

Global Status of Agroecology

A Perspective on Current Practices, Potential and Challenges

MICHEL P PIMBERT

Over the last decade, agroecology has rapidly moved from the margins and taken centre stage in global discussions on environment and development. Institutions like the United Nations Food and Agriculture Organization increasingly argue that agroecology can significantly help alleviate hunger and poverty as well as contribute to meeting other sustainable development goals. In this context, the history and practices of agroecology are outlined, and some of the ecological, social, economic, and political challenges for transformation to agroecology and food sovereignty have been identified.

At the global level, “agroecology” was barely recognised within official circles only a decade ago. But, today, agroecology has taken centre stage in policy discourses on food and farming thanks to a number of influential international processes. For example, the Food and Agriculture Organization (FAO) of the United Nations (UN) hosted a major international symposium on agroecology in April 2018, which affirmed that agroecology is key to transforming food and agricultural systems and achieving the sustainable development goals (SDGs) (FAO 2018).

This growing international recognition is good news for farmers¹ and social movements which argue for agroecological approaches to food, farming, and land use. However, the meanings of agroecology are now increasingly interpreted in different ways by different people and interest groups.

To help better understand the increasingly contested nature of agroecology, this paper briefly focuses on the history of agroecology and the visions of modernity and/or tradition it is associated with. It then explores the practices, potential, and challenges of agroecological approaches that seek to transform—rather than conform with—the dominant agri-food regime.

Brief History of Agroecology

At the heart of agroecology is the idea that agroecosystems should mimic the biodiversity levels and functioning of natural ecosystems. Such agricultural mimics, like their natural models, can be productive, pest-resistant, nutrient-conserving, and resilient to shocks and stresses. In ecosystems, there is no “waste;” nutrients are recycled indefinitely. Agroecology aims at closing nutrient loops (that is, returning all nutrients that come out of the soil back to the soil, such as through applications of farmyard manure). It also harnesses natural processes to control pests and build soil fertility (that is, through intercropping, cover crops). For example, in the mulberry grove–fishpond system of China’s Pearl River delta, the leaves of the white mulberry tree are fed to silkworms, which produce silk. Compost from the mulberry tree and silkworm excrement are applied to the fishpond to feed the fish, and the excrement of the fish and other organic matter from the bottom mud is used as fertiliser for the trees (Zhong 1982). Agroecological practices include integrating trees with livestock and crops (agro-sylvo–pastoral farming), producing food from forests (agro-forestry), growing several crops together in one plot (poly-culture), and using locally adapted and genetically diverse crops and livestock by working at different scales, from the

Michel P Pimbert (michel.pimbert@coventry.ac.uk) is with the Centre for Agroecology, Water and Resilience, Coventry University, United Kingdom.

farm plot to the wider landscapes that sustain crop cultivation, pastoralism, fisheries, and forest-based livelihoods.

Within academia, a number of pre-World War II scientists began to merge the sciences of agronomy and ecology together (Gliessman 1990). Initially, agroecology strongly focused on ecological science as a basis for designing sustainable agriculture. However, the importance of farmers' knowledge became increasingly recognised by these early pioneers of agroecology. Among Mexican scholars, the work of Efraim Hernández Xolocotzi (1977) between the 1940s and the late 1970s is particularly noteworthy for its emphasis on intercultural processes for constructing agroecological knowledge that combines ecological science with peoples' knowledge.

The increasing awareness of the environmental effects of industrial agriculture further encouraged closer links between agronomy and ecology in the search for a more sustainable agriculture. For example, as part of the growing movement to resist the introduction of Green Revolution agriculture in Mexico, several "International Courses on Tropical Ecology with an Agroecological Approach" were organised between 1979 and 1981 in Tabasco (Gliessman 2015). In the United States (US), the pioneering work of Miguel Altieri (1987) and Stephen Gliessman (2015) helped put agroecology on the map in the early 1980s. Around the same time, Pierre Rabhi (1989) championed agroecological approaches in France and in West Africa where he ran training courses in agricultural ecology at the Gorom Gorom Agroecology Centre in Burkina Faso, which he set up in 1985.

