

# Contested Landscapes: The Global Political Economy of Climate Smart Agriculture

## Introduction

The intimate relationship between the climate system and the agrifood system is increasingly recognised in expert and policy circles. The impacts of climate change on food security combined with the influence of food and agriculture over our collective ability to dramatically lower greenhouse gas emissions have given rise to calls for ‘climate smart agriculture’ (CSA). This emergent paradigm seeks to square the goals of climate change mitigation and adaptation with the need to increase productivity in the agricultural sector and reduce poverty and hunger in developing countries through the promise of a ‘triple-win solution’. The recent Conference of the Parties (CoP 22) to the climate regime in Marrakech showcased the newfound profile of agriculture as a critical site for the adaptation to and mitigation of climate change (FAO, 2016), and was dubbed the ‘action for agriculture CoP’<sup>1</sup>, within which CSA programmes and practices were a key underlying policy.

What is missing from accounts of the geophysical interdependencies and policy responses to date, however, is a fuller theoretical account of the forms of discursive, institutional and material power which are driving and shaping this agenda and drawing boundaries around the diagnosis of the drivers of climate (in)compatible development and the solutions that are therefore advanced as ‘climate smart’ agriculture. This analysis of attempts by policy-makers to manage the relationship between climate change and agriculture invites questions about whose interests are served by predominant framings, as well as how the debate is influenced by the prevailing food regime that operates globally at this historical juncture. It explores the exercise of power in determining which issues, actors and agendas are included in, as well as screened out of, policy and public debates and interventions under the guise of CSA through strategic discursive framings and attempts to assert institutional control over the development of CSA. This account reveals the processes of accommodation and legitimation at work, which seek to obscure the critique potentially posed by climate change of prevailing modes of organising food systems, while showing how business as usual modes of agrifood production and governance can be rendered compatible with addressing the threat of climate change. Consistent with a neo-Gramscian approach to understanding the operation of hegemony, we explain how this is achieved across mutually reinforcing discursive, institutional and material sites of power whereby powerful actors seek to frame, govern and align CSA with the overriding imperatives of the dominant global system of food and agriculture.

Analysing key initiatives in the area of climate-smart agriculture and the politics which surround them, as well as highlighting areas of deliberate neglect, we firstly identify the dominant discourses shaping the debate through a discussion of discursive sites of power. Secondly, we map the emerging ‘regime complex’ of institutional power that operates at the interface of the climate and agrifood system. Thirdly, we connect this to forms of material power that derive from control over production, finance and technology in the neoliberal food regime by transnational capital in the form of large agribusiness. Taken together, identifying and accounting for these three forms of discursive, institutional and material power helps to explain how responses to date are shaped by - and further entrench - landscapes of power in the global system of food and agriculture. This has important

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<sup>1</sup> <http://www.cta.int/en/article/2016-11-14/cop22-n-action-for-agriculture.html>

implications for which solutions are promoted as part of CSA and which actors are likely to benefit from the flows of technology, finance and institutional support that are mobilised in the struggle to define a viable global agrifood system in a warming world.

## **Background**

‘Between now and 2050, the world’s population will increase by one-third. Most of these additional 2 billion people will live in developing countries. ...agricultural production will have to increase by 60 percent by 2050 to satisfy the expected demands for food and feed. Agriculture must therefore transform itself if it is to feed a growing global population and provide the basis for economic growth and poverty reduction. Climate change will make this task more difficult under a business-as-usual scenario, due to adverse impacts on agriculture, requiring spiralling adaptation and related costs’ (FAO 2013: ix)

Effectively managing the intertwined relationship between climate change and agriculture has long been recognised as key to solving some of the most pressing issues of the twenty-first century. CSA has emerged in recent years as the paradigm de jour for connecting agriculture and climate change, as well as a prescription for how to manage that relationship. It has received significant support from major institutional actors, in particular from UN institutions such as the Food and Agriculture Organisation (FAO), the World Bank, the International Fund for Agriculture and Development (IFAD), as well as from agricultural research organisations such as the CGIAR consortium and private sector actors ranging from agrifood to fertiliser and biotechnology corporations.

While there is now a rich policy and grey literature that recognises the ways in which the worlds of climate and agriculture increasingly impact upon one another, critical academic scrutiny has lagged behind in engaging with the politics surrounding CSA. The majority of CSA literature is policy-oriented, articulated through a language of ‘toolkits’ and ‘pathways’, rather than engaging with issues of power, authority and equity. Moreover, there is an unusual degree of blurring in CSA debates between policy and academic literature; a large number of journal articles about CSA are authored by agricultural scientists working for the institutions which are most influential in driving the agenda. This issue is exacerbated by a significant degree of institutional integration between many of the principal actors involved in CSA, namely between UN institutions such as the FAO with agricultural research institution, and between those institutions and major corporations such as biotechnology and fertiliser associations. Whilst there is an emergent literature which considers issues such as the institutional arrangements of initiatives such as the GACSA (Aubert et al. 2015), as well as an engaged and critical grey literature on the role of fertilizer companies in promoting CSA (GRAIN, 2015), critical attention to the underlying politics and political economy of CSA is still lacking. This leaves us with a dearth of conceptual and political resources to make sense of and engage with this evolving and increasingly important agenda, and for asking questions about who it serves and how, and who and what gets left behind.

Drawing on analysis of the discursive, institutional and material forms of power that are shaping this agenda, we show how a political economy analysis is essential to understand the issues of conflict and consensus-building surrounding CSA, revealing the trade-offs obscured by its ‘triple-win’ logic. Firstly, we introduce and contextualise CSA: the emergence and evolution of the concept, its drivers and trends. We note that it has not

emerged in a neutral political space, but rather operates on a terrain of existing institutions and actors with clearly defined interests, mandates and ideologies - all of which seek to make sense of, or adopt, CSA in ways which protect or further enhance their power and influence. Secondly, we explore the discursive politics of CSA by unpacking the ambiguous definition of CSA and contextualise it within a field of other similar, but different, discourses around sustainable intensification and agroecology. Thirdly, we explore the institutional politics surrounding CSA and propose a 'regime complex' which seeks to render visible the actors, interests, institutions and power relations that shape the agenda. Mapping and analysing these institutional configurations allows us to pose questions about (i) whose agenda is represented by CSA (ii) who regulates the interface between climate change, food and agriculture (iii) what activities are validated as CSA, which are not and why. It becomes apparent that this is a political arena occupied by powerful actors where the issue of climate change – its profile and levels of financing - creates opportunities for existing actors to adjust their mandates to establish or further consolidate a role for themselves in this arena. Finally, we explore the material political economy of a dominant neoliberal food regime and its influence over the content of CSA evident in the structural power wielded by large agribusiness capital based on their control over production, finance and technology and the buy-in that public institutions seek from them. This helps to historicise the debate: its timing, form and framing in a context of a finance-led regime of accumulation and the global re-ordering of food and farming. We conclude by suggesting that, taken together, an account of these dimensions of power helps us to understand the processes of accommodation and legitimation at play to protect prevailing strategies of accumulation in the food and agriculture sector organised around industrial, high-input, export-oriented agriculture which is private-sector led, albeit with ample state and public institutional backing.

