry (Reid & McKenzie, 2016). To this end, it can be argued that self-grown food in cities can typically mitigate climate change in terms of carbon emissions triggered by food packaging, cooling, and storage. Although it is estimated that food production contributes to about 20-30% of the global greenhouse gas emission, indoor faming systems can mitigate climate change as these systems work energy efficiently and thus, have less greenhouse gas emission (Parry, et al., 2004). Further, indoor farming systems can forestall crop cultivation from being exposed to extreme weather due to climate change or pollution. This system of farming could have a broader impact of mitigating climate change only if it is implemented on a larger scale (Powlson et al., 2016). Yet, due to policy restraints and high costs, this is not very likely to be adopted in the coming decades.

Similarly, food cultivated in cities cut down on pollution as they often do not have as many 'food miles' as compared to their rurally cultivated crops (Ogato et al., 2017). Through the reduction in energy consumption, the reuse of organic wastes and recycling, UA plays a vital role in lessening the ecological footprints of cities, creating a more natural environment and making cities greener. With urban horticulture, the food produced would be fresher with an extended shelf life since they could reach the market within hours after harvesting. Likewise, the environmental pollution through carbon dioxide emission would be significantly reduce, with a considerable drop in storage and logistical costs (Barthel et al., 2015). An important question in discussion on UA is the physical carrying capacity of the city space to support horticulture. Being the two most essentials of crop cultivation, water and land have primary importance especially in the context of mounting pressure from rapid urbanisation in many African cities (Benis & Ferrão, 2017). Attempts to promote the capacity of crop cultivation in the continent's urban areas need an in-depth understanding of the social relations governing access to water and land by urban residents.

One major challenge worth citing is Africa's contemporary land tenure system. As a means by which land is owned or held, land tenure forms can be grouped into five main categories: (i) non-formal tenure land ownership such as squatting, unauthorised and (un)regularised

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sub-divisions; (ii) religious land including land outside of commercial use; (iii) public tenure or land vested in the state; (iv) private tenure or land governed by individual rights; and (v) customary tenure which encompasses land held by traditional rulers and allocated based on one's need instead of ability to pay (Badami & Ramankutty, 2015). Considering the low profile of UA in Africa's planning agenda and policies, the formal acquisition of city lands for horticultural purposes typically remains a challenge. Besides few urban areas such as Cape Town and Ethiopia's Mekelle where city officials have adopted policies in support of UA, most urban crop cultivation in the continent occur either on backyards, patios or informally occupied public land (Webb, 2011; Asrat & Simane, 2017). Others raise their crops on lands owned by private entities, including individual lease holders or commercial farms, and lands owned by the government. Generally, the farmers have specific use rights which spans over a certain duration, within which they act as tenants (Ogato et al., 2017). Due to the risk associated with reclaiming of land from borrowers, land owners in some instances are unwilling to grant usufruct rights to third parties as caretakers. Since a disproportionate percentage of UA is carried out on informally occupied lands, farmers under this tenure arrangement are confronted with challenges ranging from eviction, violence from the state, crop destruction and land repossession. There has, for instances been incident of crop slashing in Lagos and Ambo Town, Ethiopia (Akinmoladun & Adejumo, 2011; Ogato et al., 2017).

Moreover, a key impediment to urban gardening is inadequate access to low-cost water. Urban farmers generally rely on piped water for agriculture. With Africa's urban water supply infrastructure under pressure, coupled with the domestic water shortages, watering crops in home backyards and patios is not only ethically questionable but expensive (Akinmoladun & Adejumo, 2011). To this end, large scale farmers operating in either (peri) urban areas, state-owned land or in cities often rely on natural water sources such as flood plains, streams, and springs for irrigation (Cofie & Drechsel, 2007). Over-reliance on these sources tend to trigger tensions among farmers for control of access, especially with climate change gradually contributing to variable rainfall and drainage flows. Additionally, UA tends to be watered using polluted water sources. Residents in most African cities typically deposit refuse in streams and rivers, since most of the cites have poor sewage facilities (Barthel & Isendahl, 2012). While the most common water pollutant is by far biological contamination from bacteria and faecal matter, there has been high traces of heavy metals including lead (Pb) found in water sources used for irrigation in cities such as Kumasi and Nairobi (Sorensen et al., 2015). Irrigating vegetables with such water poses serious threat to public health in the region.

Furthermore, as populations continue to expand in cities, the issue of water scarcity becomes an important agenda for national and local governments. Urban authorities have a primary role to play in easing the physical and economic scarcity of water in cities, particularly those located in (semi)arid regions as they face the most threat (Amoah et al., 2007). Such measures must be adopted in ways that enhance UA. Strategies which can be adopted to supplement existing urban water sources include low-cost irrigation technologies, treadle pumps and canals. These manageable and small-scale irrigation technologies cannot only be adopted by the urban poor but can boost the productivity of UA (Cofie & Drechsel, 2007). This effort calls for changes in the attitudes of national and local institutions towards urban horticulture. Such transformation will not only promote the notion that UA deserves fiscal attention, given that it is an integral aspect of urban environment, but enhance its legitimacy. This institutional reform will further ensure that in contrast to other uses (including recreation and industrial production), UA is given priority for water allocation (Sorensen et al., 2015). Ultimately, urban authorities must endeavour to institutionalise mechanisms to enhance recycling and water treatment in urban centres.

Eatable cities: Case studies

The objective of this section is to assess data which exist in the area of UA. Two case studies of UA in Mzuzu and Accra are explored to exemplify the arguments or issues presented above. In both urban regions, urban population growth has been high over the years. These cities symbolise relatively different geographical regions of the continent (Southern as opposed to Western Africa), varied institutional capacity, dissimilar socioeconomic characteristics, different internal dynamics, and two separate scenarios of divergent urban growth of urban areas in the continent. With an estimated population of 271,400, Mzuzu is the third largest city in Malawi and is confronted with various development pressures (WFP, 2018a). As a coastal city, Accra, on the other hand, has a population of about 2.27 million residents and is connected to the international market (WFP, 2018b).

Case study 1: UA in Mzuzu

Data: the information used in this case study is drawn from Arku et al's (2011) survey with Mzuzu's urban officials.

Figure 1: Urban farmers display the produce of their fruit and vegetable garden in the middle of Mzuzu, Malawi (Photo credit: Author)

Introduction: UA in Mzuzu.

Mzuzu emerged around the Commonwealth Development Corporation's Tung Oil Estate in 1947 and received its city status in 1985 (Mtika, 2016). It is a political and economic hub, covering an estimated area of 76 km^2 (WFP, 2018a). Relative to Lilongwe and other cities in Malawi, Mzuzu is small and new in terms of population size and urban density. With an official population of 130,000 in the city and 1.7million in its outskirts, the city's residents rely on crops cultivated from far-off central region districts, including Ntcheu and other neighbouring northern districts (WFP, 2018a). As shown in Figure (1), food from these parts include Irish potatoes, cassava, beans and maize. Yet, as a means of serving its ever-growing population, Mzuzu is increasingly dependent on commodities produced in its vicinity or within the city, specifically in backyards or zones spaces (Arku et al., 2011). Most common locations on the fringes of Mzuzu for UA are Malivenji, Chigwere, Kaboko, Dunduzu, and Choma (Mtika, 2016). Common products (such as maize, vegetables, milk and chicken) obtained through this form of farming are used to satisfy the food needs of dairy companies, hospitals, education institutions and small businesses (Arku et al., 2011).

Green cities: institutional reaction to UA in Mzuzu

In terms of increasing farming activities in Mzuzu, there is an obvious contradiction between the responses of the city assembly and the officially stated land zoning code. Official policies proscribe the use of lands in the city for purposes other than those set out in the zoning codes. Technically, all farming in the urban area is illegal, since the urban infrastructure plan stipulates the use of urban land for commercial, industrial and residential purposes, but excluding agricultural purposes (Arku et al., 2011). Yet, the city's officials have not rigidly implemented these policies. For while, they have become increasingly aware of agricultural practices in the city, and/or tenants overtly engaging in farming activities such as backyard farming or livestock, urban officials do not take action or at best, have been reluctant to impose sanctions. A striking illustration of the quest for urban authorities to accommodate UA is demonstrated by a cattle herder who overtly feeds his livestock off the grass on the sides of the small airstrip of the city (Arku et al., 2011). Hence, irrespective of the safety concerns triggered by this activity, the official position of the city has not been invoked to halt farming activity in Mzuzu.

Nonetheless, in light of the growing presence of UA within the urban area, authorities who double as city residents have decided to amend some policies to better enhance the practice of farming in the city (Arku et al., 2011). This decision is also not only influenced by the threat that poorly managed UA can pose, but the realisation of the key role of UA to improve the living conditions of the people they seek to govern. Yet, budgetary constraints have hindered attempts by city officials to conduct in-depth research into the overall importance, actors, extent, exact nature and the necessary intervention needed for agriculture in the city. Financial setbacks

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Figure 2: An urban farmer tends his backyard garden in Accra, Ghana (Photo credit: Author)

have in addition undermined the prospects of urban authorities to develop alternative consultation channels with residents on essential planning and policy issues. To address these shortcomings, there was an ongoing discussion for the city to allocate a large track of land near Lunyangwa agriculture research station for horticulture. In sum, key issues which deserve some attention in Malawi are the: (i) lack of proper official understanding of the actors involved in UA; (ii) true potential of urban farming in improving urban food security; (iii) financial challenges which hinders attempts to promote and regulate UA; (iv) lack of avenues for involving key stakeholders in the planning and decision making of the city; and (v) zoning codes proscribing UA.

Case study II: UA in Accra

Data: The data used is drawn from Asomani-Boateng's (2002) survey of 87 (peri)urban horticulturalists and Arku et al's (2012) survey of 127 vegetable cultivators. These surveys interrogated the views of urban cultivators on issues relating to the constraints faced by farmers, contributions of UA, the attitudes of urban officials towards UA, and types of crops being produced. The paper now turns to provide a summary of these findings.

Introduction: challenges and prospects for UA in Accra.
Accra, akin to many developed urban areas in sub-Saharan Africa, has witnessed a slow but steady growth in population. In 1950, the city's population was estimated to be 177,147. Between 2015 to 2018, Accra has experienced an annual growth rate of 2.14% (WPR, 2018). It is projected that by 2030, the city's population will reach approximately 5 million (WPR, 2018). Also, between 2000 and 2014, a total of 29,609 square kilometres of built-up area was added to the Accra urban extent (WFP, 2018a). This physical expansion and population explosion present both challenges and prospects for UA in the country's capital. Besides the need for fresh food stuffs, the population increase has heightened the need for adequate food supply. Consequently, the opportunity to acquire food or raise crops in the urban area has become an essential aspect of the livelihood strategies of residents. Yet, the population and the city's physical expansion is placing undue pressure on the arable land available for crop cultivation (Nyantakyi-Frimpong, et al., 2016).

Feeding the City: Crop cultivation in Accra
UA in Accra dates to 1897 when the British colonised the Gold Coast. From the time onwards, the practice has become widespread. As the city's population expands, so does the figure of individuals involve in the activity (Asomani-Boateng, 2002). Empirical surveys have demonstrated that two types of faming are practiced, open and backyard (or enclosed) cultivation. According to Nyantakyi-Frimpong et al. (2016), approximately 50% of urban households engage in this activity.

Often practised by rural migrants and indigenous people, open-space farming is practised round the urban centre by people of lower socio-economic status (Obosu-Mensah, 2002). To be exact, open-space farming primarily occurs on public or unused community lands as shown in Figure (2). There are several types of arrangements for the use of urban lands, and even though some farmers pay a fee for the use of the lots, no farmer owns the land (Arku et al., 2012). In stark contrast to open cultivation, enclosed cultivation is practiced on building lots that may or may not be walled. It is mainly for house-

hold consumption. Residents who engage in this type of cultivation are generally caretakers of such plots or are landowners as enclosed cultivation takes place on private lands (Asomani-Boateng, 2002). Due to inadequate lots in the city centre, most enclosed cultivation in the city takes place in the suburbs.

Like their enclosed space counterparts, open space farmers depend on hand dug wells and pipe-borne water for irrigation (Obosu-Mensah, 2002). Typically, most open space farms are located close to rivers and streams due to the amount of water required for vegetable cultivation (Amoah et al., 2007). Although the cultivation of crops highly depends on the availability of water and the location of the land, the most commonly cultivated crops are leguminous crops, root crops, cereal, fruits and maize. Other commonly known vegetables cultivated are spinach, kontomire, lettuce, cucumber, green pepper, spring onions, carrots and cabbage (Nyantakyi-Frimpong, et al., 2016). Other aspects of UA in the city range from rearing of short-cycle species such as greater can rat, mushrooms, aquaculture, dairy farming, small ruminants and poultry.

Scale of Accra's UA

The full extent of land used in Accra for UA is difficult to determine. This is because agricultural cultivation in the city is mainly informal in nature, taking place outside the official city planning agenda. Yet, estimates from Asomani-Boateng (2002) suggests that plot sizes for UA range between 0.01-0.02 ha per farmer. The survey further illustrates that approximately 1,000 farmers were engaged in irrigated and rain-fed UA to produce more traditional vegetables, including hot peppers, eggplant, okro, tomatoes and other exotic vegetables, such as cauliflower. Results from the survey suggests that in the dry season, irrigated vegetable production occurs on a 100-ha area. The same survey further suggests that approximately 251 ha of urban land are under mixed cereal-vegetable, 47 ha under vegetables and 680 ha under maize cultivation systems. Considering that recent statistics show irregular growth on major local crops, urban authorities must adopt steps to promote Accra's UA.

Growing food growing cities: Role of UA in Accra

In light of the global climate change phenomenon, UA can help address future food insecurity issues in Accra. Due to the swelling population, it is expected that the present high demand for perishable products will increase in the future. Also, if properly managed, the practice of urban cultivation could enhance households' access to food, especially as approximately 90% of all food consumed in the city is purchased from the market (Nyantakyi-Frimpong, et al., 2016).

Capacity challenges facing UA in Accra

The practice of crop cultivation in Accra falls within the domain of different types and levels of government. Even though there is no specific legislation which provides for UA, the Ghana Decentralisation Policy, Modernisation of the Capital City and Poverty Reduction Strategy highlights small-holder agriculture development (Nyantakyi-Frimpong, et al., 2016). Yet, if the potential of UA to food and nutrition security is to be fully realised, then the following key issues which have been highlighted by the various surveys deserve serious consideration. These include the integration of UA into the course structure of educational institutions; government intervention in post-harvest handling and marketing; promotion of UA micro-enterprises; education and public awareness of urban food security and UA; land rights of farmers, such as temporary access to land; legislative and policy support for UA; and inclusion of UA into city plans.

Conclusion

The major contribution of the paper is to contribute to the scientific debate on UA. To enhance Africa's urban food insecurity, the paper reviewed the state of self-grown food on the continent. To this end, several issues at the city and national levels which challenge this practice were identified and discussed. To exemplify the arguments provided and reflect on the different dynamics of pressures exerted on UA by urban development, two case studies were drawn from two countries. The general observation of the paper is that if properly managed, UA can make an enormous contribution in Africa's quest for dietary diversity, improve the nutritional need of urban resident, and improve food security, including food availability. Along with a host of other environmental gains, other key contributions stretch from income generation for millions of urban poor, employment creation and other major contributions to the economies of African countries.

Undoubtedly, in light of the chronic hunger and malnutrition confronting millions of urban residents in the continent, it is imperative that an alternative source of food production is explored to complement existing food supply. In order to depend on UA as a supplementary source, urban authorities need to pay attention to issues which are too often ignored and yet impinge on this farming system. Based on the two case studies, and from the general discussions in the paper, the following issues are noteworthy. In order for UA to serve as

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an important player in addressing the continent's food and nutritional needs, African city governments must: (i) identify and reformulate certain aspects of municipal statutes which hinder UA; (ii) support affordable urban land tenure reforms or long-term leases for vulnerable urban populations; (iii) develop technologies which enhance safe water recycling for UA use; (iv) enable urban farmers to access national subsidized agriculture and extension programs available to their rural counterparts; (v) develop mechanisms to ensure fair and adequate representation of all stakeholders and residents on UA planning issues; (vi) mobilise research capacity in order to establish the merits of UA; (vii) address systematic prejudices against UA through education programs or awareness creation; and (viii) develop a city-wide vision or policy environment which supports UA.

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Conflict of Interests

The author hereby declares that there are no conflicts of interest.

References

Akinmoladun, O. I., & Adejumo, O.T. (2011). Urban agriculture in metropolitan Lagos: An inventory of potential land and water resources. *Journal of Geography and Regional Planning*, 4(1), 9-19. doi: 10.5897/JGRP.

Amoah, P., Drechsel, P., Abaidoo, R.C., & Henseler, M. (2007). Irrigated urban vegetable production in Ghana: Microbiological contamination in farms and markets and associated consumer risk groups. *Journal of Water and Health,* 5(3), 455-466. doi.org/10.2166/wh.2007.041.

