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African Seed Systems: The Crises of Food Security and the Rights of the Farmer in Africa's Globalising Food Regime

University of the Witwatersrand, Johannesburg

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Introduction

Africa finds itself in an increasingly globalized food regime with the actors that are involved in the agricultural sector of the continent progressively international in nature. Agribusiness has seen notable growth in recent years and it has become important to place Africa's agriculture within the context of these growing transnational corporations that dominate the industry. The globalising context in which Africa's agriculture finds itself means that the role of small-scale farmers has been altered significantly and their rights should be assessed as these corporations come to dominate the agricultural scene. Seed systems throughout Africa are a significant indication of the change that has occurred within agriculture in their relation to the capitalist international economy and the social effects that arise due to the international relations of the agricultural sector and food production (Bernstein, 2015: 1). Agriculture and, specifically, seed systems are integral to Africa's food security and changes that occur within these systems need to be understood in order to gauge the impact that these changes have on small-scale farmers.

Globalization and its impact on Africa's food security can be understood through several themes such as the liberalization of trade, the speculative trading of agricultural commodities and the volatility of food prices, and the consolidation of agro-chemical companies through acquisitions and mergers (Bernstein, 2013: 2). There is concern over globalization and the effect that it threatens to have on the distribution of resources and power within the world system to the detriment of the vulnerable and the poorer sectors of the world population and developing nations (Roth, 2011: 121). Globalization has had a particular impact on Africa's seed systems as agro-chemical corporations have acquired patents for genetically modified (GM) seeds that shift the nature of power within the agricultural industry.

The development of seeds has moved from the public development of seeds within the fields to the private development of seeds by the large agro-chemical corporations, which has resulted in a shift in power towards the corporations that are positioned in the global North. These corporations continue to gain control of access to those varieties of seeds that are improved, which is problematic for small-scale farmers in developing countries (De Schutter, 2009: 3). The process that is involved in the creating of genetically modified organisms (GMOs) is costly and requires high technology and corporations that are able to invest heavily in this process have gained an increasing share of the seed development, production and distribution market. (Rótolo et al., 2013: 36).

In order to place Africa within the context of increasing globalisation, food regime theory becomes a useful tool as it explains the role of agriculture in the expansion of an international capitalist economy (Friedmann & McMichael, 1989: 93). Seed systems in

Africa need to be placed in an international context as the increasingly globalised nature of agricultural systems influences the actors that appear on the continent. This study aims to better understand the change that has occurred within the seed systems in Africa and the impact that these changes have had on food security in Africa in relation to the global food regime as well as the effects that the changes in the seed industry have had on the small-scale farmer. A historical analysis of seed systems in SSA with an assessment of new agricultural technologies that have been introduced on the continent in recent years and the effect of multinational corporations on agriculture in Africa would allow for a greater understanding of the effect that globalisation has had on the rights of African farmers and food security. Two case studies have been selected within this study, South Africa and Malawi, in order to present examples of the processes at work.

Through a close reading of the changes that have occurred within African agriculture using Food Regime Theory, this study will attempt to further understand the impact that has been felt by small-scale farmers who are a dominant feature of African agriculture. This paper will seek to understand the influence that the increased corporatization of agriculture through globalization has had on the small-scale farmer in Africa. As agriculture has become more and more corporatized and commodified, it becomes important to consider the changes that have occurred for those actors within the industry and how these changes will impact them. This paper is attempting to do that through a close reading of the changes that have taken place within an integral part of the agricultural process: the seed.

This paper will first look at Food Regime Theory, with particular reference to Africa's place within the historicization of food regimes as this will act as a lens through which this study is viewed. Seed systems in relation to food regime theory will be analyzed in the first chapter and then critiques of the theory will be mentioned. Within this chapter, there will be a focus on the changes that have occurred within seed systems in Africa throughout the globalisation of agriculture on the continent.

The second chapter will outline the methodology that was used in the study and will make reference to the case studies that were considered in order for their ability to present concrete examples of the effect that the globalisation of seed systems has had on food security within African states.

The third chapter will consider seed systems in Africa from seed breeding to the introduction of genetically modified (GM) seed, including an analysis of agrochemical corporations, intellectual property rights, the position of GM seeds within a food security rhetoric and the change in agriculture through land grabs, agrofuels and animal feed. In this chapter, concepts of food security will be introduced briefly in order to gain

an understanding of the relevance of globalisation for the current food insecurity in the region.

The fourth chapter will address the issue of the rights of the African farmer in light of international policies and current government approaches towards seed systems in Africa. Within this chapter, the New Alliance for Food Security and Nutrition will be discussed as well as the concepts of a 'new' Green Revolution in Africa as these policies threaten to have a great effect on the rights of the African farmer. The Comprehensive Africa Agriculture Development Programme (CAADP) will also be considered within the fourth chapter. The two case studies that were previously mentioned will then be discussed in order to present an illustration of the forces at work that will hitherto have been discussed.

Within the final chapter, conclusions will be drawn and possible alternatives to the current global approach towards seeds systems will be considered as the concept of Food Sovereignty is presented as an alternative to the present system.

Chapter 1: Global Food Regimes

Food regimes are a concept that originated with Friedman and McMichael in 1989. This understanding of the world food system enables a broad comprehension of the current state of food security in Africa. Friedmann defines food regimes as being "a relatively bounded historical period in which complementary expectations govern the behaviour of all social actors, such as farmers, firms and workers engaged in all aspects of food growing, manufacturing, services, distribution, and sales, as well as government agencies, citizens and consumers" (2005: 125). Another definition is given by Friedmann as "rule-governed structure of production and consumption of food on a world scale" (1993: 30-31). In a paper written by Friedmann and McMichael "the role of agriculture in the development of the capitalist world economy" is explored (1989: 93). The changing of agriculture from a sector that created a final product to one that was part of the industrial input led to a process of accumulation by transnational corporations. It is concluded in the paper that, through the increasing ability of transnational corporations and the capital that they control to organise agriculture, state policies are undermined in their ability to direct agricultural policies towards food security issues and development, particularly in rural communities. This has particular importance in addressing the food insecurity that exists in SSA as Africa transpires within the world economy and is made up of a large number of rural communities. Africa's incorporation into the world food economy is briefly documented within food regime theory, however, this paper will attempt to put a greater focus on the continent in its analysis of food regimes.

The role that is played in agriculture by transnational corporations is particularly evident in the case of seed systems and, according to Friedmann, farms occur within a "transnational agrofood sector" as suppliers of raw materials for the players that dominate: a handful of transnational corporations (1993: 30). It is within this context that Africa's food security should be understood as transnational corporations and international institutions and their involvement in Africa are examined so that their effect on seed systems and, therefore, agriculture on the continent can be understood.

The third and current food regime, the corporate food regime, began in the 1980s and has been "universalized through liberalization" (McMichael, 2005: 266-267). This food regime has seen corporate power dominate the world food system through 'accumulation by dispossession' (Bernstien, 2016: 2). It is within this third food regime that the rights of African farmers should be placed, as Africa and the seed systems on the continent are pulled further into the global food regime and, as seed systems on the continent are observed, the effect of ever-enlarging influence by agrochemical companies is particularly reflective of this phenomenon.

McMichael draws attention to the globalization of food regimes that have become increasingly corporate in nature. In addressing food security, and, within that, seed systems, the current global food regime that has arisen is observed (2000b: 22- 23). Agriculture has been an industry that has seen a significant corporate transformation as globalization has taken place with world food production being dominated by agrochemical corporations. What needs to be considered is how the power within the agricultural industry has shifted from the farmer towards the agrochemical companies since the 1980s. In order to understand the rise of agrochemical corporations, the change in seed systems and their place in the context of Africa, global food regime theory is useful (Sage, 2013: 73).

There are elements that appear in all food regimes. These are the transactions that exist between food regimes, international division of labour, the international state system and the relations that exist between agriculture and industry, among others (Bernstein, 2016: 3), however, the corporate food regime is of most significance for analysis of Africa's food security because of the corporatisation of agriculture on the continent that has occurred in recent decades. The food regime analysis allows for an organised interpretation of agriculture's role in the accumulation of capital as well as the movement of food in the world economy and emerged in order to provide an explanation of the role that agriculture has played in the world capitalist economy (McMichael, 2009a: 139-140). The third food regime that exists within food regime theory developed as a significant critique of the 'neoliberal globalization' that has been seen where changes have occurred in the terms of capital accumulation and "crises of reproduction of 'classes of labour'" (Bernstein, 2015: 11).

It is significant to draw attention, however, to what McMichael (2005: 276) said, that,

> "The point is not to hypostatize 'food regimes.' They constitute a lens on broader relations in the political history of capital. They express, simultaneously, forms of geo-political ordering and, related, forms of accumulation, and they are vectors of power."

The First Food Regime

It is, indeed, the third food regime that will provide the theoretical underpinnings for the case study that will be observed in seed systems in sub-Saharan Africa, however, the historical context from which the third food regime has emerged provides much-needed context. What is provided, then, is a brief insight into the first two food regimes and the historical setting for the globalisation of agriculture with particular reference to agriculture and seed systems within Africa during these regimes.

The first food regime is categorized as existing during the period from 1870 to1914. It emerged as a result of colonial imports to Europe with grains and livestock being imported from the settler colonies (McMichael, 2009a: 141). Settler states provided markets for the goods that were manufactured in Europe while wheat and meat could be imported by Europe from these settler states and these international trade relations that developed were substantially different to the trading monopolies that arose with the colonial system. Settler colonies were gaining their independence at a time when occupied colonies were "subjected to direct metropolitan rule" (Friedmann & McMichael, 1989: 97). During the colonialism of the late nineteenth century production of crops such as tobacco, coffee, sugar and tea in the colonies was extended by the colonial administration for supply to the increasing markets in Europe, therefore, in Africa, there was a change from the traditional crops that had been grown on the continent towards crops that were beneficial for trade on the global market by the colonial powers. There was a reconstruction of the world economy by Britain during the nineteen-century as colonial markets were opened up to world trade after having been protected in the past. The free trade regime was possible through greater industrial commerce and due to the fact that the international currency was pound sterling. It was during this food regime that an international division of labour appeared made up of grain and meat specialised production in the former settlement colonies, the rise of protectionism in Europe in order to stem the tide of cheap wheat imports and increase rural migration as well as tropical export crops originating in the Asian and African colonies (Bernstein, 2015: 3).

After the decline of the Atlantic slave trade during the second half of the nineteenth century, attention from both African and European traders shifted towards agricultural products. Crops such as palm oil were exported in increasing amounts from West Africa. In the case of West Africa, on facing competition from Malaysia, Ghana shifted its focus from exporting wild rubber to commercial crops that would prove to be more profitable. Shifts such as these were seen during the first food regime in many African states (Berry, 1993: 68).

The change that occurred within African agriculture occurred through a systematic favouring of familiar food production by white settlers, particularly in southern Africa. Maize and wheat were adopted through price subsidies and land grabs as well as the subsidising of infrastructure over local grains such as millet and sorghum. Although a change in agriculture occurred in Africa from the appearance of white settlers, this happened largely around mining areas and much of African agriculture remained based on local grain varieties (Thompson, 2014: 396; Bundy, 1979). Seed systems in Africa remained largely outside of the global capitalist structures during the colonial era except

for the crops that were designed for export within the colonial system of extraction (Pcshorn-Strauss, 2012: 9).

The international dealings that occurred during the nineteenth-century took place in accordance with the terms of political and commercial liberalism set by the British and capitalism was, through regulation of commodity relations like central banking, the establishment of constitutional governments, and civil service reforms among other things, constructed as a national feature of nation states (Friedmann & McMichael, 1989: 99). A new class of farmers was created, which was now dependent on export markets and the formulation of commercial farming that was based on family labour (Bernstein, 2015: 5-6). Friedmann comments that the first food regime emerged within a context of free trade and the operation of the gold standard with the global rise in wheat production allowing for greater amounts of income that could fund railways and expand states even though the increased amounts of wheat had not been the goal (2005: 231-2). This expansion of infrastructure occurred in those colonial states in Africa where large export crops were being produced. Access to ports was necessary for the trade of goods and, therefore, railways were built from farms and mines inland to the ports. In the case of Nigeria, expansion of railways occurred alongside the increases in trade of groundnuts and cocoa (Berry, 1993: 68).

In Africa, from around 1900, there was increasing commercialisation of agriculture as the economies of the colonial powers in African states expanded. The crops that were planted in these African states were adapted to be those crops that would fare well on the international market or those crops that could be exported. For example, in countries such as Ghana and Nigeria, cocoa was planted. Throughout Africa what was also seen was that Africans became labourers on white settler farms, however, settler farms were not numerous and concentration on agricultural production only occurred after independence was gained by African colonial states (Berry, 1993: 67).

Towards the end of the nineteenth-century competition between European states and new competition in the form of agriculture from the settler states in trade increased and states saw need to protect their markets in order to ensure the growth of local industry (Friedmann & McMichael, 1989: 99). The protectionist attitude that arose during this time would see the start of a tradition of protectionist measures form many European states, which would affect Africa's ability to trade.

The organisation of trade into an international order shifted the economic relationships from colonial trade to a capitalist division of labour on a global scale. The increase of trade that was seen globally was exponential from 1840 to 1914 and it was the importing of wheat and meat from settler states and the exporting of capital as well as

the means of organising production in the form of people that formed the first food regime. This first food regime was centered on industrial capitalism (Friedmann & McMichael, 1989: 100) and was dominated by tropical food moving from non-European colonies and settler-colonial states providing the supply of meat and grains. The structure of this food regime allowed for an accumulation of capital in Britain and Europe through underconsumption (McMichael, 2009a: 145). During the first food regime, the global division of labour between the North and South grew into prominence.

The global division of labour that appeared was a feature of the first food regime as the direction of trade helped to dictate the production and consumption as well as the distribution of food. The direction that grains and other basic food crops are traded can lead to a dependency for states, which will change the basis of their economies (Winders, 2009: 317).

The changing role that Africa was to play within the global trade industry began to be formed, in fact, before the start of the first food regime Africa's role within the mercantilist economy was to supply slave labour to America thereby adapting for the requirements of foreign powers. In a similar manner, the changing of Africa's economy continued through into the years that cover the first food regime through colonialism. In the example of Senegal, the pre-mercantile trade worked to strengthen the Senegalese Kingdom and led to greater centralisation, but, after the French settled in 1959 in Saint Louis, productive forces did not appear and the state degenerated. The French halted the trans-Saharan links that were used by the Senegalese in order to create a situation that was, instead, conducive to the trade and economic needs of the French (Amin, 1972: 512). This example provides us with an insight into the change in trading patterns that were pushed into Africa that assisted in forcing the continent into the first food regime and the global division of labour.

With the restructuring of world trade during the first food regime, there was an altering of the colonial division of labour. Wage labour produced goods in competition with colonial producers. There was a great concern with reducing the cost of labour in Europe during the late-nineteenth century and this was achieved with cheap food that was imported from the colonies and the settler states. It was this reduction in labour costs and, therefore, manufacturing costs that allowed for extensive accumulation that is addressed by regulation theory (McMichael, 2009a: 144).

Colonialism saw to it that the commercialisation of agriculture occurred at a far more rapid pace with traditional crops being substituted for cops that would fare well on the international market in order for greater profits to be generated by farm owners. The

colonial administrators' policies towards their territories in Africa were affected, to a large extent, by the focus on surplus appropriation and social control (Berry, 1993: 23). The corporatisation of agriculture continued in Africa from the first through to the second food regime and it was at the start of the second food regime that agriculture began to be organised around new systems such as irrigation schemes (Bonneuil, 2000: 262-2). These changes to agriculture will be assessed in greater detail in the following section.

The Second Food Regime

The transformation of the agricultural industry has happened over centuries but the current food regime exists, according to Friedmann, as a direct result of the post WWII food regime, the second food regime, that emerged due to the shift that occurred in food production, through various trade agreements, to be on a world scale (1993: 30). The post-WWII food regime is labelled, by Friedmann, as the Surplus Regime and existed from 1947-72 (1993: 31). It is during this food regime that an integration of European and US agro-food sectors occurred. This food regime was far more complex in nature to the food regime that came before it and it was during this food regime that trade was organised under the hegemony of the US with two conflicting features of the international division of labour and the state system (Friedmann & McMichael, 1989: 103). Great inequalities appeared between the First World in the North and the Third World in the South in their development. The North, and the US in particular, introduced price supports that further increased overproduction in the agricultural sector and then dumping of these surpluses occurred in the form of food aid in the Third World (Bernstein, 2015: 7). After the Second World War, colonial powers in Africa sought to industrialise and further mechanise their agricultural interests in Africa. Britain and France looked to the examples of US and Soviet agricultural development and wanted to replicate these successes within their colonies. It was hoped that increasing agricultural production within Africa would assist in lessening the post-war financial crisis. From the 1950s onwards projects that focused on mechanising agriculture in Africa increased and many large scale agricultural development projects persisted after independence in previously colonial states in Africa (Bonneuil, 2000: 264).

