FOOD SOVEREIGNTY, AGROECOLOGY AND BIOCULTURAL DIVERSITY

Constructing and Contesting Knowledge

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CONSTRUCTING KNOWLEDGE FOR FOOD SOVEREIGNTY, AGROECOLOGY AND BIOCULTURAL DIVERSITY

An overview

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Introduction

Much of the knowledge produced by mainstream research is inappropriate or directly harmful to local communities and the environments on which they depend for their food security, livelihoods and culture. Narrow-lens, universal and reductionist explanatory models have generated a crisis in agriculture and natural resource management through their inability to come to terms with the dynamic complexity and variation within and among ecosystems. Similarly, the science of economics and mainstream accounts of human demography embody several reductionist biases, unproven assumptions and narrow historical perspectives that legitimize the dominant food regime and current land uses.

As a result, global narratives on people-environment interactions blame the poor, women and ethnic minorities for social and environmental ills. Despite the fact they represent by far the vast majority of the world's food and agricultural producers today (Lowder *et al.*, 2016), small and family farmers, nomadic pastoralists and agro-pastoralists, indigenous peoples and forest dwellers, artisanal fishers and urban food producers are largely excluded from participation in research and policy debates on the future of food, farming, environment and development (Chambers *et al.*, 1989; Chambers, 2008) – with women being the most excluded everywhere. Instead, representatives of large farmers and agri-food corporations are usually centre-stage in these debates. The consequence is a socially and ecologically destructive and increasingly globalized agri-food system.

Food sovereignty is an alternative paradigm for food, fisheries, agriculture, pastoralism and forest use that is emerging in response to this democratic deficit and the many environmental and social crises of food and farming. It aims to guarantee and protect people's space, ability and right to define their own models of production, food distribution and consumption patterns. It emphasizes the science

and practice of *agroecology* to design sustainable agricultures that reduce carbon and ecological footprints in rural and urban areas (Altieri *et al.*, 2015; IPES-Food, 2016). It also encompasses the concept of *biocultural diversity*: the interrelated biological, cultural and linguistic diversity as well as the local knowledge, institutions and practices which are vitally important in allowing societies to adaptively manage their farming systems, natural resources, landscapes and social life.

To achieve food sovereignty, agroecology and biocultural diversity there is a need to transform and construct knowledge for diversity, decentralization, dynamic adaptation and democracy. This is the central thesis of this book.

About this volume

Conflicts and contestations over knowledge – and who controls its production – are a key focus of social movements and other actors that promote food sovereignty, agroecology and biocultural diversity. Alternatives to the current model of agriculture, conservation and development require radically different knowledges and epistemologies from those on offer today in mainstream institutions (universities, policy think tanks, donor organizations, trade unions, etc.).

Going beyond facile critique, this collection of papers critically explores new knowledge and reforms in research, technological paradigms, organizations and professional practice that could help transform and construct knowledge for food sovereignty, agroecology and biocultural diversity. In sum, the purpose of this book is to contribute to the democratization of knowledge and power. It draws on a series of conversations with peasant farmers[1] and key scholars on food, environment and society – some of whom have been invited to contribute to this book.

This introductory chapter summarizes the main issues and concepts related to transforming knowledge for food sovereignty, agroecology and biocultural diversity. The origins, history and main features of the concepts are first briefly described, together with a vision for a radically new modernity. It highlights how these concepts and issues are dealt with in the various chapters, as well as the central arguments that run through this book.

Overall, this volume offers critical reflections on the nature and politics of knowledge(s) that are centrally involved in the governance[2] and management of food systems[3] and biocultural diversity. It argues that a fundamentally new paradigm for science and knowledge is required to achieve food sovereignty and amplify agroecological solutions along with biocultural diversity. And while a paradigm shift has many dimensions (Kuhn, 2012; Lincoln *et al.*, 2011), this volume mainly focuses on transformations in the nature of knowledge (epistemology) and in ways of knowing (the nature of human inquiry). It emphasizes in particular how the production of knowledge might be democratized. The book is careful to avoid simplistic recommendations. Instead, it argues for a re-imagining and radical reconstruction of knowledge and ways of knowing for food sovereignty, agroecology and biocultural diversity.