In an empirical sense the analysis draws from and contributes to wider debates about the power of agri - food corporations in the global economy (Clapp and Fuchs 2009) as well as work seeking to bring political economy perspectives to bear on other aspects of 'climate-compatible development' (Naess et al 2015). Theoretically, it draws upon and supports neo-Gramscian accounts of the reinforcing nature of material, institutional and discursive power in the production of hegemony in the agricultural sector and beyond (Levy and Newell 2002; Newell 2009; Schnurr 2013) as a useful way of understanding the efforts of incumbent actors to shore up their privileged position by accommodating critical challenges and de-legitimising alternative pathways. Methodologically, the research is underpinned by analysis of the emergent regime complex surrounding climate change, food and agriculture. These insights were enhanced by participant observation during the many side-events run by key actors in this debate at the 22nd UNFCCC Conference of the Parties in Marrakech.

### **The landscape of Climate Smart Agriculture: Drivers and Trends**

Agriculture is directly reliant on natural resources and the climate, consuming some 70% of global freshwater and occupying 40% of global land area (Brimoh, 2013). However, through increasingly industrialized production methods, it is now amongst the most significant contributors to climate change, accounting for 56% of global non-CO<sub>2</sub> GHG emissions through the production of methane and nitrous oxide, and between 19% and 29% of total GHG emissions (Vermeulen et al. 2012). Agriculture is also a major driver of deforestation, which accounts for an additional 17 % of global GHG emissions (Smith et al., 2007), through incursions for the grazing of cattle and the cultivation of animal foodstuffs such as soya. The contribution of the powerful meat and dairy industry in

particular has attracted attention and controversy given the land, energy and water inputs required to rear livestock, as well as the resultant methane emissions (Kirby 2011; Garnett 2009). Meanwhile, global infrastructures of storage and transportation for processing and shipping food around the world rely upon the availability of cheap and reliable fossil fuels and as a result generate large emissions of GHGs or ‘food miles’. From this to the role of retailers, packaging and consumers, there is a climate footprint throughout the supply chain (Oosterveer and Sonnenfeld 2012). Agriculture is also, however, one of the sectors most vulnerable to the effects of climate change. 2.5 billion people globally depend upon agriculture for their livelihood (FAO, 2013b). This is 41% of the world’s population, and the figure rises in Sub-Saharan Africa, where on average, over 60% of the population works primarily in agriculture (FAO, 2012). Whilst it is recognized that subsistence farming in many rural contexts is increasingly supplemented with a range of off-farm incomes and coping strategies (Bryceson, 2002), especially in situations of climatic stress and variability (Mosberg and Erikson, 2015), the fact remains that the incomes of many poor households worldwide are intimately tied to agriculture through crops, livestock and forest resources. It is not hard to see why agriculture and food security are so vital to the prospects of development and poverty reduction in the context of climate change.

2009	The term climate-smart agricultural development was first used in 2009 in FAO publication (Mann et al 2009).
	The Global Research Alliance was launched, providing an organisation and framework for cooperation and investment in research to reduce agricultural greenhouse emissions.
2010	The First Global Conference on Agriculture, Food Security and Climate Change at the Hague defined CSA as actions which; “sustainably increases productivity, enhances resilience, reduces/removes greenhouse gas emissions, and enhances achievement of national food security and development goals”.
	FAO ‘The Mitigation of Climate Change in Agriculture’ (MICCA) programme launched.
2011	The Johannesburg Communiqué – “Africa: A Call to Action: Johannesburg, South Africa: African Ministerial Conference on Climate Smart Agriculture - A common position by African Agricultural Ministers.
	Global Science Conference on CSA: The Wageningen Statement identified scientific priorities to accelerate CSA.
	CoP17 in Durban, South Africa. Parties asked the UNFCCC Subsidiary Body for Scientific and Technological Advice (SBSTA) to explore the possibility of a formal work programme on agriculture.
2012	The Second Global Conference on Agriculture, Food Security and Climate Change - The Hanoi Communiqué.
2013	FAO EPIC programme ‘Economics and Policy Innovations for Climate-Smart Agriculture’ launched.
	Global Alliance for Climate-Smart Agriculture (GACSA), launched at the UN Climate Summit, New York.
2015	CoP21 CSA showcased at a variety of side-events and exhibitions.
2016	CoP22 a series of CSA themed side-events, launch of CSA initiatives 4 par 1000, a French-led soil carbon sequestration project, joined by Moroccan-led AAA initiative, also focussed on CSA.

**Table 1** – A chronology of CSA.

Despite recent heightened attention to CSA, attempts to better understand the climate change- agriculture nexus have been a feature of discussions for decades. The need for agriculture to adapt to climate change has been recognised since the very first IPCC assessment report (Tegart, 1990), and was also reflected in the 1992 UN Framework Convention on Climate Change in Rio. However, policy approaches which seek to manage the synergies between agriculture and climate change have been slower to develop. Table 1 provides a brief chronology of the term CSA, which was first used in a 2009 FAO paper calling for greater efforts in mitigation

and adaptation (Mann et al., 2009). The concept has since gained significant traction and come to the forefront of policy debates, especially in the run up to the Paris CoP21. Indeed, the importance of agriculture to climate change negotiations was underscored by the INDCs (Intended Nationally Determined Contributions) submitted prior to CoP21, in which over 85% of developing countries made reference to agriculture, forestry and land use in their mitigation contributions, and of the countries that specified adaptation commitments in their INDCs, more than 90% referred to the agricultural sectors (FAO, 2016b). This provided the backdrop for the recent CoP22 in Marrakech, which placed an unprecedented emphasis on agriculture, and at which two additional ‘flagship’ CSA initiatives were launched: the 4 per 1000 soil carbon sequestration programme and the Moroccan-led AAA programme (Adaptation of African Agriculture).