The second food regime was marked by its existence within the larger historical context of the Cold War where surpluses were exported in the form of food aid to the third world with the guise of ensuring support from these nations. There was also a decolonisation of African and Asian states, which meant that the state system was spread to these parts of the world and there was no longer room for colonial specialisation in the former colonies; instead, wheat was imported from former settler state, in particular, the US, which undermined domestic markets. At the same time, there was a decrease in the

demand for tropical exports like sugar and vegetable oils due to the import substitutions that were brought in by the developed capitalist states (Friedmann & McMichael, 1989: 103). Within the former colonial states in Africa, there was a tendency for agricultural projects that were embarked upon under colonial rule to be continued into independence. These agricultural policies were top-down in their approach and, rather than being nuanced according to the varied problems that arose throughout the continent, applied a similar 'recipe' to all agricultural development (Bonneuil, 2000: 265).

National controls that were put in place in the US allowed for exports and imports of agricultural goods to be controlled by the more powerful states further unequalising the power that Africa had in terms of trade (Friedmann, 1993: 31). The now increasingly global agribusiness corporations that had appeared played a role in restructuring agriculture and agro-food complexes in a way that further separated the stages of agriculture between the production of raw materials and the final consumer product (Bernstein, 2015: 7). The strengthened agribusiness sector saw expansion transnationally and it is at this time that global supply chains were formed along international divisions of labour (McMichael, 2009a: 141). The rise of agribusiness is significant due to the role that these organisations go on to play in Africa in the third food regime through the seed systems on the continent.

There was a shift, due to the subsidizing of exports that were undertaken by the US, towards a regulation of trade. What emerged was an agro-food system that was based on trade between Europe and the US as well as the former colonies (Friedmann, 1993: 32). The rhetoric that developed within the former colonial states in Africa was one that identified the agricultural practices of the African farmers as being detrimental to the environment and so it was deemed vital that the African farmer was prevented from eroding the soil or deforestation. Included in this approach to the agricultural development policies in Africa was the introduction of experts within the agricultural policy development field that could assist in developing the needed farming methods considering the problems that were identified in African agriculture. These experts sought to marry science and agriculture in development policies and, therefore, further commercialised agriculture throughout Africa (Bonneuil, 2000: 266). It was thought, by some former colonial officials, that the lack of development in Africa at that time was due, at least in part, to the lack of knowledge sharing amongst neighbouring states or other states on the continent. Through the preceding colonial rule, there had come to be a perception of African agriculture as 'primitive' and in need of modernizing (Tilly, 2011: 70). Therefore, further agricultural development projects that were centred on modernisation and commercialisation that would replicate those actions that had been embarked on within the global North were perused.

During the second food regime, a shift began to appear within seed systems in Africa and there were agricultural researchers that appeared in many African countries. The focus of these researchers was on export crops. In the Congo, two-thirds of the budget of the Belgian-financed national agriculture research service was allocated to export crops in the course of this period of colonial rule (1930-1959). The research that was done in the Congo led to the hybridisation of oil palms from the wild varieties that existed naturally to a variety that would produce greater yields in order to grow palms commercially for the purpose of producing palm oil. Research into agriculture at this time would tend to have spill-over effects into neighbouring countries (Eicher, 1989: 8). These spill over effects meant that many of the same varieties of seed would be grown in different countries in Africa and the variety of crops that were produced was diminished.

With independence came the move for newly elected African governments to push for greater industrial policies in order to attempt to enter the global trading system as modern states rather than colonial ones. Many of the scientific practices, however, that continued into the era of independence were shaped by the colonial experience and, through these, African environments and African modes of production were manipulated from above through a "culture of development" (Bonneuil, 2000: 260). Agriculture in Africa, therefore, was pushed toward the international food regime as the crops that were produced were intended for international trade and needed to adhere to the standards that were being set by the trade powers. The power of the US on the international scene is an important feature to consider as this allowed for the international trade practices post-WWII to be consistent with the needs of the US. The US was, therefore, able to carve out a greater share in world agro-food production and trade (Friedmann, 1993: 33). During the second food regime, therefore, Africa went from having its agriculture dictated by the needs of colonial powers for the purpose of surplus accumulation to operating as independent states that continued to be forced to follow specific agricultural policies due to the nature of international trade rules. "The food regime sets the market, which then structures the production and distribution of agricultural commodities throughout the world economy" (Winders, 2009: 317).

A feature of this food regime that would have a great effect on African markets was the dumping by the US of surpluses on African markets through food aid. There was a need to get rid of the surpluses that were generated in the US because of the price supports and this was done through external markets in the form of subsidized exports to other states through food aid. Food aid allowed for the exporting of US trade and agricultural policies at the same time as being a tool for getting rid of the agricultural surpluses that were generated domestically (Friedmann, 1993: 35). The effect of the dominance of the agro-export model and the continuation of the surplus export policies that were initiated during this time have seen development consequences throughout the subsequent food regime where states that belonged to the third world at the time became increasingly

import reliant as the US secured its position as an exporting state (McMichael, 2009a: 143). This becomes of particular significance when the agricultural development of Africa is considered. The surpluses that were exported worked to "erode local food systems as aid naturalised what were a set of implicit power relations" (McMichael, 2009a: 144).

The dumping of surpluses in the form of food aid to underdeveloped countries linked Africa to the global food system as the trade and agriculture of those countries now had to adapt to the US standards. Aid in the form of the Marshall Plan had, as a precursor to the aid that would link Africa into the world agro-food relations, worked to establish the Atlantic agro-food relations. It was from the Marshall Plan through to the later agricultural technologies that appeared in the Green Revolution that agribusiness emerged and was stimulated with a universalising of US farming, trade and dietary practices. The expansion of agribusiness saw a reduction of the state in lieu of an expansion of capital leading to the marginalisation of small farmers through a corporatisation of agriculture (McMichael, 2009a: 146).

The capital that was invested by agro-food corporations into agricultural industries nudged agricultural production towards increased intensive livestock production, which would rely on industrial feedstuffs that would be imported from the US by Europe (Friedmann, 1993: 37). The second food regime saw a shift in agriculture to an industry that was far more intense and produced goods that were to be less and less a final product and, rather, to be products that would be manufactured into durable goods or other products. There was also the beginning of intensive meat production during this era as diets changed to include far more animal products (Friedmann & McMichael, 1989: 103). This saw the need for increased amounts of animal feed to be grown. The current food regime has seen further burgeoning of the demand for livestock due to the Westernising of the diets of new markets such as India and China (McMichael, 2009a: 141). This change in the types of crops that were in demand would play a role in the type of agriculture that commercial farms in Africa would grow in the third food regime.

The world food market that had arisen impacted the trade strategies of African and other third world countries in that they were forced to adhere to the international trade relations that had been initiated by the US in their desire to develop their national economies. Developing states were encouraged to emphasise industry over agriculture. African economies became dependent on importing cheap wheat supplies, as there was a lack of focus on the development of the domestic agricultural industry whereas, during the Marshall Plan in Europe there had been intentional steps taken towards the development of domestic agricultural industry. It was during this time that dependence was created in many African states on wheat imports (Friedmann, 1993: 38). This

further integrated Africa into the world agro-food network and increased the globalised nature of agriculture. It was through food aid that very selective industrialisation took place in Africa. The transferring of surpluses to Africa through food aid worked to establish certain norms that would lead to very specific power structures between nations with the US securely dominating and Africa lagging behind (McMichael, 2009a: 141-144).

The subsidising of US wheat and soy oil exports through PL480 were agreed to by the Third World for providing cheap food that would help in moving their states towards greater industrialisation, however, this was done at the cost of the local domestic agriculture creating a situation of dependence on imports from countries such as the US and, later, Europe (Bernstein, 2015: 7).

A major change in the terms of trade occurred where technology allowed for alternative crops to be used in the production of foodstuffs. One such example is the substitution of cane sugar for High Fructose Corn Syrup. This created a cheap alternative because of the agricultural subsidies in the US. African states were now experiencing declining agricultural exports of traditional crops as well as increasing dependency on agricultural imports (Friedmann, 1993: 38). The second food regime saw other agricultural technologies being introduced during the 'Green Revolution', which "expand[ed] staple food supplies and de-politicise[d] the countryside" (McMichael, 2009a: 145). One of the major features of the second food regime was the industrialization of agriculture, which changed labour in the US and European farming in that agriculture and, therefore, farm labour, was increasingly mechanised and inputs of chemicals were encouraged from the top by agribusiness corporations and from the bottom by the rising demands that were put on production in the agro-food sector because of increased consumerism (Bernstein, 2015: 8).

The decline of the second food regime came about due to more than simply a single reason. What had begun to be seen was the sustained growth of transnational business and agribusiness, in particular, that had outgrown the state system in which they had begun. The food crisis that occurred in 1973-74 was also responsible for the end of the second food regime. This crisis happened after grain deals that were struck between the US and the USSR during the period of Détente. What unfolded was a period of food shortages that led to the deals going forward, however, this period was followed by surpluses that then led to a great rivalry between the two states over trade and dumping (Friedmann, 1993: 39 and Bernstein, 2015: 9).

There was a continuation of the subsidy policies carried out by the US and the European Union (EU) despite criticism of these policies at a time of trade liberalisation. The world

also experienced high fuel prices and speculative farmland trading that lead to severely increased farm debt in the US (Bernstein, 2015: 9). Structural adjustment conditions were detrimental towards the cleavages within poor countries and, in particular, Africa due to their promotion of crops that were extremely specific and non-traditional in nature. Many of the states that saw an increase in 'new wealth accumulation' were also the sites of vast inequalities with much of the populations being marginalised. This was the case in many African countries and countries that found themselves in debt while being simultaneously faced with import restrictions from the markets in the North (Friedmann, 1993: 50-1).

What is presented through the expiry of the second food regime is an interesting play and contention between the politics of state and the politics of transnational groups, although Bernstein suggests that there is a lack of mention of the role of social movements during the second food regime (2015: 10).

The Third Food Regime

The market shifted in the 1970s due to the 'food crisis'. The shortages of food led to high grain prices that would greatly impact poorer states in terms of their food security. During this period there were concerns that arose in international debates such as food aid and other forms of export subsidy (Friedmann, 1993: 31).

The period 1947-72 saw the integrating of world markets into a global food system that was the beginnings of the current global food regime that will act as the lens through which to view the corporatization of African agriculture and, in particular, seed systems. The transnational agrofood corporations that were born out of the second food regime then outgrew the US state system becoming significantly more concerned with their own interests rather than the interest of the economy of the US and the interests of these corporations certainly do not reach to the interests of the farmer (Friedmann, 1993: 52). It is these conditions that feature greatly in the discussions about seed systems in Africa.

The third food regime that appeared came from a new understanding of world capitalism through globalisation. Within the current food regime there have been significant differences in the production as well as the consumption of food from previous years. There has also been a global inequality that has arisen and questions of ecological sustainability have gained importance within debates (Bernstein, 2015: 1). The globalising of world agriculture has put Africa's food security in a precarious position as agro-chemical companies seek out larger and larger profits with African agriculture providing the setting within which to achieve these. The issue of sustainable agriculture is addressed through the debate surrounding the changes that have been

seen within seed systems in Africa as genetically modified (GM) seeds have been criticised for their potentially harmful ecological effects. The private control of biotechnology has the potential to exacerbate the global restructuring of food cultures and the environmental, as well as social, impacts that that will be a result of this (McMichael, 2000b: 22).

Friedmann discusses the domination of agrofood companies in the attempt to regulate the conditions that were set in the agrofood market (1993: 52). This would allow for better conditions for these transnational corporations. It is during this time that the rules at GATT are called into question by food regime theory as intellectual property rights begin to have great implications in the agrofood market globally and for Africa.

There are differences that exist within food regime theory as Friedmann focused attention in later work on the social movements of workers and migrant farmers with a view of how there exists "selective appropriation of demands by environmental movements, and including issues pressed by fair trade, consumer health, and animal welfare activists" (2005: 229). Friedmann, as early as 1993, expressed concern about the social unrest that had surfaced in many newly developing states towards the end of the second food regime and the effect that this would have on the conflict in these regions (Friedmann, 1993: 50). For Friedmann, one of the outcomes of the first two food regimes were social movements, however, she is careful to note that social movements are not uniform in their demands or ideologies (Friedmann, 2005: 234).

McMichael, however, has focused on the transnational mobilization of peasants through movements such as Food Sovereignty, Slow Food and Fair Trade. In conjunction with this, McMichael has stressed that the oversimplification of agriculture into monocultures has created a crisis within the food regime and that a focus on the mobilization of peasants is a result of the globalization of the current, corporate food regime (2009a: 147-8). McMichael pointed to the corporate food regime as being "a set of power relations where formal rules and operating procedures are subject to continual contention- and resistance comes not only from the counter-movements, but the agents of the regime itself" (2000b: 22).

The divergence between the works of Friedmann and McMichael is not at odds with one another but, rather, they are differences that nuance the understanding of what constitutes a food regime. Friedmann approaches the idea of a corporate food regime with more caution suggesting, instead, that a corporate-environmental food regime has appeared and highlights that inequalities that will appear in this food regime between the diets of the wealthy and the poor with a marginalisation of some actors and recommenced capital accumulation for other key actors (McMichael, 2009a: 152).

According to Bernstein, "food regime analysis functioned as a critique of food regimes in world capitalism, a critique which expanded, intensified and became more explicit in the context of contemporary 'globalisation'" (2015: 11). Food regime analysis, therefore, became more pertinent as globalisation increased allowing for interpretation of the current state of the agrofood industry to be undertaken. The corporatisation of the agricultural industry has expanded the possibility for a critique of capitalism within the food regime. Food regime analysis has, certainly, allowed for a historicised understanding of the power relations that emerged, centered on an agrarian base, through development models (McMichael, 2009a: 145).

New technologies have become discernible features of the period of neo-liberal globalisation and it is in this context that GM seeds appear. These technologies, of course, emerge alongside a growing awareness of the need for sustainable ecological practices and the "crises of the reproduction of 'classes of labour'" (Bernstein, 2015: 11).

The third food regime is viewed, by McMichael, as a new neo-liberal world order that is corporate in nature with a division of labour that sees grains from the North traded for meats, fruits and vegetables from the South with the products from the South constituting a much higher value than those from the North. The free-trade policies that are suggested are in contrast with the agricultural and import protections that exist for states from the North, while states in the South are prevented from introducing protectionist measures (McMichael, 2009a: 148). Standards that are set by agribusiness as it exists on a global scale have worked to marginalize the peasant communities and increase the consumer base through the dispossession of agrarian groups. What is left as a result are increasing numbers of people who do not possess the means with which to purchase the consumer goods that are manufactured as incomes become less and less stable (Bernstein, 2015: 13). This is, of course, particularly pertinent to Africa as so many people are reliant on an agrarian means of production.

When addressing the third food regime, it is important that perspective is not lost as to the benefits that food regimes constitute in allowing broader relations to be understood. As McMichael argued, "they express, simultaneously, forms of geo-political ordering, and, related, forms of accumulation, and they are vectors of power" (2005: 272). This means that food regime theory becomes an excellent tool through which to pose questions about global food systems or relations and their place within the global political economy. In this understanding of the usefulness of food regime theory, making inquiries into the place of GM seeds within Africa's agriculture has great merit. The third food regime, therefore, becomes a particular means of analysis rather than simply a structured arrangement of the food regime within the world.

An important feature of this new corporate food regime is its position within the liberalisation of markets and the continued privatisation of services that were, previously, public, which is a feature of neoliberal globalisation. In this context, global capital begins to dominate the state, which must act in accordance with the rules that are defined by the market. It is through this set of rules that corporate power is entrenched within the agrofood system (Bernstein, 2015: 14). In Africa, corporate power is increasing through policies that are being made through strategies such as the New Alliance for Food Security and Nutrition (NAFSN) and The Alliance for a Green Revolution in Africa (AGRA). These will be covered in greater detail in the next chapter; however, the significance is the privilege that large transnational agrochemical corporations are granted within these policies (De Schutter, 2009: 2).