The conceptual foundations of Altieri and Gliessman's agroecology are firmly rooted in the science of ecology. Hernández Xolocotzi's (1997) understanding of intercultural agroecology broadly embraced social, economic, cultural, political, ethical, ecological and technological factors. And Rabhi's (1989) approach is built on ecology and is explicitly grounded in the tradition of "anthroposophy" and indigenous cosmovisions, emphasising a life-affirming ethic for planet Earth rather than only the agroecosystem. In their uniquely different ways, these pioneering agroecologists and their early followers have helped frame the foundations of today's transdisciplinary agroecology.

More recently, peasant studies have further enriched our understanding of the origins of agroecology and its transdisciplinary history. For example, Sevilla Guzmán (2011) has traced the origins of agroecology to heterodox Marxism and different strands of libertarian thought, including social anarchism.

Agroecology Builds on Farmers' Knowledge

Unlike most conventional agricultural research and development (R&D), agroecological approaches consciously seek to combine the experiential knowledge of peasant 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 opportunities. They are, after all, based on hundreds of years of collective observation, experimentation and adaptive management of dynamic complexity across time and space. The historical record shows that this vernacular science has been remarkably innovative throughout the world. Farmers,

pastoralists, forest dwellers, and fishers collectively harnessed their knowledge to generate sophisticated agricultural and land-use systems in Africa, the Americas, and Asia, well before the arrival of the Europeans (Gómez-Pompa and Kaus 1992; Dharampal 1983).

Indeed, modern principles of agroecology have their roots in the collective knowledge, practices, and ecological rationale of indigenous and peasant agriculture(s) throughout the world (Altieri 1987). Agroecological solutions are developed through respectful intercultural dialogue between scientists and farmers/citizens. Farmer-led and people-centred agroecological research thus rejects the transfer-of-technology model of R&D in favour of a decentralised, bottom-up, and participatory process of knowledge creation tailored to unique local contexts (Méndez et al 2016). Agroecology's interest in indigenous and peasant knowledge, thus, converges with other approaches that recognise the importance of "ethno science" and "peoples' knowledge" in meeting fundamental human needs in culturally unique and environmentally appropriate ways (Posey 1999). Agroecological practices that combine indigenous knowledge with modern ecological science reduce costs of production for farmers and also generate good yields as well as other multifunctional benefits. A large-scale comparison of the yields of agroecological/organic farms with conventional farms (Badgley et al 2007) showed that:

- (i) In "developed" countries, agroecological/organic systems on average produce 92% of the yield produced by conventional agriculture. In "developing" countries, however, organic agroecological systems produce 80% more than conventional farms. These findings are based on a global data set of 293 examples.
- (ii) The world currently produces the equivalent of 2,786 calories per person per day. If farms worldwide were to switch to organic agroecological methods today, farms could produce between 2,641 and 4,381 calories per person per day under an organic-only regime.

Focus on the Food System

In the 1990s, agroecology as a scientific discipline broadened its framing, moving beyond the farm towards the study of food production, distribution, and consumption. This led to a new and more comprehensive definition of agroecology as "the ecology of food systems" (Francis et al 2003).

Agroecology, thus, widened its focus to critically analyse the global food system and explore alternative food networks that relocalise production and consumption. This approach seeks to reinforce connections between producers and consumers, and integrate agroecological practices with alternative market relationships within specific territories (Gliessman 2014; CSM 2016).

This broader perspective encouraged closer links with farmer organisations, consumer-citizen groups, and social movements supporting alternatives to Green Revolution agriculture and industrial food systems. For many farmer networks and social movements, agroecology has become 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. Food sovereignty promotes transparent trade that guarantees just incomes to all peoples as well as the rights of consumers to control their food and nutrition. It ensures that the rights to use and manage lands, territories, waters, seeds, livestock and biodiversity are in the hands of those of us who produce food. Food sovereignty implies new social relations free of oppression and inequality between men and women, peoples, racial groups, social and economic classes and generations. (Nyéléni 2007)

Agroecology at the Crossroads Today

Agroecology is increasingly contested and interpreted to mean different things to different people. The term “agroecology” is now used 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; Pimbert 2015). For instance, the National Institute for Agricultural Research (INRA) in France introduced agroecology in its 2010–20 strategic research plan. In 2012, the Minister of Agriculture declared that France aims to be “the champion of agroecology” in Europe. However, civil society organisations and farmer networks argue that the French government proposes a form of agroecology very distant from what they hope to see promoted for their agriculture because it encourages, for example, no-till methods with toxic herbicide sprays. This coalition of citizens and family farmers ask that the French government promote, instead, an agrarian reform that strongly supports 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” (*Nature & Progrès* 2012 cited in Pimbert 2015).