Appeaning-Addo, K., (2010). Urban and peri-urban agriculture in developing countries studies using remote sensing and in situ methods. *Remote Sensing* 2(2), 497-513. doi:10.3390/rs2020497.

Arku, G., Mkandawire, P., Aguda, N., & Kuuire, V. (2012). Africa's quest for food security: what is the role of urban agriculture? *The African Capacity Building Foundation*, 19, 1-34.

Asomani-Boateng, R. (2002). Urban cultivation in Accra: An examination of the nature, practices, problems, potentials and urban planning implications. *Habitat International*, 26(4), 591-607.

Asrat, P., & Simane, B. (2017). Adaptation benefits of climate-smart agricultural practices in the Blue Nile Basin: empirical evidence from North-West Ethiopia. In W. Leal Filho, S. Belay, J. Kalangu, W. Means, P. Munishi, & K. Musiyiwa (Eds.), *Climate change adaptation in Africa: fostering resilience and capacity to adapt* (pp. 45-59): London: Springer.

Badami, M.G., & Ramankutty, N. (2015). Urban agriculture and food security: A critique based on an assessment of urban land constraints. *Global Food Security*, 4, 8-15. doi.org/10.1016/j.gfs.2014.10.003.

Barthel, S. & Isendahl, C. (2012). Urban gardens, agriculture, and water management: Sources of resilience for long-term food security in cities. *Ecological Economics*. doi:10.1016/j.ecolecon.2012.06.018

Barthel, S., Parker, J., & Ernstson, H. (2015). Food and green space in cities: A resilience lens on gardens and urban environmental movements. *Urban studies*, 1–18. doi: 10.1177/0042098012472744.

Benis, K. & Ferrão, P. (2017). Potential mitigation of the environmental impacts of food systems through urban and peri-urban agriculture (UPA)–A life cycle assessment approach. *Journal of Cleaner Production*, 140 (2), 784-795. doi.org/10.1016/j.jclepro.2016.05.176.

Byker, C., Rose, N. & Serrano, E. (2010). The benefits, strategies and challenges of adults following a local food diet. *Journal of Agriculture, Food Systems and Community Development.* 1(1), 125-138

Chaudhury, M., Vervoort, J., Kristjanson, P., Ericksen, P., & Ainslie, A. (2013). Participatory scenarios as a tool to link science and policy on food security under climate change in East Africa. *Regional Environmental Change*, 13(2), 389-398. doi:10.1007/s10113-012-0350-1

Clarke, C. (2018) 'Climate change and food security: *Africa and the Caribbean' International Development Planning Review,* 40(2), 223-225.

Cofie, O., & Drechsel, P. (2007). Water for food in the cities: The growing paradigm of irrigated (peri)-urban agriculture and its struggle in sub-Sahara Africa. *African Water Journal* 1 (1), 22-32.

Conceição, P., Levine, S., Lipton, M., & Warren-Rodríguez, A. (2016). Toward a food secure future: Ensuring food security for sustainable human development in Sub-Saharan Africa. *Food Policy,* 60, 1-9. doi.org/10.1016/j.foodpol.2016.02.003.

Davis, B., Di Giuseppe, S., & Zezza, A. (2017). Are African households (not) leaving agriculture? Patterns of households' income sources in rural Sub-Saharan Africa. *Food Policy*, 67, 153-174. doi.org/10.1016/j.foodpol.2016.09.018.

Dossa, L.H., Sangaré, M., Buerkert, A., & Schlecht, E. (2015). Production objectives and breeding practices of urban goat and sheep keepers in West Africa: regional analysis and implications for the development of supportive breeding programs. *SpringerPlus*, 4, 1-12. doi 10.1186/s40064-015-1075-7.

Du Toit, M.J., Cilliers, S.S., Dallimer, M., & Goddard, M. (2018). Urban green infrastructure and ecosystem services in sub-Saharan Africa. *Landscape and Urban Planning,* 180, 249-261. doi.org/10.1016/j.landurbplan.2018.06.001.

Dyer, M., Mills, R., Conradie, B., & Piesse, J. (2015). Harvest of Hope: The contribution of peri-urban agriculture in South African townships. *Agrekon*, 54(4), 73-86.

Food and Agriculture Organisation. (2007). T*he urban producer's resource book: A practical guide for working with Low Income Urban and peri-urban Producers Organizations*. FAO, Rome.

Girardet, H., & Bree, A. (2009). Cultivating the Future: Food in the Age of Climate Change. Hamburg: World Future Council. Retrieved from *http://www. worldfuturecouncil.org/fileadmin/user_upload/PDF/ cultivating_the_future.pdf*

Hall, R., Scoones, I., & Tsikata, D. (2017). Plantations, outgrowers and commercial farming in Africa: agricultural commercialisation and implications for agrarian change. *The Journal of Peasant Studies*, 44(3), 515-537. doi.org/10.1080/03066150.2016.1263187.

Hallsworth, A. & Wong, A. (2015). Urban gardening realities: a case study of Portsmouth, England. *International Journal on Food Systems Dynamics,* 6, 1-11.

Intergovernmental Panel on Climate Change. (2018). The Regional Impacts of Climate Change. Retrieved from *http://www.ipcc.ch/ipccr eport s/sres/regio nal/index.php?idp=11*.

Lindley, S., Pauleit, S., Yeshitela, K., Cilliers, S., & Shackleton, C. (2018). Rethinking urban green infrastructure and ecosystem services from the perspective of sub-Saharan African cities. *Landscape and Urban Planning,* 180, 328-338. doi.org/10.1016/j.landurbplan.2018.08.016.

Lwasa, S., Mugagga, F., Wahab, B., & Simon, D. (2015). A meta-analysis of urban and peri-urban agriculture and forestry in mediating climate change. *Current Opinion in Environmental Sustainability,*13, 68-73.

Materechera, S.A. (2018). Soil properties and subsoil constraints of urban and peri-urban agriculture within Mahikeng city in the North West Province (South Africa). *Journal of Soils and Sediments*, 18(2). 494–505. doi 10.1007/s11368-016-1569-0.

Meijer, S.S., Catacutan, D., & Ajayi, O.C. (2015). The role of knowledge, attitudes and perceptions in the uptake of agricultural and agroforestry innovations among smallholder farmers in sub-Saharan Africa. *Journal of Agricultural Sustainability,* 13(1), 40-54.

Mougeot, LJ.A. (2000). Urban agriculture: definition, presence and potentials and risks. *Cities Feeding People Series*, 31, La Habana: Cuba.

Mtika, C. (2016). Mzuzu: Malawi's nascent city. Retrieved from *https://www.africanindy.com/southern-africa/mzuzu-malawis-nascent-city-5062095*.

Nyantakyi-Frimpong, H., Arku, G., & Inkoom, D.K.B. (2016). Urban agriculture and political ecology of health in municipal Ashaiman, Ghana. *Geoforum*, 72, 38-48.

Ogato, G,S., Amare, K.A., & Geneletti, B.D. (2017). Towards mainstreaming climate change adaptation into urban land use planning and management: the case of Ambo Town, Ethiopia. In W. Leal Filho, S. Belay, J. Kalangu, W. Means, P. Munishi, & K. Musiyiwa (Eds.), *Climate change adaptation in Africa: fostering resilience and capacity to adapt* (pp. 61-85): London: Springer.

Padgham, J., Jabbour, J., & Dietrich, K. (2015). Managing change and building resilience: A multi-stressor analysis of urban and peri-urban agriculture in Africa and Asia. *Urban Climate*, 12, 183-204. https://doi.org/10.1016/j.uclim.2015.04.003.

Parry, M.L., Rosenzweig, C., Iglesias, A., Livermore, M., & Fischer, G. (2004). Effects of climate change on global food production under SRES emissions and socio-economic scenarios. *Global Environmental Change,* 14 (1),

ISSN-Internet 2197-411x OLCL 862804632

53-67. doi.org/10.1016/j.gloenvcha.2003.10.008.

Powlson, D.S., Stirling, C.M., Thierfelder, C., White, R.P., & Jat, M.L. (2016). Does conservation agriculture deliver climate change mitigation through soil carbon sequestration in tropical agro-ecosystems? *Agriculture, Ecosystems & Environment*, 220, 15, 164-174. doi.org/10.1016/j.agee.2016.01.005.

Prain, G., & Lee-Smith, D. (2010). Urban agriculture in Africa: what has been learned? *African Urban Harvest*, 13-35.

Pribadi, D.O., & Pauleit, S. (2015). The dynamics of peri-urban agriculture during rapid urbanization of Jabodetabek Metropolitan Area. *Land Use Policy*, 48, 13-24. doi.org/10.1016/j.landusepol.2015.05.009.

Reid, M.C., & McKenzie, F.E. (2016). The contribution of agricultural insecticide uses to increasing insecticide resistance in African malaria vectors. *Malaria Journal,* 15, 1-8. doi.org/10.1186/s12936-016-1162-4.

Reynolds, K. (2015). Disparity Despite Diversity: Social Injustice in New York City's Urban Agriculture System. *Antipode*, 47 (1), 240-259. doi.org/10.1111/anti.12098.

Saghir, J. & Santoro, J. (2018). Urbanization in Sub-Saharan Africa: meeting challenges by bridging stakeholders. Centre for Strategic and International Studies, *https://csis-prod.s3.amazonaws.com/s3fs-public/publication/180411_Saghir_UrbanizationAfrica_Web.pdf 1-7.*

Säumel, I., Weber, F., & Kowarik, I. (2016). Toward livable and healthy urban streets: roadside vegetation provides ecosystem services where people live and move. *Environmental Science & Policy,* 62, 24-33. doi.org/10.1016/j.envsci.2015.11.012.

Serdeczny, O., Adams, S., Baarsch, F., Coumou, D., Robinson, A., Hare, W., Schaeffer, M., Perrette, M., & Reinhardt, J. (2017). Climate change impacts in Sub-Saharan Africa: from physical changes to their social repercussions. *Regional Environmental Change*, 17(6), 1585–1600. doi.org/10.1007/s10113-015-0910-2.

Simatele, D., & Simatele, M. (2015). Climate variability and urban food security in sub-Saharan Africa: lessons from Zambia using an asset-based adaptation framework *South African Geographical Journal*, 243-263. doi.org/10.1080/03736245.2014.924873.

Smart, J., Nel, E., & Binns, T. (2015). Economic crisis and food security in Africa: Exploring the significance of urban agriculture in Zambia's Copperbelt province. *Geoforum*, 65, 37-45. doi.org/10.1016/j.geoforum.2015.07.009.

Smart, J., Nel, E., & Binns, T. (2015). Economic crisis and food security in Africa: Exploring the significance of urban agriculture in Zambia's Copperbelt province. *Geoforum*, 65, 37-45. doi.org/10.1016/j.geoforum.2015.07.009.

Smit, W. (2016). Urban governance and urban food systems in Africa: Examining the linkages. *Cities*, 58, 80-86. doi.org/10.1016/j.cities.2016.05.001.

Sorensen, J.P.R, Lapworth, D.J., Nkhuwa, D.C.W., Stuart, M.E., Gooddy, D.C., Bell, R.A., Chirwa, M., Kabika, J., Liemisa, M., Chibesa, M. & Pedleyd, S. (2015). Emerging contaminants in urban groundwater sources in Africa. *Water Research*, 72, doi.org/10.1016/j.watres.2014.08.002 51-63.

Specht, K., Weith, T., Swoboda, K., & Siebert, R. (2016). Socially acceptable urban agriculture businesses. *Agronomy for Sustainable Development,* 36, 17. DOI 10.1007/s13593-016-0355-0.

Tibesigwa, B., & Visser, M. (2016). Assessing gender inequality in food security among small-holder farm households in urban and rural South Africa. *World Development*, 88, 33-49. doi.org/10.1016/j.worlddev.2016.07.008.

Tumushabe, J.T. (2017). Climate change, food security and sustainable development in Africa. In S.O. Oloruntoba, & T Falola (Eds.), *The Palgrave Handbook of African politics governance and development* (pp. 853-68): New York: Palgrave Macmillan.

Webb, N.L. (2011). When is enough, enough? Advocacy, evidence and criticism in the field of urban agriculture in South Africa. *Development Southern Africa*, 28(2), 195-208.

Webb, N.L. 'When is enough, enough? Advocacy, evidence and criticism in the field of urban agriculture in South Africa' (2011) 28(2) *Development Southern Africa* 195-208.

West, J. (2015). Can linking small- and large-scale farmers enhance adaptive capacity? Evidence from Tanzania's Southern Agricultural Growth Corridor. In T.H. Inderberg, S. Eriksen, K. O'Brien, L. Sygna (Eds.), *Climate change adaptation and development transforming paradigms and practices* (pp. 139-60): London: Rout-

ledge.

WFP (World Population Review, 2018b). Accra Population *2018.Retrieved from http://worldpopulationreview.com/world-cities/accra-population/*.

WFP (World Population Review, 2018a). Population of Cities in Malawi 2018. Retrieved from *http://worldpopulationreview.com/countries/malawi-population/cities/*.

Wong, A. & Ribero, C. (2013). New Agriculture: an alternative means to provide enduring employment and food security for Martinique. Etudes Caribeénnes, No. 26, Article 6710. Retrieved from *http:// etudescaribeennes.revues.org/6710*

World Bank. (2018). *Poverty and Shared Prosperity 2018: Piecing Together the Poverty Puzzle*. Washington, DC: World Bank. License: Creative Commons Attribution CC BY 3.0 IGO.

WPR (World Population Review). (2018). Accra Population 2018. Retrieved from *http://worldpopulationreview.com/world-cities/accra-population/*.

Zimmerer, K.S., Carney, J.A., & Vanek, S.J. (2015). Sustainable smallholder intensification in global change? Pivotal spatial interactions, gendered livelihoods, and agrobiodiversity. *Current Opinion in Environmental Sustainability,* 14, 49-60.

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Research Paper

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What climate-smart agriculture means to members of the Global Alliance for climate-smart agriculture

Shinnola Alexander*[1]

[1] Independent Scholar, P.O. Box 303506, St. Thomas, VI 00803, USA.

* Corresponding author: *shinnola.alexander@gmail.com* | + 1 340 9984392

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Abstract

Climate-smart agriculture (CSA), a concept originally coined by the Food and Agriculture Organization of the United Nations (FAO), has been presented as a solution to the interlinked challenges of food security and climate change. According to the FAO, CSA explicitly aims for three objectives: (1) to sustainably increase agricultural productivity to support equitable increases in farm incomes, food security and development; (2) to adapt and build resilience to climate change at multiple levels; and (3) to reduce greenhouse gas emissions from agriculture. This definition of CSA is central to ongoing debates between different groups of stakeholders, such as NGOs and policy-makers in developed and developing countries, over what exactly constitutes CSA, e.g. does it encompass large-scale industrial agriculture and small-scale agriculture, organic and non-organic farming practices, and which associated practices fall in its ambit. Thus, to frame CSA's efficacy for the future, it is important to explore how different groups of stakeholders define CSA. This study collects and analyses data from qualitative, semi-structured interviews with 30 active members of the Global Alliance for Climate-Smart Agriculture (GACSA)—one of the most prominent organizations currently involved in shaping CSA policy. The interviewees include employees of governments, NGOs, research institutions, agribusiness companies and representatives of farmers' groups. Their responses reveal that for CSA practitioners within GACSA, doing CSA is perceived to be significantly more important than defining CSA or attempting to identify the differences between, for example, agroecology and CSA. Particularly challenging is to define what qualifies as "smart". Nevertheless, clarification of CSA is important for governments and policy-makers, in particular with regard to the use of inorganic fertilizers and GM technologies. Although these latter approaches are not explicitly promoted by GACSA, the membership of several "Big Ag" companies in the Alliance attracts criticism concerning the shaping of CSA's agenda and possible "greenwashing" by private interests. At the same time, the respondents note that some proponents of agroecology can be accused of "claiming the space as their own." Almost all interviewees stress the importance of a bottom-up approach based on shared governance and growth and placing farmers' needs first, rather than creating division among stakeholder groups. In addition, cooperation between farmers, researchers, and policymakers, as well as a context-specific approach to collaborative, data-driven education programmes are all cited as crucial for the future development of CSA.

Introduction

The Food and Agriculture Organization of the United Nations (FAO) coined the term "climate-smart agriculture" (CSA) in a document prepared for the 2010 Hague Conference on Food Security, Agriculture and Climate Change (CCAFS and FAO, 2014). The subsequent creation of the Global Alliance for Climate-Smart Agriculture (GACSA) marked a seemingly successful end to several years of dialogue and engagement between several or-

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ganizations and stakeholders. GACSA defines itself as a multi-stakeholder, "voluntary platform open to governments, international and regional organizations, institutions, civil society, farmers' organizations and businesses who agree with its vision and framework document" (GACSA, 2019).