The third food regime also touches on 'accumulation by dispossession' (a term made popular by David Harvey) as corporate globalisation sees the displacement of peasant cultures due to the radical change in land being geared for agricultural exports by dumping and capital dedicated to finding new areas of accumulation. Global agriculture has become, within the third food regime, transnational in nature and dominated by corporate agriculture (Bernstein, 2015: 14). McMichael argues that the corporate food regime has moved to the dispossessing of the small farmer as their place becomes irrelevant within globalisation but highlights that this is an irrational approach as "industrial agriculture is undermining conditions of human survival" (2009a: 153).

Within the third food regime, through new technological methods of transport and preserving of foodstuffs, food could be provided to consumers all year round as farm labourers in the South grow crops that could be sold to the North after being sub-contracted by transnational corporations (McMichael, 2009a: 150). In the 1990s it became increasingly clear that seed modification technologies were a noticeable feature of the global corporatisation of food and agriculture. There became an attempt by corporations to acquire large areas of land in the South in order to produce agricultural products that were not intended for direct human consumption, but rather, for the purpose of biofuels or animal feed. The trade of agricultural commodities is done, more and more, through "global commodity chains dominated by agribusiness" (Bernstein, 2015: 14). The third food regime also contains the facilitation of a transformation of agriculture to be directed towards the most affluent of the world consumer class (McMichael, 2009a: 151).

For the purpose of investigating Africa's agriculture within the third food regime the question of 'the peasant' becomes important as, within food regime theory, Africa was largely missing. The concept of the 'South' did appear but it did so as somewhat of a side

note. There has been an observation of Africa as the object of world-historical activities that happened *to them* rather than from a participatory standpoint (Bernstein, 2015: 27). McMichael observes that, within the third food regime, all regions of the globe become incorporated through "neoliberal structural adjustment and the free trade agreements of the WTO era" (McMichael, 2015a: 196). This creates a necessity for greater observations of Africa's role and place within the third food regime.

Within the African context, the role of the state has changed throughout the three food regimes. The colonial era saw a specific colonial method of extraction of resources that resulted in a global division of labour that would impact Africa's place in the future globalised food regime. The seed systems that were impacted during this era were those that were intended for export, while local crops were able to keep their diversity. This would change after the period of independence as international financial institutions would demand policies that would draw Africa further into the globalised food regime and, with it, the seed systems and crops that were to be produced. The Structural Adjustment Programmes (SAPs) that were initiated by the Breton Woods Institute had the effect of creating agro-exporting states in the global South, which, although being promoted as development initiatives, saw an undermining of local food production and "integrat[ed] small farmers into tenuous contract relations, or simply regroup[ed] the dispossessed on agro-industrial estates, or in mushrooming slums" (McMichael, 2009a: 154). During this period large numbers of peasants were displaced from their land within Africa, which had the effect of growing the labour force for other industries (Ibid: 154). The dispossessed labour force then functions as a reserve and this works to lower wages (McMichael, 2005: 285).

The policies that are being adapted by African governments such as PVPs are part of the shift that is taking place within the agricultural industry in Africa into the third food regime. Other policies such as the 'new' Green Revolution in Africa and The New Alliance for Food Security and Nutrition also work towards the corporatisation of agriculture in Africa and, therefore, push the continent into the third food regime (Cover, 2003: 12 & Vercillo et al. 2015: 6). Through the liberalisation of the market, Africa becomes increasingly part of the globalised food regime and this creates the environment that is necessary for multinational corporations to become increasingly involved in agriculture on the continent. The corporate ownership of seeds through patents allows for the corporate ownership of the means of production of agriculture (Zerba, 2001: 668).

Seed Systems, Genetic Modification and Globalisation

There has been a move to encourage governments in Africa to harmonise plant variety protection (PVP) legislation first through regional trading blocs and then on a more global level. This move towards freer seed trade between countries will see the rights of seed breeders protected over and above those rights of farmers. The International Union for the Protection of Plant Varieties (UPOV) act of 1991 is what the harmonised PVP laws in Africa are based on and was created by developed countries over twenty years ago. The encouragement for the adoption of harmonised PVP policies occurs through the accompaniment of major funding and political support. There is also a lack of farmer representation within this harmonisation process (Pcshorn-Strauss, 2012: 7). Plant breeders' rights (PBRs) are currently made up of several national systems across Africa as well as two major regional systems. One of these regional schemes falls under the *Organisation Africaine de la Propriété Intellectuelle* (OAPI) and the other regional scheme is The African Regional Intellectual Property Organisation (ARIPO). The South African Development Community (SADC) is also currently negotiating what would become a third regional PBRs system (Munyi et al., 2016: 87). The harmonisation of PVPs fails to take into account the nuances of the needs of different countries or the impact that they could have on the biodiversity in Africa. Supporting the harmonisation of seed laws are the large agrochemical companies. In a paper that was released by the Syngenta Foundation for Sustainable Agriculture, the positive impacts and reasons for the harmonisation of regional seed regulations in Africa are promoted, however, Syngenta is an agrochemical company that falls in the top five biggest agrochemical companies in the world and so it follows that it would support these claims as the harmonising of regulations allow for greater profits for big agribusiness corporations (Kuhlmann, 2015: 4). The corporatized third food regime allows for an understanding of the negative impact on small-scale farmers, food security and biodiversity should policies such as these be followed rather than accepting the increased profits that could be accumulated by companies including, but not limited to, Syngenta.

What is currently being promoted within Africa's agricultural sector is the short-term development of markets in order to ensure that multinationals will see a more suitable environment for investment. Included in this is the legal framework that dictates policies of ownership of seed germplasm. PVPs form part of this legal framework and, in the early stages of building the environment for seed markets, there was an emphasis on the spreading of hybrid seeds first, however, these channels would easily translate to the spread of GM technologies in the future (Pcshorn-Strauss, 2012: 8). In the first food regime and partly into the second, the colonial structure in Africa determined that resources were extracted from Africa as cheaply as possible in order to ensure the greatest accumulation, however, capitalist investment that is currently taking place on

the continent determines that debt repayment and dividends will account for surpluses and that these will be achieved through the building of domestic markets (Ibid: 11). The harmonising of PVPs makes up part of the globalising process of seed systems in Africa and so pushes Africa's seeds further into the third food regime.

GM seeds are a new feature within agriculture that has presented a difficulty to food regime analysis in creating a specific food regime construct and this has created the space for new dialogue in food regime theory with the potential for the use of food regime theory as a lens through which to view various modern technological changes in agriculture (Bernstein, 2015: 23). Pechlaner and Otero view intellectual property rights in conjunction with the potency of resistance as the channel through which the effect of the third food regime will depend and, for these authors, the "inter-relationship between regulatory change and genetic engineering are integral to the emerging third food regime" (2008: 2). This places biotechnology in a prominent position for framing capitalist agricultural technology and encourages a need for an inquiry into the movements that contest this technology as they fight the potential that this technology will have on local knowledge and livelihoods (McMichael, 2009a: 157-8).

The privatisation of the genetic markings of plants and animals through the patenting of them under Trade Related Intellectual Property Rights (TRIPS) is an example of the "neoliberalisation of nature" (McMichael, 2013b: 130). In many of these instances GM technologies are engineered from existing species that were usurped from societies from where they originated through methods of biopiracy (Bernstein, 2015: 15).

There are claims that are made by companies like Monsanto that through the use of bio-engineered crops, there will be crop yields high enough to feed the growing population on the existent farm and agricultural lands, therefore ensuring that more land need not be dedicated to farming (McMichael, 2001: 215), however, these claims present a very narrow view of GM technologies within agriculture. The corporatisation of crop development is a change within agriculture that has shown favour for the agrochemical transnational companies that play a role within the third food regime and this has left issues of food security in the hands of these corporations and the market (McMichael, 2009a: 150). This, however, will be discussed further in the next chapter.

Food Security and Globalisation

The food insecurity that exists in the world is said by McMichael, to be a matter of inequality within modern capitalism as well as a result of the extreme volatility of the price of staple foods. The food crisis that was seen in 2007-8 is part of the crisis of the third food regime where the integration of the food and fuel industries, through an

increased use of crop lands for biofuels, the dependence of agriculture on fossil fuels within production as well as governments supporting agrofuel projects were all contributing factors to the food price crises that was seen (Bernstein, 2015: 15-16). What has arisen as an example of the 'food regime of capital approach' that is presented to us by Araghi, is the 'agrofuels project' that sees a replacement of food crops for crops that will produce energy at a time when prices are rising. This adds to the recognizing of the neoliberal regime's politicisation of agriculture (McMichael, 2009a: 155).

Rich and poor consumers have, in the third food regime, begun to exist in an increasingly transnational world where those rich consumers are able to purchase products that have travelled far distances and are branded by their source of origin. These products will contain the label 'organic' or 'fair trade', which will be appealing to those consumers that can afford them even though the goods have been imported from regions that exist thousands of kilometeres away (Bernstein, 2015: 15). Campbell further elaborates this thinking as he points out that there is 'cultural status' that is being attached by Western societies to food that has appealing social and ecological roots (2009).

Resistance to the Corporate Food Regime

McMichael has written accounts of the social movements that stand in opposition to the corporate food regime and one of these movements that are transnational in identity is the peasant movement *La Via Campesina* (McMichael, 2013b). *La Via Campesina* promotes the idea of food sovereignty as an alternative to the corporatisation that is occurring in the third food regime. The movement proposes an alternative due to the dispossession of the peasant and the family farmers through the liberalisation of agricultural trade in the South and subsidies in the US and EU, therefore generating unfair advantage for those in the North (Bernstein, 2015: 16). According to McMichael, peasant farming is concerned more with the sustainability of farming practices in order to ensure a continuation of the ability to produce agricultural products into the future. The practices are concerned with restoration of soil fertility and water resources with an emphasis on polyculture crops that are in contrast with the monoculture crops that are produced through corporate farming. There is also the practice of sharing knowledge amongst communities, rather than the privatisation of knowledge, and general collaboration amongst communities (Ibid, 16). Avoiding the dispossession of small-scale farmers is imperative should an alternative to the corporate food regime be possible as these small-scale farmers produce the majority of agricultural goods globally, but stand to be disenfranchised by the market-driven forces of the third food regime.

The distinction between Friedmann and McMichael's understandings of the third food regime is observed in their conception of the role and place of social movements.

McMichael's interpretation of social movements is concerned with those movements that originated in the South and point to these movements as the most integral players within the corporate food regime, while Friedmann argues that there has been a connection created between food and agriculture with other issues such as diversity safety, energy and social inequalities as well as other issues of the environment (McMichael, 2009a: 152). Awareness of the importance of so-called 'quality' food is something that is reserved for the wealthy consumers and herein lays the myriad of contradictions that arise, according to Friedmann, within the new food regime (Friedmann, 2005: 257). Friedmann refers to this phenomenon as 'green capitalism' and it constitutes a prominent feature of her analysis, as "states, firms, social movements, and citizens are entering a new political era characterised by a struggle over the relative weight of private, public, and self-organised institutions" (2005: 259).

The difference that is seen in McMichael's approach is one that is concerned with the "narrative of peasant extinction in the modern world" (2009a: 153). This presents itself as a critique for the disregard that industrial, corporate agriculture has for the agricultural processes that small-holder farming allows for in terms of sustainability, amongst other things, that would not be in contrast to the survival of humanity through the ensuring of biodiversity, lessened dependence on fossil fuels, and a general regard for the knowledge that has been accumulated over generations that ensures the understanding of natural cycles and the localised environment as a way of ensuring prolonged productivity (Ibid: 153).

The originating of social movements in the South is of significance for the case of Africa as social movements arise in opposition to the corporatisation of seed systems in Africa. Resistance to the corporate food regime appears within the African context through movements such as *La Via Campesina*. The international movement provides support for those affiliated movements within Africa. The movement within Africa continues to resist the proliferation of GMOs into African agriculture. Most of the peasants' movements that appear in Africa are unions that are made up of smaller localised farmers' organisations (Mwesigye & Tramel, 2013).

Food Regime Critique

There are, of course, limitations to the food regime analysis and criticisms of this are provided by various authors. These criticisms are acknowledged in this paper as important in allowing for a greater understanding of the current food regime and are addressed in this section. Indeed, McMichael acknowledges certain shortfalls of the food

regime analysis as he points to the fact that not all food production or food consumption has fallen under the food regime analysis of domination by the corporate food system (2000a: 421).

An early critique of food regime theory pointed to the sweeping correlations drawn between industry and agriculture. The need for a differentiation between agriculture and industry to be made was highlighted by Goodman and Watts (1994). This critique, however, has been argued to be a hindrance to a general world historical understanding of capitalism and that the simplification was justified in the theory achieving a grander periodization of capitalism (Araghi, 2003: 50).

Araghi provides his own critique of the food regime theory as having value in the world historical account of "food regimes of global value relation" but is critical of the way that these concepts have been laid down alongside concepts that have been born from the regulation school (Araghi, 2003: 50). The concepts of value that are presented by Marx are needed, according to Araghi, to truly use food regime theory as a means for the investigation of the history of global capitalism, rather than having the theory tainted by the inclusion of regulatory theory concepts (Ibid: 50).

Araghi sees the first food regime that was introduced by Friedmann and McMichael as having value only in its acknowledgment of the integration that occurred between wage and non-wage labour on an international scale. The type of non-wage labour addressed by the first food regime was the basis of world market grain production through the family farms in the settler states that operated on a completely commercial basis and, therefore, has limitations in its ability to fully assess a totality of non-wage sectors that do not fit this same profile (Bernstein, 2015: 21).

Bernstein provides an alternative critique of food regime analysis that addresses, what he feels, are two areas that have been neglected by the theory: the questions of population and the peasant. The question of population growth, according to Bernstein, is neglected in the food regime analysis and is important when the rate of growth is considered (2015: 25). The question of the peasant is formulated from the perspective of the destructive nature of capitalism in the wake of the practices of "industrialised agriculture and agribusiness within the current period of neoliberal globalisation" (Ibid: 25). Aragih (2003: 61) discusses the central policy of neo-liberal capitalism as having been "informalization via 'global depeasantization' leading to rural displacement and super-urbanization", which becomes evident through the decrease in global rural populations after 1980.

What appears within food regime analysis, within the third food regime in particular, is a positioning of agribusiness as the enemy through a selective approach that verifies it as the opposing force rather than investigating the "contradictory realities", which allows for the positioning of alternatives to agribusiness as "virtuous" (Bernstein, 2015: 25). Further, still, is the lack of nuanced attention paid to agribusiness as it is approached as a single force as well as all that is negative within agriculture being attributed, within food regime theory, to agribusiness whereas there certainly are other forces of accumulation of capital. What must also be addressed is the construction of the 'the peasant way' as the right alternative to an agricultural system that has experienced a continually increased presence of agribusiness with food sovereignty assuming the role of banner for this "political project" within food regime theory (Ibid: 25).

The idea of 'the peasant' is, perhaps, not fully explained within food regime theory and becomes a term that could come to mean either an analytical or a political category. In the context of an investigation of the role of the African small-scale farmer, it becomes vital to explain the term in a more refined manner. This will be done in later sections of this paper to allow for a greater consideration of how this seeming opposition to agribusiness is constituted with a consideration for those farmers that are dispossessed by markets and capital or are drawn into a corporate agriculture because they are subjugated to do so and those that are seeking a greater means of accumulation (Bernstein, 2015: 27). A brief enquiry into the role of capital within Africa is needed in order to place the continent, and the peasantry within it, in a world-historical narrative of the agrarian change that has occurred on the continent.

Criticism that is raised by Bernstein (2015: 28) as to the necessity to consider the extensive population growth and the need for greater food production not broached by social movements such as *La Via Campesina* and food regime theory in their almost idealised opposition to agribusiness will be addressed within this paper as seed systems are investigated and the impact that agribusiness has had on Africa's food security is analysed. Of course, there are some issues that have already been raised, in terms of the link with agribusiness and food security, that will form the basis of this particular vain of thought such as the transition of food crops towards crops planted for biofuels and animal feed. There is also an argument that is introduced by Araghi that the analysis of the food regime is done not so that agriculture and food can be brought to the centre of analysis "as a result of a postmodern retreat into locality, anti-urbanism and neo-populist nostalgia for rurality, but precisely because global agriculture and food are inseparable from the reproduction of labour power" (2003: 51).