### **The discursive political economy of CSA**

According to the FAO, CSA integrates ‘three dimensions of sustainable development (economic, social and environmental) by jointly addressing food security and climate challenges’ (2013). The three main pillars of CSA are therefore i) to adapt and build resilience to climate change, ii) to reduce greenhouse gas emissions and iii) to sustainably increase agricultural productivity and incomes - hence promising ‘triple-win’ outcomes (ibid). Examples of specific practices which are promoted under the premise of CSA include agro-weather tools to help farmers judge when to crop, site-specific nutrient management to tailor fertiliser use (Richards et al. 2015) and practices such as intercropping to maximise carbon sequestration (van Asten et al. 2015), which points to the potential for CSA to facilitate the further extension of emissions trading schemes to soil carbon sequestration. Given both the scope of the objectives and possible practices that CSA could entail, it is not described as one particular technique, but instead as a broader approach to reconciling climate change and agriculture (FAO, 2013). The three pillars of CSA are often described as a continuum, and any one CSA practice can emphasise different elements of the three pillars of CSA; adaptation, mitigation and increased production.

Notably, many of the practices advocated by CSA initiatives are extremely similar to those implemented through other development programmes which seek to recognise the synergies between climate change and agriculture, and the FAO clearly acknowledge that CSA is ‘not a new agricultural system’ (FAO, 2013: 27). Despite this, it is interesting that CSA is still framed as distinct from other approaches (Locatelli et al., 2015), described as a ‘broader platform’ and ‘a new approach... to guide the needed changes of agricultural systems’ (FAO, 2013:27). This distinction is further highlighted by IFAD, who describe how CSA is distinguishable from other policies based on its ability to ‘enable smallholder farmers to become significant beneficiaries of climate finance’ (Grainger-Jones, 2011). This contradiction indicates that whilst there are often no substantive differences between CSA and many pre-existing practices, it is seen as imperative to differentiate CSA for reasons of securing new and additional finance from climate funds. Hence there is a difficult balancing act to perform between framing the definition of CSA widely in order to enrol as many powerful actors as possible, while still differentiating the specific technologies and practices of CSA from other agricultural development policies when it comes to attracting new streams of finance.

Engaging transnational agribusiness capital around CSA initiatives is of prima facie importance. Not only do headline CSA programmes such as the GACSA (Global Alliance for Climate Smart Agriculture) and EPIC (Economics and Policy Innovations for Climate-Smart Agriculture) focus explicitly on engaging

commercial actors, but CSA is increasingly being mainstreamed into Corporate Social Responsibility (CSR) discourses. For example, multinational companies such as McDonalds and Kelloggs have made commitments to 'climate smart' approaches as part of the GACSA (CIDSE, 2015). Walmart, meanwhile has announced its own 'Climate Smart Agriculture Platform' in partnership with its suppliers and well-known food companies like General Mills and PepsiCo (FutureFood, 2015), promising to drive the 'adoption of best practices in agriculture' (Walmart, 2014). McDonalds, Kellogg Company and Walmart are also signatories to the Joint Statement for Agriculture, Food Security and Nutrition made at the 2014 UN Climate Summit. In terms of corporate-led actions, the World Business Council on Sustainable Development launched a Low Carbon Technology Partnerships initiative (LCTPi) within which Monsanto co-leads the 'Climate-Smart Agriculture' programme. However, the specific mechanisms and policies through which these CSA platforms will work remain unclear, and corporations are free to define 'climate smart' approaches according to their own CSR frameworks.

Given the drive to enrol corporate actors in the CSA agenda, it is unsurprising that a powerful meta 'market liberal' frame (Clapp and Dauvergne 2011) is adopted by the key proponents of CSA that serves to draw boundaries around what is at stake and what the menu of politically, technologically and economically feasible options are. The emphasis is on pricing, market-making, technology and protecting property rights in order to meet the twin challenges of climate change and food insecurity. A strong sub-narrative at play here is an overwhelming emphasis on private sector-led agricultural development evident in the collaborative, commercially engaged learning-platform approach of the flagship CSA initiative GACSA, which very much seeks to integrate corporate interests and investment. This is exemplified by the description of the GACSA offered by Dr Andrew Enow, the coordinator of the GACSA facilitation unit, in a forum about climate smart agriculture programmes; describing the alliance as 'a voluntary, action-oriented, multi-stakeholder platform... creating an open, diverse and inclusive dialogue'<sup>2</sup>. In this narrative, the primary role of the development community therefore is to lever, and scale-up private finance with strong parallels with the *The New Alliance for Food Security and Nutrition* which 'brings partners together to unlock responsible private investment in African agriculture'<sup>3</sup>. The persistent focus on leveraging finance alongside attempts to incorporate a wide spectrum of agricultural practices under the umbrella of CSA, without questioning the many ways in which the business as usual practices of these actors might be driving climate change, are indicative of the discursive power at play in attempts to draw boundaries around the meaning and direction of CSA.

This discursive work of accommodation is also manifested through ambiguous definitions and blurring between CSA and pre-existing practices. Specifically, there have been calls to better differentiate between CSA and preexisting policies such as sustainable intensification, which are often bundled together in the policy literature. For example, during the most recent CoP22, a variety of side-events focussing on CSA referred to 'climate smart' as a catch-all prefix for a variety of initiatives, referring to 'climate smart soil management' and 'climate smart farming' across numerous contexts. In particular, many of the discussions of 'climate-smart soil management' and 'climate smart farming' at CoP22 blurred CSA with sustainable intensification, such as a World Farmer Organisation event focussing on the role of farmers in implementing the Paris Agreement, in collaboration

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<sup>2</sup>International Agricultural Research Cooperation for Climate Change - Follow-up side event of G7 Niigata Agriculture Ministers' Meeting <https://ccafs.cgiar.org/cop22-side-event-international-agricultural-research-cooperation-climate-change#.WDGpHOaLTb0>

<sup>3</sup><https://www.new-alliance.org/>

with the International Fertiliser Association and the GACSA, during which the panellists argued for sustainably intensified agriculture through increased access to, and use of, fertilizers (IFA, 2016). This argument was premised around responsible fertiliser use, which was described as ‘climate smart integrated soil fertility management’. Whilst from a policymaking perspective, bundling together different approaches and concepts allows for broadening the appeal and relevance of CSA, it is problematic to blur the distinctions between such practices, especially in this context where the prefix of ‘climate- smart’ can reinvigorate an outmoded and contested approach such as ‘sustainable intensification’ which has been subject to wide-ranging critique (Garnett and Godfray 2012; FoEI 2012). Beyond questions surrounding the distinctions between CSA and sustainable intensification, reflections upon whether and how the intensification of agricultural production or the increased role of private investment in agriculture have a part to play in accelerating climate change were missing from this debate.