A brief introduction to food sovereignty, agroecology and biocultural diversity

Food sovereignty

After several years of development by peasant movements and citizens,[4] the concept of 'food sovereignty' was first put forward internationally by La Vía Campesina[5] at the UN Food and Agriculture Organization's World Food Summit in 1996 (Desmarais, 2007; Desmarais and Nicholson, 2013). During this summit, La Vía Campesina (LVC) presented a set of mutually supportive principles that offered an alternative to world trade policies and would also realize the human right to food. Their statement, *Food Sovereignty: A Future without Hunge*r (1996), declared that 'Food Sovereignty is a precondition to genuine food security'.[6] At its heart, this alternative paradigm for food, agriculture and land use aims to guarantee and protect people's space, ability and right to define their own models of production, food distribution and consumption patterns in rural and urban contexts (Box 1.1).

BOX 1.1 FOOD SOVEREIGNTY: A FUTURE WITHOUT HUNGER

During the 1996 World Food Summit, La Vía Campesina presented seven mutually supportive principles that define an alternative paradigm for food, agriculture and human wellbeing, summarized here:

1 Food – a basic human right

Food is a basic human right. Everyone must have access to safe, nutritious and culturally appropriate food in sufficient quantity and quality to sustain a healthy life with full human dignity. Each nation should declare that access to food is a constitutional right and guarantee the development of the primary sector to ensure the concrete realization of this fundamental right.

2 Agrarian reform

A genuine agrarian reform is necessary which gives landless and farming people – especially women – ownership and control of the land they work and which returns territories to indigenous peoples. The right to land must be free of discrimination on the basis of gender, religion, race, social class or ideology; the land belongs to those who work it. Smallholder farmer families, especially women, must have access to productive land, credit, technology, markets and extension services. Governments must establish and support decentralized rural credit systems that prioritize the production of food for domestic consumption. […]

3 Protecting natural resources

Food sovereignty entails the sustainable care and use of natural resources, especially land, water, seeds and livestock breeds. The people who work the land must have the right to practice sustainable management of natural resources and to preserve biological diversity. This can only be done from a sound economic basis with security of tenure, healthy soils and reduced use of agro-chemicals. Long-term sustainability demands a shift away from dependence on chemical inputs, on cash-crop monocultures and intensive, industrialized production models. Balanced and diversified natural systems are required. [….] Farming communities have the right to freely use and protect the diverse genetic resources, including seeds and livestock breeds, which have been developed by them throughout history. This is the basis for food sovereignty.

4 Reorganizing food trade

Food is first and foremost a source of nutrition and only secondarily an item of trade. National agricultural policies must prioritize production for domestic consumption and food self-sufficiency. Food imports must not displace local production nor depress prices. This means that export dumping or subsidized exports must cease. Smallholder farmers have the right to produce essential food staples for their countries and to control the marketing of their products. Food prices in domestic and international markets must be regulated and reflect the true costs of producing that food. This would ensure that smallholder farmer families have adequate incomes. [….]

5 Ending the globalization of hunger

Food sovereignty is undermined by multilateral institutions and by speculative capital. The growing control of multinational corporations over agricultural policies has been facilitated by the economic policies of multilateral organizations such as the World Trade Organization (WTO), World Bank and International Monetary Fund (IMF). Regulation and taxation of speculative capital and a strictly enforced code of conduct for transnational corporations is therefore needed.

6 Social peace

Everyone has the right to be free from violence. Food must not be used as a weapon. Increasing levels of poverty and marginalization in the countryside, along with the growing oppression of ethnic minorities and indigenous populations, aggravate situations of injustice and hopelessness. The ongoing displacement, forced urbanization, repression and increasing incidence of racism of smallholder farmers cannot be tolerated.