Food regime theory has presented a much-improved means of theoretical understanding of the capitalist global economy in terms of agriculture with a historical outlining and

has provided theoretical understandings of the relationship between agriculture and industry on a global level, the effect of the movement of populations from one region to another on trade and agriculture and the change that occurred in terms of hegemonic power. There has also been an empirical analysis of the international monetary systems and global markets, state policies' effects on agriculture as they appear in relation to international trade policy and, important for the enquiry into the appearance of GM seeds within agriculture, a view of the appearance of agribusiness as transnational corporations as a new form of accumulation of capital (Bernstein, 2015: 24).

Through the understanding that has been provided to us by food regime theory, it is possible to detail the transformation of seed systems within agriculture as a part of the third food regime. The analytical tool that is provided with food regime analysis allows for an interesting interpretation of the corporatisation of seeds, especially within Africa. The criticisms that are presented do not hinder the ability of food regime theory to assess the change that has occurred within seed systems and the effect that this has had on the rights of the small-scale farmer and agriculture in Africa, although Bernstein's criticism of a lack of acknowledgement of population growth within food regime analysis has potential implications for the understanding of food security and, therefore, should be, to some extent, addressed (2015: 25). It is also necessary to understand the social movements and opposition to agribusiness from a position that does not ignore the complex system from which they arise so that a limited scope of these is not presented. The problems that are found within social movements that oppose the corporatisation of agriculture must be investigated in order to gain a full understanding of their place within the change that is occurring in agriculture in Africa and the inverse of this must also be investigated, as agribusiness tends to be simplified into one all-encompassing force, within food regime theory, that constitutes the enemy with little attention paid to the heterogeneous nature of it.

The third food regime, although not complete in its formation as a historicized period, has provided us with a "method of analysis" and can be used "as an analytical device" in the interpretation of seed systems within Africa (McMichael, 2009a: 148). And, even though there are criticisms as to whether a third food regime has been formulated in its entirety, food regime analysis can be used in order to view the capitalist process that has occurred over time and the food relationships that are associated with it rather than, simply, viewing it as a specific period within history. The significance of the theory lies within the vital role that food has within social reproduction and, consequently, relations of power (Ibid, 2009: 164).

The Small-Scale Farmer

The concept of the small-scale farmer is one that needs to be considered. It is a concept that shifts in its exact understanding due to the very varied methods of farming and farming activities that exist from region to region. This is also dependent on local resources and infrastructure. There is also a varying type of labour that appears on small-scale farms from region to region (Wolfenson, 2013: 15). It is, perhaps, of note to mention what it is that small-scale farms exist in relation to, or in converse to, which is the large-scale and industrialized farm that was grown from the shifting need of food to be produced for a globalized, world market and for the means of increased accumulation by the capitalist class (Bernstein, 2016: 612-13). The forces that, according to food regime theory, grow in dominance and create an opposing force to small-scale farmers include forces such as the increased inclusion of the agricultural sector into the global retail markets, the global management of food markets and, most importantly for this paper, the creating of seed-monopolies through intellectual property rights (McMichael, 2006: 407).

International comparison are, indeed, problematic as the indicators of what constitutes a small-scale farm differ greatly as a definition for public policy reasons will be impacted by the national actors. It is also true that smaller sized farms differ in their integration into the world economy (Marzin et al., 2016: XV- XVI). A small-scale farmer or a smallholder farmer is one that is certainly prevalent in Africa and, relatively, they have fewer resource endowments than farmers who operate on a larger scale (Dixon et al., 2004). For the purpose of this study the small-scale farmer is a term that references those people in Africa who engage in agricultural activity for all or part of their income but are not fully incorporated into the global retail market and those farmers who lack the financial resources to become industrialized. Many, but not all, of these farms are family farms. In contrast, a corporate farm is one that uses paid labour and the capital is held by a private or public actor that is separate from the labour (Marzine et al., 2016: 12).

Chapter 2: Methodology

In order to approach and analyse the given topic, qualitative historical analysis will be used to infer the causal relationship between global food regimes and seed systems in Africa. According to Mahoney and Rueschemeyer (2003: 4), comparative historical analysis offers, "historically grounded explanations of large-scale and substantively important outcomes." This method would allow for an understanding of the large-scale phenomenon of global food regimes and Africa's place within them. The given topic will be approached from this particular methodology in order to give "an historical understanding of value relations" (Araghi, 2003: 43). In assessing Africa's globalizing food regime, careful world historical understanding of the continent is important. Historicizing seed systems allows for an understanding of the changing political landscape within which they operate.

Limitations that may arise while using this mode of study could be the difficulty that comparative historical analysis is confronted with when trying to give historical particularity and, simultaneously, attempting to achieve theoretical generalizations (Mahoney & Rueschemyer, 2003: 5). Commentary by Araghi (2003: 50-51) on the work on global food regimes by Friedman and McMicheal (1989) pointed to the revised understanding of food regimes as more than abstract parts of ideas of economic regulations with nation-state actors towards, rather, world historical value relations as being far more methodologically sound in the interpretation of the phenomena. It follows that an historical understanding of the relationships that are confronted by this study is embarked upon.

In an attempt to create stronger causal process, process tracing will be used. According to George and Bennett (2005: 206), process tracing can be used in order to understand the larger historical context that phenomena exist within. It is difficult to understand phenomena according to one or two variables and so process tracing allows for an understanding of the "intervening causal process" (George & Bennett, 2005: 206). Through process tracing, an understanding of a series of events can be understood and a more complex understanding of an event can be realised (Waldner, 2012: 68). The effect of the globalising food regime on Africa's seed systems will be assessed through process tracing. I will look at the period from 1980, which is the start of the third and current food regime, until the current day and will use process tracing to understand the effect that the increasingly global context that Africa's seed systems exist within has had on Africa's seed systems and, with that, the rights of African farmers. The timeline that I will use for my study is also significant as the question of farmers' rights in terms of crop genetic resources came to the fore in the 1980s (Almekinders & Louwaars, 2002: 17 & Andersen, 2013: 3). Although the period from 1980 to present will be the area of focus

for this study, the historical context from where seed systems arose will also be considered in order to give a greater conceptual grounding.

The study will then consider two case studies, Malawi and South Africa, however, these will not provide a comparative analysis but, rather, they will speak to the larger process that has been addressed in the paper. Malawi has been recognised by some people as the "site of the first African green revolution" due to the input subsidy programmes that have been initiated in the country, which gives the case of Malawi great significance if the impact that these policies could have on food security is to be assessed (Lunduka et al., 2013: 563). The case of South Africa is an important one due to the fact that it was the first developing country to plant GM crops and was used as a determinant as to whether GM crops could be brought into Africa (Gouse et al., 2005: 84). South Africa also provides an insight into the reaction and impact of GM crops on smallholder farmers. This issue has been widely debated within the country (Fisher & Hajdu, 2015: 304). Both of the case studies that have been selected were done so for their ability to provide insight into the changing nature of seed systems within Africa as each of these case studies has seen their agricultural industries become further and further corporatized in recent decades. In both of the case studies that are presented there is evidence of the effects that increasing corporatisation of agriculture is having on the small-scale farmer.

The difficulties that arose with parts of the methodologies used in this study was the problem that can occur while attempting to historicize a phenomenon as large as that of agriculture in Africa. In order to overcome this issue, the study focused on the seed systems in order to allow for a far more thorough approach than would be possible had the focus of the study not been narrowed. There were also many broad and far reaching concepts that were used in the study such as the concept of the farmer and the peasant as well as corporate agriculture and neoliberal policies. In order to ensure that it remained possible to address these concepts within the confines of this study, food regime theory allowed for a specific understanding of these concepts, which was further strengthened by addressing the critiques of the theory that exists. Each section of the paper also attempts to provide specific insight into the terms that are introduced in order to allow for a far more exact understanding of each concept.

Chapter 3: Seed Systems in Africa- A Historical Perspective

Agriculture has been, for some time, an important issue in Africa as small-scale farmers dominate the continent with at least half of the population relying on agriculture for their livelihood (Anderson & Masters, 2009: 3). The corporatisation of agriculture is easily observed through the transformation of seed systems on the continent as agrochemical companies have grown to be billion dollar transnational corporations through GM technology (McMichael, 2000b: 25). The change that has occurred within seed systems in Africa has impacted long-standing traditions that exist within small-scale agriculture where farmers have, for generations, saved seeds from one season to the next in order to ensure better crops in the future. Within communities, sharing of seed between farmers has also been observed (Almekinders, Louwaars & Bruijn, 1994: 207). The importance of seed cannot be overstated as it embodies genetic wealth and has, for generations, been shared amongst farmers, not only through traditional methods, but also through international seed banks (Thompson, 2014: 398). The complexity of the traditional seed supply of farmers is largely ignored by the formal seed system or the breeding, production and distribution of seed and this disregard for traditional methods of agriculture has been overlooked to a larger degree when genetically modified (GM) seed is considered and problems surrounding the patents of seeds and farmers' attempts to save and share seed have arisen throughout Africa. With regards to food regime theory, it is significant to contrast the local nature of traditional seed systems as they are grown and distributed within the location that they are produced with the formal seed systems that see seed from various locations being distributed in locations that are kilometeres away from where the seeds originated (Bernstein, 2015: 15).

The patent rights that have arisen in conjunction with GM technologies form an important feature of modern capitalist economies with the GM seeds themselves working as a technology through which agriculture has become further corporatized. This corporatisation pushes agriculture further into the third food regime. The inequalities that arose between states in previous food regimes are exacerbated by the technology of GM seeds as the technology advantages developed countries over developing nations (Pechlaner & Otero, 2008: 352). With the appearance of global food crises, the approach that had been taken towards food security was called into question; however, the recognition that smallholder agriculture and local markets should be supported was not put into practice. Transnational corporations were able, instead, to find new sources of investment that would undermine the small farmer while they would "normalize themselves as aid actors under a development paradigm" (McKeon, 2014: 4).

This chapter seeks to address the changing nature of seed systems within Africa beginning with an interpretation of seed breeding as a precursor to GM seeds followed by an analysis of GM seeds with particular reference to the technology in the African context. Next, an inquiry into the role of agrochemical transnational corporations within Africa will be undertaken. Thirdly, there will be an addressing of TRIPS with regards to agriculture in Africa with an interpretation of the relation between GM seeds and food security in Africa. Finally, the question of agrofuels and land grabs will be addressed.

Seed Breeding

The act of seed saving among farmers has acted as an important way of selecting seeds that will ensure increased crop production in future harvests. When referring to farmers, those individuals that are responsible for the selection of the seed varieties are referred to in this section of the paper. This often includes more than one member of the household and women are an integral part of the seed selection process. The selection and then saving of seeds allows for increased adaption of crops and, through natural mutation, the local gene pool is shaped and varieties are 'improved'. A large part of the natural mutation of seeds comes from the cross-pollination of crops with new varieties (Almekinders et al., 1994: 208). Seed selections that are made by indigenous farmers over long periods of time develop cultivated varieties that are labelled as "landraces". There is a great amount of genetic diversity amongst landraces as there were large differences that existed in the ecology of where the farming took place as well as the farming practices and crop usage. During the 19th century an institutionalisation of the process through which seeds were selected was seen as European explorers were sent on missions that would seek new and useful varieties of plants. There were advances in plant breeding in the 20th century that led to genetic breeding that was far more focused (Ruttan, 2000: 370).

National agricultural research systems that appeared in many colonial African states from the 1930s were responsible for some of the seed breeding initiatives that took place on the continent. A variety of rice, 0.S.6, was bred in the Congo and by the 1980s was responsible for 90% of the upland rice that was grown in Nigeria. Hybrid maize was also developed in Zimbabwe from 1932-1960 from local germplasm in an attempt to come up with a seed that could produce higher yields. The seeds that were developed through various programmes such as these were used throughout Africa and not, simply, in the countries where they originated (Eicher, 1989: 9).

The need to improve the quality of seeds in developing countries was recognised by donor agencies since the 1970s. The aims were to see a wider use of improved seeds among farmers, especially within cereal crops. Although capital was assigned to the

purposes of the production of better quality seed, there was little effort made at developing adequate infrastructure for the distribution of seed or the marketing of it, which resulted in the majority of seed that was planted on farms in the 1990s still being seed that was produced by farmers themselves (Kugbei, 2003: 77). The seed, therefore, that was predominantly used was seed that was produced and distributed on a local level through local seed-systems. Seed selection was done according to specific agro-ecological and socioeconomic circumstances through the farmers and the natural mutation and hybridisation that occurs creating improved varieties over the generations of crops (Almekinders et al., 1994: 208).

Seed banks that were situated internationally and were coordinated by the Consultant Group for International Research (CGIAR) came to favour commercial seed companies over farmers despite the original germplasm having derived from smallholder farmers. These seed banks held germplasm that was available to all upon request (Thompson, 2014: 398).

There are a growing number of seed libraries that are being established around the globe. These libraries have been created in order to allow for the opportunity for seed breeding to happen on a more local scale and to encourage the possibility for small-scale farmers to have access to heirloom seeds as well as a more genetically diverse range of seeds. One of the most significant roles of these libraries is also to keep seeds secure as seed diversity decreases internationally (Hartnett, 2014). The ever decreasing number of seed companies that hold control of the world's seed trade has played a role in the fast decreasing genetic diversity of the worlds seeds. It is for this reason that it becomes important for institutions such as seed banks and libraries to ensure that varieties are not completely lost (Piper, 2017).

Seed saving through seed banks or seed libraries provide an alternative to seeds that are available through seed companies, which is an important fact considering the monopoly that is held in the seed industry by these companies. Establishing these alternatives returns the control of food to the hands of the locals (Conner, 2014).

The rights of farmers in regards to plant breeding were recognised in The International Treaty on Plant Genetic Resources for Food and Agriculture (The Plant Treaty), which was enforced in 2004 and, among other things, sought to recognise that there should be sharing of benefits that were derived from the utilisation of plant genetic resources. The role of the farmer was also recognised as a vital component of ensuring that crop genetic diversity could continue and that this was an essential part of sustainable food security (Andersen, 2013: 3-4). There have been various successes that have been observed in terms of realising the rights of farmers within benefit sharing. One such case is the

community seed fairs in Zimbabwe where farmers were able to share seed on a more formalised level. These farmer-driven initiatives are beneficial to the maintenance of diversity within agriculture and allow for increased access to seed by small-scale farmers (Chakanda et al., 2013: 134). Commercialised seed breeders have little incentive to develop seed that can be saved and, therefore, those farmers that buy commercially developed seed have to buy seed each year (Zerba, 2001: 665). Community seed fairs such as the Zimbabwean example provide alternatives to commercially bred seed.

Small-scale farmers made little use of the improved seeds and those farmers that were targeted were the ones that had access to larger areas of land as well as greater commercial agricultural inputs. The privatisation of the seed sector that occurred in the 1980s and 1990s through Structural Adjustment Programmes (SAPs) exacerbated the polarisation of this difference as small-farmers planted crops deemed as less profitable where demand would easily fall should there be even a small rise in price and, therefore, did not attract private sector investment (Kugbei, 2003: 77). The introduction of SAPs in Africa saw increased involvement of corporations in agriculture in Africa. Significantly, Monsanto acquired The National Seed Company in Malawi and in Mozambique and Zambian foreign corporations took over the management of seed companies. The opening up of markets through the SAPs were a precursor to the shifting nature that would occur in agriculture in Africa with the introduction of the intellectual property rights agreements alongside the advent of GM seeds. This can be seen in how local seed systems were undermined by the commercialisation of seed breeding and, subsequently, TRIPS in order for increased surplus to be gained (Zerba, 2001: 668). In this way, the historicisation of seed systems in Africa must take into account the commercial seed breeding advancements in agriculture.