The ambiguity of CSA is particularly challenged by proponents of agroecology, who have vigorously sought to defend and distinguish agroecology from CSA, arguing that CSA is an offensive PR strategy designed to ‘to drown out rising support for agroecology’ (Lilliston, 2015). Similar to the case of sustainable intensification, at CoP22, CSA was frequently referred to in discussions of agroecology without clearly distinguishing what these approaches mean, blurring terms such as ‘climate smart food security’ and ‘climate smart agroecology’<sup>4</sup>, and a similar approach can be seen in CSA literature such as the Care and Foodtank (2015) report on agriculture and climate change. Proponents of agroecology are at pains to correct this discursive ambiguity, arguing that in contrast to CSA, agroecology is a set of time-tested agronomic approaches focussed on sustainable pathways in agriculture with a much greater focus on food justice and food sovereignty (Jahi Chappell, 2014). A jointly signed letter from attendees of the International Symposium on Agroecology for Food and Nutrition Security made it very clear that the emergent CSA paradigm should not be confused with agroecology, which the authors argue is better defined, less vague and therefore less subject to potential misinterpretations and abuses (Jahi Chappell and Majot, 2014). Similar to the case of sustainable intensification, blurring such definitions offers the potential for building consensus and re-invigorating pre-existing paradigms, though this response from the agroecology community underlines the significant concern about the appropriation of the term agroecology, which given the important and fundamentally distinct ideological tradition that it represents, would be especially problematic.

### **The institutional political economy of CSA**

Beyond an account of the discursive manoeuvres described above, it is important to show how power relations manifest themselves in the particular institutional spaces between climate change and agriculture, asking questions of whose agendas are represented and advanced by CSA, who regulates the political arena in which these issues are addressed, and which activities are deemed to count as CSA (and which are not). In Figure 1 we provide a map of the regime complex: the institutions and initiatives which are most engaged in shaping and producing the CSA agenda. As we saw above, a range of public and private institutions including key actors in global governance – namely UN institutions such as the World Bank, the FAO and IFAD, as well as those in food and agricultural research including the CGIAR and its partnered research centres, are centrally involved. Also engaged across the

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<sup>4</sup><http://www.fao.org/gacsa/events/details/en/c/449682/>

policy domains of climate change and agriculture, however, are individual treaty secretariats such as the Convention on Biological Diversity (CBD), because of the links to biodiversity and genetic resources, and other global economic actors such as the International Finance Corporation (IFC) and the OECD, each seeking to assert their preferred understanding of CSA. Though it is the case that CSA is not novel in terms of the actual practices proposed, as noted above, the paradigm has given rise to new configurations of the food regime and of actors at the interface between climate change and agriculture, where institutional backing and legitimation is required to support and enhance the financialisation of food, agriculture and climate change. CSA therefore provides an opportunity to lend renewed political effort and financial resources to previous reforms; revitalizing pre-existing policies in the climate change, food and development arena; as the FAO state ‘CSA offers an opportunity to revitalize ... efforts, overcome adoption barriers, while also adjusting them to the new realities of climate change’ (FAO 2013: xi). While this refers to initiatives to advance ‘sustainable’ agriculture, it is also used strategically to endorse and advance efforts to advance a market liberal model in the agricultural sector consistent with the global neo-liberal food regime prevailing since the 1980s (McMicheal 2016), as we demonstrate later in relation to efforts to access carbon market finance and re-package technologies and practices favoured by agribusiness as CSA.

### **The regime complex of CSA**

By way of understanding the power dynamics between institutions active in the CSA arena here we develop an analysis of a regime complex around CSA. ‘Regime complexes’ refer to loosely coupled sets of regimes which allow for the tracing of the relationships and dynamics between actors within the complex. Analyses of such complexes have been produced for genetic resources (Raustiala and Victor, 2004), food security (Margulis 2013) and climate change (Keohane and Victor, 2011), but not yet for the complex which covers climate change, food and agriculture. Whilst the CSA regime operates through a number of the same actors and institutions found in the climate change regime complex, it is distinct in that by focussing on the specific policy of CSA, rather than a broader issue such as climate change, the CSA regime more obviously accommodates both proponents and critics. For example, it includes a number of NGOs, civil society and farmer organisations critical of the approach, albeit wielding uneven power over the key fora through which CSA is being promoted, which is critical to the ability of the complex to accommodate criticism and bolster its legitimacy. This occurs through seeking consensus and stability for the sorts of dominant framings noted above and the material interests they serve through discursive reinforcement and institutional enmeshment with key neo-liberal institutions such as the World Bank and OECD and an array of corporate actors, while allowing for spaces of dissent through weaker and less powerful but more farmer-oriented institutions such as IFAD and other organisations in which civil society actors are better represented.

The first key observation from the CSA regime complex is the extent to which UN institutions are active drivers, financially and conceptually, across a diversity of initiatives and programmes. For example, at the heart of the regime complex in Figure 1 are three FAO initiatives which are central to advancing CSA. Most notably this includes the GACSA, which provides a broad platform for CSA initiatives and is the highest profile of these programmes, as well as MICCA (Mitigation of Climate Change in Agriculture), which focuses on mitigation and adaptation to climate change through agriculture, and the EPIC programme, which seeks to maximise climate



finance and policy innovations for CSA. More recently, the 4 par 1000 soil carbon sequestration programme led by the French agricultural ministry, and the Moroccan-led AAA programme may also make an impact, though these programmes are still in the early stages of development and are yet to be operational. CSA has also received significant exposure through UNFCCC CoP events, in particular at the most recent CoP22 in Marrakech, as well as major conferences on agriculture and food security, such as the Global Conference on Agriculture, Food Security and Climate Change, which is sponsored by the FAO, and the International Symposium on Agroecology which is also organised by the FAO. Moreover, many of the principal agricultural research organisations involved in CSA, most notably the CGIAR and its numerous partnered research centres, receive a large share of their funding through UN institutions, whilst the central CGIAR Fund is administered by the World Bank. Notably, the CGIAR Fund has recently seen a downturn in funding and the World Bank has decreased their contributions from \$50 million in 2014 to \$30 million in 2015 as part of wider budget cuts (Arkin, 2016). This may diminish the future significance of the UN institutions in terms of their funding to the CGIAR, yet it does underscore the desire for institutions such as the CGIAR to push for a key role advancing a paradigm like CSA which presents significant opportunities to increase profile and attract finance for their work. Finally, it is clear that there is also a lot of interest from the World Bank in CSA opportunities for climate finance and emissions trading mechanisms, especially through no-till agriculture and bio-char; a point we return to below.