7 Democratic control

Smallholder farmers must have direct input into formulating agricultural policies at all levels. The United Nations and related organizations will have to undergo a process of democratization to enable this to become a reality. Everyone has the right to honest, accurate information and open and democratic decision-making. These rights form the basis of good governance, accountability and equal participation in economic, political and social life, free from all forms of discrimination. Rural women, in particular, must be granted direct and active decision-making on food and rural issues.

Subsequent declarations and documents by La Vía Campesina have built on these core food sovereignty principles.

(La Vía Campesina, 1996; www.viacampesina.org)

As the largest transnational agrarian movement today, LVC is mainly recognized for championing and developing the food sovereignty paradigm (Desmarais, 2007; Wittman *et al.*, 2010). It does so by actively building alliances with other social movements trying to respond to the impacts of capitalist development in food, agriculture and land use. For example, LVC was one of the seven organizations[7] that planned and facilitated the 2007 International Forum on Food Sovereignty in Nyéléni (Mali), where over 600 participants from 80 countries further developed the political, economic, social and ecological dimensions of this alternative policy framework. The Nyéléni Declaration affirms the centrality and primacy of 'peoples' – rather than governments of nation states – in framing policies and practices for food, agriculture, environment and human wellbeing:

> 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 prioritizes 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.
>
> *(La Vía Campesina, 2007)*

The organizers of Nyéléni 2007 aimed to expand the food sovereignty debate outside producer groups of small and family farmers (Box 1.2) to include consumer groups and workers' trade unions, as well as the youth and women (see www.nyeleni2007.org). As the LVC has globalized the struggle for food sovereignty, many other organizations, social movements, indigenous peoples' networks and citizen-consumers have adopted and further developed this progressive framework, generating major statements on food sovereignty over the last ten years in particular (Desmarais and Nicholson, 2013; and see www.viacampesina.org).

LVC strongly emphasizes the importance of women's rights and their knowledge for the further development of food sovereignty (Wiebe, 2013). As stated in the Declaration of Maputo: '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 Vía Campesina, 2008a).

BOX 1.2 FAMILY FARMS FOR AUTONOMY AND COMMUNITY RESILIENCE

Worldwide, over 72% of the total number of farms are family farms which are smaller than one hectare in size (Lowder *et al.*, 2016). A family farm can be seen as an association composed of two or more members linked by family relations or customary ties. Production factors are harnessed in common to generate resources for social reproduction as well as financial, material and moral benefits in both rural and urban areas (Sourisseau, 2015). The autonomy, economic viability and resilience of family farms are enhanced when farmers control their resource base, including land, water, seeds and labour as well as knowledge, skills, social networks, local organizations and institutions (EAFF, PROPAC and ROPPA, 2013).

The broader historical context of peasant agricultures and various traditions of agrarian social thought have also influenced the emergence, theory and practice of food sovereignty – and continue to do so today. These influences include:

- agrarian collectivism, as well as social anarchism and libertarian socialist thought – all of which view peasants as progressive agents of change (Bakunin, 1987; Herzen, 1992; Kropotkin, 1892, 1898);

- Marx's view that capitalism induces a fundamental metabolic rift between society and nature (1981);
- heterodox Marxism (Chayanov, 1989);
- peasant studies (Hernández Xolocotzi, 1985,1987; Polanyi, 1957; Shanin, 1987; van der Ploeg, 2013);
- centre-periphery and dependency theory (Amin, 1976; Gunder Franck, 1978);
- post-development theory (Escobar, 1996; Esteva and Prakash, 1998; Partant, 1999, 2002); and
- agrarian social theory and thinking on environment and radical ecology (Bookchin, 1989; Friedmann, 2005; McMichael, 2009; Gonzales de Molina, 2010; Martinez-Alier, 2002).