Today, climate-smart agriculture is widely touted as an effective approach for improving agricultural yields and protecting the livelihoods of farmers in the face of climate uncertainty. Still, while CSA has found a home among policymakers and international organizations, including NGOs, it has been met with resistance by organizations who have openly criticized GACSA for various shortcomings. For example, CIDSE complained that one year on from GACSA's launch in 2014, 60 percent of its private sector members came from the fertilizer industry (CIDSE, 2015). Another shortcoming attributed to GACSA is its failure to strictly define CSA. Many such critics have declined to join GACSA, arguing that in the absence of explicit guidelines, the term stands to be exploited by agribusinesses that have already begun to introduce climate-smart initiatives as part of their self-proclaimed efforts to curb climate change (Newell & Taylor, 2017). Furthermore, Chandra et al. (2017) claim that organizations, mainly originating in the global North, are establishing the scientific evidence base and credibility of climate-smart agriculture by launching CSA projects targeting rural communities in the global South, where they draw criticism from grassroots farmers, civil society groups and NGOs.

While the expansion of climate-smart agriculture is endangered by the harsh criticism received over its goals and legitimacy (CIDSE, 2015; Climate-Smart Agriculture Concerns, 2015), actual debates among CSA stakeholders and practitioners are poorly understood because critics focus principally on CSA policy proposals emanating from GACSA. This paper proposes that debates among GACSA members may provide fresh insight to industry and governments seeking to understand the definition of CSA and to gauge how its policy might evolve over the medium to long-term future. Using qualitative interviews with stakeholders who are members of the GACSA, the paper looks at how they attempt to resolve key questions as legitimate practitioners of CSA, such as the problem of achieving CSA objectives in the context of use of fertilizer and genetically modified (GM) technologies, the context-specific issue of "doing" CSA in different geographic areas, and the challenge of differentiating CSA from agroecology. The paper first provides a background on the debates concerning definitions of CSA; then it explores GACSA members' views on CSA; and finally, it presents a discussion and conclusion that addresses these findings in the broader context of contemporary debates to further understanding of climate-smart agriculture and what its future holds.

Literature Review

Current political and academic debates surrounding climate-smart agriculture reflect uneven power relations between the North and the South and between industrial agriculture and small-scale agriculture (Chandra et al, 2017; Chandra et al, 2018; Lipper & Zilberman, 2018). The concept of CSA has always been positioned between policy and science (Saj et al., 2017), and there are various definitions assigned to the term by international organizations, policy-makers, NGOs, and scholars.

The FAO states that CSA contributes to the attainment of sustainable development goals by confronting climate challenges and food security through three pillars: "sustainably increasing agricultural productivity and incomes; adapting and building resilience to climate change; reducing and/or removing greenhouse gases emissions, where possible" (FAO, 2013, p.9). Thus, in its discussion of CSA, the FAO emphasizes aims over methods, leading to criticism from NGOs that there is more adaptation than food security or mitigation in CSA initiatives and that CSA in its current form is a 'business as usual' strategy (Saj et al., 2017).

Other definitions presented in the academic literature, albeit different from the FAO's definition, also focus on aims, such as reducing climatic risks that are occurring with more frequency today (Engel & Muller, 2016; Steenwerth et al., 2014). Still, Lipper et al. (2014) describe CSA as a transformation process of agricultural systems to support food security under climate change realities. The ambiguity regarding CSA's definition has led some critics to suggest that CSA is simply used—or was designed—to gain access to climate funds (Newell & Taylor, 2017).

Whilst the definition of climate-smart agriculture is contested, a separate political and academic debate revolves around which approaches to agriculture can be considered 'climate smart'. It should be noted that there is sparse scholarship clearly identifying the scientific underpinnings of CSA, including which approaches are included in its ambit (Rosenstock et al., 2016). Some practices included within CSA are widely considered to be 'climate-smart' by proponents and critics alike (Branca et al., 2011; Lipper et al., 2014). According to the World Bank (2012, p. 2), these involve "mulching, intercropping, conservation agriculture, crop rotation, integrated crop-livestock management, agroforestry, improved grazing, and

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improved water management" as well as "better weather forecasting, more resilient food crops and risk insurance." CCAFS and FAO (2014) also include farm, ecosystem and landscape management to improve resource efficiency and resilience in CSA approaches. Yet a principally results-based definition underpins the idea that CSA cannot be "universally applied" because it "involves different elements embedded in local contexts" (CCAFS and FAO, 2014, p. 3).

At the same time, the promotion of GM technology as climate-smart has generated controversy. An official CSA document published by FAO and CCAFS (2016) explicitly states that CSA does not promote genetically modified organisms (GMOs); however, GMOs are not expressly forbidden, and the FAO suggests that organizations and individuals may use GM technology as their national policy dictates. Moreover, there is no unified view on this issue in the academic literature. While Newell and Taylor (2017) argue that GMO technologies are among the controversial interventions in CSA and that CSA justifies financing and advancing them, Nagargade et al. (2017) consider genetic engineering to be a promising tool to reduce greenhouse gas emissions in CSA.

Fertilizer and pesticide use have been another source of contention within climate-smart agriculture debates (GRAIN, 2015). Among stakeholders, there is no agreement on the validity of inorganic fertilizer use as a climate-smart agricultural practice (Duflo, Kremer, & Robinson, 2011; Lipper et al., 2014). Some CSA programmes, such as Smart Rice in Indonesia, apply both inorganic and organic fertilizers (Perdinan et al., 2018) and there seems to be growing evidence from developing countries that the use of inorganic fertilizers can reduce emissions and increase yields and returns for the farmers, including smallholders (Arslan et al., 2015; Behnke et al., 2018; Zougmoré, 2018). However, Newell and Taylor (2017) underline the key role of biotechnology and fertilizer associations in promoting CSA in developing countries, where, as they argue, application of fertilizers could be dramatically reduced without comprising crop yields. In this regard, the Global Alliance for Climate-Smart Agriculture is also a focus of harsh criticism, as some stress a major presence of fertilizer companies within GACSA and worry that this creates more opportunities for climate-smart agriculture to be misunderstood and misappropriated (Steenwerth et al., 2014). In September 2015, nearly four hundred civil society groups signed a joint statement rejecting the Alliance's "false solutions" which they claim enable members to "greenwash" their practices, i.e. portray them as more environmentally friendly than they are in reality (Climate-Smart Agriculture Concerns, 2015).

At the same time, GACSA has steered the remarkable growth of CSA, and its evolution will continue to impact CSA's future. Yet how CSA stakeholders and practitioners, including the diverse stakeholders at GACSA, understand CSA and the debates surrounding it are poorly understood. This paper seeks to contribute to current scholarship on CSA by exploring meanings assigned to climate-smart agriculture by GACSA practitioners, navigating contemporary debates on CSA through the lens of stakeholders within GACSA, and framing CSA's efficacy for the future.

Methodology

The purpose of this research is to explore the meanings assigned to climate-smart agriculture and its approaches among Global Alliance for Climate-Smart Agriculture members representing diverse stakeholder groups such as policy-makers in developed and developing countries, academia, NGOs, and the agriculture industry. A qualitative methodology is best suited to address this research aim.

Data Collection

Organizations listed on the roster of the 2016 annual forum of the Global Alliance for Climate-Smart Agriculture were invited to participate in a brief qualitative telephone or Skype interview. All 105 listed organizations were contacted by email, with positive responses obtained from 30. The interviews with the 30 GACSA members were conducted in spring and summer 2016. All participants were assured anonymity and gave their informed consent.

A semi-structured interview format was chosen because its flexibility allows for new, important topics to emerge (Gill et al., 2008). Interviews ranged in length from 21 to 45 minutes, with an average of 33 minutes. Twenty-one interviews were conducted by phone; nine were conducted via Skype. An interview guide was formulated using clear, open-ended questions. Topics included participants' educational and professional backgrounds; experiences working within climate-smart agriculture; and debates surrounding the meanings of climate-smart agriculture, its uses, and its future. I took time before beginning the interviews to familiarize myself with the questions in order to prevent the interview process from appearing too scripted or unnatural (Gill et al., 2008). Some questions were added or skipped during each interview.

Participants

All interviewees were at least 18 years of age, one-quarter were female, the remainder men (7 women, 23 men). CSA involvement broadly split along science, policy, farming and business lines; position titles included Agriculture Inspector, Regional Director, Chief Scientist, Senior Ecologist, Senior Policy Adviser, Program Manager, Vice President of Production and Sustainability, Climate-Smart Advisor, and Director of Agriculture. Interviewees were professionally based in the following nations: United States (15); Italy (5); and one each in Belgium, Canada, Costa Rica, Germany, Ireland, Indonesia, Kenya, Malawi, South Africa, and the United Kingdom.

Data Analysis

The transcripts of the conducted interviews were read, re-read and coded based on a grounded theory approach (Glaser & Strauss, 1967). The qualitative data analysis computer software NVivo was used to understand the various meanings assigned to climate-smart agriculture and contemporary debates and issues within this type of work. The coding schema was developed out of an iterative approach to identify themes and analytical categories within interviewees' experiences and narratives.

Findings

An overwhelming majority of climate-smart agriculture stakeholders and practitioners were of the view that CSA emerged as a critical response to increasing concerns over agriculture's footprint on the environment and deteriorating food security, and a growing awareness concerning the complex relationship between agriculture and climate change. One US-based interviewee working in the food industry aptly summarized this idea:

> "[CSA] . . . grew out of an evolving understanding of . . . agriculture as being the sector most vulnerable to climate change . . . and on the other hand, the fact that agriculture, directly and indirectly, through land conversion, is a driver of climate change."

For some, the creation of CSA, and subsequently the Global Alliance for Climate-Smart Agriculture, was part of a trend towards accepting agriculture's role in climate change, or at least for GACSA members to become part of those discussions. Other interviewees were sceptical about CSA's novelty, claiming that many of the practices pre-dated the term's emergence on the international scene in 2010. One interviewee recalled, "I used to call it 'Low Carbon Farming' and . . . 'Resource Efficient Agriculture' [but] it's about the triple bottom line—lower environmental impact, higher profitability and improved food security." Another observed that "here in Africa, farmers have been doing some of the practices that are now being labelled as 'climate-smart' from long back."

Stakeholders and practitioners were asked to define climate-smart agriculture based on their own experience and work in the field. Although many interviewees restated the original FAO definition, many others acknowledged the existence of diverse interpretations of the term climate-smart, one of the potential challenges for CSA implementation. Yet one interviewee asserted that this problem was not unique to CSA, comparing it to the notion of organic farming before the advent of certification. When asked what other names could replace CSA, some interviewees proposed "climate-resilient" or "climate-conscious" agriculture to capture the essence of CSA without being objectionable, divisive or just another buzzword. Several interviewees noted that the term "smart" raised questions about whether programmes or organizations critical of CSA could be judged "climate-stupid." While the majority of interviewees clearly felt that CSA holds great promise for addressing climate change on a global scale, many reflected on the challenges of defining what "smart" means in terms of creating effective change.

Part of climate-smart agriculture's challenges arise from the careful balancing and high standard posed by the FAO's focus on the three pillars of productivity, adaptation, and mitigation. When questioned if CSA objectives could be met if only two out of three pillars were achieved, interviewees emphasized the importance of context. "It depends how you define success in your field," answered one ecologist. Others stressed the importance of maintaining a careful balancing act—or "interesting trade-offs" as a scientist put it—to ensure that productivity does not come at the expense of adaptation and mitigation. Indeed, one US-based interviewee observed, "There is an inherent tension between production and greenhouse gas emissions."

Interviewees in the study came from several organizations, with a handful working in agribusiness, a sector that is often criticized in debates surrounding climate-smart agriculture and the composition of the Global Alliance for Climate-Smart Agriculture. One US-based interviewee in the fertilizer industry readily acknowledged the criticism that "[CSA is] being driven by Big Ag or it's being driven by the fertilizer companies" and suggested that, "maybe [the critics] don't understand the efforts that we have going on." Interviewees outside of the fertilizer industry also questioned the usefulness of these criticisms. "One side of the argument

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affirming that . . . climate resilience is the single biggest benefit that biotechnology can confer; others arguing [the] agricultural model it represents is the antithesis of resilient agricultural systems." With regard to GMO use, several interviewees pointed out that the Alliance didn't promote or forbid the use of these technologies. One of the respondents noted the following:

> "I would say the biggest piece that's not helpful is that . . . there are those that would say there's only one way to do that, and that's this way: GMO-free, organic, all natural, that's the only way we can achieve this. . . . So, the biggest challenge is programmes that want to claim all the space as their own and that want to say their way is the only right way."

Some responses pointed to several important issues outside of the original research questions. Among them included the ideological and technical distinctions between climate-smart agriculture and agroecology. Several interviewees representing both developed and developing countries stated that agroecology was consistent with CSA; however, the two agricultural approaches were not identical. One respondent went on to admit that CSA had always been about the outcomes but stressed that agroecology was about the methods. Another interviewee noted that in terms of being 'climate-smart,' methods of CSA and agroecology were very similar, although not exactly the same. Several interviewees agreed that debate on distinctions between agroecology and CSA was not technical but rather ideological or even philosophical. These tensions are highlighted below:

> ". . . [T]here's certainly voices in the commodity agriculture private sector agribusiness world which are very hostile to some of the voices that are defending a more agroecological approach. Likewise, I think there are also many organizations on the agroecological side of the spectrum that regard commodity agriculture as an enemy by definition. . . ."

Almost all interviewees claimed to place farmers' needs first, rather than creating division among stakeholder groups, thus adhering to a context- or geographically-specific definition of climate-smart agriculture. "If people say they are doing [CSA], then they would show they are doing it. No one's going to anoint anyone on the planet to become the king of the CSA beliefs. I'm not sure what the value of that is." While some respondents warned that too many interpretations of CSA could hamper its progress, there was an equally strong view that placing too much emphasis on the definition of CSA detracts from the important work that is being done to achieve its aims. Although Newell and Taylor (2017) suggest that GACSA simply exists to align CSA with corporate interests and investments, these interviews indicate that stakeholders did not view themselves and their role in this way. Rather, almost all interviewees agreed that doing CSA was the most important work. Instead of reflecting on the membership of GACSA, they typically sought to emphasize the important role of farmers in CSA and the need for more engagement between farmers, researchers, and policymakers.

"That's obviously a two-way process . . . extension systems, especially in sub-Saharan Africa, they're really not as strong and not as many farmers are within the systems. . . . So that's obviously a major strategic blockage and a real problem if you're trying to increase the resilience of agricultural systems."

On the whole, farmers were described as being vital to the success and growth of CSA. The need to incorporate farmers into discussions in order to improve two-way dialogue and knowledge transfers was often cited by respondents as one of the most pressing issues in climate-smart agriculture:

> "Because often what you see – and this is criticism in this sphere – is you get a lot of smart people together and talk about what farmers should do and there's not a farmer in the room. If you remember Dwight Eisenhower's famous quote, you know, 'Farming seems easy when your plough is a pencil and your cornfield is a thousand miles away.'"

For climate-smart agriculture to succeed, interviewees reiterated the need to conduct collaborative, data-driven programmes working alongside the farmers they seek to help. To do so requires a context-specific approach, but also one that recognizes that it is the farmers' livelihoods at stake when risks are taken in CSA. These interviewees envisioned a CSA that was not top-down, but one based on shared governance and growth. These and other themes discussed during the interviews are presented in Tables 1 a & b, which summarize the main statements made by the interviewees.