More recently, indigenous and peasant communities from all continents affirmed the link between agroecology and food sovereignty:

Agroecology is the answer to how to transform and repair our material reality in a food system and rural world that has been devastated by industrial food production and its so-called Green and Blue Revolutions. We see Agroecology as a key form of resistance to an economic system that puts profit before life [...] Our diverse forms of smallholder food production based on Agroecology generate local knowledge, promote social justice, nurture identity and culture, and strengthen the economic viability of rural areas. As smallholders, we defend our dignity when we choose to produce in an agroecological way. (Nyéléni 2015)

Transnational social movements such as La Vía Campesina (LVC)² are mobilising to build, defend, and strengthen agroecology. These movements are claiming agroecology as a bottom-up construction of knowledge and grass-roots innovations that need to be supported—rather than led—by science and policy (Pimbert 2018). They also clearly emphasise the indivisibility of agroecology as a science, a practice, and a social movement. They reject an agroecology that promotes “input substitution” approaches that maintain dependency on corporate suppliers of external inputs and on global commodity markets, and

which leave untouched the structural vulnerabilities (ecological, economic and social) of monocultures and linear food chains. Instead, these social movements favour a transformative agroecology based on the redesign and functional diversification of agroecosystems, as well as their integration with re-territorialised local and regional markets (CSM 2016). The practices of agroecology practitioners working within the food sovereignty paradigm include:

- (i) 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 resilient agroecological systems that mimic natural ecosystems.
- (ii) Farmers distancing themselves from markets supplying inputs (hybrid seeds, genetically modified organisms, fertilisers, pesticides, etc), reduced dependence on commodity markets for inputs enhances farmers’ autonomy and control over the means of production.
- (iii) 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, for example, short food chains and local procurement schemes that link organic producers with schools and hospitals.
- (iv) A rediscovery of forgotten resources, local knowledge on crop and livestock management, organic manure to improve the nutritional quality of foods, renewable energies and their decentralised and distributed micro-generation.
- (v) Trade rules that protect local economies and ecologies. The spread of socio-ecologically resilient food systems depends on: (a) replacing patents on biodiversity with locally adapted legal frameworks that recognise 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 for equity, social inclusion and ecological regeneration.

This radical vision is in sharp contrast with that of mainstream organisations which seek to co-opt agroecology and ensure its compatibility with “business as usual.” For example, the Global Forum on Agricultural Research (GFAR) shared its vision on the future of agroecology at the April 2018 FAO symposium on scaling up agroecology. The GFAR’s declaration stated that it “does not consider agroecology as a radical alternative to the green revolution, nor as a parallel pathway that cannot exist with agribusiness and industrial agriculture” (SOCLA 2018). Despite official recognition that agroecology has a role to play in global agriculture, there is very little public funding for R&D, especially for a more transformative agroecology. For example, in the US, a recent analysis of funding by the US Department of Agriculture (USDA) showed that projects with an emphasis on agroecology based on agroecosystem diversification represented only 0.6%–1.5% of the entire USDA Research, Education and Economics (REE) budget (DeLonge et al 2016).

In all countries, agricultural research and extension mainly aim to tweak the system by inventing “new” problem-solving approaches such as Climate Smart Agriculture (CSA) and Sustainable Agricultural Intensification (SAI) that are essentially “more of the same” (Royal Society 2009). The CSA and SAI selectively incorporate agroecological practices to improve resource use efficiency in farming, while also embracing and promoting an eclectic mix of herbicide-tolerant crops, toxic insecticides, genetically modified seeds and livestock, proprietary technologies and patents on seeds, energy-intensive livestock factory farming, large-scale industrial monocultures, carbon-offset schemes, and biofuel plantations (Pimbert 2015). When included in CSA and SAI, agroecological techniques are, thus, made to conform to the dominant agri-food regime and the logic of capitalist development (Levidow et al 2014). In sum, agroecology today is at the crossroads.

