Agroecology as an Alternative Vision to Conventional Development and Climate Smart Agriculture

Pimbert, M

DOI 10.1057/s41301-016-0013-5
ISSN 1011-6370
ESSN 1461-7072

Publisher: Springer

Agroecology as an Alternative Vision to Conventional Development and Climate-smart Agriculture

Michel Pimbert
E-mail: michel.pimbert@coventry.ac.uk
Running Header: Agroecology as an Alternative Vision

Abstract: After briefly describing the origins and recent history of agroecology, the author critically reflects on what makes agroecology fundamentally different from climate smart agriculture (CSA). This article focuses in particular on the more transformative elements of the agroecology and food sovereignty paradigm to clearly identify overlaps and divergences with CSA and explore its incommensurable values against conventional development frameworks.

***Keywords**:* agroecological transformation; food sovereignty; circular economy models; deepening democracy; climate resilient food systems

Introduction

Agroecology, which was barely recognized or promoted within official circles only five years ago, has become more centre stage in policy discourses on food and farming. For example, the European Union's Standing Committee on Agricultural Research in its third Foresight Report calls for research to create 'radically new farming systems' that must 'differ in significant respects from current mainstream production systems' (EU SCAR, 2012). High priority should be given to approaches that 'integrate historical knowledge and agroecological principles'. Similarly, the report of the International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD, 2009) advocates reducing the vulnerabilities of the global food system through locally based innovations and agroecological approaches. The UN Special Rapporteur on the Right to Food –in his report on *Agroecology and the Right to Food* presented at the United Nations Human Rights Council in 2011 – has also helped put agroecology on the map of the international community and policymakers (De Schutter, 2010). And the contribution of agroecological innovations to climate change adaptation and mitigation was widely emphasized by civil society and scientists at the recent 21st yearly session of the Conference of the Parties (COP21) to the 1992 United Nations Framework Convention on Climate Change (UNFCCC) in Paris.(1).

This growing international recognition is good news for the proponents of agroecological approaches to food, farming and land use. However, agroecology means different things to different people. As has happened before with words such as 'sustainability' or 'participation', the meanings of agroecology are now increasingly contested and re-interpreted by different people and interest groups. Current debates in France are particularly noteworthy in this regard. In 2012 the French Minister of Agriculture Stéphane Le Foll, declared that France aims to become *'the champion of agroecology'* in Europe. The French National Institute of Research in Agriculture (INRA) has introduced agro-ecology in its 2010-2020 strategic research plan (INRA, 2010). However, civil society groups and farmer networks argue that the French government proposes a 'form of agroecology very distant from what they hope to see promoted for our agriculture' because it encourages, for example, no-till methods with herbicide sprays. This coalition of civil society organizations and small farmers

want the French government to promote instead an agrarian reform that favours a diversified organic agriculture on a human scale. For them: *'*Agroecology is synonymous with greater producer-consumer proximity, employment creation, a solidarity economy and diverse food products for citizens' (Fédération Nature & Progrès, 2012).

Simply put, the term 'Agroecology' is now being used and reworked by different actors as part of a normative vision of the future that either seeks to conform to the dominant industrial food and farming system, or to radically transform it (Levidow *et al*., 2014). An example of the former is the concept of Climate Smart Agriculture (CSA) as developed by the UN Food and Agriculture Organization (FAO, 2010) and promoted by the Global Alliance for Climate Smart Agriculture (GACSA, 2014). In sharp contrast, agroecology developed within the paradigm of food sovereignty has a more transformative intent, theory, and practice.

This article argues that, taken together, agroecology and food sovereignty represent an alternative paradigm to climate smart agriculture and conventional development. After briefly describing the origins and recent history of agroecology, it critically reflects on what makes agroecology fundamentally different from climate smart agriculture (CSA). It focuses in particular on the more transformative elements of the agroecology and food sovereignty paradigm to clearly identify its incommensurable values and its overlaps and divergences with CSA and its associated model of development.

Origins and brief history of agroecology

At the heart of agro-ecology is the idea that agro-ecosystems should mimic the biodiversity levels and functioning of natural ecosystems. Such agricultural mimics, like their natural models, can be productive, pest resistant and nutrient conserving.

The term 'agroecology' was first coined in 1928 by Bensin (Wezel and Soldat, 2009) and a number of pre-World War 2 scientists had already begun to merge the sciences of agronomy and ecology together (Gliessman,1990). However, it was the increasing awareness of the environmental impacts and pollution caused by industrial farming that really set the stage for closer links between agronomy and ecology in the search for more sustainable agriculture(s) (Herber, 1962; Merrill, 1976; Dalgaard *et al.,* 2003). In the USA, the work of Miguel Altieri (1987) and Stephen Gliessman (1990) in particular helped put agroecology on the map in the early 1980s. Around the same time, Pierre Rabhi championed agroecological approaches in France and in West Africa where he ran training courses in agricultural ecology at the CEFRA (*Centre d'études et de formation rurales appliquées*) and the Gorom Gorom Agroecology Centre in Burkina Faso, which he set up in 1985 (Rabhi, 1989). The conceptual foundations of Altieri and Gliessman's agroecology are firmly rooted in the science of ecology and agroecosystem analysis. Rabhi's approach built on ecology and was explicitly grounded in the tradition of anthroposophy (Steiner, 1924) and indigenous cosmovisions, emphasizing a life affirmative ethics with a central focus on the Earth rather than only the agroecosystem. In their unique ways, these pioneering agroecologists and their early followers have helped to frame the foundations of today's transdisciplinary agroecology.