Secondly, it is important to note how actors and bodies within the regime complex interact and intersect. There is a particularly close relationship between research organisations and universities in the agricultural sector, as well as a close connection between these groups and biotechnology and agricultural research with the private sector. For example, CIRAD, which is a notable agricultural research organisation, is embedded within Agropolis International, a research consortium based in Montpellier, France, which has a number of University members as well as biotech research organisations. The degree of overlap between private sector agricultural corporations such as fertiliser groups, biotech and research organisations are also a significant feature. For example, the CGIAR CCAFS research programme is partnered with Monsanto, the International Plan Nutrition Institute (a fertiliser lobby group), NGOs partnered with fertiliser companies such as EcoAgriculture, as well as a large number of universities.<sup>5</sup> These examples show the partnerships, collaborations and interactions between such organisations are critical to understanding this regime complex, which is very much characterised by institutional embedding and a system of revolving doors.

To further exemplify some of these features it is instructive to look to the GACSA as a flagship CSA initiative. The core of support is derived from a variety of UN institutions; the World Bank, FAO, UNDP, UNFCCC and IFAD, as well as the CGIAR. In terms of membership, the February 2016 GACSA signatories includes a variety of actors, ranging from states to NGOs, universities, the private sector and a small number of farmer's groups<sup>6</sup>. However, the membership structure also shows how a number of actors involved in the initiative are significantly over-represented. For example, the FAO, which founded the GACSA, is independently a signatory alongside the World Bank, IFAD and the World Food Programme. A similar story is evident with the CGIAR, which is independently a signatory as well as several of their consortium research centres such as the ICRAF, IRRI, CIFOR and CIRAT, not to mention other agricultural research organisations which have partnerships with, or are funded by, the CGIAR such as CIRAD. This issue has also been highlighted by previous

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<sup>5</sup> <https://ccafs.cgiar.org/partners>

<sup>6</sup> <http://www.fao.org/gacsa/members/members-list/en/>

analyses of the GACSA, which found fertiliser companies to be over-represented through their membership of numerous representative bodies and industry umbrella organisations who are all separate signatories (CIDSE, 2015). The interconnections between private corporations, biotech and research organisations described above are also reproduced through the GACSA, whose members include fertiliser companies such as Yara – who have been particularly influential in the evolution and emergence of the CSA paradigm, having been heavily involved in early conferences through which CSA was conceptualized (GRAIN, 2015), Mosaic and Haifa Chemicals Ltd. These companies are joined by a number of fertiliser lobby groups such as Fertilisers Europe and the Fertiliser Institute, as well as NGOs partnered with fertiliser companies such as Agriculture for Impact (GRAIN, 2015).

The GACSA has been criticized for a lack of oversight, transparency and accountability usually expected of UN intuitions (Aubert et al., 2015), and whilst some of these issues could be accounted for by the self-described ‘light touch’ governance structure of the GACSA,<sup>7</sup> this structure remains instructive for understanding who is represented, and who is over-represented in the GACSA - and helps to explain why more critical readings of the drivers of climate (in) compatible development are given short shrift. The conspicuous absence of Monsanto from GACSA membership is particularly noteworthy, explainable perhaps by the unwanted attention the antihero of agriculture might attract, plus the fact Monsanto have been able to lever influence over the CSA agenda through other means: co-leading a project for the WBCSD, not to mention their partnership with agricultural research bodies such as the CGIAR.

It is also notable, nevertheless, that on the periphery of the CSA regime complex there are emergent collaborations of groups which oppose and challenge dominant framings of CSA. For example, the civil society group ‘Climate Smart Agriculture Concerns’ came together in late 2014 to reject the premise of CSA as a form of corporate greenwashing, and includes La Vía Campesina, Greenpeace and ActionAid International as well as a number of farmer organisations and human rights organisations (Climate Smart Agriculture Concerns, 2015). Other organisations to raise concerns about the genetic engineering and biotechnology facets of CSA practice include CIDSE, an alliance of Catholic development agencies as well as Caritas International, a Catholic development NGO. Meanwhile, the ETC Group and Heinrich Böll Stiftung have sought to challenge how, as they put it, CSA seeks to ‘outsmart nature’ and in the run up to the Paris CoP21 called on governments to reject CSA in favour of more farmer-oriented agroecology practices (ETC Group and Heinrich Böll Stiftung, 2015). Not all NGOs contest CSA, however, and more conservative groups such as CARE, FoodTank and Humana are all broadly supportive of CSA. Moreover, it is interesting to note that emergent CSA initiatives such as 4 par 1000 also seek to distinguish themselves from programmes such as GACSA, which is described as ‘more oriented toward industry and includes biotechnology as one approach...’ (Ministère de L’agriculture, 2016). This heterogeneity amongst civil society organisations and NGOs is perhaps unsurprising, given the complexity of the climate change and agriculture issue, and as argued by Tramel (2016), whilst climate change has activated an exceptional space for countermovement building, divisions between and within organisations along lines of class, race and gender are inevitable given the complexity of the issues at the heart of the debate. Thus, while there is contestation of dominant framings of CSA by an emergent alliance of civil society groups and NGOs, it is likely that with continued proliferation of CSA initiatives, the landscape is likely to become more complex and

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<sup>7</sup> International Agricultural Research Cooperation for Climate Change - Follow-up side event of G7 Niigata Agriculture Ministers’ Marrakesh CoP 2016.

fragmented, and it is possible that these civil society groups may also fragment in response to the new agendas. Nonetheless, as it stands, key agribusiness actors are significantly over-represented and dominant in the CSA regime complex as are public global governance institutions with a strong commitment to the prevailing food regime organised as it is along neo-liberal lines.

### **The Material Political Economy of CSA**

Besides documenting the forms of discursive and institutional power that work to frame and govern CSA in particular ways, a global political economy analysis also needs to understand the broader material dimensions of power exercised by dominant agribusiness actors that derive from their control over production, finance and technology in the current food regime (Clapp and Fuchs 2009). This strengthens an account of the emergence, development and implications of dominant framings of CSA by showing how these actors use CSA to advance their preferred technologies and strategies as well as seek to re-package them in ways which access new financial and revenue streams associated with carbon markets and the 'bio' or 'green economy'. This 'solutions' and 'action-oriented' oriented narrative offers little space for reflection on the 'problems' associated with the existing organisation of systems of food and agriculture in relation to their role in exacerbating climate change.