Discussion: Policy recommendations

This paper interviewed Global Alliance for Climate-Smart Agriculture stakeholders to understand their definitions of climate-smart agriculture, the challenges of defin-

Table 1a: Themes and categories that emerged during the interviews with GACSA members

History of climate-smart agriculture
Motivating concerns behind the creation of CSA: • Increasing environmental concerns • Accepting agriculture's role in climate change • Realization that climate change is a scientific reality, not a political game • Business-as-usual cannot feed Earth's population in a sustainable way • Main incentive: make CSA profitable for farmers
Historical names of the concepts close to CSA: • Low Carbon Farming • Resource Efficient Agriculture • Resilience, adaptation, and "mitigation" applied to agriculture • Climate-resilient agriculture • CSA is not a new concept: there was "Doing CSA before CSA"
Defining CSA
Challenges of defining CSA: • CSA's three pillars definition generates the most consternation • Main concern: which pillar is the most important? • Stakeholders' perspectives of the pillars are very different • Ultimately, it is not impossible to have all three pillars • Problem of defining CSA is not unique (e.g. the notion of organic farming) • CSA is still new and evolving, and its realization requires time • "Doing" CSA is more important than "defining" it • Definition of CSA is important for governments and policy-makers
Alternative opinions on what counts as CSA: • Some think it is a completely organic production without GMO and inorganic fertilizers • Some think that to achieve at least two pillars out of three means CSA, but in some situations, even one pillar is enough
Opinions on what "smart" means: • Be ahead of the climate-related risks • For the practices to be climate-smart, they need to be site-specific • Smart agricultural practices mean informed by climate science • "Smart" means creating effective change
Criticism of CSA
• It is not clear what 'climate-dumb' agriculture is • CSA is hard to do • Many people think that "climate-smart" is just "business as usual" agriculture and, arguably, greenwashing • There are dangers of accepting "new" things too quickly just because they're labelled "CSA," such as simply giving fertilizers to the farmers without educating them
Criticism of the Global Alliance for Climate-Smart Agriculture
• GACSA allows anyone to join • Private interests of large fertilizer, seed and GM companies are shaping CSA agenda, while they are part of the climate change problem; in particular, inorganic nitrogen fertilizers have a huge carbon footprint • Participation in CSA used as greenwashing by large commercial companies, members of GACSA

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Table 1b: Themes and categories that emerged during the interviews with GACSA members

Response to the critique of CSA and GACSA
• CSA is not a religion; it's an inclusive approach to achieve three pillars • CSA is hard to do, but agroecology is also hard to do. Farmers will not adopt approaches that are not in their interests • If production is increasing faster than emissions reductions, it is still a success • Biotechnology can increase the resilience of crop genetic material • Criticizing GACSA is different from criticizing CSA • GACSA does not explicitly promote GM technology or inorganic fertilizers • The critics don't understand the efforts that GACSA has going on • It is good that NGOs and other stakeholders criticize and question CSA and GACSA. This criticism will remain • Disputes are waning over time
Problems doing CSA
• There is a gap in education and culture with regard to CSA • The political-economic power of large international and national civil society groups and NGOs that oppose CSA and GACSA impedes progress and doesn't allow CSA to reach its full potential
Suggestions on improvements
• System-based approach to CSA is required • Place farmers' needs first instead of creating division among stakeholder groups • Need to incorporate farmers into CSA discussions in order to improve two-way dialogue and knowledge transfers • Need for a context-specific approach to collaborative, data-driven education programmes for the farmers
Big corporations versus smaller farms
• CSA is perceived as linked to technology (such as creation of plants with high carbon storage capacities, and other GMOs), and therefore, a threat to smaller farms • CSA does not put a burden on smallholder farmers; it actually pushes them in the direction of a more reliable food supply
The North versus the South
• Farmers' needs in developed countries are most likely very different to a subsistence farmer's needs in a country where the climate is changing or water scarcity is a serious issue • In the case of low food security, the priority might be on improving production and increasing adaptive capacity without much emphasis on mitigation • The USA, similar to other developed countries, is engaged in addressing all three pillars of CSA: productivity, resilience, and mitigation
Agroecology versus CSA
• Agroecology is consistent with CSA, but they are not identical • CSA is about the outcomes and agroecology is about the methods • Debate on the distinctions between them is not technical but rather ideological or philosophical • Some proponents of agroecology can be accused of "claiming the space as all their own" • Some proponents of agroecology fail to see the different contexts of what are the needs of the various farmers • There is a niche in the market for everyone

ing it, and contemporary debates surrounding its use as a solution to addressing food security in a climate change context. The results reveal that even though for some interviewees climate-smart agriculture is merely a new name for old practices, the majority feel that CSA was born from the fact that the current system had to change. Still, for GACSA members, there is no one single definition of CSA and roughly a third of the respondents maintained that given the impending global crisis that is climate change, the work of defining CSA may actually be a waste of critical resources, time, and energy. Many respondents considered that CSA's three pillars model (i.e., productivity, adaptation, and mitigation) is a good idea but hard to achieve, or will be context-specific.

Almost all interviewees considered that the outcomes of CSA are far more important than definitions, and that the priority must be for increasingly shared governance of CSA's objectives with farmers. Overall, most respondents did not take a hard line against the inclusion of agribusinesses. This could be a result of their membership within the GACSA, which has opened its doors to agribusinesses and other industries that have greatly contributed to agriculture's share of greenhouse gas emissions. Below, I place these findings into broader discussions of CSA and what that means for the Alliance.

The origins of GACSA were rooted in an emphasis on empowering smallholder farmers, a group widely believed to be the most vulnerable to the unpredictability of climate change. Still, the extent to which agribusinesses influence CSA policies is not entirely clear though many civil society groups point to the Alliance's ambiguous stance towards fertilizers, GMOs and pesticides as confirmation of agri-businesses' influence in the CSA arena. This has contributed to the growing belief that the "clever ambiguity" of climate-smart agriculture opens the door for powerful interest groups to undermine the important work needed to protect the livelihoods of many around the world who already suffer from or are in increasing danger of under-nutrition.

Critics' questions about the role of agribusiness in climate-smart agriculture will continue to serve as a source of scepticism, particularly as their productivity goals are balanced against other pillars within CSA. What this study's findings reveal, however, is that though these debates are important to the future of CSA and the Alliance, interviewees voiced resistance to spending too much time on the work of weeding out who belongs and who does not. Similarly, the interviewees stated that the debate on the differences between agroecology and CSA was not technical but rather ideological or even philosophical.

Many interviewees expressed a sense of urgency, and placed farmers' needs front and centre in their analyses of what needs to be done and by whom. Surely, critics of agribusinesses could argue that a "farmers first" approach keeps agribusiness running as usual and that the Alliance provides a "smart" cover to enable their greenwashing. Although it has been established that the current food supply is sufficient to meet global nutritional needs, and that distribution not production is the biggest challenge, the pillar of "productivity" is still a hard one to argue against, especially when warned of the dire consequences of not securing food for future generations. This enables the "productivity above all else" industries to continue to dominate part of the CSA space. Productivity is highly measurable and provides quick feedback, and thus lends itself well to be privileged over the other two pillars, adaptation and mitigation, whose time horizons extend well beyond a single growing season.

Climate-smart agriculture has grown immensely since its inception in 2010, and despite increasing criticism, its growth hasn't been seriously affected. Indeed, the future of CSA seems very bright and its goal to reach 500 million people, though ambitious, may be yet attainable. Still however, CSA is not immune to serious setbacks if the most pressing issues are not resolved in the short to medium term.

Conclusion

This qualitative study is based on data generated from 30 semi-structured interviews with stakeholders within the Global Alliance for Climate-Smart Agriculture; therefore, the findings must be considered in this context. While every attempt to reach a broad sampling of Alliance stakeholders was made, this paper only provides insight about those GACSA members who were willing to take their time to share their expertise and experiences. Members of the Alliance are naturally biased towards praising its positive attributes to increase its legitimacy and reach, while ignoring harsh criticisms about its goals and legitimacy. Lastly, GACSA members in the US were over-represented among the sample selection. Further research could examine the experiences of members based outside of the US and GACSA, in order to better understand how other stakeholders conceptualize and give meaning to CSA. The analysis of the interviews was organized around several tensions identified in the literature review, namely between agroecology and CSA, smallholder farmers and industrial agriculture, and developed and developing countries.

Given several interviewees' call for shared governance of

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climate-smart agriculture with farmers, further research is also necessary to understand farmers' meanings of and concerns about CSA. Finally, this research is useful to scholars and practitioners seeking to understand how to best convince individuals, institutions, or organizations to adopt CSA practices, by pointing to disparities in viewpoints and motivations driving work to meet each of the three pillars.

The CSA stakeholders interviewed in this study continuously looked toward the future to orient their work and import the significance of the promise and potential of CSA. Of course, these stakeholders recognize that CSA is not perfect, nor will be any solution tackling a massive problem such as climate change. To continue to address climate change successfully, CSA advocates will need to continue to address issues that challenge its legitimacy as a proper and adequate solution to a critical issue.

The FAO's 'three pillars' definition holds great potential, but generates serious questions about its effectiveness if certain pillars (i.e., productivity) are privileged over others. Moreover, one must question the distinction between productivity and equitable increases in productivity. CSA, and GACSA, must guard against upholding agricultural practices that have contributed to the deleterious outcomes (e.g., greenhouse gas emissions) it seeks to diminish. This work is made all the more difficult given criticisms that energy spent on defining and branding CSA actually detracts from the critical work necessary to do CSA. Yet, climate-smart agriculture must address—head-on—criticisms about corporate responsibility, greenwashing, and shared governance in order to succeed. Questions about CSA's legitimacy are important, both for its wider adoption as a solution and for whatever comes next. Global climate change needs innovative solutions—the consequences of doing nothing are simply too great to ignore.

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Conflict of Interests

The author hereby declares that there is no conflict of interest.

References

Arslan, A., McCarthy, N., Lipper, L., Asfaw, S., Cattaneo, A., & Kokwe, M. (2015). Climate smart agriculture? Assessing the adaptation implications in Zambia. *Journal of Agricultural Economics*, 66(3), 753-780. doi:10.1111/1477-9552.12107

Behnke, D., Heft-Neal, S., & Roland-Holst, D. (2018). Early warning techniques for local climate resilience: Smallholder rice in Lao PDR. In L. Lipper, N. McCarthy, D. Zilberman, S. Asfaw, & G. Branca (Eds.), *Climate Smart Agriculture. Natural resource management and policy* (Vol. 52, pp. 105-136). Cham, Switzerland: Springer.

Branca, G., McCarthy, N., Lipper, L., & Jolejole, C. (2011). Climate-smart agriculture: A synthesis of empirical evidence of food security and mitigation benefits from improved cropland management. Mitigation of Climate Change in Agriculture, 3, 1-42. Retrieved from *http://agris.fao.org/agris-search/search.do?recordID=XF2006449707*

CCAFS and FAO. (2014). Knowledge on Climate-Smart Agriculture: Questions & answers. Rome: Food and Agriculture Organisation of the United Nations (FAO) and Climate Change, Agriculture and Food Security (CCAFS). Retrieved from *https://ccafs.cgiar.org/publications/questions-answers-knowledge-climate-smart-agriculture#.Wo-TR7yWbIU*

Chandra, A., McNamara, K. E., & Dargusch, P. (2017). The relevance of political ecology perspectives for smallholder Climate-Smart Agriculture: A review. *Journal of Political Ecology*, 24(1), 821-842. doi:10.2458/v24i1.20969

Chandra, A., McNamara, K. E., & Dargusch, P. (2018). Climate-smart agriculture: Perspectives and framings. *Climate Policy*, 18(4), 526-541. doi:10.1080/14693062.2017.1316968

CIDSE (2015). Climate-Smart revolution... or a new era of green-washing? International Cooperation for Development and Solidarity (CIDSE) Update Briefing, May 2015. Retrieved from *http://www.cidse.org/publications/just-food/food-and-climate/climate-smart-revolution-or-a-new-era-of-green-washing-2.html*

Climate-Smart Agriculture Concerns. (2015). Cop-21statement. Don't be fooled! Civil society says no to "climate-smart agriculture" and urges decision-makers to support agroecology. Retrieved from *http://www.climatesmartagconcerns.info/cop21-statement.html*

Duflo, E., Kremer, M., & Robinson, J. (2011). Nudging farmers to use fertilizer: Theory and experimental evidence from Kenya. *American Economic Review*, 101(6), 2350-2390. doi:10.3386/w15131

Engel, S., & Muller, A. (2016). Payments for environmental services to promote "climate-smart agriculture"? Potential and challenges. *Agricultural economics*, 47(S1), 173-184. doi:10.1111/agec.12307

FAO. (2013). Climate-Smart Agriculture sourcebook. Rome: Food and Agriculture Organization of the United Nations (FAO). Retrieved from *http://www.fao.org/docrep/018/i3325e/i3325e00.htm*

FAO and CCAFS. (2016). Knowledge on Climate-Smart Agriculture. Climate-Smart Agriculture: What is it? Why is it needed? Rome: Food and Agriculture Organisation of the United Nations (FAO) and Climate Change, Agriculture and Food Security (CCAFS) . Retrieved from *http://www.fao.org/3/a-i4226e.pdf*

GACSA. (2019). Global Alliance for Climate-Smart Agriculture (GACSA). Retrieved from *http://www.fao.org/gacsa/en/*

Gill, P., Stewart, K., Treasure, E., & Chadwick, B. (2008). Methods of data collection in qualitative research: Interviews and focus groups. *British Dental Journal*, 204(6), 291-295. doi:10.1038/bdj.2008.192

Glaser, B. G., & Strauss, A. (1967). *The discovery of grounded theory: Strategies for grounded research*. New York, NY: Aldine de Gruyter.

GRAIN. (2015, Sep 23). The Exxons of agriculture [Web log post]. Retrieved from *https://www.grain.org/article/entries/5270-the-exxons-of-agriculture*

Lipper, L., Thornton, P., Campbell, B. M., Baedeker, T., Braimoh, A., Bwalya, M., … Torquebiau, E.F. (2014). Climate-smart agriculture for food security. *Nature Climate Change*, 4, 1068-1072. doi:10.1038/nclimate2437

Lipper, L., & Zilberman, D. (2018). A short history of the evolution of the climate smart agriculture approach and its links to climate change and sustainable agriculture debates. In L. Lipper, N. McCarthy, D. Zilberman, S. Asfaw, & G. Branca (Eds.), *Climate Smart Agriculture. Natural resource management and policy* (Vol. 52, pp. 13-30). Cham, Switzerland: Springer.

Nagargade, M., Tyagi, V., & Singh, M. K. (2017). Climate Smart Agriculture: An option for changing climatic situation. In S. Jurić (Ed.), *Plant engineering* (pp. 143-165). IntechOpen. doi:10.5772/intechopen.69971

Newell, P., & Taylor, O. (2017). Contested landscapes: The global political economy of climate-smart agriculture. *The Journal of Peasant Studies*, 45(1), 1-22. doi:10.1080/03066150.2017.1324426

Perdinan, P., Dewi, N. W. S. P., & Dharma, A. W. (2018). Lesson learnt from Smart Rice Actions in Indonesia. *Future of Food: Journal on Food, Agriculture and Society*, 6(2), 9-20.

Rosenstock, T.S., Lamanna, C., Chesterman, S., Bell, P., Arslan, A., Richards, M., Rioux, J., Akinleye, A. O., Champalle, C., Cheng, Z., Corner-Dolloff, C., Dohn, J., English, W., Eyrich, A. S., Girvetz, E. H., Kerr, A., Lizarazo, M., Madalinska, A., McFatridge, S., Morris, K. S., Namoi, N., Poultouchidou, N., Ravina da Silva, M., Rayess, S., Ström, H., Tully, K. L., & Zhou, W. (2016). The scientific basis of climate-smart agriculture: A systematic review protocol. (CCAFS Working Paper no. 138). Copenhagen, Denmark: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). Retrieved from *https://hdl.handle.net/10568/70967*

Saj, S., Torquebiau, E., Hainzelin, E., Pages, J., & Maraux, F. (2017). The way forward: An agroecological perspective for climate-smart agriculture. *Agriculture, Ecosystems & Environment*, 250, 20-24. doi:10.1016/j.agee.2017.09.003

Steenwerth, K. L., Hodson, A. K., Bloom, A. J., Carter, M. R., Cattaneo, A., Chartres, C. J., … Jackson, L. E. (2014). Climate-smart agriculture global research agenda: Scientific basis for action. *Agriculture & Food Security*, 3(11), 1-39. doi:10.1186/2048-7010-3-11

World Bank. (2012). Climate-smart agriculture: A call to action. (Working Paper no. 103482). Retrieved from *http://documents.worldbank.org/curated/en/992021468197391264/pdf/103482-WP-PUBLIC-CSA-BROC.pdf*

Zougmoré, R. (2018). Promoting Climate-Smart Agriculture through water and nutrient interactions options in semi-arid West Africa: A review of evidence and empirical analysis. In A. Bationo, D. Ngaradoum, S. Youl, F. Lompo, & J. O. Fening (Eds.). *Improving the profitability, sustainability and efficiency of nutrients through site specific fertilizer recommendations in West Africa agro-ecosystems* (Vol. 2, pp. 249-263). Cham, Switzerland: Springer.

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Research Paper

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Climate-smart agriculture policy and (in)justice for smallholders in developing countries

Ibnu Budiman*[1]

[1] Researcher in Global Change and Global Ethics, Wageningen University, 6708 PB Wageningen, Netherlands

* Corresponding author: *Budimanibnu26@gmail.com* | + 62 857 62480753

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Abstract

The Food and Agriculture Organization of the United Nations developed the term Climate-Smart Agriculture as an approach to transform agricultural systems to support development and ensure food security in a changing climate. This paper analyses whether climate-smart agriculture policy meets the demands of climate justice and respects the rights of smallholders; and if not, how it could be amended. The study is based on a literature review supplemented by four interviews with climate-smart agriculture actors from diverse backgrounds: a consultant, a smallholder farmer, a practitioner, and a scientist. To examine the climate-smart agriculture concept and its implementation, the following ethical positions are considered: maximalist, minimalist, Pogge´s intermediate position, Nussbaum's capability approach, Kantian, and Altruist. The study finds that current climate-smart agriculture approaches are not being fairly implemented because there is the unjust sharing of benefits of income and burdens of emission reduction costs, among smallholders and agro-industries. According to the principles of climate justice, this sharing proportion should be equally distributed based on an individual's capacities and poverty should be taken into consideration as well. Climate-smart agriculture should be fair for the farmers; it should not only push and promote agribusiness expansion. The power of multinational corporations has substantially altered global agrifood chains to the detriment of small farmers and the environment. The mandatory inclusion of local, regional and national level civil society organisations and networks holds the potential for a more fair implementation of climate-smart agriculture. Climate-smart agriculture policy could be more successfully implemented if state and non-state/private sector actors would support such collaboration, allowing for decision making at local levels and a deep and honest reflection on development narratives.