Some of these traditions of radical thought have deeply influenced peasant struggles for self-determination and the right to food sovereignty. For example, Bakunin's proposals on collectivist anarchism (Bakunin, 1982) and Proudhon's 'principle of federation' (Proudhon, 1979) informed the consciousness and agency of an impoverished peasantry in Spain. During the Spanish civil war (1936–1939), the peasants of Andalusia and Aragon established communal systems of land tenure, in some cases abolishing the use of money for internal transactions, setting up free systems of production and distribution and creating a decision-making procedure based on popular assemblies and direct, face-to-face democracy. In those parts of Spain not overrun by Franco's troops, about three million men, women and children were living in collectivized communes over large areas (Bookchin, 1998; Leval, 1975).

Kropotkin's ideas on agrarian and industrial mutualism (Kropotkin, 1898) influenced Mahatma Gandhi's views on self-rule *(Swaraj)* and progress based on economic self-reliance *(Sarvodaya)* to end poverty through improved agriculture and small-scale cottage industries in every village of India (Bhatt, 1982). And today, newly emerging thinking on the convergences between food sovereignty and the right to the city[8] (Lefébvre, 1968; Harvey, 2012; Purcell, 2013), with an emphasis on urban agroecology and new garden cities (Bliss, 2011; Ross and Cabannes, 2014; Tornaghi, 2016) as well as libertarian municipalism and the use of eco-technologies in locally controlled circular economies (Bookchin, 1986, 1995; Jones *et al.*, 2012), all build on, or echo, the vision of direct democracy which Peter Kropotkin described over a century ago in *Fields, Factories and Workshops* (Kropotkin, 1898).

Similarly, the enduring struggles of indigenous peoples[9] for self-determination, control over their ancestral territories and their right to protect their knowledge systems and lifeways (see Chapters 4 and 6) all strongly amplify the vision of food sovereignty put forward by peasant organizations. Adopted after decades of negotiations between representatives of indigenous peoples and governments, the landmark United Nations Declaration on the Rights of Indigenous Peoples contains many statements that overlap with the intent and practice of food sovereignty (UNDRIP, 2007). Indigenous peoples' affirmation of their rights to self-determination and cultural revitalization are driving their food sovereignty agendas. Indeed, many

indigenous peoples' movements, such as the Zapatistas in the Chiapas of Mexico, have embraced food sovereignty as part of their struggles for self-determination, decolonization, cultural affirmation, autonomy and gender equity (Gahman, 2016; Collier and Quaratiello, 2004).

More generally, the food sovereignty movement draws extensively on human rights-based frameworks. Virtually everywhere in the global North (Brent *et al.*, 2015) and South (Pimbert, 2008) the movement emphasizes the right to food, farmers' and workers' rights, rights to culture and livelihoods as well as the right to self-determination. This reflects a radical conception of rights: rights that are claimed by citizens rather than granted by the state. As Priscilla Claeys writes: 'The [food sovereignty] movement's assertion of new rights contributes to shaping a cosmopolitan, multicultural, and anti-hegemonic conception of human rights' (Claeys, 2012).

Increasing visibility and influence

As a concept and framework, the term 'food sovereignty' has moved from the margins and gained more visibility during the last ten years in particular (Desmarais and Nicholson, 2013; McKeon, 2015). The term is increasingly recognized by parts of the international community, some of the United Nations organizations, governments and a growing number of academic research centres and universities. For example, several recent international reports on the state of the world's food and agriculture mention 'food sovereignty' as a possible pathway to more sustainable agricultural development (e.g. IAASTD, 2009; HLPE, 2016).

The reform of the UN's Committee on World Food Security (CFS) and the creation of the Civil Society Mechanism (CSM) in 2010 have given representatives of small-scale producers and civil society supporters of food sovereignty a unique opportunity to engage with and influence governments at the international level (Brem-Wilson, 2015; CFS, 2009; McKeon, 2015). Like any other policy framework, food sovereignty implies a purposeful course of action to advance specific objectives based on national and international policies as well as an enabling global multilateralism (see Pimbert, 2008; Windfuhr and Jonsén, 2005; www.viacampesina.org). However, rather than presenting a fixed menu of policy instruments, advocates of food sovereignty use their interventions in the CFS to propose a range of policy shifts and directions for governments who seek to implement (or harm) food sovereignty. High-level policy dialogues with governments allow the food sovereignty movement to further develop its broad policy discourse[10] and create space for change.