Initially, 'agroecology' strongly focused on ecological science as a basis for the design of sustainable agriculture. However, the importance of farmers' knowledge for agroecological innovation also became increasingly recognized and championed by these early pioneers of agroecology. Unlike most conventional agricultural research and development, agro-ecological approaches consciously seek to combine the

experiential knowledge of farmers and indigenous peoples with the latest insights from the science of ecology. Local knowledge and indigenous management systems are usually effective responses to site-specific challenges and risks. They are, after all, based on literally hundreds of years of collective observation, experimentation and adaptive management of dynamic complexity and diversity. Good agro-ecologists value and build on such knowledge and farmer-led experimentation to develop locally appropriate farming practices (Box 1). Agro-ecology's interest in indigenous knowledge thus converges with other approaches that emphasize the importance of 'ethno science' and 'peoples' knowledge' in meeting fundamental human needs in culturally and environmentally appropriate ways (Brokensha *et al*., 1980; Richards, 1985; Chambers *et al*., 1989; Posey, 2000).

Box 1. Agroecology builds on the knowledge of farmers, indigenous peoples, fisherfolk, pastoralists and forest dwellers.

Four areas of farmer and peoples' knowledge are particularly important for agroecologists:

i) Local taxonomies – wo/men's detailed knowledge and classification of different types of soils, plants, animals, and ecosystems.

ii) Ecological knowledge
- climate, winds, topography, minerals, micro-climates, plant communities, and local ecology
- knowledge of not only structures but also of processes and dynamic relations e.g. influence of the moon and other planets on growth cycles of crops and livestock

iii) Knowledge of farming practices
- functional biodiversity e.g. the intentional mixing of different crop and livestock species & varieties to stabilise yields, reduce the incidence of diseases and pest attacks on the farm, and enhance resilience to shocks and stresses.
- optimal use of resources and space
- recycling of nutrients
- water conservation and management

iv) Experimental knowledge that stems from:
- wo/men farmers' careful observations of dynamic processes over time and space
- active experimentation. For example, farmers' seed selection as well as their animal and plant breeding work has generated myriads of locally adapted crop varieties and animal breeds. Indeed, most of the world's crop and livestock genetic diversity we still see today is an embodiment of the knowledge and creative work of previous generations of wo/men farmers across the world.

All this collective knowledge reflects the multi-use strategies of men and women farmers, indigenous peoples, pastoralists, fisherfolk, and forest dwellers deriving their food and livelihoods in culturally specific ways in highly diverse contexts.

In the 1990s, 'agroecology as a scientific discipline went through a strong change, moving beyond the field or agroecosystems scales towards a larger focus on the whole food system, defined as a global network of food production, distribution and consumption' (Wezel *et al*., 2009: 3).

This broader perspective encouraged closer links with farmer organizations, consumer-citizen groups, and social movements supporting alternatives to industrial food systems and Green Revolution agriculture. For many social movements and farmer organisations, agroecology became explicitly linked with food sovereignty:

‘Food sovereignty is the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems. It puts those who produce, distribute and consume food at the heart of food systems and policies rather than the demands of markets and corporations. It defends the interests and inclusion of the next generation. It offers a strategy to resist and dismantle the current corporate trade and food regime, and directions for food, farming, pastoral and fisheries systems determined by local producers. Food sovereignty prioritises local and national economies and markets and empowers peasant and family farmer-driven agriculture, artisanal fishing, pastoralist-led grazing, and food production, distribution and consumption based on environmental, social and economic sustainability’ (Declaration of Nyeléni, 2007).

In Europe, the European Coordination of La Via Campesina recently stated that: ‘Agroecology as understood by social movements is complementary and inseparable from the food sovereignty we want to build’ (ECVC, 2013). Speaking at the recent Nyéléni International Forum on Agroecology in Nyéléni (Mali), Ibrahima Coulibaly went further in saying that: ‘There is no food sovereignty without agroecology. And certainly, agroecology will not last without a food sovereignty policy that backs it up’.(2) Today’s more transformative visions of agroecology for food sovereignty thus integrate transdisciplinary knowledges, farmers’ practices, and social movements - whilst recognising their mutual dependence (Anderson *et al*., 2015; Nyéleni Declaration on Agroecology, 2015; Méndez *et al*., 2016;).

Climate smart agriculture and agroecology

The term ‘agroecology’ is also used by other actors to describe their own equally distinct approach to agricultural development. Most notably, the proponents of ‘Climate Smart Agriculture’ (CSA) and ‘Sustainable intensification’ (SI) have selectively incorporated some agroecological practices and combined them with more mainstream technologies of industrial farming. ‘Agroecology’ is thus presented as an important component of CSA and SI by the UK Government’s Office of Science (Royal Society, 2009; Foresight, 2014), the Consultative Group on International Agricultural Research (CGIAR) (3) and the Global Alliance for a Climate Smart Agriculture (GACSA, 2014).

At one level, there does appear to be overlaps and possible convergences between CSA and the traditions of agroecology described earlier. For example, FAO’s general definition of CSA describes attributes that are also claimed by agroecology: ‘climate smart agriculture’ ‘sustainably increases productivity, resilience (adaptation), reduces/removes greenhouse gases (mitigation), while enhancing the achievement of national food security and development goals’ (FAO, 2010). Moreover, proponents of CSA realize that approaches that focus exclusively on agricultural production without taking into account environmental sustainability are likely to have negative and possibly irreversible consequences. Indeed, CSA advocates emphasize the need to *sustainably* increase agricultural productivity and incomes. In its Framework document, the Global Alliance for a Climate Smart Agriculture strongly argues for:

> ‘sustainable increases in the productivity of food systems, by a sustainable use of natural resources, the adaptation of people’s livelihoods that are threatened by climate change, and agricultural practices that contribute to reduced emissions and less deforestation as a result of agriculture’ (GACSA, 2014).