Introduction

Climate change is already causing subtle changes in weather patterns that are overwhelming communities, affecting their capacity to cope with physical disasters and social disasters like chronic poverty (Comfort et al., 1999; Heltberg, Siegel, & Jorgensen, 2009). Heltberg et al. (2009) state that climate change adaptation strategies have done little to date to address the underlying problems of vulnerability. Risk and hazard amplified by climate change are affecting the agriculture sector negatively. At the same time, industrialized agriculture is considered as one of the main drivers of climate change due to its contribution of 13 percent of total global emissions. In response, international organizations proposed the policy of climate-smart agriculture as a solution (World Bank, 2017).

The Food and Agriculture Organization of the United Nations (FAO) established climate-smart agriculture as a holistic concept that addresses agricultural development issues and other sustainable development goals

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in the context of climate change. Climate-smart agriculture purports to tackle both environmental problems and socio-economic challenges by addressing the three following elements: (i) improving crop productivity and people's incomes; (ii) increasing resilience of livelihoods; and (iii) abating greenhouse gasses (GHGs) emissions to protect ecosystems (FAO, no date, a).

Among other actors involved, some powerful actors may exploit their position when implementing climate-smart agriculture, causing further inequality and affecting farmers' rights and their welfare. For example, because of their inability to carry out climate-smart agriculture practices, climate-smart agriculture may force farmers to transfer their holdings to agribusiness companies (Taylor, 2018). On the other hand, development projects that implement climate-smart agriculture claim to target poverty reduction, food security, and economic empowerment (Steenwerth et al., 2014). These development projects may also have limitations because of the way development has become an 'industry' that often does not hold its promises; sometimes having disastrous effects (Ferguson, 1990; Moyo, 2010). Therefore, long-term, effective solutions for farmers are unlikely to be found in intervention-specific development alternatives (Escobar, 1992). Rather than project-based support for smaller groups of farmers, structural support for all farmers is required. Moreover, farmers need to be actively involved in consensual decision-making for climate-smart agriculture, because by its very nature farming is a locally-specific issue that defies one-size-fits-all solutions.

High-income countries have a duty to support vulnerable smallholders in low-income countries for various ethical reasons. For one, this duty is part of the global effort to support sustainable development (Dernbach & Brown, 2009). Second, to make amends for colonialism and modern-day neo-colonialism. Third, developed countries import large quantities of food products from developing countries (Thøgersen, Pedersen, Paternoga, Schwendel, & Aschemann-Witzel, 2017). Through the concept and practice of climate-smart agriculture, climate change adaptation agendas in the agricultural sector are emphasized in part to comply with ethical duty (Nunan, 2017).

In this paper, we query whether current policies and practices of climate-smart agriculture meet demands for climate justice and particularly, respect the rights of smallholders; and if not, how should policy and practice be amended. This study is a general analysis of smallholders' cases in developing countries such as in Asia (Indonesia, India, Bangladesh) and Africa (Malawi).
Chapter two describes the conceptual framework and methods utilized. Chapter three focuses on an analysis of the relationship between agribusiness, farmers and poverty, under the principle of climate justice. It presents arguments and counter-arguments for the intended outcomes of climate-smart agriculture in terms of climate justice and expectations of farmers. Chapter four discusses potential ways to transform the implementation of climate-smart agriculture. Chapter five concludes and suggests areas for further research.

Methodology and Framework

This qualitative study is based on a literature review supplemented by four interviews undertaken with climate-smart agriculture actors from diverse backgrounds (profession and countries), namely a consultant, a smallholder farmer, a practitioner, and a scientist. This small sample size is due to limited funding. The climate-smart agriculture actors were purposively selected based on their profession and experience related to climate-smart agriculture in developing countries. The consultant comes from Indonesia and has worked for ten years in agricultural development. The farmer is an Indonesian with fifteen years of farming experience. The Dutch practitioner works on environmental efficiencies and controversies about yield intensification in smallholders and agriculture production systems of South-East Asia. The Dutch scientist is a Wageningen researcher who works on agriculture, land use and greenhouse gas emissions. Each interview took between one and two hours to conduct. For ethical reasons, the actors' identities are kept anonymous.

This study assumed that each of the interviewed actors would take different ethical positions in examining the concept of climate-smart agriculture and its implementation. In this research, the following six ethical positions are considered: maximalist, minimalist, Pogge´s intermediate position, Nussbaum's capability approach, Kantian, and effective altruist (table 1). These ethical positions were selected due to their relevance to the case of climate-smart agriculture.

From a maximalist viewpoint, it is obligatory to maximise general welfare and the outcome is of importance. According to this view, people intend to do their best and do not settle for less (Chappell, 2009). The minimalist viewpoint emphasizes justice and looks at how people come to own property, what types of things can be held and so forth. It focuses on the urgency of negative duties, and thus reduces all ethical questions to the principle that one can live one's life as one likes, so long as no harm is done to others .

Pogge (2001) argues that negative duties need to be managed within a theory of global justice because by

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Table 1: Ethical positions

Maximalist	Minimalist	Pogge's Intermediate Position	Nussbaum's Capability approach	Kantian	Altruist
Maximise general welfare	Not inflict harm on people	Shape and enforce social conditions which are harming the global poor	Justice is grounded on the individual Ten human capabilities, inter alia life, health and control on the environment	Forbids us from using people as a mere means	Do as much good as possible

shaping and enforcing social conditions that foreseeably cause monumental suffering through global poverty, people are harming the global poor. These people are active participants in the largest, though not the gravest, crime against humanity ever committed (Pogge, 2001). In the capability approach by Nussbaum, justice is grounded on the individual. She states that the central human capabilities include but are not limited to the ability to live to the end of human life of normal length and to be adequately nourished. Nussbaum distinguishes ten human capabilities, *inter alia* life, health, and control over the environment (Nussbaum, 2009).

Kantian theory forbids the use of people as a mere means (Wood, 2007), i.e. that action is morally permissible only if it would be permissible for others to do the same act. Effective altruism is a philosophy and a social movement that aims to revolutionise the way we do philanthropy. It encourages individuals to do as much good as possible, typically by contributing money to the best performing aid and development organisations (Singer, 2015).

In this study, climate-smart agriculture is viewed as a policy narrative. Blaikie (2009) states that policy narratives are constructed by international development institutions such that public speakers may frame an issue strategically in terms of their interests and their agenda. Narratives are required to be implementable and doable by policy, hence, some facts may be used and others ignored in order to persuade people. Narratives make sense of complexity, reduce uncertainty and appeal to common sense (Blaikie, 2009). Consequently, it is crucial to reflect on narratives.

The analysis interrogates the relationship between climate-smart agriculture and expectations about development, food security in a changing climate and the reality of actual development practice. It aims to draw attention to the moral commitments of climate-smart agriculture proposals, pointing to the possibility of a radical break with the present. Empirical findings and normative perspectives are utilised together to elaborate upon climate-smart agriculture concepts and implementations.

Results and Discussion

This chapter is divided into two sections. The first section examines whether current policy and practice for climate-smart agriculture meet demands for climate justice. The second section analyses justice in relation to climate-smart agriculture development programmes and poverty.

Climate-Smart Agribusiness Industries and Injustice for Smallholders

Practices of conventional agriculture systems have led to an increase in GHG emissions and other forms of environmental degradation (Horrigan, Lawrence, & Walker, 2002). However, there is still uncertainty about the impacts of agricultural practices on the environment (Payraudeau & van der Werf, 2005). In order to deal with those issues, the FAO established an approach known as Climate-Smart Agriculture (CSA) through several programmes. For instance, Mitigation of Climate Change in Agriculture (MICCA) studies the life cycle assessment (LCA) of agricultural production chains by looking at mitigation opportunities, identifying the barriers of sustainable agriculture adoption at the farm level, and calculating the costs (FAO, no date, b). These studies have been conducted on some agricultural commodities and processed products in developing countries, using a concept of ecology of scale rather than economy of scale (Consultant, interview, December 12, 2017). Another FAO programme is Ex-Ante Carbon-balance Tool (EX-ACT). It aims at supporting the accounting process of GHG emission reductions from agricultural production. MICCA and EX-ACT provide knowledge and information to assist farmers and decision-makers to find policy options for climate change mitigation (FAO, no date, c).

The involvement of strategic decision-makers is expected to accelerate the actions for climate-smart agriculture. Therefore, the FAO promotes a collaboration of diverse stakeholders, consultants, farmers, and international development organizations, inter alia the World Bank, the Consultative Group on International Agricultural Research (CGIAR), the International Fund for Agricultural Development (IFAD), the UN World Food Programme (WFP), and the United Nations Environment Programme (UNEP). This partnership, according to the interviewed consultant, has had an impact in several countries in South Asia and Africa, but not yet in Southeast Asia.

Nonetheless, the climate-smart agriculture concept has been critiqued as being nothing less than a regime with material power that controls agricultural production, financial investment, and technology, i.e. climate-smart agriculture is being promoted to benefit multinational corporations and connected actors. As front-runners, these actors mobilise the flows of technology and finance to further build up a world agrifood system or regime (Newell & Taylor, 2018). The transnational agribusinesses use their power to establish various supply chain certification systems as strategies to control suppliers in developing countries (Bulkeley & Newell, 2015).

The domination of multinational corporations in climate-smart agriculture is unethical. For instance, the Global Alliance for Climate-Smart Agriculture (GACSA) initiative utilises political movements and involves private corporates to greenwash industrial agriculture (Budiman, 2016). Some of the corporates are Yara (the world's largest fertiliser manufacturer), Syngenta (GM seeds, highly hazardous pesticides), McDonald's (the hamburger chain), and Walmart. These companies are some of the planet's worst social and environmental offenders in agriculture (Deen, 2014). Chandra et al. argue that climate-smart agriculture has further marginalized vulnerable smallholders by reducing or undermining the opportunities they have to respond socio-politically to problems that include growing inequality, uneven power relations and social injustice (Chandra, McNamara, & Dargusch, 2017). Besides, current practices of climate-smart agriculture increase the incomes of private actors and perhaps larger farmers, not the majority of smallholder farmers.

The interviewed scientist (December 5, 2017) claims that climate-smart agriculture approaches are basically common practices that farmers practised earlier; however, the focus on the reduction of emissions is an innovation. Within climate-smart agriculture approaches, the duty of emission reductions tends to burden smallholders more than the industry. Why then is climate-smart agriculture imposed more at the farm than industry level? This issue is linked to climate justice.

Climate justice links human rights and development to achieve a human-centred approach (Aminzadeh, 2006). Within climate-smart agriculture approaches, farmers have not been completely put in the centre of the approach. Hence, many climate-smart agriculture projects do not safeguard farmers' rights and do not share the burdens, benefits, and impacts of climate change equitably and fairly (Budiman, 2017). As industries possess more power and produce a higher carbon footprint compared to farmers, who should be financially responsible for climate actions to save the planet?

Developed countries are targeted under the polluter pays principle (PPP) in which the burden is placed on those who pollute. Caney (2010) argues that PPP is not appropriate for poor countries that do not have the capacity to pay. He suggests that PPP should be sensitive to such countries by considering the fact that poor farmers produce emissions because of survival reasons, to fulfil their basic needs. Thus, the burden for climate actions should not fall upon them, but rather to entities that have the greatest ability to pay (Caney, 2010).

Caney (2010) discusses climate justice in a horizontal manner, considering relations among countries, but he neglects to consider the relationship between major corporates as buyers and farmers as suppliers in the production chain. In principle, all actors in the agrifood value chain should bear the costs (burden) for climate-smart practices equally. When farmers cannot afford climate-smart agriculture practices, they should be supported by institutions and donors. Current planning of climate-smart agriculture includes the development of means to produce food with low-carbon technology. To make such climate-smart agriculture practises feasible, the interviewed scientist is of the view that the strategy should be to structurally force farmers to join larger firms. However in this way, farmers would become human labour for major agribusiness corporates and would lose their independence, rights, and control over their land and environment.

Forcing farmers to work as labour for major corporates is unethical due to the fact that it eliminates the farmers' right to enjoy their valuable functioning that links to quality of life. According to Nussbaum's concept, the set of valuable functionings that a person has effective access to is termed their capability. Thus, a person's capability represents the effective freedom (independence) of an individual to choose between different functioning combinations – between different kinds of life – that he/

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she has reason to value.

Nevertheless, farmers in India claim that climate-smart agriculture helps them to protect their crops from climate change (Khatri-Chhetri, Aggarwal, Joshi, & Vyas, 2017; VoA News, 2016). The interviewed scientist claims that climate-smart agriculture works and that it is unethical to allow farmers to farm in an unsustainable way. Emitting a great amount of GHGs causes environmental problems that limit the rights of other people. The interviewed scientist argues that statements like "poor farmers want their children to become farmers" romanticise farmer poverty, rather than enhance their capability to develop.

The interviewed practitioner (December 12, 2017) challenged the interviewed scientist's claims by saying that farmers are victims of bigger regimes of economics and politics, including the regimes global capitalism and more recently, climate change. Before these regimes emerged, farmers´ practices had been sustainable. Then these regimes came along with corresponding agricultural policies that introduced high input agriculture systems. Nowadays, farmers have adopted intensified agricultural practices, and have contributed immensely to food security; though nonetheless small farmers have not received a fair price for their products. Despite this, the current regimes want to (again) reform farmers' behaviour in terms of climate change. Therefore, farmers are continually steered by massive regimes that are beyond their control, and thus are arguably not the ones to be blamed. Are bigger political regimes responsible? The United Nations Climate Change Conference (UNFCCC), Paris COP 21, lacked discussions about serious strategies for climate-smart agriculture (Saikawa, 2015). The non-legally binding commitments may contribute to further climate injustice in terms of agricultural stress and food insecurity. In addition, the target of sticking to a 1.5-2.0-degree global temperature increase, as stated in the Paris agreement, is projected to endanger water resources and agricultural production. In the Paris agreement, there is no provision to cover farmers' loss and damage from climate disasters (Weiskel, 2016).

Accordingly, farmers have become more impoverished and vulnerable. In the name of food security, the world's most powerful actors, who look for the most efficient way to produce food, have welcomed agrifood firms and technologies. Thus, where is the justice? Or have these powerful actors already redefined justice? These powerful actors' plans are unethical because they are harming others, namely farmers who possess low bargaining power and often lose in this kind of battle.

The current climate-smart agriculture concept is powered by strong capitalist actors that affect the way justice is conceptualised within existing climate-smart agriculture arrangements. There is a gap between its policies and practices that may lead to unintended effects. Mosse (2004) presumes that these unintended effects are neither necessarily perverse nor hidden. This effect may serve to ensure that farmers remain impoverished, especially in developing countries (Budiman, 2016). If the capitalist regime continues unabated, effective development programmes need to be developed as explained in the following section.

Climate-Smart Agriculture, Development Programmes, and Poverty among Farmers

Most people residing in rural areas of developing countries live in extreme poverty while managing small farms (UN, 2011). One valid question, therefore, is whether climate-smart agriculture as part of climate change mitigation can become a driver of farmers' decisions, particularly if mitigation efforts do not lead to short-term increases in farmer income or welfare (Mbow et al., 2014). There is a connection between climate-smart agriculture, poverty reduction, development programmes, and economic development (Steenwerth et al., 2014).

Nunan (2017) argues that current climate-smart agriculture development programmes do not change practices on the ground. She critiques the fact that climate-smart agriculture targets thousands of small farm businesses each working in different conditions and with individual farmer behaviours. This causes the technical effectiveness and adaptation measures of climate-smart agriculture (CSA) to be uncertain or questionable. Sharma & Suppan (2011) are critical of the limited understanding of the CSA concept and its practical designs, and of the absence of a monitoring methodology (Sharma & Suppan, 2011). Governments may avoid creating policy in this sector where implementation and monitoring for uncertain outcomes may be costly. Accordingly, smallholders may be unable to sustain climate-smart agriculture activities in the long-term due to its uncertain economic impacts (Fröhlich, Schreinemachers, Stahr, & Clemens, 2013). Are these obstacles conquerable? For this, we should have a closer look at developing countries and their circumstances.

Many developing countries receive development aid. Therefore, some organisations are concerned that climate-smart agriculture will become a condition for the receipt of development aid. Considering the above-mentioned uncertainties in the climate-smart agriculture approach, its programmes as with any other development projects may fail (Shames et al., 2012). Smallholders have

neither an asset base nor surplus capital to compensate for project failures. Therefore, there is a need to re-examine the feasibility of climate-smart agriculture projects implemented through development programmes.

Climate-smart agriculture development (CSA) programmes have failed and even led to increased vulnerability among smallholders in several countries. In Malawi, where a strong strategy for developing agroforestry (as a component of climate-smart agriculture) is in place, a development programme could not solve its governance problems due to a dichotomy among government bodies. Forestry departments are usually mandated to multiply and disseminate all types of tree germplasm. While, environment departments dislike regulated rows, intensive management and chemical control of weeds. This conflict led to an increase in the expenditure of human labour to clear weeds (FAO, 2013). In Bangladesh, a development programme failed to change farmers' behaviour from using chemical fertilizer to organic fertilizer ('interviewed practitioner, interview, December 12, 2017). In Indonesia, a development programme could not convince the government to provide subsidies for organic fertilizers (Osorio, Abriningrum, Armas, & Firdaus, 2011).