Agricultural research in Africa was predominantly funded by the state and exists in the public sphere; however, the harmonising of PVPs and the increasing privatisation of the agricultural sector has diminished the role of the state within agricultural research. National agricultural research systems (NARS) that exist within African states vary greatly from country to country but a commonality that exists is the attempts, with a large influence by the World Bank, to increase the role of the private sector and create links with global scientific research, among other things, within these agricultural research systems. The regional blocs that are being ushered in terms of research will change the division of labour that exists between the different research partners. In particular, biotechnology has created a need for states to integrate into a globalised agricultural system with "regional and international alliances and public-private partnerships" (Sumberg, 2005: 27). Intellectual Property rights (IPR) and Plant Breeders' Rights (PBR) or PVPs that were introduced in the 20th century allowed for increased private sector investment through the possibility of returns of investment in

plant breeding activities, which could be taken advantage of by petrochemical and pharmaceutical companies. The most significant differentiation between seed types was the yields that they were able to produce and it was, therefore, possible for regional seed companies to compete with the larger multinational companies. This resulted in many multinationals leaving the seed sector, however, the multinational companies that did not exit the seed sector were those companies that had invested heavily in biotechnology and it was these companies that began to consolidate globally within the seed sectors. Countries that are less developed have not yet seen a significant formalisation of the systems of seed ownership but it is these systems of seed ownership that allow for private corporations to generate profits and Africa has been marked as the new possibilities for wealth accumulation, which will be achieved through the private control of multiplication and distribution of seeds (Pcshorn-Strauss, 2012: 12). The role of the state is viewed, then, by corporations as being the facilitator for the formalisation of seed systems, which is necessary for the increased role of private companies within the agricultural sectors in Africa.

Genetically Modified Seed

The decade after the technology of plant breeding was initiated genetically modified organism (GMO) technology was developed. GMOs are defined by the World Health Organisation (WHO) as "organisms (i.e. plants, animal or microorganisms) in which the genetic material (DNA) has been altered in a way that does not occur naturally by mating and/or natural recombination" (WHO, 2015).

Genetically modified (GM) technologies are framed, often, by companies that have developed them, policy makers and the like, as a technology with great benefits for those people in the developing world who suffer from hunger and malnutrition and that this technology can work towards increased development in those states that are currently severely underdeveloped. The perception that has been created of GM seeds has been one that is 'pro-poor' and this perception is touted as the technology's defense. Of course, what is observed in contrast to this opinion of GM seeds is that the greatest share of GM seeds that are being developed are not, in fact, geared for small-scale farming that appears in abundance in the South but, rather, has been developed for industrialised farming (Glover, 2010: 68).

The production of transgenic crops focuses mainly on two traits, which are herbicide tolerance (HT) and insect resistance (IR). There are also specific crops that have been concentrated on and these are soybean, canola, cotton and maize. Despite the smaller number of crops that have seen GM technological application, a dramatic adoption of these crops has been observed (Pechlaner & Otero, 2008: 353). The disadvantage that

many farmers in developing countries experience economically has meant that research that is conducted into seed varieties is conducted with the needs of farmers from more developed states in mind (De Schutter, 2009: 3).

The agricultural problems that are faced in the South are addressed to a minor degree by GM seeds with no real evidence that there will be benefits for farming in the South with the introduction of GM seeds. Rather than creating GM seeds that will assist farmers and their needs, GM technologies are expected, by agrochemical companies, to transition small-farmers to become far more commercially positioned (Glover, 2010: 69). Although GM seeds were adopted primarily within developed states, there have been an increasing number of developing states that have begun to introduce this technology into their agricultural industries and the skewed advantages for developed countries over developing ones has been called into question in various forums with one of these being the 9th round of WTO negotiations that was titled the 'development round'. Criticism from developing countries arose due to the protectionist practices of the developed countries that disregarded the need for development within the developing countries (Pechlaner & Otero, 2008: 354).

The conflicting arguments of which of the appropriate agricultural policies should be followed, agroecological crops or genetically modified ones, becomes polarised by several factors, one of which is the potential that exists for the cross-pollination of GM seeds with non-GM seeds. Should cross-pollination take place- a likely occurrence due to the close proximity that farms appear in in Africa- the patents that exist for GM seeds will apply to the seeds that have accidentally been exposed to GM traits (Azadi & Ho, 2010: 162). Agricultural biodiversity is also threatened by the use of GM seeds. While GM crops have the potential to increase seed production in the short term, the effect that this change in agriculture will have on the sustained system of food production is worrying. The damage that will happen to the ecology in Africa will have consequences that threaten to reduce agricultural production in the long term (Scoons & Thompson, 2009: 387). McAfee (2003: 204), states that "[a]griculture in particular cannot be understood separately from the specific ecological and social situations in which it is carried out." Biosafety measures are far more difficult to implement and monitor in the African context due to the differences that exist within the social character of the continent to those which appear in the more developed states (Aheto, 2013: 100).

Local knowledge and community based interpretations of food security allow for far more tailored approaches to agriculture. The knowledge that exists within communities as to the nutritional value of various crops that are available to them can work towards decreasing instances of malnutrition and socio-economically vulnerable areas can benefit from greater use of biodiversity in order to ensure that farm systems develop to

become varied in the crops that are produced (Toledo & Burlingame, 2006: 478-479). McMichael (2000b: 27) provides examples of rural areas that have relied on plants that are categorized as 'weeds' to form part of their diets or for the purpose of healthcare such as rural women in India and peasants in Veracruz in Mexico. The loss of biodiversity that is threatened by the use of GMOs, therefore, has potentially negative consequences for local communities.

Another concern that surrounds the adaption of GM seeds into agriculture in Africa is the strengthened control of agribusiness within the agricultural sector of developing nations through the patents that agrochemical corporations hold over GM seed technology (Kloppenburg, 2014: 1226). The intellectual property agreements that have been extended to include plant and animal genetic material has the effect of making GMOs costly and, therefore, poor farmers are not able to take advantage of the technology. Applying patents to GM seeds dictates that the owner of the patent has a twenty-year long monopoly over the protected seed, which means that the farmer that plants a patented seed loses any rights over it and are not able to replant, save or exchange the seed (De Schutter, 2009: 6). This will be discussed in more detail in subsequent sections of the paper.

Genetically modifying seed has intensified the discussion around the industrialization of agriculture as farmers from all regions around the globe are confronted with transnational corporations increasing monopoly in the seed industry. Through GMOs, seeds have become a product of capital and a significant part of the global food regime (Kloppenburg, 2014: 1226). These industrial companies have gradually enlarged their influence within Africa's seed industry. The seeds that have been the focus of GM development in Africa have, until recently, been staple crops such as maize, rice, wheat, cotton, soybeans and rapeseed. There are now, however, various actors including, primarily the transnational agrochemical companies, that are involved in developing non-commercial GM seeds for the stated purpose of humanitarian intervention. This approach to GM seed development in Africa allows for an increased positive reception of GM seeds within Africa creating an environment that would see food and farming systems that become progressively based on GM technology. This use of humanitarian projects is, therefore, of great advantage to large transnational corporations that profit from GM seed dispersion in Africa (Mayet et al., 2016: 6-7).

Agrochemical Corporations

The agrochemical corporations that have come to dominant the GM seed market have changed dramatically since the 1980s from companies that dealt in chemicals and pharmaceuticals to companies that are now dominated by agribusiness as well as biotechnology. The decision by Monsanto, the first company to invest in the development of biotechnologies, to begin research in genetically modifying seed stemmed, in part, from a recognition of the declining profit margins that would continue into the future with regards to the petro-chemical industry as increasing numbers of generic products came onto the market as well as the vulnerability of the market due to the fluctuating oil prices that were being experienced during the 1970s. Further chemical crop management approaches were also limited and there was a fear that the industry would decline. Monsanto was, therefore, aware that investment into research and development had to be made (Glover, 2010: 70-1).

The large amounts of capital that are needed in order to research biotechnology has seen the research that is conducted become more and more concentrated in the hands of private firms. These firms have gone through mergers that see the number of patents available reducing in size and consolidating in the hands of fewer and fewer firms (Maisashvili et al., 2016: 1-2). Large corporations having the means to invest in the process, therefore, sees multinational corporations gain an ever-increasing share of the seed development, production and distribution market (Rótolo et al., 2013: 36). The corporations that are dominating the industry currently are Bayer and Monsanto (now merged), Dow and DuPont (now merged), Syngenta and BASF. Prior to the mergers mentioned, these companies accounted for over 50 per cent of the global market sales of the crop seed/ biotechnology and agricultural chemical industry. The role of intellectual property rights within the agricultural biotechnology industry create a strong incentive for mergers and acquisitions and this has meant that chemical companies have vertically integrated into biotechnology and seed industries (Maisashvili et al., 2016: 1-3).

The patent protections that arose in the seed industry were a significant motivation for large agrochemical corporations to acquire already established seed firms. The patents were also to be enforced with strong government protection, which increased the impetus for these companies to transition into the biotechnology and seed industry (Howard, 2015: 2489-90). Monsanto was the first agrochemical company to see the potential for expansion that lay in GM technology. After investing large amounts of money into research and development of this new agricultural technology the company sought out markets in which it could see returns. Markets in Europe, however, were closed to GM seeds and, therefore, the company saw the potential that lay within developing countries. A great expansion of Monsanto occurred from 1995 to 1999

through biotechnological interests and the company acquired seed companies around the world. Monsanto, therefore, gained significant traction within the seed markets of the global South (Glover, 2010: 82). The state had an important role to play in facilitating the ever increasing power of these transnational companies through greater intellectual property rights protection and a reducing of antitrust enforcement. The interpretation of antitrust laws within the US by federal judges makes the enforcement of these laws particularly problematic, which has played a large role in the dramatic acquisitions and mergers that have taken place amongst agrochemical and seed companies (Howard, 2015: 2490-1).

Due to the consolidation of the biotechnology market, there has been a shift in power within agriculture where the development of seed has moved from the public to the private sector. The power has, therefore, transferred to the hands of the agrochemical corporations and is now positioned within the global North (De Schutter, 2009: 3). The shift from the surplus food regime to the corporate food regime happened as these corporations began to accumulate power within the agricultural industry through GM technology. The power that these corporations are able to accumulate is done through, what is termed by Pechlaner and Otero, a 'neoregulated' international global trading platform (2008: 366).

The merging of these agrochemical corporations further consolidates power amongst an ever-decreasing number of transnational companies. On 1 March 2016, Dow and DuPont merged to form DowDupont creating a company, according to their website, with an estimated value of $130 billion (A Powerful Combination Unlocking Exceptional Values, 2015). More recently, another significant acquisition occurred in the form of the German drug and chemical company, Bayer, acquiring Monsanto in a $66-billion-dollar deal. Due to the merging of Bayer's competitors, the company acquired Monsanto in order to continue having a competitive advantage in the industry. According to Reuters, "if the deal closes, it will create a company commanding more than a quarter of the combined world market for seeds and pesticides in the fast-consolidating farm supplies industry" (Roumeliotis & Burger, 2016).

Projects like the New Alliance for Food Security and Nutrition (NAFSN), initiated by the G8, have received criticisms from many including the UN special rapporteur on the right to food, Olivier de Schutter, for its unsustainable policies and its skewed advantages for corporations over smallholder African Farmers (Provst et al., 2014). Projects such as this one threaten the sustainability of seed systems in Africa and, in so doing, the food security. It is fundamental to understand these types of investments that do not consider the needs of the continent and, rather, push Africa further into the globalised food regime. De Schutter highlighted the importance of the role of seed systems in a report on

seed policies, "the professionalization of seed breeding and its separation from farming…has led to grant temporary monopoly privileges to plant breeders and patent-holders through the tools of intellectual property" (2009: 2).

Attention towards agriculture by development agencies as well as corporations has been experienced in recent decades. The International Assessment for Agricultural Science and Technology for Development (IAASTD) has speculated on GM technologies and the industrialisation of agriculture due to the negative ecological and social impact that stands to take place due to the failure of the market to address these issues. In particular, from a spatial perspective, consumers from states across the globe are in competition for land and other resources necessary for agriculture, however, developed states consume far greater amounts of food that is produced. There is a continued attempt, through agribusiness, to acquire land and resources for the intention of producing biofuels and animal feed for populations in the North, which fails to take into consideration the social or ecological impacts of industrial agriculture (McMichael, 2012a: 101).

A focus on agribusiness for the purpose of developing those countries that face problems of food insecurity fails to consider the factors of energy and climate change that appear in addressing the food crisis in the long term as well as the continued division of global labour that results in increasing profits for corporations rather than for the world (McMichael, 2009b: 238).

Intellectual Property Rights and TRIPS

Globalization and its impact on Africa's food security can be understood through several themes such as the liberalization of trade, the speculative trading of agricultural commodities and the volatility of food prices, and the consolidation of agro-chemical companies through acquisitions and mergers (Bernstein, 2013: 2). There is concern over globalization and the effect that it threatens to have on the distribution of resources and power within the world system to the detriment of the vulnerable and the poorer sectors of the world population and developing nations (Roth, 2011: 121). Globalization has had a particular impact on Africa's seed systems as agro-chemical corporations have acquired patents that shift the nature of power within the agricultural industry. Intellectual property rights are consolidated amongst an ever-decreasing number of large corporations. This creates a barrier to both farmers and public plant-breeding institutions when attempting to gain access to plant genetic material. Concurrently, there is international pressure for research to work with these large corporations rather than provide alternatives to them (Kloppenburg, 2014: 1226).

Intellectual property rights for plants only became available in the US in 1930 when the Plant Protection Act of 1930 saw that patenting rights were extended to plant breeders.

Traditional areas of technology developed patenting rights much sooner than the area of biotechnology. In Europe in the 1960s, plant variety registration was implemented which would allow for the protection of the rights of plant breeders. The US followed suit in the 1970s in ensuring that the rights of plant breeders were protected. Plant variety registration, however, differed from patents as it allowed for free use by breeders and for farmers that wanted to re-use seed (Ruttan, 2000: 386)

As GM technologies became increasingly profitable there has been a push by the companies that develop these technologies for increased patent laws on the seeds that are developed. The patents that are currently held are held by an increasingly smaller number of companies as these companies go through various mergers. Biotechnology companies have gradually lobbied for the patents of their seeds to be enforced at an international level. This lobbying resulted in the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) that was established in 1994. There are issues that arise concerning developing nations and TRIPS as there are such large numbers of small-farmers that exist in developing nations and there are suggestions that, far from alleviating world hunger, GMOs may contribute negatively to both food sustainability as well as biodiversity. This is of significance as the justification for TRIPS is often the contribution that GM seeds will make to global food security; however, this is an unlikely result in the longer-term (Strauss, 2009: 288-291).

The precursor of the negotiations that took place through the WTO, the GATT, issued many agreements during the Uruguay round that have been adopted and have significant effect on agricultural biotechnology. The most noteworthy of these are the TRIPS agreement. The WTO seeks to allow for intellectual property rights (IPR) that will be common to all members through the TRIPS agreement (Pechlaner & Otero, 2008: 355). The standard of IPR that has been set has played a large role in the domination of handful of corporations in the ownership of the genetic resources for food and agriculture. Through the implementation of the TRIPS agreement, there has been a privatisation of knowledge and a diluting of the knowledge of the informal sector (Mulvany, 2005: 68).

The arguments that arose over the TRIPS agreement did so because the protection rights are in the favour of those that produce the GM technologies but they do not address the rights of the regions from where the seeds originated. The rights of those in the global North are protected with little regard for the role that has been played by the global South in the development of the seeds. There is an obvious lack of attention paid to the traditional knowledge that played a role in the development of the seeds (Pechlaner & Otero, 2008: 355). The disregard for the role that has been played through the originating of plant genetic resources in the global South is referred to as ‘bio-piracy’

and it was the critics of TRIPS that highlighted the fact that, over generations, it was farmers that had preserved certain traits within the seeds that they were using with traditional farming methods. Arguments have arisen over how traditional knowledge could be protected, as this knowledge is often community based, however, recognition of the ownership belonging to a community as a whole could work as a possible solution (Plahe & Nyland, 2003: 33-34).

The concerns that arise over TRIPS in the context of the global food regime are the skewed advantage that is gained by corporations through the patenting of GM seeds. In 2002 a report was released by the Commission on Intellectual Property Rights that questioned the IPRs around GM seeds that had been created due to their failure to consider the interests of developing nations. The recommendations that arose were that developing nations create legislation that would rather be of benefit to their own agricultural systems (Plahe & Nyland, 2003: 35). Through actions such as TRIPS, the neoliberal world order is ratified to the detriment of the rights of small-scale farmers and it is only governments and corporations that are able to take out a patent on seeds as farmers and communities are not legal entities (McMichael, 1999: 25-6).

TRIPS provide an example of "wholly new mechanisms of accumulation by dispossession" as the world's genetic resources come to be owned by a small number of large companies and agricultural production becomes commodified to encourage only capital-intensive practices (Harvey, 2003: 147). This mechanism of accumulation has far reaching effects for the small farmer throughout Africa.