What is significant here is how the dominant neo-liberal food regime that has taken hold since the 1980s shapes the contours of the debate about the CSA regarding appropriate interventions, actors and technologies. The idea of a food regime locates the production and consumption of food within broader historical cycles in the organisation of the global capitalist economy (McMicheal 2009). This helps to situate initiatives around CSA in relation to trends towards the financialisation of the food system apparent in new suites of products and services and the use of private capital for large land acquisitions (Fairhead et al. 2012). It enables us to understand attempts to use CSA as a vehicle for reconciling global neo-liberal models of agricultural production and consumption and the imperative to identify new sites of accumulation with the potential barriers to accumulation posed by climate change – affecting productivity, market access and availability of inputs and presenting a more generic crisis of legitimisation for business as usual global food systems. In this sense, while sympathetic to Bernstein's (2016) claim that agriculture has fully absorbed into circuits of capital, the approach developed here underscores Friedman's argument that 'food regimes and agrarian changes must be located in a wider set of analyses of agrarian and capitalist transitions' (2016: 671) and, we would add, the contradictions associated with them. In particular in this case, the way in which accumulation strategies based on the intensive use of fossil fuels (including substantially from agriculture) are systematically undermining the conditions of reproduction in relation to food and farming because of the impacts of climate change.

One of the most significant strategies by which this private-sector led transformation of the agricultural sector is expected to occur is by engaging finance capital. Political economists, drawing on Regulation theory that also informs many accounts of food regimes, refer to the particular power of finance capital in the post-Fordist global political economy as a finance-led regime of accumulation. The concept of regime of accumulation refers to the way in which production, circulation, consumption and distribution organize and expand capital in a way that stabilizes the economy over time. The modes of regulation required to stabilise these regimes include the law, state policy, corporate governance and cultures of consumption (Aglietta 2000). In the world of both climate and agriculture it manifests itself not only in the agency of financial actors in shaping preferred responses to these

issues, but in the creation of new suites of financial products to manage the risks brought about by both the financial turbulence and climate impacts of a global political economy in which they are hegemonic actors and primary beneficiaries. Examples include the creation of new asset classes such as weather derivatives, catastrophe bonds sold to other businesses vulnerable to extreme weather events associated with climate change and the selling of crop insurance to poorer farmers against crop failure as a result of climate change (Isaksen 2015). In relation to CSA, the Climate Bond Initiative's Agriculture, Forestry and Other Land Use (AFOLU) Technical Working Group have recently released their proposed eligibility criteria for AFOLU projects that qualify under the 'Climate Bonds Standard', with the aim of inviting 'climate friendly' investment in agriculture (Paul 2015).

Whilst for these financial actors, shifts in the food regime promoted by the need to address climate change create potential opportunities, for agribusiness producers they can present real threats. We see this clearly in relation to the role of the fertilizer industries, for example, that mobilized in response to the conclusion of the 2008 International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) that the use of chemical fertilisers could be dramatically reduced without comprising crop yields. According to GRAIN, faced with this potential challenge to their business model, 'the fertiliser companies have moved aggressively to control the international debate on agriculture and climate change, and to position themselves as a necessary part of the solution' (2015:3). Materially there is a great deal at stake for the sector. Nitrogen fertilisers require an enormous amount of energy to produce; fertiliser production accounts for 1-2% of total global energy consumption and produces about the same share of global greenhouse gas (GHG) emissions. Proactive engagement with CSA has to be understood then as attempt to anticipate and pre-empt the regulation of the production and use of nitrogen fertilizers as well as concern about the sector's vulnerability to climate regulation of fossil fuels given their reliance on natural gas reserves and the extent of the chemical fertilizer industry's undeclared scope 3 (indirect) emissions that it is keen to see escape regulatory attention. More proactively, CSA projects have also leant a convenient cover for attempts at introducing controversial technologies into new markets or gaining access to growing markets for their products. An example of the former would be the 'climate smart' projects such as Water Efficient Maize for Africa (WEMA), seen by critics as a 'Trojan Horse' to establish smallholder dependence on Monsanto's specially developed proprietary hybrid seeds (Schnurr 2015). Regarding the latter it is perhaps no coincidence that Norwegian fertilizer company, Yara International is trialling 'sustainable intensification' in Tanzania under the umbrella of CSA when it is recalled that Africa has the world's fastest growing market for fertilizers and Tanzania and Mozambique could hold important new source of natural gas reserves for fertilizer production (AFSA & GRAIN 2015).

### **Old wine in new bottles? CSA, Climate markets and GM crops.**

Land management strategies consistent with this finance-led model of agricultural development are presented as a climate 'fix'. During the negotiations towards the Paris CoP21 agreement, proposals were made to include agriculture in carbon trading mechanisms, particularly soil carbon sequestration, which, according to some estimates has the potential to offset some 5-15% of global fossil-fuel emissions (Paul et al 2009). There has been extensive lobbying from the World Bank about expanding carbon markets in this way, preparing the ground for market-based CSA interventions through pilot schemes, reports and capacity building through initiatives such as the Forest Carbon Partnership Facility, the Partnership for Market Readiness (PMR) and the Biocarbon Fund. The

push to link climate and agriculture has the backing of the Global Donor Platform for Rural Development, whose members include many of the actors we have already described as active in this arena - government departments from the UK, Germany, Italy, France, the European Commission and the US, plus the World Bank and other development banks, The Food and Agriculture Organisation, The International Fund for Agricultural Development, The World Food Programme, The International Food Policy Research Institute and the Alliance for a Green Revolution in Africa.

The FAO, in particular, eyes market access opportunities in CSA, noting 'agriculture-related emission reductions from developing countries' as a chance to 'provide important investments to spur rural development and sustainable agriculture in developing countries. Product standards and labels could be developed to certify the mitigation impact of agricultural goods' (FAO 2013). By these means CSA interventions offer the means to reassure consumers about the climate impact of products they are buying through voluntary and private regulation as befits a CSR approach. Indeed, the GACSA seeks to provide a 'learning platform' in order to bring together diverse organisations modelled on other multi-stakeholder initiatives and 'roundtables' on 'responsible production' which are flourishing in key agricultural sectors that contribute significantly to climate change such as soy (where deforestation is a key issue), beef (where emissions from livestock are a concern), palm oil and biofuels (where deforestation, biodiversity loss and dispossession are also problematic). These practices form part of a long history of attempts by business actors keen to accommodate social and environmental critiques of their conduct through the development of private regulation (Jansen and Vellema 2004).