Non-governmental organizations (NGOs) are one of the key actors in CSA development programmes. NGOs primarily promote climate-smart agriculture with a view to enhance the capacity of agricultural systems to support food security and climate mitigation (FAO, no date, d). Have NGOs accomplished their purpose? The FAO (no date, d) states that there is no one-size-fits-all blueprint for how climate-smart agriculture should be pursued. Roe (1991) shows that blueprints are undergirded by narratives, and argues that the reason we do not learn more from past development efforts is precisely the reason we cannot better plan for the future (Roe, 1991). Currently, few countries in Africa and the Association of Southeast Asian Nations (ASEAN) have created a blueprint for climate-smart agriculture (Saj et al., 2017). To operationalize it, attention should be given to coordination between national and local stakeholders.

The lack of operational blueprints is one key reason that explains why climate-smart agriculture development programmes do not really reach poor farmers (Taylor, 2018). From a Kantian viewpoint the actions of development programmes should not be judged according to their consequences, but by their intention. The rightness or wrongness of development programmes depends on whether they fulfil their ethical duty.

What is the ethical duty of development programmes? According to Escobar (1992), development discourse creates ways of thinking about poverty and ways of designing programmes in order to alleviate poverty. Experts have proposed different strategies, rooted in local histories and traditions, for the improved implementation of development programmes (Leimgruber, 2018). Indeed thirty years ago Escobar (1992) argued that development has to be redefined and this insight is still relevant today in the case of climate-smart agriculture. This illustrates how little progress has been made in the past few decades.

Climate-smart agriculture does not redefine agricultural 'development'. The interviewed scientist states that climate-smart agriculture is not as novel as it seems to be. Mitlin, Hickey and Bebbington (2007) acknowledge public opinion as the key arena in which dominant views can be contested and argue that counter-hegemonic alternatives may require actors from outside and within the state, not only NGOs. Currently, NGOs participate in policymaking at the global level in terms of climate change; however, their operational experience is their strong point (Mitlin et al., 2007). This may allow us to use the development concept differently in the future in order to achieve the intended outcomes.

In the last decade, a number of economic publications have stressed the counterproductive consequences of development aid (Easterly, 2008; Moyo, 2010). Common concerns include the idea that development aid feeds a cycle of dependence in recipient countries, promotes corruption and constitutes a barrier to developing countries taking responsibility for their own economic and social development. Transforming institutional capability in utilising aid is hence needed.

Based on the premise of climate-smart agriculture implemented in the current 'development industry', climate-smart agriculture within development programmes is incommensurate with effective altruism (Singer, 2015). An act to help farmers is correct if and only if it is an act that, among all the acts available to the stakeholders, maximizes the overall interest-satisfaction among all affected farmers.

Both the interviewed scientist and practitioner argue that being poor is not an excuse not to contribute to climate-smart agriculture. The interviewed farmer, however, stresses that poor farmers are foremost concerned with their survival. Escobar (2002) shows that the development discourse creates the impression that the poor must be treated and reformed (Escobar, 2002). However, our findings show that the development discourse on climate-smart agriculture fails to seriously consider ways

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to eradicate poverty.

By definition and principle, climate-smart agriculture is necessary for the environment and development. However, the current implementation of climate-smart agriculture in developing countries as promoted does not support a just development for farmers. Inequality in the current implementation strategies of climate-smart agriculture may contribute to impoverishing farmers rather than the opposite. The existing climate-smart agriculture approaches do not meet the demand for climate justice. Farmers are still left behind. Climate-smart agriculture ignores farmers' capabilities to effectively farm and to own land. The power of big corporates in climate-smart agriculture eliminates the freedoms of farmers to enjoy their valuable functioning, hence, more attention on farmers' capabilities is advisable (Robeyns, 2011).

How then can climate-smart agriculture be ethically implemented? A dialogical process that allows arguments and counter-arguments is required for just and equitable outcomes from climate-smart agriculture to eradicate poverty among smallholders. To reach an acceptable argument may occupy much time. In the meantime, alternative strategies such as governance reform and introducing win-win practices can be considered. This topic is explained in the following chapter.

Revising Climate-Smart Agriculture

A revision of climate-smart agriculture policy and practice is required to ensure farmers' rights. This section focuses on the second part of our research objective, exploring the potential opportunities to improve justice in the implementation of climate-smart agriculture and to increase economic resilience for farmers.

Revisiting Governance

The interviewed consultant suggests a need for a change in food production and in generating livelihoods in terms of climate-smart agriculture. Regarding the responsibility of reducing emissions, LCA (life cycle assessment) may be useful and may identify which activities or which actors, e.g. industry, farmers, or consumers, should be held responsible for emissions. The industry level as the richest actor has the greatest ability to pay for emission reduction costs. As a powerful actor, it has the means to facilitate a structural change in climate-smart agriculture implementation.

According to Pogge, global institutions have established the rules and regulations that benefit the interests of developed countries over developing nations. This leads to the moral criticism of rich groups exploiting their bargaining power intellectually and economically to shape new forms of imperialism (Pogge, 2005). This global order neglects smallholders' capacity in developing countries. In the case of climate-smart agriculture, the FAO and its alliance can be viewed as a set of global institutions that perhaps inadvertently advance the interests of the giant agri-food industries of developed countries. This governance structure needs to be reconsidered.

Costs to reduce emissions in the agricultural sector are a burden for developing countries and will most likely disturb any attempts to reduce poverty. Current climate-smart agriculture threatens smallholders' access to their farms and to their basic human rights (Sonderholm, 2012). Nowadays, farmers are not solely producers of food but they have also become consumers of food produced by big agri-food industries. Recent climate agreements may form a new geopolitics of food security as a response to uneven food supply and its distribution. Some developed countries have even used agricultural land and resources to produce bioenergy. Given the levels of hunger in poor countries, this can be considered a violation of human dignity (Weiskel, 2016).

This paper argues that governance needs to be changed to create a fair system of food production and trade. Yet, it may not be easy to change global governance. Climate-smart agriculture is most obviously a type of market-based solution that involves businesses in climate governance. Bulkeley & Newell (2015) argue that globalization has increased the participation of businesses in climate governance and as such, has endorsed broader shifts from the state to market power. One of the key sectors in business is finance, e.g. the insurance industry works with leading banks, and climate-smart agriculture promotes climate insurances. However, this insurance may not benefit farmers, rather it can cause more risk to farmers if they fall in debt.

Another problem with the governance of 'climate-smart' agriculture (CSA) is that the corporates and managerial technocrats do not take a holistic view. Climate change is a major issue, but it's not the only one. The planetary boundaries concept considers nine environmental situations that should be considered (SEI, 2009). One of them is biodiversity which is at breaking point. Current solutions proposed under CSA won't protect the biodiversity of insects and the entire food web.

The governance of climate-smart agriculture should emphasise voluntarism and networks of partnerships of civil societies and farmer groups, in contrast to neo-liberal modes of governance. The following section presents an example of a more fair network of governance for cli-

mate-smart agriculture.

Redefining Development Programmes

Chandra et al. (2017) show that three socio-political processes, namely inequality, unequal power relations and social injustice, make smallholders significantly vulnerable. They suggest that climate-smart agriculture development programmes need to embed renewed concepts of equality, power relations, and social justice into both policy and practices of climate-smart agriculture. Agroecology could be an example of a development programme on climate-smart agriculture (CSA) that applies all three concepts. Agroecology addresses local risks, specificities, and the priorities of smallholders. This practice is aligned with Nussbaum's approach to respecting farmers' capability.

Since CSA has a rather strong focus on policies, institutions, and financing, without having a specific blueprint for climate-smart practices, agroecology actually responds to the needs of climate-smart agriculture in terms of site-specificity and potential for adoption by farmers because it is strongly based on local practices. Agroecology combines farmers' knowledge and their culture with modern scientific findings. It is a sustainable farming practice that returns CO2 to the soil, reducing about a quarter of all current global GHG emissions (Saj et al., 2017). Through family farms that are rich in biodiversity, often on collective territories, agroecology nourishes people and heals broken ecosystems. In this sense, climate justice and food sovereignty are acts of political resistance. They exist outside the corporate control of the food systems (Budiman, 2017b), most likely alleviating farmers' poverty.

To implement climate-smart agriculture approaches, agroecology can be governed through collective farming to incentivize farmers (Matthews, 2015). The main incentive expected by farmers is an increase in income, usually facilitated by collaborations in the governance model of cooperatives. All four interviewees were positive about collective actions of cooperatives to sustainably grow and support food production, and to achieve climate-smart agriculture objectives. However, they emphasize that these collective actions should not reduce farmers' sovereignty, because land ownership allows farmers to retain their independence and remain at least partly independent of big industries. Cooperatives are a form of good governance to improve agri-food value chains.

Technological innovations in climate-smart agriculture, according to the interviewed consultant, are viewed as barriers for farmers. To solve this issue, collaborations in cooperatives need a successful innovation that is partly dependent on effective business models that are used to diffuse innovative technology (Long, Blok, & Poldner, 2016). Moreover, such a business model can link the collaboration with consumers. Results of LCA studies show that high emissions are caused by consumers due to their preference for certain products, and that firms claim that they produce products that are demanded by consumers. Ethical production and consumption need to be promoted within climate-smart agriculture.

In addition, cooperation among international development programmes is required to support agroecology cooperatives. With reference to effective altruism (Singer, 2015), different approaches may be combined to optimise the utilisation of climate-smart agriculture approaches, to significantly enhancefarmers' livelihoods.

Conclusion and Recommendations

The current climate-smart agriculture policy and approaches are not fairly implemented, due to injustice in sharing benefits of income and burdens from emission reduction costs, among farmers and industries. According to the principle of climate justice, that proportion should be equally distributed based on an individual's capacities and taking into consideration poverty. Industries have a greater ability to pay for emission reduction costs. Likewise, farmers must also farm sustainably.

Implementation of climate-smart agriculture can be analysed from the six ethical positions utilised in this study. The industries use the maximalist viewpoint that maximises general welfare and the importance of the outcome. Actors in the agrifood industries intend to do the best (for themselves) and do not settle for less. The industries perceive their action as just and fulfilling the urgency of negative duties. This is also aligned to the minimalist viewpoint where one can live one's life as one likes, so long as no harm is done to others. Yet the industries do not manage their negative duties within a theory of global justice, because through the current implementation of climate-smart agriculture, they have been shaping and enforcing social conditions that foreseeably cause monumental suffering through global poverty, and in the process are harming poor farmers. Justice is grounded on the individual. The central farmer capabilities (inter alia life, health, and control over the environment) include but are not limited to the ability to live to the end of human life of normal length and to be adequately nourished. Climate-smart agriculture should not be utilised by the industries to use farmers as a mere means.

A reflection on development narratives may facilitate a successful implementation of climate-smart agriculture. This narrative should be constructed in a dialogical pro-

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cess that allows arguments and counter-arguments, resulting in just and equitable outcomes to eradicate poverty among smallholders.

To enforce justice in the implementation of climate-smart agriculture, its governance dominated by big food regimes of transnational companies will have to be transformed. Alternatively, we have argued that renewing development programmes through agroecology may hold the promise of justice in climate-smart agriculture for farmers. This movement should be utilised to encourage individuals to do as much good as possible. Multiple stakeholders can unite to support these movements. It can be done by contributing money to the best performing aid and development organisations.

Revising the governance of climate-smart agriculture through agroecology and farmers cooperatives would likely change the direction of the current climate-smart agriculture approaches. Climate-smart agriculture should be promoted to achieve a just transition for different groups of people and the environment. These modalities are required to actualize climate-smart agriculture policy as part of the notion of sustainable development to balance economic development, environmental protection, and social equality.

Further research is required on two topics. First, on how the capitalists/beneficiaries of the current global order justify their version of climate-smart agriculture. Second, on the governance model required to manage a fairer climate-smart agriculture.

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Conflict of Interests

The authors hereby declare that there are no conflicts of interests.

References

Aminzadeh, S. C. (2006). A moral imperative: The human rights implications of climate change. *Hastings International and Comparative Law Review*, 30(2), 231–265.

Blaikie, P. M. (2009). The tsunami of 2004 in Sri Lanka: An introduction to impacts and policy in the shadow of civil war. *Norsk Geografisk Tidsskrift - Norwegian Journal of Geography*, 63(1), 2–9. doi:10.1080/00291950802712061

Bradshaw, T. K. (2007). Theories of poverty and anti-poverty programs in community development. *Community Development*, 38(1), 7–25. doi:10.1080/15575330709490182

Budiman, I. (2016, November 4). Climate-smart agriculture not an oxymoron. The Jakarta Post. Retrieved from *http://www.thejakartapost.com/news/2016/11/04/climate-smart-agriculture-not-oxymoron.html*

Budiman, I. (2017, August 14). ASEAN after 50: Climate justice and smallholder farmers. Retrieved from *http://asc.fisipol.ugm.ac.id/asean-50-climate-justice-smallholder-farmers/*

Bulkeley, H., & Newell, P. (2015). *Governing climate change* (2nd ed). New York: Routledge.

Callahan, D. (1981). Minimalist ethics: On the pacification of morality. In A. L. Caplan, & D. Callahan (Eds.), *Ethics in hard times* (pp. 261–281). Boston, MA: Springer. doi:10.1007/978-1-4684-4022-5_9

Caney, S. (2010). Climate change and the duties of the advantaged. *Critical Review of International Social and Political Philosophy*, 13(1), 203–228. doi:10.1080/13698230903326331

Chandra, A., McNamara, K. E., & Dargusch, P. (2017). The relevance of political ecology perspectives for smallholder Climate-Smart Agriculture: A review. *Journal of Political Ecology*, 24(1), 821–842. doi:10.2458/v24i1.20969

Chappell, T. (2009). *Ethics and experience: Life beyond moral theory* (1st ed). McGill-Queen's University Press https://doi.org/10.4324/9781315711676

Comfort, L., Wisner, B., Cutter, S., Pulwarty, R., Hewitt, K., Oliver-Smith, A., Wiener, J., Fordham, M., Peacock, W., & Krimgold, F. (1999). *Reframing disaster policy: The global evolution of vulnerable communities. Global Environmental Change Part B: Environmental Hazards,* 1(1), 39–44. doi:10.3763/ehaz.1999.0105

Deen, T. (2014, September 24). Climate-Smart Agriculture is Corporate Green-Washing, Warn NGOs. IPS News. Retrieved from *http://www.ipsnews.net/2014/09/climate-smart-agriculture-is-corporate-green-washing-warn-ngos/*

Dernbach, J. C., & Brown, D. A. (2009). The ethical re-

sponsibility to reduce energy consumption. *Hofstra Law Review*, 37, 985-1006.

Easterly, W. (2009). Can the West save Africa? *Journal of Economic Literature*, 47(2), 373–447. doi:10.1257/jel.47.2.373

Escobar, A. (1992). Imagining a post-development era? Critical thought, development and social movements. *Social Text,* (31/32), 20–56. doi:10.2307/466217

Escobar, A. (2002). The problematization of poverty: The tale of three worlds and development. In S. Schech, & J. Haggis (Eds.) *Development: A cultural studies reader* (pp. 79–92). Oxford: Blackwell.

FAO (no date, a). Climate-smart agriculture. Retrieved from http://www.fao.org/climate-smart-agriculture/en/
FAO (no date, b). Mitigation of climate change in agriculture (MICCA) programme. Retrieved from *http://www.fao.org/in-action/micca/en/*

FAO (no date, c). EX-ante carbon balance tool (EX-ACT). Retrieved from *http://www.fao.org/tc/exact/ex-act-home/en/*

FAO (no date, d). Economic and policy analysis of climate change. Retrieved from *http://www.fao.org/climatechange/epic/home/en/*

FAO (2013). Advancing agroforestry on the policy agenda – A guide for decision-makers (Agroforesting Working Paper no.1). Rome. Retrieved from *http://www.fao.org/fsnforum/ar/resources/fsn-resources/advancing-agroforestry-policy-agenda-guide-decision-makers*

Farming First (2011). The story of agriculture and the green economy. Retrieved from *https://farmingfirst.org/green-economy/*

Ferguson, J. (1990). *The anti-politics machine: "Development", depoliticization and bureaucratic power in Lesotho. Cambridge*: Press Syndicate of the University of Cambridge.

Fröhlich, H. L., Schreinemachers, P., Stahr, K., & Clemens, G. (2013). *Sustainable land use and rural development in southeast Asia: Innovations and policies for mountainous areas*. Springer Science & Business Media.