Challenges for Agroecological Transformation

An agroecology that transforms—rather than conforms with—the prevailing agri-food regime must address the following challenges.

Inventing a new modernity: Most of the world’s food is still grown, collected and harvested by over 2.5 billion small-scale producers. Worldwide, over 72% of the total number of farms are family farms which are smaller than one hectare in size (Lowder et al 2016). Collectively, these smallholders are by far, the largest investors in farming and land, and produce at least 70% of the world’s food according to the FAO.³ This food is primarily sold, processed, resold and consumed locally, with many people obtaining their incomes and livelihoods by working at different points of the food chain, from field to plate. Worldwide, these diverse localised food systems provide the foundations of people’s nutrition, incomes, economies, and culture. But, despite these contributions, local food systems—as well as the organisations and local institutions that govern them—are largely ignored, neglected or actively undermined by governments and corporations.

In capitalist, socialist, and communist nation states, the dominant view of modernising development envisions having less people living off the land. It encourages an exodus of people from rural areas to work in industry and urban-based trade and services (Perez-Vitoria 2015; Pimbert 2008). Also, 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).

However, this modernisation agenda is seen as inevitable by most corporations and governments. Contesting and neutralising the agency of this hegemonic view of modernity is a key priority for the agroecology movement. 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 rejected by social movements working for agroecology and food sovereignty. In response to a development model geared towards ensuring the extinction of small-scale food providers, LVC is

redefining what it means to be a “peasant.” A process of “re-peasantisation” is slowly unfolding as more national and regional organisations proudly embrace the term “peasant” to describe themselves (Desmarais 2007).

Throughout the world, growing numbers of smallholders and citizens are affirming this alternative peasant identity and projecting an alternative vision of modernity, rich in meaning and hope. Many voices in social movements claim that agroecology as part of food sovereignty can help give birth to this new modernity by regenerating a diversity of autonomous food systems (Pimbert 2008; Perez-Vitoria 2015). Embraced by an increasing number of youth, this vision of modernity and diversity rejects the idea of development as a process of commodification of nature and social relations (Rist 2013). It looks to other definitions of “the good life,” including *buen vivir* or *sumak kausai* in Latin America, de-growth in Europe, feminist subsistence perspectives (Mies and Bennholdt-Thomsen 1999), and ecological Swaraj in India (Kothari et al 2014). A transformative agroecology must be increasingly grounded in a radical pluralism that honours and nurtures cultural diversity by enabling many paths to the realisation of self-defined aspirations and definitions of the “good life.”

Linear to circular food systems: The linear and increasingly globalised structure of industrial food, energy, and water systems 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. However, planetary limits are being exceeded (Steffen et al 2015). “Business as usual is no longer an option” (IAASTD 2009); a fundamental transformation is needed 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 by re-localising production and consumption (Jones et al 2012).

However, this re-localisation of food systems within territories also calls for the integration of food, energy and water within circular systems. This is a major challenge for the agroecology and food sovereignty movement because radically new knowledge must be developed for that purpose (Pimbert 2018).

Agroecological R&D is increasingly challenged to develop and scale out circular systems that mimic natural ecosystems at different scales—from individual farm plots to entire cities—by using functional biodiversity, ecological clustering of industries, recycling, and re-localised production and consumption within a territorial-based approach to sustainable living. These rural and urban systems are often characterised by agroecological approaches, ecological design, widespread recycling and reuse, a focus on “doing more with less,” and the re-localisation of production processes, supply chains, and consumption (Jones et al 2012). Circular systems that combine food and energy production with water and waste management aim to reduce carbon and ecological footprints, while maintaining a good quality of life through “a controlled process of de-growth in consumption and production” driven by the eight “Rs” described by Serge Latouche (2009): re-evaluate, re-conceptualise, restructure, redistribute, re-localise, reduce, reuse, and recycle.

Rethinking economics: A fundamentally different economics is needed for the widespread adoption and spread of agroecology, since throughout the industrial food system and its related sectors (energy, manufacturing, etc), there is a direct relationship between the huge 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 much fairer and more gender equitable distribution of productivity gains through a reduction of working hours. It also calls for alternative forms of economic organisation that provide opportunities and local autonomous spaces for the generation of use values rather than exchange values; a guaranteed and unconditional minimum income for all men and women; and a progressive shift to an economics based on the principle of “From each according to their means, to each according to their needs” (Gollain 2000; Latouche 2003; Mies and Bennholdt-Thomsen 1999; D’Alisa et al 2014).