In terms of creating demand for new 'climate-friendly' projects, the International Food Policy Research Institute and FAO have focused on soil carbon in particular. IFPRI's Assistant Director General Alexander Müller has argued for an inclusion of soil carbon sequestration in carbon markets to 'provide strong incentives for public and private carbon funds in developed countries to buy agriculture-related emission reductions from developing countries [...]' (FAO, 2009). Indeed, there are already several agricultural methodologies approved under the UNFCCC by the CDM (Clean Development Mechanism) Executive Board, and many projects exist, particularly in relation to pig farms and oil palm plantations. These are contested for many reasons such as biodiversity destruction and soil and water pollution, as are CDM methodologies for agrofuels and for charcoal from industrial tree plantations. Through these means large agribusiness strategies such as industrial livestock production, a major emitter of greenhouse gases (mainly nitrous oxide and methane), are repositioned as a worthy recipient of climate finance.

Significant effort has also been vested in trying to get financial support and UN carbon market backing for no-till agriculture (or 'conservation tillage' as companies tend to refer to it), which aims to reduce carbon emissions from the soil by not tilling the soil, a practice commonly used for cultivating GMOs in countries like Argentina. This is in spite of evidence of the long and widespread use of the practice, raising questions about the methodologies proposed and about their 'additionality' (i.e. that they bring about emissions savings which would not have resulted anyhow) which is a key requirement for securing funding through the CDM (Newell 2009). Similarly, biochar is proposed as a new form of soil carbon sequestration in which fine-grained charcoal is applied to the soil. The International Biochar Initiative (IBI) argues, for example, that applying charcoal to soils would create a reliable and virtually permanent carbon sink, mitigate climate change, and make soils more fertile. Once again, clever boundary drawing exercises sustain these claims about the 'climate-smart' benefits of these interventions (Fairhead et al 2016). The burning of biomass to produce charcoal is described as close to carbon

neutral because greenhouse gas (GHG) emissions during combustion are supposedly offset by CO<sub>2</sub> absorption during new growth. But this ignores the impacts of conversion or degradation of the large areas of land needed to produce the quantities of biochar proposed by many advocates. It is also unclear what percentage of black carbon will remain in the soil, for how long, and how much will be turned into CO<sub>2</sub> and emitted again. Despite these uncertainties, biochar has been proposed among others by the UNCCD, by a number of African countries and Belize, Costa Rica, Micronesia, and soil carbon sequestration is also central to new initiatives such as the 4 per 1000 programme, which seeks to increase the soil carbon store by 0.04% per year, in so doing offsetting increasing atmospheric CO<sub>2</sub> (4 par 1000, 2016).

The role of GM agriculture in CSA has been a further terrain of contestation. Hundreds of patent applications have been made for so-called 'climate ready' GM crops by leading biotech firms. This includes extending the geographic and climatic range of crops and their capacity to tolerate salt, drought, heat and floods, as well as engineering plants so that applications of nitrogen fertilizer can be reduced. CSA provides an opportunity to finance and advance controversial interventions such as GMOs and GM trees. The urgency of the climate challenge, combined with recurrent Malthusian discourses around a growing population, falling yields and lack of fertile land are invoked to push transgenics, and strengthen calls for increased research into and social acceptance of GM crops. A CGIAR and CCAFS briefing warns, for example: 'if farmers are to use more climate-friendly alternatives, such as nitrogen-fixing crops, then the pace of research to ensure the viability of these adaptation approaches needs to quicken' and 'As the kinds and incidences of plant diseases grow, research to develop disease-resistant crop varieties will become increasingly important' (Thornton 2012:7). Thus, for Paul et al (2009:6) 'The biotech industry clearly sees climate change as an unlimited opportunity for expansion and is lobbying for GM to be recognised as offering key solutions...'

The push to finance technologies and projects of benefit to agribusiness interests is clearly also part of the broader politics of climate change around displacement of responsibility and the search for 'cost-effective' market-solutions to climate change in the form of 'climate capitalism': the attempt to reconcile the need to decarbonise the global economy with the continual imperative to locate new sites of accumulation for growth (Newell and Paterson 2010). As critics put it: 'What really links REDD, LULUCF and agriculture is the push to extend carbon markets and let big polluters continue polluting' (Paul, 2012:3) whereby 'Climate-smart agriculture is aimed at regenerating the flagging carbon markets, with agriculture to be treated as a vast new sink for industrial emissions' (ibid: 5). What is interesting, therefore, is the way in which the reaction to the threat posed by climate change to the agricultural system is a re-assertion and acceleration of neo-liberal solutions: that the challenge climate change poses to agricultural and food systems is actually a function of a finance and investment gap; and the need for technology-driven CSA for which neo-liberal actors are ideally placed to provide solutions.

## **Conclusions and Implications**

'We risk paradigm maintenance. Current proposals for responses to climate change seek to maintain current power structures and basically amount to business as usual or worse' (Paul et al 2009:42).

We have argued in this paper that providing a global political economy account of power as manifested at the interface of climate change and food governance is key to understanding why CSA takes the form it does and who

is served by it. It enables us to understand the actors driving the initiatives and their privileged role in defining solutions. While these manifestations of discursive, institutional and material power take distinct forms, they also reinforce and rely upon one another such that the level of institutional access that leading agribusiness firms secure in global policy fora on CSA is a function of their control over production in supply chains as well as over finance and technology in the global food system, and the fact that attempts to render the food system 'climate smart' will require their cooperation and support. The power and reach and 'common sense' character of the discourses of 'triple-win' solutions for all are also a function of the privileged institutional spaces that key actors such as the FAO and the World Bank are able to occupy, the material resources they have to disseminate and reinforce preferred understandings of CSA through publications and toolkits, and their attendance at and sponsorship of all the key events where these issues are discussed. It is the mutually-enforcing nature of these expressions of material, institutional and discursive power then that allows incumbent actors in the current food regime to protect their hegemonic control and to accommodate threats to their legitimacy. We also noted competition between the different actors in the regime complex as they seek to pursue advantages for their own institutions by leveraging the high-profile attention that the relationship between climate change and agriculture is attracting, such that actors like the CGIAR seek to remedy their recent funding decreases through involvement in high-profile initiatives around CSA.

Whilst there is a strong case for thinking more systematically about the relationship between climate change and the organisation of global systems of food and agriculture and for constructing global and national institutional mechanisms and processes for addressing this in inclusive and equitable ways, the current framing of CSA is unlikely to achieve these ends. Rather than embracing an opportunity to reflect upon and address the contribution of agricultural models organised along industrial, high-energy and chemical input, and export-led lines, the advent of CSA has been used to exploit opportunities to consolidate and advance the control of private actors over land, technology and livelihoods in ways that are inimical to addressing either rural poverty or sustainability. This has occurred by advancing controversial technologies (such as GMOs and biofuels), promoting agricultural techniques and practices whose social and environmental benefits are still poorly understood (such as biochar and no-till agriculture), and by seeking to finance CSA through new forms of 'green economy' financing and global carbon markets whose dubious environmental benefits and negative social impacts have been widely documented (Stephan and Lane 2015).