Heltberg, R., Siegel, P. B., & Jorgensen, S. L. (2009). Addressing human vulnerability to climate change: Toward a 'no-regrets' approach. *Global Environmental Change*, 19(1), 89–99. doi:10.1016/j.gloenvcha.2008.11.003

Horrigan, L., Lawrence, R. S., & Walker, P. (2002). How sustainable agriculture can address the environmental and human health harms of industrial agriculture. *Environmental Health Perspectives*, 110(5), 445–456. doi:10.1289/ehp.02110445

Khatri-Chhetri, A., Aggarwal, P. K., Joshi, P. K., & Vyas, S. (2017). Farmers' prioritization of climate-smart agriculture (CSA) technologies. *Agricultural Systems*, 151, 184–191. doi:10.1016/j.agsy.2016.10.005

Leimgruber, W. (2018). *Between global and local: marginality and marginal regions in the context of globalization and deregulation*. Routledge.

Long, T. B., Blok, V., & Poldner, K. (2016). Business models for maximising the diffusion of technological innovations for climate-smart agriculture. *International Food and Agribusiness Management Review,* 20(1), 5–23. doi:10.22434/IFAMR2016.0081

Matthews, A. (2015). Matthews incentivising climate smart agriculture on Irish farms. Food. Retrieved from *https://www.slideshare.net/amtthews/matthews-incentivising-climate-smart-agriculture*

Mbow, C., Van Noordwijk, M., Luedeling, E., Neufeldt, H., Minang, P. A., & Kowero, G. (2014). Agroforestry solutions to address food security and climate change challenges in Africa. *Current Opinion in Environmental Sustainability*, 6, 61–67. doi:10.1016/j.cosust.2013.10.014

Mitlin, D., Hickey, S., & Bebbington, A. (2007). Reclaiming development? NGOs and the challenge of alternatives. *World Development,* 35(10), 1699–1720. doi:10.1016/j.worlddev.2006.11.005

Mosse, D. (2004). Is good policy unimplementable? Reflections on the ethnography of aid policy and practice. *Development and Change*, 35(4), 639–671. doi:10.1111/j.0012-155X.2004.00374.x

Moyo, D. (2010). Dead aid: Why aid makes things worse and how there is another way for Africa. Penguin Books. Retrieved from *http://cms.medcol.mw/cms_uploaded_resources/4685_4.pdf*

Newell, P., & Taylor, O. (2018). Contested landscapes: the global political economy of climate-smart agriculture. *The Journal of Peasant Studies*, 45(1), 108–129.

Nunan, F. (2017). *Making climate compatible development happen*. New York: Routledge.

ISSN-Internet 2197-411x OLCL 862804632

Nussbaum, M. C. (2009). *Frontiers of justice: Disability, nationality, species membership.* Cambridge: Harvard University Press.

Osorio, C. G., Abriningrum, D. E., Armas, E. B., & Firdaus, M. (2011). Who is benefiting from fertilizer subsidies in Indonesia? The World Bank. Retrieved from *https://elibrary.worldbank.org/doi/abs/10.1596/1813-9450-5758*

Payraudeau, S., & van der Werf, H. M. (2005). Environmental impact assessment for a farming region: a review of methods. *Agriculture, Ecosystems & Environment*, 107(1), 1–19.

Pogge, T. (2001). Priorities of global justice. Metaphilosophy, 32(1/2), 1–5. doi:10.1111/1467-9973.00172
Pogge, T. W. (2005). Human rights and global health: a research program. *Metaphilosophy*, 36(1-2), 182–209. doi:10.1111/j.1467-9973.2005.00362.x

Priambodo, A., & Kumar, S. (2001). Energy use and carbon dioxide emission of Indonesian small and medium scale industries. *Energy Conversion and Management,* 42(11), 1335–1348.

Robeyns, I. (2006). The capability approach in practice. *Journal of Political Philosophy*, 14(3), 351-376.

Roe, E. M. (1991). Development narratives, or making the best of blueprint development. *World Development*, 19(4), 287–300.

Saikawa, E. (2015, December 16). A win for air quality in Paris summit, but climate-smart agriculture still lags. The Conversation. Retrieved from *http://theconversation.com/a-win-for-air-quality-in-paris-summit-but-climate-smart-agriculture-still-lags-52240*

Saj, S., Torquebiau, E., Hainzelin, E., Pages, J., & Maraux, F. (2017). The way forward: an agroecological perspective for Climate-Smart Agriculture. *Agriculture, Ecosystems & Environment*, 250, 20-24.

SEI (2009, September 17). The nine planetary boundaries. Retrieved from *https://www.stockholmresilience.org/research/planetary-boundaries/planetary-boundaries/about-the-research/the-nine-planetary-boundaries.html*

Shames, S., Wollenberg, E. K., Buck, L. E., Kristjanson, P. M., Masiga, M., & Biryahwaho, B. (2012). *Institutional innovations in African smallholder carbon projects. CCAFS Report 8*. Copenhagen, Denmark: CCAFS.

Sharma, S., & Suppan, S. (2011). Elusive promises of the Kenya agricultural carbon project. South Minneapolis: Institute for Agriculture and Trade Policy. Retrieved from *https://www.iatp.org/documents/elusive-promises-kenya-agricultural-carbon-project*

Singer, P. (2015). *The most good you can do: How effective altruism is changing ideas about living ethically.* New Haven: Yale University Press.

Sonderholm, J. (2012). Thomas Pogge on global justice and world poverty: A review essay. *Analytic Philosophy,* 53(4), 366–391.

Steenwerth, K. L., Hodson, A. K., Bloom, A. J., Carter, M. R., Cattaneo, A., Chartres, C. J., … Horwath, W. R. (2014). Climate-smart agriculture global research agenda: Scientific basis for action. *Agriculture & Food Security,* 3(1), 11.

Taylor, M. (2018). Climate-smart agriculture: What is it good for? The Journal of Peasant Studies, 45(1), 89–107.
Thøgersen, J., Pedersen, S., Paternoga, M., Schwendel, E., & Aschemann-Witzel, J. (2017). How important is country-of-origin for organic food consumers? A review of the literature and suggestions for future research. *British Food Journal*, 119(3), 542–557.

UN (2011). World Economic and Social Survey 2011: The great green technological transformation. Department of Economic and Social Affairs, United Nations. Retrieved from *https://www.un.org/en/development/desa/policy/wess/wess_current/2011wess.pdf*

VoA News (2016, August 11). Indian farmers battle with climate smart agriculture. VOA News. Retrieved from *https://www.voanews.com/a/indian-farmers-battle-with-climate-smart-agriculture/3460162.html*

Weiskel, T. (2016, March 20). What comes after Paris COP21…? Agricultural stress ==> Food insecurity and ==> the demand for climate justice." Retrieved from *https://www.cctvcambridge.org/node/383914*

Wood, A. W. (2007). *Kantian ethics.* New York: Cambridge University Press.

World Bank (2017). Climate-smart agriculture. Retrieved from *http://projects-beta.worldbank.org/en/results/2017/11/29/climate-smart-agriculture*

What price should nature pay because of our desire for increased yields?

Photo credit BillsExplorations

For decades humans' efforts have been dedicated towards increasing agricultural yields, ignoring the fact that with every 20 percent of raised yield comes the high and intangible cost of 9 percent loss of species, according to the Helmholtz Centre for Environmental Research. To raise yields farmland is being intensively exploited, the consequence of which is not focused upon enough by recent research. In Europe, where 80 percent of land is dedicated to agriculture and related services, different practices have been followed to increase crop yields. Consolidation of farmlands, in which smaller fields are joined together to form large fields, is used to facilitate agricultural mechanization and an increased use of fertilisers and pesticides. A group of scientists at the Helmholtz Centre for Environmental Research – UFZ, conducted a global meta-analysis synthesising 115 studies to investigate the relationship between yield and biodiversity and evaluate the situation. In the research article, the UFZ biologist Dr. Michael Beckmann and co-authors elucidate how measures followed to increase yields impacts negatively on biodiversity. According to the authors, the bidimensional relationship between raised yield and decreased biodiversity is hitherto an under-researched area.

The scientific group conducted a systematic review of the Web of Science, finding almost 10,000 studies. By use of selection criteria they reduced the number of studies to 1,371; from which 115 studies were considered to have sufficient data for their study. The 115 studies yielded 449 cases: 292 for species richness and 157 for yield. The team further developed a mathematical model in order to overcome the differences among the studies related to climate zone, area and time. They classified the agricultural areas by intensity of land-use: low, medium and high. After analysing the data, they found that conventional intensification in areas of medium land-use intensity have the highest yield increases – 85 percent, but that these same areas show the largest loss in species richness – almost 25 percent. On the other hand, the high intensity systems showed no significant loss of species and yet substantial yield gains – 15 percent. Though this may sound good, the research team warns that it is most likely related to the fact that these areas already lost their biodiversity due to the earlier increase in intensity. The study also demonstrates how intensification measures, in cases like timber, may lead to high yields without a corresponding loss in biodiversity. The study highlights the importance of focusing on the relationship between yield and biodiversity, and opens the door for more research to understand the most optimal ways in which intensive land-use could be developed without a loss of biodiversity.

Reference

Beckmann, M., Gerstner, K., Akin-Fajiye, M., Ceauşu, S., Kambach, S., Kinlock, N. L., Phillips, H. R. P., Verhagen, W., Gurevitch, J., Klotz, S., Newbold, T., Verburg, P. H., Winter, M., & Seppelt, R. (2019). Conventional land-use intensification reduces species richness and increases production: A global meta-analysis. Global Change Biology, 1-16. Doi:10.1111/gcb.14606

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UniKassel & VDW, Germany- June 2019

Summer School "Future of Food — Sustainable Food Systems" 24th-31st August 2019 at the Academy of Schloss Kirchberg

Photo credit: www.schloss-kirchberg-jagst.de

Schloss Kirchberg

The summer school is intended for all young people, including farmers, food artisans, trainees, students and young professionals, who are interested in sustainable food and agriculture and seek to play a role in shaping our sustainable diet in the future.
We will together investigate the burning questions on (animal) food production. Each day we will get to know a different stage of the value chain through lectures, interesting field trips and intensive discussions about:

- What enlightened consumers want today
- Current nutrition trends
- Existing and future trade and marketing concepts
- The role the food trade plays in sustainable food supply
- Animal welfare and meat consumption
- How we (should) imagine ecologically and ethically sustainable agriculture

These questions in addition to other important issues and concepts will be discussed with experts and pioneers and, of course, one another.

We look forward to your applications until June 30, 2019.
The application form and further information can be found on our website
www.schloss-kirchberg-jagst.de/sommerschule

For all questions we are also available at *bildung@besh.de* and 07954 9211880.

Salty? Well, no worries, this comes with less sodium chloride!

A research team at Washington State University has discovered a way to produce a salty taste with less sodium chloride content. According to the United States of America Office of Disease Prevention and Health Promotion, daily sodium intake should not exceed 2,300 mg. Yet, US Americans usually consume more salt than they need, which is unhealthy. Data shows that US American females consume a daily average of 2,980 mg, while males' average consumption is over 4,000 mg per day.

The negative health impacts of sodium chloride are well-known, including calcium excretion which can lead to a

negative calcium balance. Calcium chloride and potassium chloride, however, have no such ill-effects. Rather, potassium has a positive effect on blood pressure, but it comes with a bitter taste which people do not really accept. The research team succeeded to make a blend of calcium chloride and potassium chloride, but with less sodium chloride. The team conducted sensory tests using sensory analysis with consumers and the University's potentiometric electronic tongue to investigate the acceptability of the new blend and to calculate the optimal proportions of each salt in the new combination. The sensory tests included a variety of combinations including salt solution, salt in water and salt in tomato soup.

The ideal combination was found to comprise 96.4 percent sodium chloride, 1.6 percent potassium chloride and 2 percent calcium chloride. The researchers suggest that additional salt blends could be created that increase the proportion of the other two salts while reducing sodium chloride further. Recent studies confirm that the best way to reduce salt consumption is to do so gradually. Thus, the use of new blends may help people in their transition to lower salt diets. "It's a stealth approach, not like buying the 'reduced salt' option, which people generally don't like," said Carolyn Ross, a Food Science professor at the Washington State University.

Reference

Barnett, S. M., Diako, C., & Ross, C. F. (2019). Identification of a salt blend: Application of the electronic tongue, consumer evaluation, and mixture design methodology. *Journal of Food Science*, 84(2), 327-338. Doi:10.1111/1750-3841.14440

Our tongue can also smell!

People usually associate flavour with their taste sense. In fact, flavour has been proven to come more from the smell sense than the taste sense. Anyway, our brain uses information from different senses including taste and smell to reach its final perception on flavour. It was previously understood that recognition of a flavour is the result of a combination of smell and taste information, that were considered to interact only when reaching the brain. Thus, and up till now, the perception of a flavour was thought to begin in the brain itself. However, a new discovery by the Monell Center, Philadelphia, USA may have proven the earlier understanding to be wrong.

The Monell Center claims to be the world's only independent, non-profit scientific institute dedicated to interdisciplinary basic research on the senses of taste and smell. Its new scientific study reveals that the body sensors responsible for detecting odours in the nose, the so called functional olfactory receptors, exist in the taste cells too. This research may explain how scent molecules can influence the taste perception. The practical importance of these findings relate to the future possibilities of using "odour-based taste modifiers" to overcome excessive use of salt or sugar, especially for people who are fighting obesity and diabetes.

The inspiration for the main research idea came from the 12-year old son of Mehmet Hakan Ozdener, the lead author of the study and a cell biologist at Monell. The son had asked his father if snakes' protrude their tongues to smell, which prompted Ozdener to investigate further. Several experiments conducted by the Monell Center prove that some taste cells contain both taste and olfactory receptors. The experiments demonstrate how human taste receptors may respond to odours in a similar manner to olfactory receptors. The results suggest that olfactory receptors interact with the taste receptors on the tongue to provide the flavour perception. "The presence of olfactory receptors and taste receptors in the same cell will provide us with exciting opportunities to study interactions between odour and taste stimuli on the tongue" said Ozdener. The question that remains is whether the olfactory receptors are located in a specific taste cell type or not. Scientists will continue to explore the mechanism by which odour molecules modify the taste cell responses that lead to the final taste perception.

Reference:

Malik, B., Elkaddi, N., Turkistani, J., Spielman, A. I., & Ozdener, M. H. (2019). Mammalian taste cells express functional olfactory receptors. *Chemical Senses*, XX, 1-13; doi:10.1093/chemse/bjz019

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Alliance for Development and Climate

Reported by Azadeh Farajpour

Climate protection is a question of survival for humanity, as we know it today. The limits of Earth's capacity are being reached faster and faster. The extreme and sudden changes in climate patterns adversely affect the world. Many studies have shown that the volume of anthropogenic greenhouse gas emissions (GHG), e.g., CO2 influences this issue in a strongly negative way. The industrialized countries have been the primary emitters of GHG emissions for a long time and are consequently held responsible for climate change, though China is by now the greatest emitter. The main victims are the people in developing countries: 100 million people in coastal and drought areas are at risk due to heat and rising sea levels. Since their livelihood is threatened, up to 140 million people could be displaced from their homes due to climate change by 2050, according to World Bank. At the same time, 600 million people in Africa still have no access to electricity.

Photo credit: Jervis Sundays, Kenya Red Cross Society

To this extent, climate change is closely linked to development policy and programs. What is needed is, therefore, a robust implementation of the UN Sustainable Development Agenda 2030 that is compatible with climate protection. Economic growth for development must be organized to be climate-neutral or even climate-positive. Climate protection measures are particularly more effective in developing and emerging countries than in industrialized countries. However, there is hardly a chance to implement the SDGs by 2030 (at best by 2050). Also, contemporary politics will not lead to a climate-neutral economic growth in developing countries.

The partner countries in the Global South require extensive support, but the developed countries are not able and not willing to finance the process. Therefore, along with development cooperation programs such as the Marshall Plan with Africa launched by Germany's Federal Ministry for Economic Cooperation and Development (BMZ), influential partners in politics and state, economy and business as well as society and NGOs need be won to provide the necessary resources, in particular financially. In other words, significant voluntary contributions of non-state actors are needed to complement government efforts effectively. Privately-funded, high-quality GHG emissions compensation projects can effectively support partner countries in climate protection and their development (through ex-

tensive ecological, social, and economic co-benefits). They are a crucial element with which climate change will be mitigated, and development can simultaneously be achieved.

With this consideration in mind, the BMZ launched the Alliance for Development and Climate in autumn 2018. The alliance aims to promote development and simultaneous climate protection. It seeks to shift public attention on international development and climate protection efforts. Also, it is an institutionalized platform for non-governmental engagement, in particular for the private sector. The members voluntarily compensate for CO2 emissions in high-quality projects in developing countries, e.g., afforestation, reforestation, and humus formation in agriculture. One example projects on the preservation of mangroves. Mangroves bind up to 5 times more CO2 than other forests and protect the neighboring lands against flooding. Sadly enough, one-third of mangroves worldwide are already destroyed. These projects generate jobs and source of income for those looking after the mangroves. These kinds of projects inherently yield enormous social and economic co-benefits, thereby enabling prosperity for many people. Looking ahead, the members of the alliance can hopefully contribute to a better future.