Countries like Mali and Senegal have included food sovereignty thinking in their national policies, and constitutional recognition of the right to food sovereignty has been achieved in Ecuador, Bolivia and Nepal (Beuchelt and Virchow, 2012). For example, the government of Mali undertook a consultation process with farmers to draft its new agricultural framework law (LOA, 2005). After more than a year of work, this law has enshrined food sovereignty as a priority for improving

rural and urban living standards. While the government may use the term as a rhetorical device, Malian farmer organizations continue to discuss ways of implementing the food sovereignty framework throughout the country.[11] Other countries such as Peru, Argentina, Guatemala, Brazil, El Salvador and Indonesia have legislation supportive of food sovereignty efforts (Wittman, 2015).

In academia too, interest is growing in the critical analysis and study of food sovereignty (Agarwal, 2014; Andrée *et al.*, 2014; Bernstein, 2014; Brem-Wilson, 2015; Burnett and Murphy, 2014; Claeys, 2015; Desmarais and Wittman, 2014; Edelman, 2014; Grey and Patel, 2015; Henderson, 2017; Kloppenburg, 2014; Masson *et al.*, 2017; Martınez-Torres and Rosset, 2014; McMichael, 2014; Schiavoni, 2017; Tilzey, 2017; Trauger, 2015; van der Ploeg, 2014). *The Journal of Peasant Studies* has published a selection of academic papers that were presented at two well-attended international conferences on food sovereignty: the first in 2013 at Yale University (USA) and the second in 2014 at the Institute for Social Studies in The Hague (The Netherlands) (*The Journal of Peasant Studies*, 2014).

Anticipating the risk of co-option by powerful actors, social movements and critical scholars alike affirm that 'food sovereignty' is not, and cannot be, a piecemeal approach to change. It entails a fundamental transformation of the industrial capitalist food system by working towards autonomy and democracy (Pimbert, 2010). The proponents of food sovereignty are not working for 'inclusion' in existing political structures and the dominant culture. Instead they strive to 'transform the very political order in which they operate' (Alvarez *et al.*, 1998).

As Patel puts it, the food sovereignty movement argues 'for a mass re-politicization of food politics, through a call for people to figure out for themselves what they want the right to food to mean in their communities, bearing in mind the community's needs, climate, geography, food preferences, social mix and history' (Patel, 2007).

Contesting, re-imagining, and constructing knowledge for food sovereignty ultimately depends on putting into practice these forms of radical democracy and active citizenship in the governance of research and the production of knowledge (see Chapter 8).

Agroecology and food sovereignty: a brief history

Agroecology focuses on the ecological relations in farming systems, and it seeks to understand the dynamics, the form and the functions of these relations. Its underlying analytical framework owes much to systems theory and approaches that aim to integrate the numerous factors – environmental and social – that influence agriculture and land use (Altieri, 1987; Carrol *et al.*, 1990; Lowrance *et al.*, 1984). This agroecological knowledge can then be used as the basis for the design of more sustainable, diverse and resilient agricultures (Altieri, 1987; Vandermeer, 2010).

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 relatively resilient to stresses such as climate change. The goals of sustainability and productivity

are met through agroecosystem designs that enhance functional diversity at the genetic, species, ecosystem and landscape levels. They are also met through the use of agroecological methods such as genetic mixtures, crop rotations, intercropping, polycultures, mulching, terracing, the management of diverse micro-environments for nutrient concentration and water harvesting, agro-pastoral systems and agroforestry. The design of biodiverse, energy-efficient, resource-conserving and resilient farming systems is based on mutually reinforcing agroecological principles (Box 1.3). These 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).