Attention to the structural and systemic drivers of crises around climate change and food insecurity is thereby distracted by emphasis on incremental technological, economic and behavioural change, fetishizing individual acts of consumption (through standards and CSR best practice) and realignments in pricing, technology and property regimes (as promoted by actors such as the FAO and World Bank). What these initiatives and collaborations reveal is the significant investment in asserting the capacity of these actors and institutions to successfully manage the tensions and contradictions flowing from the challenge climate change poses to business as usual politics and practice in the agricultural sector and to translate contentious politics into manageable technocratic responses. Discursively they can be traced in acts of de-politicisation and attempts to obscure trade-offs through 'triple-win' initiatives, efforts to accommodate and diffuse political threats to fossil fuel intensive technology-driven export-led food systems upon which the current food regime is organised and moves by agencies to bolster their own bureaucratic positions by securing access to large amounts of climate finance being

directed to climate adaptation and CSA. As over 350 civil society organisations declared in a statement from September 2015 criticising GACSA:

"Agribusiness corporations that promote synthetic fertilisers, industrial meat production and large - scale industrial agriculture - all of which are widely recognised as contributing to climate change and undermining the resilience of farming systems - can and do call themselves 'Climate Smart'" (Climate Smart Agriculture Concerns 2015).

Solutions proposed under the umbrella of CSA reward and thus consolidate the power of large agribusiness corporations and finance capital. The effect of discursive privileging and institutional support for only those solutions consistent with the existing distribution of power, finance and technology in global food systems is to delegitimise, and in some cases, appropriate, alternative solutions which might make an important contribution to climate change mitigation and adaptation as well as enhance the productivity of the majority of the world's smallholder farmers. A range of solutions have long been advocated, for example by the world's largest organisation of smallholder farmers, *Vía Campesina*, who have attempted to demonstrate the benefits of agroecological small-scale sustainable farming. As the UN Special Rapporteur on the Right to Food put it in calling for a greater diversity of approaches to food security and climate change:

"The current input-intensive agricultural system is struggling under the combined pressures of climate change and food insecurity, exacerbated by large-scale agrofuel production and increased speculation on land. This type of agriculture depends heavily on fossil fuels that generate excessive greenhouse gas emissions. It also leads to the expulsion of rural populations and to inefficient and wasteful food chains... Policy makers have other choices." (2009).

At the broadest level we showed how the drive to align responses to climate change under the prevailing food regime that has been predominant since the 1980s, organised around private-led transnational production networks and value-chains vertically integrating a diverse set of producers and retailers from 'farm gate to dinner plate', in ways which consolidate the power of a handful of leading agribusiness actors, helps to explain the form of responses to CSA to date. We unpacked the ambiguous definitions and approaches to CSA and traced a regime complex which demonstrated the interests of UN institutions, in particular the FAO and World Bank, along with the private sector and agricultural research and biotechnology institutions in propagating a version of CSA that aligns with their political worldview and material interests. The degree of support given to this project by this range of powerful international institutions acting in mutually reinforcing ways shows that the material power of agrifood corporations is enhanced by the backing, financial support and legitimation lent by these institutions and the uptake and reinforcement of key messages around the 'triple-win' nature of CSA for farmers. The delegitimation of alternatives is combined with the repetition of narratives that population increases together with declining yields and lack of available land means that practices such as CSA are framed as the only viable way forward. The effect is to elude questions about which farmers and whose environment will be protected by CSA and how, while privileging carbon fetishism and reducing the climate-agriculture interface to commensurate fungible units - the 'carbon cash crop' model.



Thus, an emphasis on emissions trading has displaced a focus on emissions reduction; an emphasis on control through technology has predominated over access to technology and radical innovation; consolidation of land rather than redistribution; and reinforcement of property rights rather than sharing of technologies central to climate resilient agricultural practices. CSA has become a site for the attempted resolution of the need for finance to find something to invest in, extending their control over land; for governments and neo-liberal global institutions to shore up flagging carbon markets by expanding into agriculture; for biotechnology firms to reinvent GMOs as 'climate-smart' and for global agricultural institutions to raise their profile and diversify their funding streams by taking on mandates for tackling and responding to climate change. The unfortunate and inevitable effect of this confluence of agendas is to ensure that other accounts of how to respond effectively to the crises facing food, farming and the environment are side-lined and ignored. Therefore, our account has demonstrated that CSA, which is by its own account not a novel approach, currently serves to strengthen and reinvigorate the status quo of the post-1980s neoliberal food regime. The battle to create food systems that are just and compatible with a climate system that is stable and inhabitable by humans is far from over. Contestations over CSA are merely the latest skirmish in this conflict.

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## Appendix

<b>AAA</b>	Adaptation of African Agriculture initiative.
<b>CGIAR</b>	Consortium of International Agricultural Research Centres'
<b>CCAFS</b>	(CGIAR Research Program) on <i>Climate Change, Agriculture and Food Security</i>
<b>CIFOR</b>	The Centre for International Forestry Research
<b>CIMMYT</b>	Centro Internacional de Mejoramiento de Maíz y Trigo - The International Maize and Wheat Improvement Centre
<b>CIRAD</b>	Centre de coopération internationale en recherche agronomique pour le développement.
<b>CSA</b>	Climate smart agriculture
<b>CSR</b>	Corporate social responsibility
<b>CoP</b>	Conference of the parties
<b>EPIC</b>	Economics and Policy Innovations for Climate-Smart Agriculture
<b>FAO</b>	Food and Agriculture Organisation
<b>GACSA</b>	Global alliance for climate smart agriculture
<b>IAASTD</b>	International Assessment of Agricultural Knowledge, Science and Technology for Development
<b>ICRAF</b>	The World Agroforestry Centre (formerly International Centre for Research in Agroforestry)
<b>IFAD</b>	The International Fund for Agricultural Development
<b>IRRI</b>	International Rice Research Institute
<b>INDC</b>	Intended Nationally Determined Contributions
<b>LULUCF</b>	Land use, land use change and forestry
<b>MICCA</b>	Mitigation of Climate Change in Agriculture
<b>REDD</b>	Reducing Emissions from Deforestation and Forest Degradation
<b>UN</b>	United Nations
<b>UNDP</b>	United Nations Development Programme
<b>UNFCCC</b>	United Nations Framework Convention on Climate Change
<b>WBCSD</b>	World Business Council for Sustainable Development

### Glossary of terms

\*Figure 1 attached.

**Figure 1 caption – A regime complex of actors in the climate smart arena.**