Within Africa, there has been a wide range of policy decisions and changes since the arrival of GM foods on the continent. The African Model Law on Biosafety was commissioned by what was then the Organisation of African Unity in June 1999. It appeared due to the controversy that surrounded biotechnology and GMOs in Africa. It was intended to function as a basis upon which African states could develop biosafety legislations. The Model Law was far wider in its range than the Cartagena Protocol in the hopes that this would help to protect the continent's biodiversity as those that adopted the law were aware that Africa remained a vital centre for genetic resources (Halleson, 2007: 55-6). The development of the African Model Law was significance for the difference that it had towards the issues of state sovereignty towards their genetic resources, which was now expanded from the concept that had been adopted by the FAO's International Undertaking on Plant Genetic Resources in 1983 to include social and economic justice concerns with regards to the control of genetic resources that were derived from African states (Zerbe, 2007: 97 & 105).

Towards the end of the previous decade many of the large agrochemical companies were filling multiple patents for 'climate ready' genes within seeds at patent offices around the globe. At the same time initiatives such as the Water Efficient Maize for Africa (WEMA) and CropLife were involved in pushing for governments of developing countries to pursue much stricter intellectual property laws. The above-mentioned initiatives are part of the New Green Revolution for Africa (AGRA) that will be considered in greater detail in a subsequent chapter. These initiatives are being pursued under the pretext of philanthropy, however, issues such as the effect that they will have on small-scale farmers and global distribution of food are not considered adequately. For example, Kenya adapted an 'Anti-Counterfeit Act' that will unequivocally criminalise anyone who violates plant breeders' rights (Moola, 2010: 5 & 14). The Consultative Group on International Agricultural Research (CGIAR) established several centres in Africa after it had played a key role in the Green Revolution that took place in Asia. CIGAR has entered into multiple partnerships with private companies including Monsanto, DuPont and Syngenta. The WEMA provides an example of these partnerships (Jones, 2015: 10).

GM Seeds as a Solution for Food Insecurity?

An open letter written by various NGO groups that was addressed to Jacques Diouf who was the Director General of FAO criticized the decision of the organisation to use agricultural biotechnology in order to address the food insecurity of the poor. The letter accuses FAO of ignoring the needs of the world's farmers and the importance of food sovereignty. The letter was written after FAO released a report on 17 May 2004 that was titled "Agricultural biotechnology: meeting the needs of the poor" (FAO, 2008). The letter attempts to highlight the importance of acknowledging the effect that private corporate control of GM seeds would have on agriculture rather than trying to deny the scientific proponents of GM seeds that FAO report outlined. The letter responded to the report as it was the first time that FAO had taken such a positivist approach towards GM seeds (Paarlberg, 2005: 40).

Diouf wrote a letter in response that defended the policies of FAO and this highlighted certain practices that the organisation followed. The response that was issues by Diouf was clear to highlight the support of FAO in using conventional seed breeding techniques, along with other technologies, to improve harvests. There is also mention of the need to improve roads and local markets in rural areas. An important point that is made is that better "more equitable" terms of trade need to be negotiated for international terms of trade. The letter is adamant that FAO is of the opinion that GMOs are not, in fact, the only solution in order to ensure that global food security is improved pointing to the lack of use of these technologies amongst the small-scale farmers in the

developing world. It is stipulated that TRIPS that were negotiated were done so in order to protect the rights of farmers and that this agreement would also protect the rights of the farmers from where the original genetic resources came. Diouf's letter makes reference to the need for the world to make use of technologies in order to feed the world as the population continues to grow and increased urbanisation but encourages developing nations to be a part of the discussions that are to take place (FAO, 2008). This letter is important because it was a precursor to the subsequent agricultural policies that have been introduced in more recent years that promote agribusiness and the biotechnology that they advocate.

While the increased yields that are promised by the advocates of GM seeds provide a prominent selling point for this technology, GM seeds fail to readdress the issues that arise due to organisational and distributional problems that exist around food security. Sen's post-Malthusian understanding of food security requires an inquiry into the factors beyond food production. There is a danger in the assumption that food security can be achieved through higher food production, as this would only be true if we existed in a world where food was equally distributed between all sectors of society, instead, "[a] person starves when he cannot establish his entitlement to the food that he needs" (Sen, 1982: 450-451). Food Security cannot be achieved by moving food into areas of famine as what needs to be created is a situation of entitlement and not only a situation of increased food (Sen, 1982: 48).

Collier (2008: 4) returns to the idea of the need for increased food production in order to decease food insecurity as he sees increased supply of food as the answer to lowering food prices allowing the poor increased access to food, however, this is refuted by the concept of the global food regime and the appearance of an international division of labour that has produced an asymmetrical form of food security in which an over-consumption of food is seen in the North and an under-consumption of food is seen in the South (McMichael, 2009b: 288).

Small-scale agricultural producers are the majority producers of agricultural produce and, therefore, their role within agricultural policies needs to be addressed. In order for policies to seriously consider the role of the small-scale farmer, they need to consider a rights-based approach that considers the capacity of smallholder farmers to produce food that can improve food security on a local level (McMichael, 2015: 54). The creation of narratives around GM seeds that focus solely on the scientific based assessments of it fail to take into consideration the political implications that will be faced by an adoption of this technology. By highlighting the 'risk-assessment' approach towards GM seeds, there is an opportunity for researchers to decouple the technology from the social repercussions that need to be addressed (Dibden et al., 2013: 60). Claims that GM seeds will increase food security through increasing crop yields or lowering input costs are

refuted by evidence that increasing trade-liberalisation and globalisation are not, in fact, improving food security in the South but are, instead, replacing family farms with large industrialised farms where the beneficiaries are agrichemical corporations and not the farmers or governments in the South. This move towards business oriented farming addresses profit and not food security especially as the technology appears in states that do not have the institutional capacity to regulate the industrialisation of agriculture (Azadi & Ho, 2010: 161). Food aid that was given to Southern Africa after the drought and subsequent food crisis that happened in the region in 2002 brought up debates about the inclusion of GMOs within the food aid that was sent to the region by governments from the North, in particular the USA. Many governments in the South rejected the food aid, which brought about heavy criticisms; however, the reasons that the governments in the region had for rejecting the GM food aid had wider concerns than they were criticised as they worried that the seed that would be given as food aid would be planted by farmers leading to patenting complications (Zerbe, 2004: 594 & 603). The question of food aid into Africa remained unable to solve the entitlement failure that had been raised by Sen (1982), while forcing Africa closer to GM friendly policies.

2007/8 saw an international food crisis that resulted in food riots in many developing nations. Years of liberal trade policies within these developing nations had created a situation of market dependence that resulted in increased vulnerability to sharp rises in the global prices of commodities. The global food regime that has emerged sees a continued focus on neoliberal market policies with no serious proposals for government regulation in developing nations (Holt-Gimenez & Shattuck, 2011: 112-13). The neoliberal approach was contained within the Green Revolution methods in agriculture that came about in the 1960s and 1970s where claims were made that increased agricultural inputs would positively impact agricultural outputs and, therefore, income for rural farmers. This was considered due to the thought that there would be a greater labour force needed for the larger amounts of outputs that would be seen during the harvest and that higher food production would decrease food prices allowing for an increasing of real wages. This equation is not, however, as simple as this as new inputs are expensive leading to an inability for poor farmers to access them as well as these inputs not automatically increasing the labour demands. These criticisms of the claims made by Green Revolution advocates were coupled with a questionable sustainability of the agricultural practices in terms of ecosystems and biodiversity (Cioffo et al., 2016: 280). The criticisms surrounding the Green Revolution can be understood in terms of the new agricultural technologies that are being advocated for increased agricultural efficiency in the same way in which GM seeds have been where investments in new agricultural technologies do not necessarily increase the need for labour or the real wage leaving the issue of increased food security unresolved.

There is a failure to consider the wealth and knowledge disparity that exists in the global world order when the argument that GM crops will increase agricultural output and, therefore, increase food security considers the problem of food insecurity. The *World Development Report 2008* proposes that the capacity of the small farmer should be a focus of development, however, The Bank continues to advocate for the development of these small farmers to happen through increased trade liberalisation. The approach that it takes does not take into consideration the skewed power relations that exist in favour of large actors within the global market place such as agrochemical corporations (Vanhaute, 2011: 54).

Agrofuels, Animal Feed and Land Grabs

According to McMichael (2010: 626), biofuels "represent the crisis of the current food regime". McMichael suggests that this is done due to the creation of a problematic issue within the neoliberal world order, which dictates that the global market is responsible for ensuring food security via effectively allocating agricultural resources. The issue arises because agrofuels displace food crops as well as the producers of food as corporate agriculture seeks increased profits rather than seeking to increase global food security. The acquisition of land in the developing world for the purposes of agrofuels displaces many small-scale farmers and diminishes their ability to access land. There are a multitude of African countries such as Tanzania, Mozambique, Ethiopia, Ghana, Sierra Leone and Zambia, among others, that have seen large-scale agrofuel investments. Conflict over the rights to access land has arisen, in particular, with regards to land that is deemed as public land. Worrying observations have been made by some that there are trends by governments in Africa to secure agrofuel deals rather than ensuring food production within their countries (Sulle & Hall, 2014: 115-116). Agrochemical corporations such as Monsanto (now acquired by Bayer) and DuPont (now merged with Dow to form DowDuPont) have had significant influence in lobbying for the expansion of the corn-ethanol sector within the US. The expansion of this industry is beneficial to them because it is a means of "bolstering the consumption of genetically modified (GM) corn in the context of the decline of [high-fructose corn syrup] HFCS intake" due to the ability for the substitution of HFCS with other products such as cane sugar and peanut oil that could be produced in climates that are more temperate (Baines, 2015: 305 & 299).

The agrofuel industry allows for a greater capitalist model in agriculture as it reduces the seasonal risks that occur in agriculture, while lessening the difference between labour and time of production though controlling the production factors, such as seeds, and the products that are produced by reducing these down to basic sugars, starches

and oils (Holt-Giménez & Shattuck, 2009: 185). McMichael makes the inference that there has been an abstraction of food through the transforming of food crops to fuel with a disregard for the ensuing ecological impact with emphasis placed on the contribution to the food crises that occurred due to the re-designation of agriculture from food to fuels (McMichael, 2013a: 35-36). The interlinking of the agricultural markets to fuel markets has increased the volatility of the food markets which has had devastating impacts on developing nations at times when there is a surge in the prices of food impacted by the aforementioned volatility of the markets. The instability of these markets occurs due to the increase of price speculation in commodity markets (Elliot, 2008: 3). Changing diets within global populations, especially countries such as China and India, has seen an increase in the consumption of meat. Amplified demand for meat has the effect of diverting land towards growing animal feed over food crops (McMichael, 2009b: 282).

Through the food regime lens, the conversion of food crops to fuel crops further distorts food into a capitalist commodity that disregards the social or environmental impacts that will occur due to this conversion (McMichael, 2013a: 36). Agrofuels provide new areas that agrochemical and biotechnology companies are able to expand into in order to ensure that greater returns are seen (McMichael, 2009c: 826), while the conversion of agricultural land from food crops to agrofuels sees farmers becoming increasingly vulnerable to prices as they will be reliant on the prices offered by ethanol refineries rather than on local and international food markets that are far more diverse in nature (Holt-Giménez & Shattuck, 2009: 183).

The crisis of food prices that was seen in 2007/8 had widespread consequences for global food security networks as some food exporting states stopped exporting food surpluses and food importing states looked to external food production opportunities resulting in 'land grabs' in developing nations. International development assistance strategies combined with philanthropic capital looked to agricultural investment as potential opportunities to develop rural areas and enhance food security, however, questions of the underlying causes of food insecurity failed to be addressed (Sommerville et al., 2014: 240). Through land grabbing and market liberalisations there has been the displacement of food producers (McMichael, 2014: 935).

The change that has occurred in the landscape of African agriculture presents a picture of how the peasantry are being responsibly destroyed, to paraphrase Oliver De Shutter, by the institutions such as the World Bank (McMichael, 2012b: 687). The significance of the adaption of agricultural land for the use of agrofuels in relation to seed systems in Africa is the genetically engineered organisms that enable the processing of new feedstock for cellulosic ethanol, which, due to the high energy needed to create energy

out of biomass, will only be viable commercially if ethanol is genetically engineered (Holt-Giménez & Shattuck, 2009: 183). The diversion of food crops to animal feed and agrofuels further corporatizes agriculture and leads to the dispossession of small farmers in Africa from their land as land grabs occur "by transnational agribusiness, sovereign wealth funds and private entities, in collusion with governments in (and beyond) the South to establish large-scale enterprises dedicated to export production of food staples and agrofuels" (Bernstein, 2014: 1035).

The debate that has arisen in recent years over global land grabs (GLG) is an argument over the occurrence of companies, states and individuals that are both local and foreign acquiring large areas of agricultural land. These actions have been spurred on not only by the desire for foreign states to produce their own food but also due to the rise in commodity prices that has been experienced (Zoomers et al., 2017: 243).

A worrying feature of GLG is that of foreign states purchasing large areas of land in order to produce food that can be exported to their domestic economies. GLG also appear as a means of generating bulk staples. These bulk staples, however, are not intended as food that can be consumed but, rather, as animal feed or biofuels among other things (Bernstein, 2016: 627). The increasing frequency of GLG is explained by the need for multinational companies and state entities to acquire the means of producing resource commodities. These acquisitions have been carried out predominantly in the global South for a variety of purposes. A concern that arises when the issue of GLG is considered is that these deals are often biased toward foreign markets and do not take proper consideration of local communities (Wolford et al., 2013: 190). The governments of the states in which the land is "grabbed" are, most often, involved in the process, however, this certainly does not guarantee that the best deals for the local communities or the domestic markets are ensured. The incentive for governments to encourage private investment in the landholding that the country has is backed by the international communities policies of 'good governance' and neoliberal policies, however, the local communities that are often small-holder farmers who have farmed that land for generations are usually negatively affected as they are employed under worse working conditions or are pushed off the land entirely (Zoomers, et al., 2017: 244).

Chapter 4: The Question of the Rights of the Farmer in Africa

The agrarian question has, according to McMichael (2010: 612), changed in nature within the current food regime, as it has become a question of the consequences of agriculture without farmers as agriculture becomes increasingly industrialised. This question, of course, is vital within the context of Africa as so much of the population relies on agriculture for employment.

The rise of transnational corporations and, with that, transnational capital, has transformed the setting within which capital and labour relations exist. The dispossession of small-scale farmers is a result of the favour that is given to capital in order to increase the market channels for surpluses produced by agro-industry (McMichael, 2010: 612). The agrarian question has, therefore, become one of the politics of 'accumulation by dispossession' (Harvey, 2003).

The traits that have been focused on in the development of GM seeds have disregarded the needs of farmers in Africa as traits such as herbicide resistance within a crop tends to require less labour in the growing of these crops. This is ultimately undesirable in Africa where there is a large supply of labour and, in many countries, a shortage of employment opportunities (Rao & Dev, 2010: 60). Prior to the advent of GM seeds, the privatisation of the seed industry was already to favour the larger scale farmers due to the capital that they were able to generate and the types of crops that they planted which made them attractive sources of profit for the private companies that took hold of the seed industry in Africa (Kugbei, 2003: 80).

New policies that have been introduced by international actors towards agricultural development in Africa will have tremendous impact on the continuing influence that multinational corporations will have on the continent. These policies advocate the use of new agricultural technologies including GM seeds and will further benefit large scale farming practices while undermining small-scale farmers. This section will seek to understand some of these policies and the effect that they have had, and will continue to have, in Africa.

The New Alliance for Food Security and Nutrition

A worrying policy development that has occurred is The New Alliance for Food Security and Nutrition (NAFSN). The neoliberal economic approach that NAFSN takes excludes the needs of small-scale farmers and, rather, works to enhance productivity on larger commercial farms. NAFSN was initiated by the G8 and seeks to improve food security by improving small-scale farmers' access to markets. It is hoped that private investment

will allow for faster adoption of new agricultural technologies, including biotechnologies. Although governments appear to be the main actors in these new multilateral agreements that are struck, multinational corporations have great influence on the policies that are adopted through the advisory roles to government that they hold (Vercillo et al., 2015: 2-6). NAFSN involves actors from the private sector that had plans prior to invest in agriculture in Africa, however, the advantage of NAFSN for big businesses is that it has led to policy reforms that create an environment that is more in favour of corporations than small scale farms. There was little civil society participation in the creation of the policies, which have been ushered in by NAFSN and there is concern that the risks that small-scale farmers might face are not being addressed (Munoz, 2013).