For the CGIAR,

> ‘CSA is not a set of practices that can be universally applied, but rather an approach that involves different elements embedded in local contexts. CSA relates to actions both on-farm and beyond the farm, and incorporates technologies, policies, institutions and investment’.(4)

Like agroecologists, CSA practitioners emphasize the need to think beyond the farm to include the wider landscape in which agro-ecosystems are embedded. Three features characterize these so-called Climate Smart Landscapes:

> ‘climate-smart practices at the field and farm scale; diversity of land use across the landscape to provide resilience; and management of land use interactions at landscape scale to achieve social, economic and ecological impacts’ (Scherr *et al*., 2012).

Despite these broad similarities, agroecology and CSA are fundamentally different in other important regards. For example, Climate Smart Agriculture does not exclude practices and technologies that can undermine, or are incompatible with, agroecological approaches. Along with environmentally friendly agroforestry and intercropping practices, CSA also embraces and promotes an eclectic mix of herbicide-tolerant crops, toxic insecticides and fungicides, genetically modified seeds and genetically engineered livestock and fish, proprietary technologies and patents on seeds, as well as energy-intensive livestock factory farming, large scale industrial monocultures and biofuel plantations. When these are included, agroecological techniques are made to conform to the dominant agro-food regime typical of CSA and conventional development (Levidow *et al*., 2014). Finally, influential actors backing CSA also support finance and investments for market-based approaches to climate adaptation and mitigation as well as the funding of ‘climate-smart agriculture’ projects by carbon-offset schemes (GACSA, 2014). The commodification of carbon and the creation of private carbon rights in the name of ‘green growth’ is part of CSA’s agenda (Moreno *et al.,* 2015).

It is particularly striking that none of the promoters of CSA clearly list the specific techniques involved. Indeed, a clear definition of what CSA is - and what it is not - is absent. This lack of conceptual clarity on what practices CSA supports (and rejects) is deeply problematic because it allows the concept to be co-opted by some of the world’s biggest industrial contributors to climate change. For example, agrichemical corporations and their lobby groups are strongly represented in the major alliances and initiatives promoting CSA today:

- Launched at the UN Secretary-General’s 2014 Climate Change Summit in New York, the Global Alliance for Climate-Smart Agriculture (GACSA) now has over 100 members including 22 national governments and agribusiness lobby groups representing the chemical fertilizer, pesticide and seed industries. According to GRAIN, 60 percent of the private sector members of the Alliance represent the fertilizer industry, including Yara that dominates the global market for nitrogen fertilizer (GRAIN, 2015);
- Prior to the December 2015 COP21 meeting in Paris, the World Business Council for Sustainable Development (WBCSD) launched its Low Carbon Technology Partnerships Initiative (LCTPi)(5). Climate-Smart Agriculture is one of the LCTPi’s eight main priority areas, and involves major corporations in the food and agriculture related sectors. The programme is co-chaired by Monsanto and also includes Yara, DuPont, Dow, Olam, Walmart, Tyson Foods, PepsiCo, Diageo, Starbucks, Kellogg’s, Jain Irrigation, ITC, Uniphos, Coca-Cola and Unilever (ETC and Heinrich Böll Stiftung, 2015).

In the context of competitive world capitalism and its current phase of expansion (Harvey, 2014), the corporations involved in CSA must aim to maximize their profits by: i) accelerating and scaling up the diffusion of existing technologies – whether harmful or benign - by removing technological, market and social barriers and introducing enabling policy and financial instruments; ii) develop Public Private Partnerships (PPPs) on the Research, Development, Demonstration and Deployment (RDD&D) of potentially game changing new innovations for CSA and patented technologies for further capital accumulation; iii) reducing costs of labour and securing comparative advantages through de-localizations and mergers; and, iv) externalizing the social and environmental costs of production, processing, distribution and retail of goods and services for food and agriculture. The dominant corporate model legally obliges the chief executives of all these companies– on behalf of shareholders – to prioritize profits over equity and sustainability, whatever their personal inclination.

Climate Smart Agriculture – and the corporate version of CSA in particular - thus represents a continuation of business-as-usual industrial agriculture in which farmers are increasingly dependent on agrichemical corporations for external inputs and global commodity markets for the sale of their farm produce. Moreover, the corporate drive to expand CSA markets for nitrogen and phosphorus fertilizers as well as genetically uniform seeds is likely to further destabilize the Earth system and its capacity to support contemporary human societies (Steffen *et al*., 2015). As such, CSA's practices are not at all compatible with the more transformative visions of agroecology and sustainable living. They are rejected by all those for whom:

> 'Agroecological initiatives aim at transforming industrial agriculture partly by transitioning the existing food systems away from fossil fuel-based production largely for agro-export crops and biofuels towards an alternative agricultural paradigm that encourages local/national food production by small and family farmers based on local innovation, resources and solar energy. This implies access of peasants to land, seeds, water, credit and local markets, partly through the creation of supportive economic policies, financial incentives, market opportunities and agroecological technologies' (CIDSE *et al*., 2013).