BOX 1.3 MODERN PRINCIPLES OF AGROECOLOGY ORIGINATE IN THE KNOWLEDGE AND PRACTICES OF INDIGENOUS AND PEASANT FARMERS

- Adapting to the local environment and its diverse micro-environments
- Creating favourable soil conditions for plant growth and recycling nutrients, particularly by managing organic matter and by enhancing soil biological activity
- Minimizing losses of energy, water, nutrients and genetic resources by enhancing the conservation and regeneration of soil, water and agrobiodiversity on the farm and neighboring landscape and watershed
- Diversifying species, crop varieties and livestock breeds in the agroecosystem over time and space – including integrating crops, trees and livestock at the field and wider landscape levels
- Strengthening the 'immune system' of agricultural systems through the enhancement of functional biodiversity – natural enemies of pests, allelopathy and antagonists etc., by creating appropriate habitats and through adaptive management in time and space
- Enhancing beneficial biological interactions and synergies throughout the system and among the components of agro-biodiversity, thereby promoting key ecological processes for sustainable production and resilience to stresses and shocks.

(Adapted from Altieri, 1995; Gliessman, 1998)

Within academic circles, the term 'agroecology' was coined in 1928 by Bensin (1928, 1930, cited in Wezel and Soldat, 2009); a number of pre-Second World War scientists such as Klages (1928) had already begun to merge the sciences of agronomy and ecology together (Gliessman, 1990). Mexican scientists and practitioners played an important role in the development of agroecology, arguing for an ecological approach to food production as early as 1926 in the First Agroecological Congress in Meoqui, Mexico (Rosado-May, 2015).

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. Among Mexican scholars for example, the work of Efraim Hernández Xolocotzi between the 1940s and late 1970s is particularly noteworthy for its emphasis on intercultural processes for constructing agroecological knowledge that combines ecological science with peoples' knowledge (Hernández Xolocotzi, 1977, 1985, 1987).

However, it was the increasing awareness of the environmental impacts and pollution caused by industrial farming and Green Revolution agriculture that really encouraged closer links between agronomy and ecology in the search for a more sustainable agriculture (Herber, 1962; Merrill, 1976). 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 organized between 1979 and 1981 at the College for Tropical Agriculture in Tabasco (Mexico). These courses allowed Mexican students to interact with scientists from Mexico and the USA, and helped seed resistance to industrialized food and farming (Gliessman, 2015). In the USA, the pioneering work of Miguel Altieri (1987) and Stephen Gliessman (1990) helped put agroecology on the map in the early 1980s as a credible alternative to industrial monocultures. 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; Rabhi and Caplat, 2015).

The conceptual foundations of Altieri and Gliessman's agroecology are firmly rooted in the science of ecology and agroecosystem analysis. Hernàndez Xolocotzi's understanding of intercultural agroecology embraced a broad conceptualization that included social, economic, cultural, political, ethical, ecological and technological factors (Rosado-May, 2015). And Rabhi's approach is built on ecology and is explicitly grounded in the tradition of 'anthroposophy' (Steiner, 1974) and indigenous cosmovisions, emphasizing a life-affirming ethic with a central focus on the Earth rather than only the agroecosystem. In their uniquely different ways, these pioneering agroecologists and their early followers have helped to frame the foundations of today's transdisciplinary agroecology.

More recent debates in peasant studies have further enriched our understanding of the origins of agroecology and its transdisciplinary history. For example, Sevilla Guzmán and Woodgate (2015) have traced the origins of agroecology – and its links to food sovereignty – to neo-Narodnism, heterodox Marxism and different strands of libertarian thought, including social anarchism (see also Sevilla Guzmán, 2011). Building on the seminal thinking of Chayanov (1989), van der Ploeg has also analyzed agroecological praxis as a form of resistance to capitalist modernization by agrarian social movements and peasants struggling for autonomy (van der Ploeg, 2009, 2013).