Agroecological transformation depends on a creative re-imagination of economics that explores the rich possibilities of solidarity economics, de-growth thinking, anarchist economics, feminist economics, and other alternatives (Pimbert 2018).

Deepening democracy: One of the clearest demands of food sovereignty movements is that farmers and other citizens should exercise their fundamental human right to decide their own food and agricultural policies (Nyéléni 2007). As an integral part of food sovereignty, agroecology is perhaps best understood as a process that aims to expand the realm of democracy and freedom, by regenerating a diversity of locally autonomous and socially just food systems (Pimbert 2008).

Social movements committed to a transformative agroecology generally seek to reverse the democratic deficit and exclusion that favour the interests of powerful corporations, investors, big farmers and technocratic research institutes. This will often require an expansion of “direct” democracy in decision-making in order to complement, or replace, models of representative democracy that prevail in conventional policymaking for environment and development. This is a major challenge. 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 as well as other citizens in the governance of food systems and the wider ecosystems they are embedded in (grasslands, forests, wetlands, etc) requires social innovations that: (i) create inclusive and safe spaces for deliberation and action; (ii) build local organisations, horizontal networks and 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); (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 2008).

Fourth, only with some material security and free time can people—both men and women—be “empowered” to think about what type of policies and institutions they would like to see and how they can develop them. Free time is needed for men and women to fully engage in, and regularly practise, the art of participatory direct democracy. This requires radical reforms in economic arrangements similar to those listed above.

Gender justice: Deepening democracy also implies greater gender justice and the need for a more feminist agroecology:

If we do not eradicate violence towards women within the movement, we will not advance in our struggles, and if we do not create new gender relations, we will not be able to build a new society. (La Via Campesina 2008)

But, despite its critical perspective, agroecology has not yet incorporated an explicit gender approach that can problematise social relations in patriarchal contexts, adequately value the role(s) of peasant women, and make more visible the relationship between women’s domestic work and care with socio-environmental sustainability (Larrauri et al 2016). This also hides from view the many inequalities between men and women in peasant agriculture (Bezner Kerr 2013). Agroecology as a science, practice and social movement needs to develop ways of knowing, knowledge, and practices informed by a feminist agroecology that challenges patriarchy and forms of structural violence against women in particular. Given the vital importance of women’s knowledge and work in land care, farming, and food preparation, this is an urgent priority.

Structures for Multilevel Decision-making

New institutional and political structures are needed to combine localism with interdependence for coordinated action across large areas. Diverse agroecologies and re-territorialised food systems in which economics is re-embedded in society (of Polanyi 1957), all require inclusive participation and collective action to coordinate local adaptive management and governance, across a wide range of food systems and associated landscapes (forests, wetlands, grasslands, etc). Moreover, strengthening citizen-centred food systems and autonomy calls for forms of political and social organisation that can institutionalise interdependence, without resorting to the global market or the central state.

One option is democratic confederalism, which involves a network of people-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 (Bookchin 2015; Öcalan 2017). The larger and more numerous the linked federations and confederations become, the greater is their potential to exert countervailing power to democratise and decentralise the governance of food systems and their diverse agroecologies.

In this regard, the struggle to democratise the governance of research for agroecology and food sovereignty is emblematic as it seeks to create more democratic ways of knowing through

two complementary approaches: (i) supporting bottom-up networks of self-managed research and grass-roots innovation as well as citizen oversight over the production of knowledge; and (ii) democratising public research and increased funding for research on the technical and institutional dimensions of agroecology as food sovereignty (Pimbert 2018).

To different degrees, food producers in these two approaches work closely with supportive researchers to decide strategic upstream research agendas and priorities, including the allocation of funds for R&D. Institutional innovations, such as popular assemblies, and methods for inclusive deliberative processes, such as citizens' juries, help create safe spaces for decision-making "with," "by," and "for" farmers and other citizens

(Pimbert et al 2011; Excluded Voices, *Centre for Agroecology and Food Security*). By valuing and working with peoples' knowledge, this transformative process 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 (Santos 2014).