Fundamentally different visions of development and well-being

At a deeper level, four dimensions of agroecology for food sovereignty make it radically different from the vision of CSA and conventional development.

i) A search for a new modernity and peasant identity

Most of the world's food is still grown, collected and harvested by over 2.5 billion small scale farmers, pastoralists, forest dwellers and artisanal fisherfolk. Collectively, these smallholders are by far the largest investors in farming and land (HLPE, 2013), and produce at least 70 percent of the world's food according to the UN Food and Agriculture Organization.(6) This food is primarily sold, processed, resold and consumed locally, with many people deriving their incomes and livelihoods through work and activities at different points of the food chain, from field to plate. Such localized food systems provide the foundations of people's nutrition, incomes, economies and culture throughout the world. Despite these contributions, local food systems—and the organizations that govern them—are largely ignored, neglected or actively undermined by governments and corporations.

First, the dominant development paradigm envisions having less people living in rural

areas, farming and depending on localized food systems. It encourages an exodus of people from rural areas to work in industry and urban-based trade and services (Perez-Vitoria, 2005; Pimbert *et al*., 2006). Many development policies are indeed based on the belief that those subsistence producers who continue to farm, fish, rear livestock and harvest forests and common property lands should 'modernize' as quickly as possible. They should become fully commercial producers by applying industrial food and agricultural technologies that allow for economies of scale (Desmarais, 2007). Those who cannot make this transition should move out of farming and rural areas to seek alternative livelihoods.

Second, the global restructuring of agri-food systems threatens local food systems, with a few transnational corporations gaining monopoly control over different links in the food chain (Clapp and Fuchs, 2009; ETC, 2013). An important part of this process is what Ivan Illich has termed 'radical monopoly': 'the substitution of an industrial product or a professional service for a useful activity in which people engage or would like to engage', leading to the deterioration of autonomous systems and modes of production (Illich, 1973). Radical monopolies replace non-marketable use-values with commodities by reshaping the social and physical environment and by appropriating the components that enable people to cope on their own, thus undermining freedom and cultural diversity (Illich, 1973).

This modernization agenda is seen as desirable and inevitable by most corporations and governments. However, the idea that small-scale producers and indigenous peoples as a group are bound to disappear reflects just one vision of the future—it is a political choice that relies on specific theories of change that is disputed and rejected by social movements working for agroecology and food sovereignty. In response to a development model geared to ensuring the extinction of small-scale food providers, La Vía Campesina is redefining what it means to be a 'peasant'. A process of 're-peasantization' is slowly unfolding as more national and regional organizations proudly embrace the term 'peasant' to describe themselves, projecting an alternative identity and modernity rich in meaning and hope for the future (Desmarais, 2007; Perez.Vitoria, 2015).

Many voices in social movements claim that agroecology and food sovereignty can help invent this new modernity by regenerating autonomous food systems in rural and urban spaces (Anderson *et al*., 2015; Nyéléni, 2015.(7)). Embraced by a growing number of youth, this vision of modernity rejects the idea of development as a process of commodification of nature and social relations (Rist, 2013) and looks to other definitions of 'the good life' - including Buen Vivir or Sumak Kausai in Latin America, De-growth in Europe, and Ecological Swaraj in India (Latouche, 2011; Kothari *et al*., 2014).

ii) From linear to circular food systems

Agroecology in the context of food sovereignty goes much further than CSA's focus on *agricultural production* alone: it questions the structure of the entire food system. From field to plate, the globalized supply chains that feed the world rely on the intensive use of fossil fuels — for fertilizers, agrochemicals, production, transport, processing, refrigeration and retailing — and are a major contributor to climate change and air pollution. In France, for example, the national food system accounts for more than a third of the country's greenhouse gas (GHG) emissions (Jancovici, 2010). In turn, the energy sector that supports industrial food and farming has an equally damaging ecological footprint: exploring oilfields, mining uranium, building dams and logging forests all serve to degrade and emit large quantities of the greenhouse gases that fuel climate change. Worldwide, food and agriculture may be

responsible for up to 50 percent of global GHG emissions (GRAIN, 2015).

Modern industrial food, energy and water systems are fundamentally unsustainable. Their linear, and increasingly globalized, structure assumes that the Earth has an endless supply of natural resources at one end, and a limitless capacity to absorb waste and pollution at the other. The imperative is now for transformation rather than reforms that leave the basic structure of modern food systems unchanged. An alternative to the conventional development model is to shift from linear systems to circular ones that mimic natural cycles. This can be done by adopting a circular metabolism that reflects the natural world. There are two ecological design principles here which are shared by agroecology and related approaches such as bio-mimicry, eco-design, and permaculture (Jones *et al*., 2102). The first is that nature is based on nested and interacting cycles—for example, carbon, nitrogen, phosphorus, and water. The second is that 'waste' is converted into a useful form by natural processes and cycles, ensuring that waste from one species becomes food for other species in the ecosystem.

In circular production systems, specialized and centralized supply chains are replaced with resilient and decentralized webs of food and energy systems that are integrated with sustainable water and waste management systems. Circular systems that mimic natural ecosystems can be developed at different scales, from individual farm plots to entire cities, by using functional biodiversity, ecological clustering of industries, recycling, and re-localized production and consumption within a territorial based approach to sustainable living. These rural and urban systems are often characterized by: agroecological approaches; eco-design; a focus on 'doing more with less'; widespread recycling and reuse; and the re-localization of production processes and supply chains. Circular systems that combine food and energy production with water and waste management aim to reduce carbon and ecological footprints whilst maintaining a good quality of life through a controlled process of de-growth in consumption and production based on the '8 Rs' described by Serge Latouche: Re-evaluate, Re-conceptualize, Restructure, Redistribute, Re-localize, Reduce, Reuse, Recycle (Latouche, 2009).