In the case of SSA it becomes significantly important to assess the neoliberal framework that NAFSN is advocating as corporations are both the developers and the promoters of new biotechnology with weak governments left with little choice but to accept the standards that are presented to them allowing multinational corporations to become their own regulators (Vercillo et al., 2015: 6). This creates a worrying power dynamic where small-scale farmers no longer control their own production with great repercussions for food security in Africa.

In the creation of NAFSN there was little to no participation from marginalised groups or small-scale farmers who are most affected not only by hunger and malnutrition but also by the policy changes that will be made due to the new agreements. Rather than raising the concerns of the marginalised and small-scale farmers, NAFSN focuses on the needs of big business and multilateral corporations. Evidence of this focus appears when the policy commitments to focus on specific areas are observed as these areas fail to include marginalised groups. These targeted areas will, instead, see agro-industrial development take place with the idea that increased infrastructure will encourage more investments, however, the infrastructure planned does not extend to rural and marginalised areas outside of targeted 'corridors' (Herre et at., 2014: 2). The European parliament has, recently, been openly critical of the policies of NAFSN saying that agribusiness is being advocated to the detriment of biodiversity as well as smallholder farms (The Guardian, 2016).

Food systems in developing countries in Africa threaten to be taken over by large corporate agriculture as policies are adopted that favour big business despite small holder farming techniques having the potential to allow for more sustainable farming techniques. An emphasis on industrial agriculture ignores the needs of community-based agriculture and the wealth of knowledge that small-scale farmers have of a sustainable approach to agriculture and localised requirements. The needs of large scale

and small-scale producers differ where an emphasis on increased crop production alone does not take into account the social context of local producers (McMichael, 2015b: 55-6).

The actions that are being taken through NAFSN have been criticized for their narrow approach to food security that sees simply the availability of food as the problem that will be addressed rather than the structural problems that are faced by many of the partner states in Africa. Increasing the production of food in SSA will not, necessarily, improve food security or nutrition on the continent. There has not been enough attention paid to context specific problems that make the adaption of new technologies difficult or, in some cases, detrimental to development on a community level (Vercillo et al. 2015: 6). The market-based strategies that are adopted with the advocating of a "trickle down" effect prioritises the needs of large-scale investors rather than the needs of the poor or the majority neglecting the resulting resource grabbing that can occur. The profitability of such initiatives looks to "what is profitable for distant markets and retailers" instead of policies that will protect domestic food security (McMichael, 2015b: 56).

In relation to seed systems NAFSN places a heavy focus on GM technology and advancements within agriculture in Africa are seen, by NAFSN, to be intrinsically linked to the adoption of GM seeds. This generates a disturbing picture of the results of the introduction of policies in line with NAFSN due to the issues that have already been raised in this paper around the question of GM seeds. The role of African governments has become one that is predominantly focused on reducing the risks for investors within the agricultural sectors of their countries instead of pushing to uphold responsible investments in order to protect their citizens (Vercillo et al., 2015: 7). This focus on GM seeds within these new policies will work to advantage larger corporatized farms while further undermining the seed systems that exist within the states in which they will be implemented. Most of the countries that are part of the NAFSN have begun many initiatives to harmonize PVP laws at a regional level and pledged that the individual states will alter their seed laws so that they are in line with UPVO 1991 (Jones, 2015: 11).

The largest donors within NAFSN were, according to Patel et al. (2015: 24), the Norwegian fertilizer corporation Yara and the Swiss seed company that is amongst the four biggest companies in the world, Syngenta. The companies that have investments within the NAFSN point to the type of agriculture that can be expected to be supported by the programme such as larger-scale chemically intensive, export oriented agriculture that will see foreign expertise remaining in the private sector (Ibid, 2015: 25). The companies that are involved in the internationally supported programme have vested

economic interests in GM seeds and so it stands to reason that an impartial approach towards the seed systems in Africa cannot be anticipated.

The 'New' Green Revolution and The Comprehensive Africa Agriculture Development Programme (CAADP)

Capitalist philanthropic actors have become part of seemingly 'pro-poor' policies that are promoted throughout Africa. The World Bank, in its 2008 development report, supported the idea of public-private philanthropic partnerships as inherent to achieving the goal of reducing world poverty. The goal, they assessed, would be best achieved through correcting market failures and engaging in public-private partnerships in the agribusiness sector. These partnerships were deemed to be able to allow for biotechnology products to be available to increased numbers of farmers, particularly smallholder farmers in the rural areas. The Alliance for a Green Revolution in Africa (AGRA) was an example of 14 of these partnerships including capitalist philanthropists such as the Gates Foundation and Syngenta (Morvaridi, 2012: 1195-6).

The Green Revolution technologies that were advanced in the 1970s saw the displacement of millions of smallholder farmers by either, the larger, capitalised farmers or, due to their soils becoming infertile and the drying up of credit that had been subsidised. Many farmers, after the consequences of the Green Revolution, returned to agroecological farming methods, however, these methods remained in the margins as they were not included in large scale agricultural development plans (Holt-Giménez & Altieri, 2013: 92-4). A new Green Revolution, promoted through private-public partnerships such as AGRA, seeks to improve the technology that is used in small-scale farming throughout Africa with a specific emphasis on new seed technologies. Philanthropic capital has formed partnerships with multinational corporations such as Monsanto to produce seeds that will be specifically suited to conditions in Africa. Drought resistance will be one such modification of the seeds in order to ensure that there can be increased yields during times of drought allowing farmers to invest in fertilizers. The corporations that are investing in these technologies are, of course, set to gain financially due to the implementation of their technologies within Africa (Morvaridi, 2012: 1196).

Traditional agricultural systems present a barrier to new agricultural technologies because it is knowledge intensive rather than capital intensive. Instead, Africa presents new markets for capital in the form of agricultural inputs, including GM seeds, should new agricultural technologies be adapted. Increasing Africa's link to global markets also allows for an expansion of capital into new markets in terms of products as, with reduced local markets, African markets will have to rely on importing food (Thompson, 2014: 390).

Philanthropy that is conducted by private capitalists or foundations has gained great prominence in the agricultural development aid with large sums of money being put towards "solving social problems using business methods" (Thompson, 2014: 392-3). The venture philanthropy that has appeared has manifested in a particular approach to agriculture that affects Africa's seed systems due to the push towards a singular outcome of calculable yields, which becomes highly apparent with AGRA. Many civil society groups have advocated the alternatives that are available to policies that favour large-scale farming. The International Agricultural Assessment of Knowledge Science and Technology for Development (IAASTD) has recognised the value that lies in agroecological smallholder agriculture where strategies of productivity are combined with those of ecological sustainability and biodiversity (Holt-Giménez & Altieri, 2013: 94).

CAADP is an African based initiative that is promoted by AGRA (Thompson, 2012: 348). According to CAADP's website, it is a framework for the transformation of food security, economic growth and wealth creation for the African continent (About CAADP, nd.). It was initiated by the New Partnership for Africa's Development (NEPAD) and its stated main objective is to foster economic growth through agricultural development in Africa. There is an emphasis by this initiative for African led development, which differs from policies that were embarked on in the past. It has been taken up in varying degrees from state to state within the continent and its intention is to act as a framework through which state policies can operate (Kolavalli, 2010: 1).

The Green Revolution had the effect of negatively impacting the environment in Africa as well as ignoring crops that are traditional to the region and led to increased amounts of land and resources accumulating in the hands of smaller number of the wealthier members of society. At the same time, it was noted that small-scale farmers provide more employment than large-scale farms in Africa. There has, therefore, been a call by international development agencies for increased investment in rural agriculture. CAADP became a part of this change in thinking for development (Clover, 2003: 12). The theoretical focus that the programme promises to have on rural and smallholder farmers does not translate in to the practical results of CAADP and smaller actors are consistently excluded from workshops and consultations that are meant to involve stakeholders (Thompson, 2014: 397). The programme also sees the occurrence of biopiracy as corporations are able to gain control over the seeds that are bred from African cultivars. CAADP has also prioritised the global market in its policies in order to achieve food security asserting that African farmers will profit should they produce goods that can compete on the global market. In terms of African seed systems, seed laws will be made uniform across many African countries so that royalty payments will

be easier to enforce and collect further corporatizing seed systems across Africa (Thompson, 2012: 348).

The CAADP forms part of increasing number of partnerships that are seeking to formalise seed systems in Africa (Ojiewo et al., 2015: 44). This process will allow for further control of the agricultural industry by corporations and will undermine the role of the farmer. As was previously discussed, PVP frameworks that are being ushered in through policies such as CAADP will aid the extraction of profit from investments in Africa. AGRA is, of course, not advocating explicitly for GM technologies to be used, however, the channels that are being created through these programmes to spread hybrid seeds will pave the way for GM seeds to be spread via these same channels (Pschorn-Strauss, 2012: 8). The harmonising of PBRs throughout Africa through several initiatives has been criticized by many civil society groups for undermining the rights of smallholder farmers in developing countries (Munyi et al., 2016: 96). Several regional organisations throughout Africa such as The Association for Strengthening Agricultural research in Eastern and Central Africa (ASARECA) and the Central and West African Centre for Agricultural Research and Development (CORAF/WECARD), among others, are working to build programmes that will have the capacity to implement CAADP alongside the USAID Feed the Future programme, which aim to ensure that a quarter of the seed within the region is certified seed. These certified varieties of seed will replace the farmer's varieties (Pschorn-Strauss, 2012: 30).

Case Studies

- South Africa

South Africa provides an interesting case study with regards to seed systems, as it was the first developing country to plant GM crops. This occurred through the planting of GM maize in the country and the success or failure of these GM maize trials were thought to be a determining factor as to whether or not other African countries would adopt the technology (Gouse et al., 2005: 84). South Africa can also provide an insight into smallholder farmer experience with GM seed (Fisher & Hajdu, 2015: 304). The South African seed sector, however, is significantly different to that of other African countries as the seed systems in the country are predominantly commercially bred and the distribution and production of seed is generally controlled by corporate companies and is geared towards the needs of the large-scale commercial farmer. The breeding of seed has also extended beyond maize and now there are a large variety of crops that are certified (Swanepoel, 2016: 6).

The history of seed breeding in South Africa began in the late 1950s. Sensako led the South African maize-breeding programme in 1959; however, other companies such as

The Northern-Transvaal Cooperative, Sabi, Schoeman and Pannar followed this. These developments came soon after the world's first commercially successful single-cross hybrid had been created just north of South Africa in Rhodesia (Jones, 2015: 17).

The dominance of commercial large-scale farming within South African agriculture creates an environment where it is near to impossible for smallholder farmers to compete in an effective way on entering the market (Swanepoel, 2016: 6). The seed systems in South Africa fall mainly into two distinct sectors due to the historical politics of the country. These two sections are the dominant white-owned commercial section that includes hybrid and GM seeds and the predominantly black owned smallholder, resource poor section. The seed systems in South Africa have been shaped by specialised commercial seed markets that were developed with the needs of the large-scale farmers in mind. These systems began to be developed in the 20th century and it was during this century that PBRs were introduced into policy (Greenberg, 2012: 19).

From 2003 to 2009 the South African government initiated the Massive Food Production Programme (MFPP), which sought to reduce poverty in rural areas by increasing the yields of maize crops in the Eastern Cape province. It aimed to do this through a subsidisation of hybrid and GM maize seeds as well as fertilizer and mechanisation. The MFPP had a narrow focus of raising yields and was remiss in its consideration of the nuanced role that farming plays in the broader contexts of Eastern Cape small holder livelihoods (Fisher & Hajdu, 2015: 305).

Within the 1991 International Convention for the Protection of New Varieties of Plants (UPOV), there is a clause that stipulates farmers' privilege, however, there are significantly different interpretations of this amongst those states that have national PBRs systems in place. South Africa's 2015 version of the PBR legislation, however, mirrors the UPOV 1991 legislation in so much as it needs the Minister to specify several factors with regards to the clause allowing for the regulator to have the option of giving smallholder farmers greater privilege in terms of PBRs within South Africa (Munyi et al., 2016: 98). The PBR legislation that exists in South Africa, including the farmers' privilege provision are little known to the rural small holder farmers in South Africa and, during the consultation process of the amendments that occurred to the farmers' privilege provision, smallholder farmers were not involved in the discussion due to the lack of knowledge that they had of the existence of the legislation (Netnou-Nkoana et al., 2015: 1). At the time of the creation of the Genetically Modified Organism Act 15 of 1997 in South Africa commercial crops of GM seeds had already been planted. There were also close ties between the council that made up part of the structure that would work to implement the act and GM research initiatives. During the initial decades of GM seed

adoption in South Africa there were also significant lobby groups that advocated for its use (Wynberg & Fig, 2013: 20-1).

Maize became a staple crop over the traditional crop, sorghum, in South Africa, in part, due to the constraints that were placed on labour in rural areas as most families had members of the household that were employed as migrant labour and Maize was a crop that was far less labour intensive. Maize hybrids and GM maize seed that are available in South Africa are designed predominantly for large scale, input and capital intensive farming and need to be repurchased every year and have hardly been adopted in rural areas due to these constraints (Fisher & Hajdu, 2015: 305). There is an argument by the South African government that the unclear definition of 'farmer' has been manipulated by large-scale commercial farmers, which has led to a decrease in plant breeding initiatives. It is important, however, that smallholder farmers' rights continue to be protected as part of an attempt to address poverty levels in rural areas in South Africa and to ensure that diversity within crop genetic resources is maintained (Greenberg, 2012: 30-1).

According to Cochet et al. (2015: 45), the numbers of commercial farms that appear in South Africa have decreased indicating the consolidation of farms. Alongside the decreasing number of farms, there in an increase in the average size of the farms that are found in South Africa. It is important to assess the phenomenon of land grabbing that occurred in South Africa at the time the relocation of black South Africans to the Bantustans. As people were moved off their land and relocated to places that had obvious agricultural weaknesses, their agricultural production ceased to be as favourable as it had been in the past and was touted by white agricultural experts as being a result of inefficient 'native' agricultural techniques. The land that the local populations had been moved from was redistributed to white farmers that would run commercial farms benefiting from governmental support (Cochet et al., 2015: 25 & 28).

In 2011 the Census in South Africa recorded that about 2.5million households in the country were involved in traditional subsistence farming. This large number of people only has access to around 14 per cent of the country's available farmland and the distribution of land is an obvious legacy of the previous apartheid system. The majority of the funds that have been made available for agrarian reform and black economic empowerment policies has been allocated to a relatively small number of 'emerging' black farmers that are transitioning to commercial farming leaving very little to no support available for smallholder subsistence farmers. Commercial farming, however, only contributes 3 per cent to South Africa's GDP (Black, 2016: 17). The gulf between small scale, rural farmers and large-scale, commercial farmers is one that is difficult to address within policy and has led to a contradiction between the promotion of

traditional farming practices and the proliferation of GM and hybrid seed (Wynberg et al., 2012: 7).

- Malawi

Malawi provides an apt case study in order to assess the corporatization of seed systems within Africa and the effect that this has had on farmers in the country as 85 per cent of the citizens make their living off agriculture, which also makes up 90 per cent of the national export earnings. The agricultural sector in Malawi is made up of both smallholder and large-scale farms; however, the smallholder sector is the dominant contributor to the national economy (Brooks, 2014: 18). Malawi has also included the previously discussed neoliberal agricultural agreements within its recent policy formation (Patel et al., 2015: 26). The subsidy programmes that have been initiated in Malawi are an important feature of the politics of the agricultural industry in the country as international commercial seed companies have been advantaged over the local producers and local seed varieties (Chinsinga, 2011: 59). The seed varieties that are available in Malawi have changed dramatically due to government subsidy programmes that have favoured formal, commercialized seed systems over the local, informal seed systems (Kerr, 2013: 872).

The dependence that the country has on agricultural production and maize in particular has had the effect of the country turning to food aid in years of drought in conjunction with the removal of fertilizer and seed subsidies that had once existed in the country. Malawi has been heralded as an example of the progress that can be made through Green Revolution initiatives; however, the policies that have been adopted in the country were chosen because of the potential that they held for market dominance for multinational seed companies and the political advantage that would couple this for politicians (Chinsinga, 2011: 59). Maize is a crop that is of particular importance within Malawian agriculture and has been since the 1800s, however, since independence, the prominence of maize has grown exponentially as it began to be used as a tool by politicians amongst the country's large portion of smallholder farmers. Historically, colonial agricultural practices in Malawi would present the beginnings of the erosion of seed sovereignty in the country. This occurred through the promotion of selected crop types and seed varieties, which began to shift the control of seeds from the African farmers to the colonial power and their emphasis on crops for export. The more diverse crops that had existed in Malawi prior to the colonial regime such as the indigenous sorghum, finger millet and a mix of legumes began to be replaced by maize during the first food regime (Kerr, 2013: 872-5).