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Report

Development of organic products in Kyrgyzstan

Aiperi Otunchieva [1]*

[1] The University of Kassel, Germany.

Contact detail: aiperi3822@gmail.com

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Women prepare fruits from solar dryer. (Photo by Ms. B. Raimkulova, RSP in Kyrgyzstan from IFOAM)

Kyrgyzstan is a mountainous and landlocked Central Asian country, one of five former Soviet Republics in the region. Agriculture is the main economic sector employing around 20% of population and contributing roughly 20% to the country's GDP. Due to its climatic conditions, the Central Asian region was considered as a space for growing cotton, wheat, fruits and vegetables and tobacco and other cultures during Soviet times. Owing to its nomadic culture, Kyrgyzstan has been active predominantly in the animal husbandry sector.

The Soviet mono-cropping approach devastated soil productivity and caused environmental pollution. Excessive cotton production exhausted water resources leading to the human induced catastrophe of the Aral Sea for our generations. Moreover, overuse of chemical fertilizers over the last 20 years led to soil degradation destroying 50% of arable land's productivity (Sagynalieva, 2018). In light of such historical developments, growing awareness of the advantages of organic agriculture is plausible.

Starting December 2018, Kyrgyzstan plans to shift to 100% organic farming within the next ten years, following Bhutan's way of development. It was ordered that "farmers should not use agrochemicals, pesticides (toxic chemicals), synthetic substances, hormones, growth regulators, feed additives, GMOs, antibiotics and additives other than biological preparations for plant protection and organic fertilizers" (Podolskaya, 2018). This announcement of the

speaker of parliament caused positive reaction among organic producers, bio farmers' associations and consumers. Genetically Modified Organisms, in short GMOs, are the ones whose genes have been artificially amended in order to increase food production, resist severe climatic conditions and diseases. However, apparently GMOs are not the solution for securing sufficient food of good quality. Taking into account one billion people who go hungry every day, it is evident that the problem of hunger does not derive from food production. It is rather a structural issue of food commodification. Therefore, it is quite important to provide incentives to small-scale organic farmers through the introduction of new support policies. Currently cheap and suspicious food products imported from China are widespread in Kyrgyzstan. Locally grown fruits and vegetables are exported to Kazakhstan and Russia.

The recent trend demonstrates that organic farming is growing in the country. In fact, in 2014 Kyrgyzstan took serious steps in controlling GMO products by banning cultivation, import and sale of GM products, although this rule was later changed setting a low level of GMO contamination (0.9%) in imports (Sustainable Pulse, 2018). In addition, the number of organic farmers increased from 647 to 1300 during the period 2007-2015. Simultaneously, 257 ha of land used for organic cotton cultivation increased to 740 ha for the same period. More than 1,279 farmers managing 15,000 ha of land received organic certification in 2013 (Sagynalieva, 2018). It is a good start, but it is crucial to keep up the pace and to continue on this path of development.

In January 2016 Kyrgyzstan received the status of special support for stimulation of sustainable development within the framework of the EU Generalized Scheme of Preferences (GSP). This gives Kyrgyzstan new opportunities for diversification of goods production and their export to the European markets. It opens up the possibility to export products without tariffs for more than six thousand goods. Before introduction of the GSP, Kyrgyzstani exporters had to pay 14,5% for several types of fruits and vegetables and 5-9% for clothing. Kyrgyzstan exports mostly agricultural products to the EU, fresh and processed fruits, tobacco and etc. Since the development of its textile industry, Kyrgyzstan additionally exports clothes, leather and felt products and carpets. It already exports walnut, honey, medical herbs, apricot, beans, plums and other agricultural products.

Kyrgyzstan has a strong potential for export of organic products to the countries of EU. Basic prerequisites for developing organic agriculture exists including expertise and laboratory capacity at Kyrgyz Turkish Manas University, production of biological agents by Agro Bio Center, research for creation of bio fertilizers by the National Academy of Sciences and support of international organizations through various projects for farmers, business sector and government (Doolotkeldieva, 2014). So far, based on local materials, bio fungicide and bio preparade for bacterial protection of plants have been certified and are available for purchase.

However, further developments require a number of serious steps from different stakeholders. Current challenges for organic agriculture development include lack of legal framework, shortage of local study programs and thus specialists in organic agriculture, lack of certification knowledge among farmers, and low consumer awareness. Moreover, shortage of expertise and financial costs of certification hinder small scale farmers in getting recognition for their organic products for export. It is challenging for an individual farmer to promote their bio products, since several active bio associations do not cover all farmers in the country.

In conclusion, initial measures for organic agriculture development have been taken in Kyrgyzstan and its promotion depends on numerous factors. Being part of the Eurasian Economic Union might put Kyrgyz bio farmers in a disadvantaged position because Russian producers of chemical fertilizers have vested interest in expanding its market. The majority of agricultural products are exported to Kazakhstan and Russia and for wholesale exporters price prevails over quality. Therefore, creation of favorable conditions for bio farmers, improving legal framework, support in obtaining EU bio certification, support in value chain development and raising awareness among consumers should be prioritized.

References

Doolotkeldieva, T. (2014). *Natural, economic conditions, scientific and technical potential for the development of organic agriculture in Kyrgyzstan*. IFOAM Organic World Congress 2014, Istanbul, Turkey, 13-15 October 2014.

ISSN-Internet 2197-411x OLCL 862804632

Podolskaya, D. (2018). Kyrgyzstan to start producing only organic products. News Agency 24kg, Available at *https://24.kg/english/103783_Kyrgyzstan_to_start_producing_only_organic_products/*

Sagynalieva, M. (2018). *The development of organic agriculture in the Kyrgyz Republic: Economic and ecological sustainability.* Bishkek: OSCE Academy. Policy Brief #50.

Sustainable Pulse. (2018). Kyrgyzstan Parliament orders 100% organic agriculture within 10 years, Available at *https://sustainablepulse.com/2018/12/18/kyrgyzstan-parliament-orders-100-organic-agriculture-within-10-years/#.XFGgFi2ZNQI*

The picture is taken from *https://www.ifoam.bio/en/meet-alisher-yuldashev-rural-service-provider-kyrgyzstan-building-solar-dryers*

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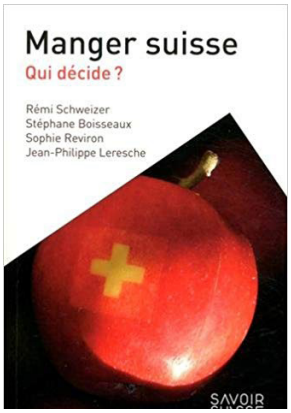

Manger suisse : Qui décide ?

A review by Marion Reichenbach

Authors: Rémi Schweizer, Stéphane Boisseaux, Sophie Reviron, Jean-Philippe Leresche
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Have you ever tasted a piece of delicious Gruyere produced in Switzerland? Or bought Swiss Müesli labelled with a small Swiss flag for your breakfast? Even if not, you may wonder: what makes a product, be it Swiss, German or Chinese, a product of its country? Made in Switzerland sounds obvious but let's start with the example of a cheese: is a Swiss cheese Swiss because its main ingredient, milk, come from Swiss cows fed on the Swiss Alps? What if, to improve its range of products, a cheesemaker adds figs, which can only be cultivated in warmer climates such as in Turkey, to its goat cheese: does it make the cheese less Swiss, or even not Swiss at all? Or what if, for economic reasons, the same cheesemaker imports milk from a neighbouring EU country to produce its cheeses? Surely the expertise accumulated by generations of Swiss cheesemakers contributes as much to the Swissness of the cheese as the origin of the ingredients. Chocolatiers would say know how is even more important than the origin of the ingredients, because carefully crafted exquisite Swiss chocolate bars are famous worldwide although not a gram of cacao is grown in Switzerland. And why would you even market a country as a brand? German food retailers indicate the provenance of products but do not brand them with a little flag. When you buy a mango, you buy the one you come across, regardless of whether it is Peruvian or Indian, and no flag is adorned on it.

All these questions became a hot topic in Swiss politics and public opinion during the last 10 years, cumulating in a Swissness legislation which came into force on the 1st January 2017. "Manger Suisse: Qui Décide? / The Taste of Switzerland: Who Decides?" published by EPFL Press in 2018, is a short book which retraces the political saga from the origin of the debate on Swiss eating to the enactment of the Swissness legislation. More than a mere political saga, the journey to the Swissness legislation's enactment was for the usually mild-temperate, slow paced Swiss politics a genuine thriller full of intense debates, unprecedented lobbying and unexpected alliances between political parties and across the food value chain. The book notably explains how the Helvetic Confederation came to legislate on what is Swissness, how to quantify it, why to use it as a brand, which groups of interests were involved in shaping it with which objectives, what were the economic implications at stake, and what outcomes the Swissness legislation has on the fridge content of everyday Swiss citizen-consumers—the stakeholders who had launched the debate.

The book's introduction begins with one observation: Made in Switzerland was already established as an informal brand, mainly for manufactured goods, long before the Swissness legislation. The Swiss Made argument sold well as a guarantee of quality and precision but also nature and simplicity, as for Swiss watches or cosmetics. While the Swiss Made argument for manufactured goods was mainly used to increase their attractiveness in foreign markets, its economic justification weakened within Switzerland. After a famous case of Swiss pots produced in China, Swiss citizens raised the issue of Swiss Made as a question of identity and culture, but also, in the context of globalization and increased concern over the environment, as a guaranteed promise —in its strictest sense— of local production. Thus, Swiss citizens raised the debate with the will to keep control over what and how they consumed, following which the Helvetic Confederation stepped in to legislate on the matter.
The book's first chapter traces the history of indication of origin: towards the end of the 20th century, indication of origin emerged as a means of public protection for both producers and consumers. The year 1992 saw the liberalisation of ag-

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riculture in Switzerland; a sharp political reorientation. Swiss wines were the first to be adorned with an indication of origin to support winemakers through the market transition. Wine is an agricultural product whose quality directly relates to the soil in which the grapevines are grown . To guarantee the wine's origin was also to guarantee its quality as a selling feature for the producer and as a reason to buy for the consumer. Later, indication of origin as a quality guarantee began to be used for traditional regional products. Slowly, its use increased at higher levels of the food value chain: as food retailers came to understand the economic added value of the indication of origin, labels indicating the origin of production appeared on the shelves, although they were only one marketing tool amongst others to differentiate a product. In parallel, abuses in the use of indication of origin, notably in the use of the Swiss flag, increased. However, the then-current legislation was weak and allowed no legal recourse. Acting on behalf of Swiss citizens tired of the abuses, the Helvetic Confederation initiated the process to enact a new legislation.

The second chapter presents the different actors in the Swiss food value chain. Though some were less exposed to the public eye than others, all the actors had an interest in shaping the new legislation on indication of origin. First the producers: to guarantee the quality of their products and thus to increase their attractiveness above that of imported goods, the producers aimed for a strict legislation. Second in the food value chain, the food processors aimed for a new legislation that would leave them flexible enough to remain cost efficient. Third, the food retailers aimed for a legislation from which they could benefit from the added value of indication of origin but also be able to accommodate consumers by emphasizing other selling features like cheapness or organic production. At the end of the food value chain, consumers wanted a legislation strong enough to guarantee the inherent promises of the indication of origin label.

The third chapter comes to the heart of the subject and explicitly narrates the political process behind the new legislation: the considerable legal uncertainty on the use of Switzerland as an indication of origin and notably the use of the Swiss flag as a brand, the scandals which launched the public debate, and the different power plays which ensued. Very soon, consumers and their representatives lost foot in the discussion and played only a minor role in shaping the new legislation. The first drafts tended to a quantification of the product's Swissness based on cost price and degree of transformation, a deal largely favourable to the food processors who were well prepared to defend their interests. However, the solution achieved no consensus and as the discussions continued a shift occurred: producers found their voice and advocated for a quantification based on the origin of the ingredients and the location of the main transformation process. To everyone's surprise, the producers received the support of one food retailer giant against the promise of flexibility and allowance of exceptions . One by one, other giants in the food value chain rallied behind the proposition once an exception deal specific to products with strong economic stakes was secured. The Swissness legislation was approved and enacted by the Helvetic Confederation on the 1st January 2017.

Stating that the objectives of the Swissness legislation were achieved, the book's authors go on to explain the newly-defined concept of Swiss eating with concrete examples. With the Swissness legislation, the brand Swiss Made is now defined and thus better protected. The inherent promise of the indication of origin, labelled with the Swiss flag, is precisely quantified by two conditions: firstly, for any Swiss product, 80 percent of the weight of the raw ingredients must come from Switzerland, according to the availability of the ingredients in Switzerland; and secondly, the main transformation process must happen in Switzerland. Major exceptions include coffee and chocolate which can still be considered Swiss Made if the whole transformation process in done in Switzerland even though none of the ingredients come from Switzerland. With this exception, the Helvetic Confederation recognizes the importance of know-how and the economic stakes of the Swiss Made argument for these two products. The case of water is also very specific: when used to dilute a juice for example, its origin is not important. But if the water is a main ingredient of the drink like in the case of beer, then it does. As a result, a Swiss beer can be Swiss even if its only ingredient coming from Switzerland is water.

The authors conclude by positioning the enactment of the Swissness legislation in a broader citizen-consumer perspective and the myths associated to it . In a world more and more globalized but also in the context of a stronger rural-urban dichotomy, Swiss citizens sought to regain power to define and decide what they were eating: they are dubbed citizen-consumers because, by their decision to buy or not to buy a certain product, they favour specific production features. They nowadays think of how they consume, not only what they consume. With the indication of origin, they sought to reconnect their consumption to local markets and support "their" agriculture. Even though Switzerland has perhaps one of the world's most direct democracies, there was still a whole world of difference between the initial will of the consumers and the final legislation, which brings to question the real bargaining power of the consumers... and their own illusions. After all, direct marketing—the most direct way to consume locally and connect with local producers—still represents only 5 percent of the Swiss market, ensuring that the use of a Swiss Made label is mostly advantage to intermediate actors of the food value chain.

"Manger Suisse – Qui Décide? / The Taste of Switzerland – Who Decides?" benefits from the inherent qualities of the collection Savoir Suisse (Swiss Knowledge) edited by EPFL Press, a collection designed precisely to highlight research work to the wider public: simple, didactic, well-written, and in French. Due to the linguistic specificity of Switzerland, little research work relevant to the French-speaking Swiss public is available. Thus, to publish in French helps the popularisation of science in Switzerland but also creates a clear limitation, because the quality of the Savoir Suisse collection would justify a larger distribution. Moreover, the collection's authors are often either directly involved in the said research or direct actors in the matter under discussion, which enhances the content of the books, making the work feel close. Furthermore, each book in the collection focuses on a very specific topic in Swiss society rather than exposing larger, more general topics. Regarding the content in itself, its Swissness is significant. However, the uniqueness of the case deserves interest and raises larger questions related to food, agriculture and society in other countries.

Information about the author:

Marion Reichenbach is a Swiss PhD Student at the Faculty of Organic Agricultural Sciences, University of Kassel. Her work focuses on the effects of urbanization on dairy production, chiefly in terms of feed efficiency, in the emerging megacity of Bangalore, India.

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Water-Energy-Food Nexus for ensuring food and nutritional security and socioeconomic development

The concept of Water-Energy-Food (WEF) Nexus highlights the need for an integrated management and governance, across levels and scales, of the three sectoral resources by all stakeholders. The Bonn 2011 Nexus Conference, called "The Water, Energy and Food Security Nexus – Solutions for the Green Economy" was the starting point of the WEF Nexus Dialog that emphasizes three action fields: 1. Accelerating access, integrating the bottom of the pyramid (the social dimension), 2. Creating more with less (the economic dimension) and 3. Investing to sustain ecosystem services (the ecological dimension) (Dombrowsky, 2011). Within the last 7 years there have been several policy implementations and research studies to observe the potentialities of NEXUS and contingency of the system adaptation . According to the FAO, food and nutritional security is a core pillar of the WEF Nexus that should be accomplished through the integrated management and governance systems. However, there are still lacunas in the technologies, policies, management tools as well as in implementation. There are always competing and contested demands across sectors that may hinder food and nutrition outcomes, and challenge the social demands for sustainable energy and improved water and sanitation systems. The Water-Energy-Food (WEF) Nexus needs to attend to the role of technology in water resource management, understand the importance of traditional social norms and values, challenges from climate change and extreme weather patterns, and most importantly, contend with economic costs that hitherto are considered externalities.

The upcoming issue (Volume 7 Number 3) is dedicated to the Water-Energy-Food (WEF) Nexus dialog with a specific angle on food and nutritional security as well as socioeconomic development. Call for research papers, book or film reviews and special reports closes on **1st August 2019**. Please contact kindly Managing Editors for the further information. ***Email: managingeditors@fofj.org***

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Specialized Partnerships in Sustainable Food Systems and Food Sovereignty, Faculty of Organic Agricultural Sciences, at the University of Kassel, Germany and the Federation of German Scientists (VDW), Germany