Well-designed circular systems based on cooperative, communal, and collective tenure over land, water, seeds, knowledge and other means of livelihood - rather than on new forms of State enclosure and dependency on corporate-owned proprietary technologies - can: reduce fossil fuel use and emissions; increase food, water and energy security; create jobs; boost incomes; and, promote resilient and self-reliant communities that are inclusive of gender, race, class, disability, ethnicity, and difference (Pimbert, 2010; Jones *et al*., 2012). Last, but not least, such re-localized circular systems can be consciously designed for local control by communities of citizens, thereby enhancing the potential for conviviality, autonomy and direct democracy in rural and urban spaces.

iii) Rethinking economics, trade and markets

In sharp contrast to CSA and conventional development, a transformative agroecology and food sovereignty seeks to reduce dependence on corporate suppliers of external inputs and distant global commodity markets. This vision for the transformation of the dominant agri-food regime translates into an approach that emphasizes forms of economic organization and regeneration based on:

• *Re-embedding agriculture in Nature, relying on functional biodiversity and internal resources for production of food, fibre and other benefits.* Local endogenous development based on a matrix of resilient agroecological and circular systems that

mimic the structure and function of natural ecosystems: biodiversity-rich agroforestry systems, intercropping, genetic mixtures, mob grazing, polycultures, agro-sylvo–pastoral/fish systems;

• *Farmers distancing themselves from markets supplying inputs* (seeds, fertilizers, growth hormones, pesticides, credit, etc.). Reduced dependence on commodity markets for inputs enhances farmers' autonomy and control over the means of production;

• *Farmers diversifying outputs and market outlets.* A greater reliance on alternative food networks that reduce the distance between producers and consumers whilst ensuring that more wealth and jobs are created and retained within local economies: short food chains and local food webs, Community Supported Agriculture, local procurement schemes that link organic producers with schools and hospitals for example, community controlled food processing units, farm-based eco-tourism as places for urban dwellers to discover and reconnect with Nature and rural cultures;

• A rediscovery of *forgotten resources:* local knowledge on crop and livestock management; organic manure and the soil's capacity to sequester and fix carbon and improve the yields and nutritional quality of foods; renewable energies and their decentralized and distributed micro-generation (solar, wind, biogas, etc.);

• *Trade rules that protect local economies and ecologies:* the spread of climate - resilient food systems depends on: (a) replacing proprietary technologies and patents on biodiversity with locally adapted legal frameworks that recognize farmers' rights and guarantee equitable access to diverse seeds and livestock breeds; (b) replacing global, uniform standards for food and safety by a diversity of locally developed food standards that satisfy food and safety requirements; (c) introducing supply management and import quotas to guarantee stable prices and market outlets for food providers; and, (d) introducing local food, energy, and water procurement schemes.

At a deeper level, it is also becoming clear that a fundamentally different kind of economics is needed for a widespread shift to agroecology and food sovereignty. This is urgent because throughout the industrial food system and its related sectors (energy, manufacturing, etc.), there is a direct relationship between the vast increases in productivity achieved through the use of automated technology, bio-science applications, re-engineering, and downsizing, and the permanent exclusion of high numbers of workers from employment. This erosion of the link between job creation and wealth creation calls for a more equitable distribution of productivity gains through a reduction of working hours, and for alternative development models that provide opportunities and local autonomous spaces for the generation of use values rather than exchange values (Gollain, 2000; Latouche, 2003; Rist, 2011; D'Alisa *et al*., 2014). As highlighted in Box 1, these alternative models represent a radical departure from the economics that underpins CSA and conventional development.

Box 1. Alternative economic practices to make other worlds possible

- The re-localization of plural economies that combine both market oriented activities with non-monetary forms of economic exchange based on barter, reciprocity, gift relations, and solidarity;
- A guaranteed and unconditional minimum income for all;
- A significant drop in time spent in wage-work and a fairer sharing of jobs between men and women;
- A tax on financial speculations, to fund the regeneration of local economies and

ecologies;
- Economic indicators that reflect and reinforce new definitions of well-being such as conviviality and frugal abundance;
- A shift from globalized, centralized and linear food systems to decentralized and democratically controlled circular economy models that link food and energy production with water and waste management in urban and rural settings.

However, there is no consensus yet within the agroecology and food sovereignty movement as to what kind of economic arrangements and indicators of well-being are needed, though the movement agrees that a fundamental rethink of the dominant economic paradigm is a priority. Activists and scholars are beginning to seriously look at the relevance of different traditions of alternative economics for agroecology and food sovereignty, including solidarity economics (Utting, 2015), the economics of de-growth (Latouche, 2003; D'Alisa *et al.* 2014), participatory economics (Hahnel, 2005), and anarchist economics (Shannon *et al*., 2012).

iv) Deepening democracy

One of the clearest demands of the agroecology and food sovereignty movement is for citizens (8) to exercise their fundamental human right to decide their own food and agricultural policies (Nyéléni, 2007). Food sovereignty is indeed 'perhaps best understood as a process that seeks to expand the realm of democracy and freedom by regenerating a diversity of locally autonomous food systems' (Pimbert, 2010).

Democratizing food system governance means enabling farmers and other citizens, both men and women, to directly participate in the choice and design policies and institutions, decide on strategic research priorities and investments, and assess the risks of new technologies. Social movements committed to agroecology and food sovereignty seek to reverse the democratic deficit and exclusionary processes that all too often favour the values and interests of the most powerful corporations, investors, big farmers and technocratic research institutes. This can be best done through an expansion of direct democracy in decision making in order to complement, or replace, models of representative democracy that prevail in conventional development.