For ethical and practical reasons, transformation depends on hitherto excluded farmers and citizens—men and women—co-constructing knowledge, policies, and practices for the local adaptive management and governance of diverse ecosystems and economies. This is all the more important in today's context of growing inequalities, rapid global change, and uncertainty.

NOTES

- 1 Farmers here refers to smallholder peasant and family farmers who grow crops and raise livestock, pastoralists, artisanal fishers, landless farmers/workers, forest dwellers, indigenous peoples, hunters and gatherers, and other small-scale producers.
- 2 La Vía Campesina (IVC) is an international movement that brings together peasant organisations of small- and medium-sized producers, agricultural workers, landless people, women farmers, migrants and indigenous communities from Africa, Asia, the Americas, and Europe. IVC comprises about 164 local and national organisations in 73 countries and represents about 200 million farmers altogether. For more details, see: <https://viacampesina.org/en>
- 3 See FAO (2014).

REFERENCES

Altieri, Miguel (1987): *Agroecology: The Scientific Basis of Alternative Agriculture*, Boulder: Westview Press.

Badgley, Catherine, Jeremy Moghtader, Eileen Quintero, Emily Zakem, M Jahi Chappell, Katia Avilés-Vázquez, Andrea Samulon and Ivette Perfecto (2007): "Organic Agriculture and the Global Food Supply," *Renewable Agriculture and Food Systems*, Vol 22, No 2, pp 86–108.

Bezner Kerr, Rachel (2013): "Seed Struggles and Food Sovereignty in Northern Malawi," *Journal of Peasant Studies*, Vol 40, No 5, pp 867–97.

Bookchin, Murray (2015): *The Next Revolution: Popular Assemblies and the Promise of Direct Democracy*. London: Verso.

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

CSM (2016): "Connecting Smallholders to Markets: An Analytical Guide," Civil Society Mechanism in the Committee on World Food Security, Rome.

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

DeLonge, Marcia S, Albie Miles and Liz Carlisle (2016): "Investing in the Transition to Sustainable Agriculture," *Environmental Science & Policy*, Vol 55, No 1, pp 266–73.

Desmarais, Annette Aurélie (2007): *La Vía Campesina: Globalisation and the Power of Peasants*, Pluto Press, London.

Dharampal (1983): *Indian Science and Technology in the Eighteenth Century: Some Contemporary European Accounts*, Hyderabad: Academy of Gandhian Studies.

FAO (2014): "Towards Stronger Family Farms: Voices in the International Year of Family Planning," Food and Agriculture Organization of the United Nations, Rome, <http://www.fao.org/3/a-i4171e.pdf>.

— (2018): "Scaling up Agroecology Initiative: Transforming Food and Agricultural Systems in Support of the SDGs," Food and Agriculture Organization of the United Nations, Rome.

Francis, Charles et al (2003): "Agroecology: The Ecology of Food Systems," *Journal of Sustainable Agriculture*, Vol 22, No 3, pp 99–118.

Gliessman, Stephen R (1990): *Agroecology: Researching the Ecological Basis for Sustainable Agriculture*, New York: Springer.

— (2014): *Agroecology: The Ecology of Sustainable Food Systems*, Boca Raton: CRC Press.

— (2015): "Agroecology: Roots of Resistance to Industrialised Food Systems," *Agroecology, A Transdisciplinary, Participatory and Action-oriented Approach*, V Ernesto Méndez, Christopher M Bacon, Roseann Cohen and Stephen R Gliessman (eds), Boca Raton, FL: CRC Press.

Gollain, Françoise (2000): *Une Critique du Travail: Entre Écologie et Socialisme*, Paris: La Découverte.

Gómez-Pompa, Arturo and Andrea Kaus (1992): "Taming the Wilderness Myth: Environmental Policy and Education Are Currently Based on Western Beliefs about Nature Rather than on Reality," *Bioscience*, Vol 42, No 4, pp 271–79.

Hernández Xolocotzi, Efraim (1977): *Agroecosistemas de México: Contribuciones a la Enseñanza, Investigación y Divulgación Agrícola*, Chapingo, Mexico.

IAASTD (2009): "Agriculture at a Crossroads: Synthesis Report," International Assessment of Agricultural Knowledge, Science and Technology for Development, Washington, DC: Island Press.