Unlike most conventional agricultural research and development (Chapter 2), agro-ecological 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 place and site-specific challenges and opportunities. They are, after all, based on literally hundreds of years of collective observation, experimentation and adaptive management of diversity and dynamic complexity across time and space. The historical record shows that this vernacular science has been remarkably innovative across the world. Farmers, pastoralists, forest dwellers, fisherfolk and indigenous peoples collectively harnessed their knowledge to generate sophisticated agricultural and land-use systems in Africa, the Americas and Asia before the arrival of the Europeans. The Incas, the Mayas and the Aztecs all developed systems capable of feeding large and concentrated populations in the Americas (Gómez-Pompa and Kaus, 1992; Gliessman, 1991; Fedick and Morrison, 2004; Ford and Nigh, 2015). European explorers and travellers to Africa and Asia in the sixteenth, seventeenth and eighteenth centuries chronicled the ingenuity and sustainability of highly diverse local agricultures, and the prosperous agrarian life they allowed (Dharampal, 1983; King, 1911; Jones, 1936).

In exploring the epistemological basis of agroecological thought, Hecht (1995) has highlighted the importance of indigenous and peasant knowledge in the construction of modern agroecology. Good agroecologists value and respectfully build on peoples' knowledge and farmer-led experimentation to develop locally appropriate farming practices and agroecological solutions (Box 1.4). Agroecological solutions for sustainable food systems are not delivered top-down. They are developed through respectful intercultural dialogue between scientists and farmers/citizens, building on peoples' local priorities, knowledge and capacity to innovate. Farmer-led and people-centred agroecological research thus rejects the transfer-of-technology model of research and development (R&D) in favour of a decentralized, bottom-up and participatory process of knowledge creation tailored to unique local contexts (Méndez *et al.*, 2016; Levidow *et al.*, 2014; Rosset *et al.*, 2011). Agroecology's interest in indigenous and peasant 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, 1999).

BOX 1.4 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:

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

2. Ecological knowledge
    a. climate, winds, topography, minerals, micro-climates, plant communities and local ecology
    b. 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
3. Knowledge of farming practices
    a. functional biodiversity e.g. the intentional mixing of different crop and livestock species and varieties to stabilize yields, reduce the incidence of diseases and pests and enhance resilience to shocks and stresses
    b. optimal use of resources and space
    c. recycling of nutrients
    d. water conservation and management
4. Experimental knowledge that stems from:
    a. wo/men farmers' careful observations of dynamic processes over time and space
    b. active experimentation. For example, farmers' seed selection as well as their animal and plant breeding 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 and Soldat, 2009; Wezel *et al.*, 2009). This led to a new and more comprehensive definition of agroecology as: 'the integrative study of the ecology of the entire food system, encompassing ecological, economic and social dimensions, or more simply the ecology of food systems' (Francis *et al.*, 2003).

Agroecological research thus widened its focus to critically analyze the global food system and explore alternative food networks that re-localize production and consumption (e.g. short food chains and webs, local food procurement schemes…). 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). Increasingly too, a transformative agroecology aims to facilitate a shift from linear food systems to circular ones that

mimic natural cycles and reduce carbon and ecological footprints – ensuring that circular systems are designed to replace specialized and centralized linear supply chains with decentralized webs of food and energy systems that are integrated with water and waste management in sustainable rural and urban circular economies (Jones *et al.*, 2012; Pimbert, 2015b).

This broader perspective has also 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 organizations, agroecology became explicitly linked with food sovereignty. Most notably, ecologically sound and sustainable methods of farming and food provisioning are projected as an integral part of the vision for food sovereignty (La Vía Campesina, 2007).