The struggle to democratize agricultural research for agroecology and food sovereignty is emblematic in this regard. Social movements and activist scholars acknowledge that technological fixes are not enough and view science as part of a bottom-up, participatory development process in which farmers and citizens take centre stage. In this approach, instead of being passive beneficiaries of 'trickle down' development or technology transfer, food producers and citizens participate as knowledgeable and active social agents, including in setting upstream strategic priorities for national research and its funding(9).Here, food producers work closely with researchers in developing research priorities, co-producing knowledge and in strengthening and spreading agroecological innovations through horizontal networks (Box 2). By valuing and working with peoples' knowledge, a transformative agroecology thus seeks to reverse what Boaventura de Souza Santos describes as 'cognitive injustice' and 'epistemicide' – the failure to recognise the fundamental right of different knowledges and ways of knowing to exist and give meaning to peoples' lives (Boaventura de Souza Santos, 2014).

Box 2. Embedding agroecological research in democratic practice

Two complementary approaches are proposed as alternatives to the increasingly corporate-

controlled research of conventional development (Pimbert, 2007):

1. *Democratizing public research and increased funding for participatory agroecological research.* This implies a systemic transformation within the existing educational and research establishment. It entails deep changes in academic cultures, in the self-image of researchers and academics, in teaching pedagogies, in research agendas and methodologies, organizational cultures, operational procedures, and in the very role that universities and research institutes play in society. Policy recommendations made by farmer and citizens' juries on the governance of agricultural research often focus on changing the determinants of innovation and factors that influence research choices e.g. science policies, public–private partnerships, funding, and ways of working of scientists (Pimbert *et al*., 2011).

2. *Support bottom-up agroecological research for autonomous learning and action.* This requires the strengthening of farmer- and citizen led innovation and sociocultural networks that are organized along more horizontal and egalitarian lines to produce and transform knowledge, with or without the involvement of professional scientists. Examples include: The Réseau Semences Paysannes in France and its approach to agroecological research and participatory plant breeding (www.semencespaysannes.org); the *Campesino a Campesino* movement in Central America (Holt Giménez, 2006); and the social process methodology used in constructing sustainable peasant agriculture and food sovereignty in Cuba (Rosset *et al*., 2011).

More generally, agroecology and food sovereignty's commitment to deepening democracy reflects aspirations and values that fundamentally differ with the worldview of CSA and conventional development. First, deepening democracy assumes that every citizen is competent and reasonable enough to participate in democratic politics. However, this requires the development of a different kind of character from that of passive taxpayers and voters. Second, active citizenship and participation in decision-making are rights that are claimed mainly through the agency and actions of people themselves – they are not granted by the State or the market. Third, empowering farmers and other citizens in food system governance requires social innovations that i) create inclusive and safe spaces for deliberation and action; ii) build local organizations and their federations to enhance peoples' capacity for voice and agency; iii) strengthen civil society and gender equity; iv) expand information democracy and citizen controlled media (community radio and video film making, among others); v) promote self-management structures at the workplace and democracy in households; vi) learn from the history of direct democracy; and, vii) nurture active citizenship (Pimbert, 2010). Fourth, only with some material security and time can people be 'empowered' to think about what type of policies and institutions they would like to see and how they can develop them. This requires radical reforms in economic arrangements similar to those listed in Box 1. Last, new political structures are needed to combine localism with interdependence for coordinated action across large areas. One option is confederalism, which involves a network of citizen-based (as opposed to government) bodies or councils with members or delegates elected from popular face-to-face democratic assemblies, in villages, towns, and neighbourhoods of large cities. These confederal bodies or councils become the means of interlinking villages, towns, neighbourhoods and agro-ecological regions into a confederation based on shared responsibilities, full accountability, firmly mandated representatives and the right to recall them if necessary (Bookchin, 2015; Öcalan. 2015).

Concluding remarks

Despite mainstream rhetoric, Climate Smart Agriculture and agroecology are not interchangeable concepts nor practices that can easily co-exist. They represent two fundamentally different visions of development and well-being. CSA is mainly designed to serve the interests of agribusiness and the financial industry. Its powerful supporters and lobby groups are committed to conventional development based on uniformity, centralization, control, and the expansion of global markets - including new carbon markets. In contrast, a truly transformative agroecology aims to rebuild a diversity of decentralized, just, and sustainable food systems that enhance community and social-ecological resilience to climate change. Its supporters seek to deepen economic and political democracy whilst inventing a new modernity based on conviviality and plural definitions of well-being.

Notes

1 http://www.cop21.gouv.fr/en/
2 https://www.youtube.com/watch?v=-Km9Kv5UylU&feature=youtu.be
3 http://www.cgiar.org
4 https://ccafs.cgiar.org/climate-smart-agriculture-0#.VnfXaEvfj1p accessed on 21 December 2015.
5 http://lctpi.wbcsdservers.org/the-opportunity
6 http://www.fao.org/family-farming-2014/en/
7 https://www.youtube.com/watch?v=-Km9Kv5UylU&feature=youtu.be
8 The concept of citizen is at times understood to exclude indigenous peoples and minority ethnic groups who are not considered to be part of the nation state. However, the word citizen is originally derived from the latin *civis* and was in use before the emergence of the nation state. Citizen referred to individuals active in a public body and involved in the management of community affairs. In this article I use the word citizen in this broad sense to include all people living and working in a given country.
9 www.excludedvoices.org

References

Altieri, Miguel A. (1987) *Agroecology: the scientific basis of alternative agriculture,* Boulder: Westview Press.

Anderson, Colin, Michel P. Pimbert and Csilla Kiss (2015) 'Building, defending and strengthening agroecology. A global struggle for food sovereignty'. The Centre for Agroecology, Water and Resilience and the Centre for Learning on Sustainable Agriculture. http://www.agroecologynow.com/new-publication-building-defending-and-strengthening-agroecology/

Bookchin, Murray (2015) *The Next Revolution. Popular Assemblies and the Promise of Direct Democracy.* Essays by Murray Bokkchin edited by Debbie Bookchin and Blair Taylor, London and New York: Verso.