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

Kothari, Ashish, Fredrico Demaria and Alberto Acosta (2014): "Buen Vivir, Degrowth and Ecological Swaraj: Alternatives to Sustainable Development and the Green Economy," *Development*, Vol 57, Nos 3–4, pp 362–75.

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

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

Larrauri De Marco, Olga, David Pérez Neira and Marta Soler Montiel (2016): "Indicators for the Analysis of Peasant Women's Equity and Empowerment Situations in a Sustainability Framework: A Case Study of Cacao Production in Ecuador," *Sustainability*, Vol 8, No 12, pp 1,231–49.

La Vía Campesina (2008): "The Maputo Declaration," Maputo, Mozambique, <https://viacampesina.org/en/declaration-of-maputo-v-international-conference-of-la-via-campesina/>.

Levidow, Les, Michel P Pimbert and Gaetan Vanloqueren (2014): "Agroecological Research: Conforming—Or Transforming the Dominant Agro-food Regime?" *Agroecology and Sustainable Food Systems*, Vol 38, No 10, pp 1,127–55.

Lowder, Sarah K, Jacob Scoet and Terri Raney (2016): "The Number, Size, and Distribution of Farms, Smallholder Farms, and Family Farms Worldwide," *World Development*, Vol 87, pp 16–29.

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

Nyeléni (2007): "Declaration of Nyéléni, Forum for Food Sovereignty," viewed on 23 December 2015, <http://nyeleni.org/spip.php?article290>.

— (2015): "Declaration of the International Forum for Agroecology," Nyéléni, Mali.

Mies, Maria and Veronika Bennholdt-Thomsen (1999): *The Subsistence Perspective: Beyond the Globalised Economy*, London: Zed Books.

Öcalan, Abdullah (2017): *The Political Thought of Abdullah Öcalan*, London: Pluto Press.

Perez-Vitoria, Silvia (2015): *Manifeste Pour un XXI Siècle Paysan*, Actes Sud, Arles.

Pimbert, Michel P (2008): *Towards Food Sovereignty: Reclaiming Autonomous Food Systems*, London and Munich: RCC and IIED, <http://www.environmentandsociety.org/mml/pimbert-michel-towards-food-sovereignty-reclaiming-autonomous-food-systems>.

— (2015): "Agroecology as an Alternative Vision to Conventional Development and Climate-smart Agriculture," *Development*, Vol 58, Nos 2–3, pp 286–98.

— (2018): *Food Sovereignty, Agroecology, and Bio-cultural Diversity: Constructing and Contesting Knowledge*, London: Routledge.

Pimbert, Michel P, Boukary Barry, Anne Berson and Khanh Tran Thanh (2011): *Democratising Agricultural Research for Food Sovereignty in West Africa*, London: IIED.

Polanyi, Karl (1957): *The Great Transformation*, Boston, MA: Beacon Press.

Posey, Darrell A (ed) (1999): *Cultural and Spiritual Values of Biodiversity*, London: United Nations Environment Programme and Practical Action.

Rabhi, Pierre (1989): *L'Offrande au Crépuscule*, Candide, Lavilledieu.

Rist, Gilbert (2013): *Le Développement: Histoire d'une Croissance Occidentale*, Presses de Sciences Po, Paris.

Royal Society (2009): *Reaping the Benefits: Science and the Sustainable Intensification of Global Agriculture*, London: The Royal Society.

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

Sevilla Guzmán, Eduardo (2011): *Sobre los Orígenes de la Agroecología en el Pensamiento Marxista y Libertaria*, Cochabamba: AGRUCO.

SOCIA (2018): *Declaración de la Sociedad Científica Latinoamericana de Agroecología, sobre el II Simposio Internacional de Agroecología de la FAO: Ampliación de la Agroecología para Contribuir a los Objetivos de Desarrollo Sostenible*, Rome.

Steffen, William et al (2015): "Planetary Boundaries: Guiding Human Development on a Changing Planet," *Science*, Vol 347, No 6, 223, pp 1–15.

Zhong, G F (1982): "The Mulberry Dike-fish Pond Complex: A Chinese Ecosystem of Land-water Interaction on the Pearl River Delta," *Human Ecology*, Vol 10, No 2, pp 191–202.