During the second food regime in Malawi the 'modernising' of agriculture became a focus with the goal of increasing crop yields. The colonial period had the effect of shifting the view towards African seed varieties to one that saw them as inferior when compared to European seed varieties (Kerr, 2013: 875). The post-colonial period in Malawi increased smallholder reliance on external inputs for agriculture through government policies and international factors. The government continued to encourage crops that were grown for export and, with the structural adjustment policies that were introduced in the 1980s, the fertilizer subsidies that had been brought into the country since independence were eradicated (Kerr, 2005: 59). Fertilizer subsidies were reintroduced in 2005 through the Farm Input Subsidy Programme (FISP) and were credited with increasing the agricultural output of the country in the seasons after their implementation, however, the rainfall in the seasons were higher than in previous years and the negative impact that fertilizers have on the environment are numerous, particularly in regions that do not always have constant access to water. FISP was used as a political tool to gain support from a largely rural and small-holder farmer based electorate rather than being selected as a programme that would best increase the agriculture in the country (Ressnick, 2012: 221-2). The environmental consequences of increased fertilizer use in Malawi is representational of multiple instances during the push for a Green Revolution that would have lasting environmental effects for many countries.

More recently, Malawi was to sign its agreement to commit to NAFSN in June 2013, which was later than many other countries. Malawi's commitments to the agreement, however, were influenced by the fact that Malawi was in need of foreign direct investments and its recent encouragement by the International Monetary Fund (IMF) to devalue its currency. Within Malawi, programmes such as NAFSN and AGRA, alongside USAID, have advocated for agrodealership networks that that have displaced the services that were provided by the state Agricultural Development and Marketing Corporation (ADMARC) in favour of privatised agricultural services. The role of the state has not disappeared even though it will no longer work as the mechanism of delivery of new technologies. Instead, the state still functions as the arbiter of the agricultural policies and models that will be ushered into the country (Patel et al., 2015: 27-29). AGRA will be greatly involved in replacing current seed systems within Malawi and, in 2009, they launched the African Seed Investment Fund (ASIF) that will give seed companies risk capital in eight Eastern and Southern African countries of which Malawi is one. This initiative seeks to improve the delivery of certified seed to smallholder farmers. Creating the infrastructure for new markets within Malawi and Africa paves the way for further commercialisation and greater involvement by multinationals of the seed industry in the future (Pcshorn-Strauss, 2012: 32).

Of particular importance for seed systems within Malawi is AGRA's Programme for Africa's Seed Systems (PASS) which will support the dissemination of certified seeds through Malawi, provide grants for seed companies, strengthen agro-dealer networks in Malawi and provide funding for the development of new seed varieties. Although AGRA will seek to provide funding for the development of new varieties, currently the larger companies that are operating in Malawi such as Monsanto, Demeter and Pannar are undertaking the development. With the AGRA policies and programmes that have been introduced into the country, government does not offer support for the saving or exchange of uncertified seed (Banda et al., 2014: 18 & 44).

There is evidence in Malawi for the suggested success of agroecological methods for improving crop yields, however, these examples are not often reported (Patel, 2013: 49). The methods of one such example encourages farmers to use intercropping and to plant legumes between maize crops (Msachi et al., 2009). These alternative agricultural approaches are important due to the fact that Maize requires far more nutrients in order to grow successfully. Intercropping methods, therefore, provide increased nutrients to the soils as well as providing an alternative source of nutrients for a population who suffers from malnutrition (Kerr et al., 2009: 1466). The diversifying of the varieties of seeds that are used in the country would be beneficial to the country in order to create an agricultural industry that is sustainable. According to a study by Kerr et al. (2007), farmers in Malawi were less likely to grow legume crops due to the limited access that they have to legume seeds as well as the limited genotypes available among other things. Alternative approaches to agricultural development in Malawi could help to counter the results that have been incurred by the Green revolution strategies that have been applied in the country as the commercialisation of plant genetic resources has played a role in the dwindling availability of plant genetic resources that has been observed. Currently, nutrition policies and agricultural and seed policies are at odds with each other as nutrition policies seek to diversify local crops in order to diversify nutritional intake while agricultural and seed policies will work to decrease the diversity that is available to farmers be it an intended or unintended outcome (Swanby et al., 2016: 15).

Chapter 5: Conclusions and Possible Alternatives

With the food crisis that appeared in 2007/8 there was a renewed interest in agriculture in the developing world. New agricultural technologies, such as genetically modified seeds, have been advocated as a possible solution to the world's food insecurity by development agencies and agribusiness; however, increasing crop production through GM seeds fails to address the structural problems within the food insecure nations. Further, the corporatisation of agriculture through the increased use of GM seeds and the patents on these that are held works to undermine the rights of smallholder farmers who make up a substantial proportion of Africa's agricultural sector. The alternatives that are available in the form of agroecology and some of the principles that appear in ideas of food sovereignty provide an alternative trajectory along which agriculture can proceed that would allow for greater sustainability and increased food security for the individual. Through food regime analysis, it becomes clear that GM technology will continue to corporatize the global agricultural industry with significant effects on the development of African states as power in the agricultural industry continues to shift to international corporations that are based in the North. Green Revolution technologies provide a means for agrochemical corporations that are increasing in size through mergers and acquisitions to gain further control of the means of production within agriculture in Africa. Seed systems in Africa provide an insight into this growing control as seed has continued to be increasingly held in the hands of private industry rather than in the hands of the farmer as a historicized study of seed systems in Africa has provided evidence of the increasing way in which these seed systems have been undermined in favour corporatized forms of agriculture (Kloppenburg, 2014).

The dominance of larger seed corporations within Africa is observed in the case studies that were presented and provide insight into the diminishing of seed variety and, therefore, an increase in monoculture crops. This is true more generally throughout Africa as specific seeds are promoted through government policies that are introduced. This was also seen within the case study of South Africa. In both of the case studies, the globalisation of agriculture led to a diminishing of the ability of small farmers to participate effectively within the industry and, rather, large corporate farms are favoured through policies that encourage globalisation with the increased involvement of corporations within the agricultural industry through their technologies. The continued rise in transnational corporation involvement in agriculture in African through the patenting of seeds has led to a decrease in the variety of crops that are grown on the continent which has grave consequences for the sustainability of agriculture and food security in Africa. The issues surrounding food security that were introduced by Sen (1982) that consider entitlement failure suggest that an undermining of the small scale farm will lead to greater entitlement failure as small scale farmers are dispossessed from

their means of income generation as they are disposed from their land due to the favouring of large scale farms that is observed through the agricultural policies that are being introduced It is necessary to consider the social consequences of policies that have begun to be implemented across Africa in order to understand the real effects that they will have (Dibden et al., 2013; McMichael, 2015b).

Van der Ploeg suggests that there is a disconnection between the production and the consumption of food as agriculture becomes increasingly corporatised. In tis was agriculture is becoming further and further removed from nature and, with this, has been a rise in the 'food wars' (van der Ploeg, 2008: 1-2).

In recent years, van der Ploeg argues, the peasantry has been rediscovered in both the developing and the developed world as the world experiences events such as the financial crisis. The peasantry is seen as something that is fluid in its position within history and so, the marginalisation that the peasantry has experienced has led to the reformation of the peasantry in recent years (van der Ploeg, 2008: 1-3).

There us a false perception, according to van der Ploeg (2013: 3 & 5), that the peasantry is backward in nature, however, he argues, farmers are able to adapt to the changing forces of the agricultural industry. The nature of the peasantry is, in fact, to increase yields so as to create increased value of production. The increasing of production is not done, by peasants, through the acquiring of increased amounts of lands and, therefore, there is a focus on the necessity to increase available yields, which is a fundamental factor in ensuring a global increase in the production of food (van der Ploeg, 2013: 5-6).

Food Sovereignty

The food sovereignty movement is of particular relevance to the question of genetically modified seed as 'the seed' is central to agriculture and, therefore, food production. Sovereignty over seed is increasingly lost as the control that transnational corporations have over the genetic material of seed grows (Kloppenburg, 2014: 1226). The principle of food sovereignty is intrinsically linked to the idea of 'seed sovereignty' that allows farmers to determine the types of seed that they plant and use as well as having control over the production and distribution of these seeds (Kerr, 2013: 870).

Due to the global nature of increased corporatisation of agriculture, a facet of food sovereignty seeks to give rights to those groups that would otherwise see a lessening of their voices in terms of agricultural policies. *La Via Campesina* represents a social movement that has sought to bring small-scale farmers to the table in discussions that

various bodies have over issues of international food and agriculture (Brem-Wilson, 2015: 73). The movement has advocated the right for people to eat food that is healthy and culturally appropriate as well as sustainable in the way that it is produced, while promoting the right for agricultural systems to be defined locally rather than on a global scale (Holt-Giménez & Altieri, 2013: 95). Within food sovereignty, there is a redefining of food security to include ideas of the politics and the relations of power around food. It is, however, difficult to understand how the conceptualising of food sovereignty has changed since its conception. Patel produces an approach to the wide-ranging definitions that are available which asserts that there is an inherent *right* to play a role in the shaping of food policies, rather than the *privilege* that a small number of large corporations have over food policies (2009: 667).

The Committee on World Food Security (CFS) represented a strengthening of the food sovereignty movement as it began to represent the voice of civil society in the discussions that took place around food security. The reform that occurred within the committee took place at a good pace and this can be attributed, in part, to the contribution of social movements and NGOs that sought to see the recognition of "food producing constituencies in transnational food and agricultural policy-processes" (Brem-Wilson, 2015: 77-8). This is of significance because the food sovereignty movement arose in retaliation to an increasingly globalised agricultural system where increased liberalisation of trade depleted domestic agricultural sectors, particularly in the global South. The exact nature of the complexity of global environments results in the need for more than one approach to agriculture to include the domestic needs of a particular region (McMichael, 2014: 934). The structure of *La Via Campesina* reflects the distrust of policies that are dictated from single bodies of authority at the top. The movement, instead, does not have a single policy making unit but any organisation that is to be a part of *La Via Campesina* must support their principles, which have their basis in food sovereignty principles (Patel, 2009: 669). In response to the food crisis that took place in 2008, agribusiness suggested that the solution would involve a standard remedy that could be applied to all regions in the form of free trade and genetically modified seed, however, movements such as *La Via Campesina* and those who, like it, advocate food sovereignty, stress the importance of including the voices of those that are most affected by changes within the producing and consuming of food where policy making strategies are concerned (Schiavoni, 2009: 682).

Food sovereignty is a movement that considers the "importance of revaluing farming for domestic food provisioning and for addressing social inequalities" and is not just a peasant movement (McMichael, 2014: 935). Of course, Bernstein (2014) discusses the term 'peasant' in relation to the food sovereignty movement in terms of what constitutes its definition. There is, surely, a difference between landowners and farm workers as

well as the difference that exists between medium and small-scale famers. In part, food sovereignty has come to mean an opposition to the corporate food regime that has emerged but what constitutes this other is not unitary in nature. The differences that exist between actors within the agricultural sector in Africa are recognised through the region, locality or community specific approach to agriculture that food sovereignty encompasses. Through globalisation and in the globalised food regime there is tendency for the international institutions (situated predominantly in the global North) to apply blanket approaches to global development initiatives. These initiatives have, more often than not, fallen along neoliberal market based approaches. The food sovereignty approach calls for nations to have the right to determine their own policies depending on the specific requirements of that region (Martinez-Torres & Rosset, 2014: 983).

Van der Ploeg (2013: 7) makes the case that, through small-scale farming, there is the potential for an increased yield to be achieved through the 'emancipatory aspirations' of the peasantry. This adds support to the idea that food security could be best achieved through a food sovereignty approach as the peasantry continues to increase their productivity and yields of their crops. The ability for the peasantry to increase agricultural productivity suggests that small-scale farming within the peasantry could be the best way to increase global food security (van der Ploeg, 2013: 10).

What becomes central to the movement is reassessing domestic food markets in order to ensure food security for citizens as well as keeping the interest of society at the forefront of policies in terms of ensuring the sustainability of agricultural practices rather than the use of mono-crops and chemicals (McMichael, 2014: 936). There are, however, problems that need to be considered in assessing the feasibility of food sovereignty principles. One such problem is costs that will be involved for smallholder farmers in substituting export-oriented crops for crops destined for the local market as well as the consideration that dietary preference, after years of globalisation, includes products that may not be available locally (Edelman, 2014: 916). It should also be recognized that there are regions that are not able to produce enough food locally for their populations. This issue is exacerbated by climate change (Ibid: 918).

An alternative to the restricting intellectual property rights has appeared in the form of the Open Source Seed Initiative (OSSI) in the United States. The OSSI is working towards increased sharing of germplasm with the intention of encouraging public plant breeding. It also wants to combine the skills of both plant breeders and plant scientists through 'open source' licencing of plant genetic material and seed varieties, which would allow for seed saving practices to take place as well as encouraging seed saving amongst farmers (Kloppenburg, 2014: 1226). There is scepticism, however, of the initiative, particularly in the global South, due the view by OSSI that there should be financial

reward for breeders in the form of royalties. The OSSI is also not averse to GM technologies through an open source principal (Ibid: 1227). The principles of food sovereignty do include the practices of seed sharing and so features as an alternative to the corporatization of seed systems that has been outlined in previous sections of this study (Bernstein, 2014: 1045). The idea of an 'open source' approach to seed technologies provides an interesting distinction between corporate biotechnology and, simply, biotechnology on which Kloppenburg has provided an interesting discussion (Kloppenburg, 2014 in Bernstein, 2014: 1053).

Agroecological systems work as opposition to the industrialised agriculture that has been promoted through the 'new' green revolution as these systems shift away from fossil fuel based systems of production that are focused on export. Instead, agroecology encourages local or national production of food that relies far more on local or traditional knowledge. Through this differentiation there is a focus on a prolonged understanding of resolving the food insecurity that is seen across the developing world and these practices are viewed as being a viable means of increasing agricultural production (Putnam et al., 2014: 169). There is criticism that small scale farming will not be able to create the agricultural surpluses that are require to feed the ever growing urbanised population (Bernstein, 2014: 1045) and so it is vital to consider the advantages that may exist within agroecological farming methods. Agroecology has its roots within traditional farming methods and smallholder systems. It is also knowledge intensive in contrast to the capital intensive nature of commercialised farming as agroecology does not rely on external inputs. The intention of agroecology farming is to generate the ability for small community based farms to improve farming methods through a sharing of knowledge (Holt-Giménez & Altieri, 2013: 92). There is, certainly, an emphasis on an approach to the food system in its entirety, rather than as separate parts. The definition that is given by Francis et al. (2008: 100) is that it is "the integrative study of the ecology of the entire food system, encompassing ecological, economic and social dimensions." Agroecology is, essentially, based on replicating nature within farming production in order to reduce the need for external inputs (De Schutter, 2010: 18).

As the GM seed industry has expanded and been concentrated, there have been fewer alternatives for farmers in their choice of seed as most of the independent seed companies have little faculty for research. Purchasing GM seed from agrochemical corporations does not give the farmer ownership of the seed but, rather, through contract law, the farmer licences the use of the seed from the company and, with its use, the corporation forsakes any liability for the seed or what it produces (Kloppenburg, 2014: 1229).

The state poses an interesting problem in the discussion of food sovereignty as the level on which sovereignty is held is approached. Should sovereignty be associated with the producer of food or can state led initiatives coincide with the food sovereignty principles? In order for food sovereignty to be achieved there is the need for transnational agribusiness and international trade to be regulated so that domestic markets, including small-scale farmers, can be protected (Bernstein, 2014: 1050). It is vital that there is structural change in conjunction to the technical changes that are occurring within agriculture and the structural change can only occur with the political pressure that is provided by social movements (Altieri, 2010: 128-9).

The required political support that is needed for food sovereignty principles to be adopted into policy has still not been achieved and there is a myriad of issues that need to be considered when reflecting on the possibility for increased food sovereignty principles to be brought into agricultural development ideas on a national level (Winfuhr & Jonsen, 2005: 36). The concept does, however, provide an alternative to the corporatized seed systems that have progressively appeared in Africa through the aforementioned policies that are being adopted and the ever-accumulative control of seed systems by transnational corporations through PBRs and GM seeds.

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