Brokensha, David W., D. M. Warren and Oswald Werner, (1980) *Indigenous knowledge systems and development,* Michigan: University Press of America.

CIDSE, IUF, La Vía Campesina, FIAN International (2013) *Using the Global Strategic Framework for Food Security and Nutrition to Promote and Defend the People's Right to Adequate Food.* p. 28.

Chambers, Robert, Arnold Pacey and Lori Ann Thrupp (1989) *Farmer First: Farmer Innovation and Agricultural Research,* London: ITDG Publishing.

Clapp, J. and D. A. Fuchs (2009) *Corporate Power in Global Agrifood Governance*, Cambridge, MA:. MIT Press.

Dalgaard, Tommy, Nicholas J. Hutchings and John R. Porter (2003) 'Agroecology, Scaling and Interdisciplinarity', *Agriculture Ecosystems and Environment* 100 : 39-51.

D'Alisa, Giacomo, Federico Demaria and Giorgos Kallis (2014) *Degrowth: A vocabulary for a New Era,* London: Routledge.

De Schutter, O. 2010. *Agro-ecology and the right to food.* UN General Assembly, Human Rights Council. Report submitted by the Special Rapporteur on the Right to Food. http://www.srfood.org/index.php/en/component/content/article/1174-report-agroecology-and-the-right-to-food

Desmarais, Annette Aurelie (2007) *La Via Campesina: Globalization and the Power of Peasants.* London: Pluto Press.

European Coordination Via Campesina (ECVC) (2013) 'Proposal of position text on agroecology for the European Coordination Via Campesina'. http://www.eurovia.org/

ETC (2013) 'Putting the Cartel before the Horse…Who Will Control Agricultural Inputs?', Communiqué 111. ETC Group.

ETC and Heinrich Böll Stiftung (2015) 'Outsmarting Nature? Synthetic Biology and "Climate Smart" Agriculture'. ETC Group & Heinrich Böll Stiftung. ETC communiqué 114.

EU SCAR (2012) 'Agricultural knowledge and innovation systems in transition: A reflection paper'. Brussels: Standing Committee on Agricultural Research (SCAR) of the European Union. http://ec.europa.eu/research/agriculture/scar/pdf/akis_web.pdf

FAO (2010) 'Climate-Smart Agriculture. Policies, Practices and Financing for Food Security, Adaptation and Mitigation'. FAO. Rome. http://www.fao.org/docrep/013/i1881e/i1881e00.htm

Fédération Nature & Progrés (2012) Lettre ouverte à Stéphane Le Foll Ministre de l'agriculture, de l'agroalimentaire et de la forêt. Alès, 17th December 2012.

Foresight. The Future of Food and Farming (2011) Final Project Report. London. UK: The Government Office for Science,

Gliessman, Stephen R. (1990) *Agroecology: researching the ecological basis for sustainable agriculture,* New York: Springer.

Gliessman, Stephen R. (1998) *Agroecology: Ecological Processes in Sustainable Agriculture,* Ann Arbor: Sleeping Bear Press.

Gollain, Françoise, (2000) *Une critique du travail. Entre écologie et socialisme,* Paris: Editions La Découverte.

Global Alliance for Climate-Smart Agriculture (GACSA) (2014) 'Framework Document'. http://www.fao.org/gacsa/en/

GRAIN (2015) 'The Exxons of Agriculture'. www.grain.org/article/entries/5270-the-exxons-of-agriculture.

Hahnel, Robin (2005) *Economic Justice and Democracy: From Competition to Cooperation,* London: Routledge.

Harvey, David (2014) *Seventeen Contradictions and the End of Capitalism.* Oxford: Oxford University Press.

Herber, Lewis, (1962) *Our Synthetic Environment,* New York: Knopf.

HLPE (2013) 'Investing in smallholder agriculture for food security'. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome.

Holt Giménez, Eric. (2006) *Campesino a Campesino: Voices from Latin America's farmer to farmer movement for sustainable agriculture,* Oakland, CA: Food First Books.

Illich, Ivan (1973) *Tools for Conviviality,* London: Marion Boyars Publishers.

INRA (2010) 'Document d'Orientation: Une science pour l'impact'. http://inra.dam.front.pad.brainsonic.com/ressources/afile/224599-e325e-resource-document-dorientation-2010-2020.html

International Assessment of Agricultural Science, Technology and Development (2009) 'Agriculture at a crossroads: Synthesis report'. IAASTD. http://www.agassessment.org/reports/iaastd/en/agriculture%20at%20a%20crossroads_synthesis%20report%20(english).pdf

Jancovici, Jean-Marc (2010) 'Combien de gaz à effet de serre dans notre assiette?', www.manicore.com/documentation/serre/

Jones, Andy, Michel P. Pimbert and Janice Jiggins (2012) *Virtuous Circles: Values, Systems, Sustainability.* London: IIED and IUCN CEESP.

Kothari, Ashish, Federico Demaria and Alberto Acosta (2014) 'Buen Vivir, Degrowth and Ecological Swaraj: Alternatives to sustainable development and the Green Economy', *Development* 57(3–4): 362–375.

Latouche, Serge (2009) *Farewell to Growth,* London: John Wiley Publishers.

Latouche, Serge (2003) *Décoloniser l'imaginaire: La Pensée créative contre l'économie de l'absurde,* Paris: Parangon.

Latouche, Serge (2011) *Vers une société d'abondance frugale : Contresens et controverses sur la décroissance*, Paris, Fayard - Mille et une nuits.

Levidow, Les, Michel P. Pimbert, Gaetan Vanloqueren (2014) Agroecological Research: Conforming—or Transforming the Dominant Agro-Food Regime?, *Agroecology and Sustainable Food Systems*, 38 (10): 1127-1155.

Méndez, V. Ernesto. Christopher M. Bacon, Roseann Cohen and Stephen R. Gliessman, (2016) *Agroecology. A Trandisciplinary, Participatory and Action-oriented Approach,* Boca Raton: CRC Press.

Merrill, Richard (1976) *Radical Agriculture,* New York: Harper & Row Publishers.

Moreno, Camila, Daniel Speich Chassé and Lili Fuhr (2015) 'Carbon Metrics – Global abstractions and ecological epistemicide', *Ecology,* Volume 42. Edited by the Heinrich Böll Foundation.

Nyéléni (2007) *Declaration of Nyéléni.* Forum for Food Sovereignty. http://nyeleni.org/spip.php?article290. Accessed online 23 December 2015.

Nyeléni (2015) *Declaration of the International Forum for Agroecology.* http://www.foodsovereignty.org/forum-agroecology-nyeleni-2015/. Accessed on line 23 December 2015.

Öcalan, Abdullah (2015) *Civilisation. The age of masked gods and disguised kings. Manifesto for a democratic civilization.* Volume 1. Cologne: New Compass Press and International Initiative Edition.

Perez-Vitoria, Silvia (2005) *Les paysans sont de retour.* Actes Sud.

Perez-Vitoria, Silvia (2015) *Manifeste pour un XXI siècle paysan.* Actes Sud.

Pimbert, Michel P. (2007) *Transforming Knowledge and Ways of Knowing for Food Sovereignty,* Reclaiming Diversity and Citizenship Series. London: IIED.

Pimbert, Michel P. (2010) *Towards Food Sovereignty: Reclaiming Autonomous Food Systems.* Multimedia e-book - http://www.environmentandsociety.org/mml/pimbert-michel-towards-food-sovereignty-reclaiming-autonomous-food-systems . London and Munich: IIED and Rachel Carson Centre.

Pimbert, Michel P., Khanh Tran-Thanh, Estelle Deléage, Magali Reinert, Christophe Trehet and Elizabeth Bennett (2006) *Farmers' Views on the Future of Food and Small Scale Producers.* IIED Reclaiming Diversity and Citizenship Series. London: IIED.

Pimbert, Michel P., Boukary Barry, Anne Berson and Khanh Tran Thanh (2011) *Democratising agricultural research for food sovereignty in West Africa,* Bamako and London: IIED, CNOP, Djoliba, Kene Conseils, IRPAD and URTEL.

Posey, Darrell Addison (ed.) (2000) *Cultural And Spiritual Values Of Biodiversity,* London: UNEP and Practical Action.

Rabhi, Pierre (1989) *L'Offrande au crepuscule,* Lavilledieu: Éditions de Candide.

Richards, Paul (1985) *Indigenous Agricultural Revolution. Ecology and food production in West Africa,* London: Hutchinson education.

Rist, Gilbert (2011) *The delusions of economics. The misguided certainties of a hazardous science,* London: Zed Books.

Rist, Gilbert (2013) *Le développement. Histoire d'une croyance occidentale.* 4th revised Edition. Paris: Presses de Sciences Po.

Rosset, Peter Michael, Braulio Machín Sosa, Adilén María Roque Jaime and Dana Rocio Ávila Lozano (2011) 'The Campesino-to-Campesino agroecology movement of ANAP in Cuba: Social process methodology in the construction of sustainable peasant agriculture and food sovereignty', *Journal of Peasant Studies* 38(1): 161–191.

Royal Society (2009) 'Reaping the benefits: Science and the sustainable intensification of global agriculture'. London: Royal Society. http://royalsociety.org/uploadedFiles/Royal_Society_Content/policy/publications/2009/4294967719.pdf

Santos, Boaventura de Souza (2014) *Epistemologies of the South. Justice Against Epistemicide,* Boulder: Paradigm Publishers.

Shannon, Deric, Anthony J. Nocella II and John Asimakopoulous (eds,), 2012. *The Accumulation of Freedom. Writings on Anarchist Economics,* Edinburgh: AK Press.

Scherr, Sara J., Seth Shames and Rachel Friedman (2012) 'From climate-smart agriculture to climate-smart landscapes', *Agriculture & Food Security,* 1: 12.

Steiner, Rudolf (1984) *Agriculture. Fondements spirituels de la méthode Bio-dynamique.* Editions Anthroposophiques Romandes. Lausanne (initially printed in 1924).

Steffen, Will, Katherine Richardson, Johan Rockström, Sarah E. Cornell, Ingo Fetzer, Elene M. Benett, Reinette Biggs, Stephen R. Carpenter, Wim de Vries, Cynthia A. de Wit, Carl Folke, Dieter Gerten, Jens. Heinke, Georgina M. Mace, Linn M. Persson, Veerabhadran Ramanathan, Belinda Reyers and Sverker Sörlin (2015) 'Planetary boundaries: Guiding human development on a changing planet', *Science,* Vol. 347(6223).

Utting, Peter (2015) *Social and Solidarity Economy: Beyond the Fringe,* UNRISD and London: Zed Books.

Wezel, Alexander and Virginie Soldat (2009) 'A quantitative and qualitative historical analysis of the scientific discipline agroecology', *International Journal of Agricultural Sustainability* 7(1): 3-18.