Agroecology: in danger of co-option

Barely recognized within official circles only six years ago, agroecology is now more visible in policy discourses on food and farming. For example, in its third Foresight Report the European Union's Standing Committee on Agricultural Research calls for research that gives a high priority to approaches that 'integrate historical knowledge and agroecological principles' to create 'radically new farming systems' that must 'differ in significant respects from current mainstream production systems' (EU SCAR, 2012). Similarly, the report of the International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD, 2009) argues that the vulnerabilities of the global food system can be reduced 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 policy makers (De Schutter, 2010). And both civil society groups and scientists continue to marshal the latest evidence on the multiple benefits of agroecological models of production, including reduction in carbon footprints, adaptation to climate change, reversals in the loss of biodiversity, reductions in agri-chemical pollution (chemical fertilizers and pesticides, antibiotics and growth hormones), reduced water footprints of crops and farm enterprises, multiple yields and often higher profit margins than industrial monoculture farms, creation of employment and new sources of livelihoods and fewer public health hazards for wider society.[12]

However, agroecological knowledge and practices are 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, 2015a). For instance, the National Institute of Research in Agriculture (INRA) in France introduced agroecology in its 2010-2020 strategic research plan (INRA, 2010). In 2012, the Minister of Agriculture declared that France aims to be 'the champion of agroecology' in

Europe. However, civil society organizations 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 in the context of so called 'sustainable agricultural intensification' (Garnett *et al.*, 2013; Royal Society, 2009) and 'climate smart agriculture' (Campbell *et al.*, 2014; Pimbert, 2015). This coalition of citizens and small farmers ask that the French government promote instead an agrarian reform that strongly 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).

Subsequently, the European Coordination of La Vía Campesina stated that: 'Agroecology as understood by social movements is complementary and inseparable from the food sovereignty we want to build' (ECVC, 2013). More recently, representatives of indigenous and peasant communities from across the world reaffirmed this idea:

> 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)*

Speaking at the 2015 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' (www.agroecologynow.com/video/ag/). A similar opinion was strongly expressed by a South Korean delegate from La Vía Campesina: 'Agroecology without food sovereignty is a mere technicism. And food sovereignty without agroecology is hollow discourse' (cited by Rosset and Martínez-Torres, 2014).

Throughout the world, transnational social movements are mobilizing to build, defend and strengthen agroecology as the pathway towards more just, sustainable, resilient and viable food and agricultural systems. These social movements are claiming agroecology as a bottom-up construction of knowledge and practice that needs to be supported – rather than led – by science and policy. They reject an agroecology which promotes 'input substitution' approaches that maintain dependency on suppliers of external inputs and commodity markets, and which leave untouched the ecological, economic and social vulnerabilities of genetically

uniform monocultures and linear food chains (McRae *et al.*, 1990; Rosset and Altieri, 1997). Instead, these social movements favour a transformative agroecology based on a redesign and functional diversification of the agroecosystem as well as its integration with re-territorialized local and regional markets (CSM, 2016; Pimbert, 2015; Rosset and Altieri, 1997). And they clearly emphasize the indivisibility of agroecology as a science, a practice and social movement. Today's more transformative visions of agroecology for food sovereignty thus integrate peoples' knowledge and transdisciplinarity, farmers' practices and social movements – while recognizing their mutual dependence and agency (Anderson *et al.*, 2015; Méndez *et al.*, 2016; Nyéléni, 2015; Pimbert, 2007).

It is this transformative agroecology which the contributions to this volume seek to advance, rather than one that conforms to the dominant agri-food regime.

Biocultural diversity: the intimate link with agroecology and food sovereignty

'Biocultural diversity' describes the diversity of life in all its manifestations: biological, cultural and linguistic. This concept encompasses biological diversity at all levels (genetic, species, ecosystem and landscape) as well as cultural diversity in all its forms.

Languages are a major indicator of cultural diversity and linguists estimate that some 5,000 to 7,000 languages are spoken today on all five continents (Maffi, 2001). Many of the areas of the planet with the highest biological diversity are inhabited by indigenous and traditional peoples (Maffi and Woodley, 2010). Out of the nine countries which account for 60% of the world's languages, six of these centres of linguistic/cultural diversity are also mega-diversity countries harbouring remarkably high numbers of unique plant and animal species (Durning, 1993). This strong overlap between biodiversity 'hotspots' and indigenous peoples' territories is what the 1988 Declaration of Belém calls the inextricable link between biological diversity and cultural diversity.[13]

Biocultural diversity emerges from the countless ways in which people have interacted with their natural surroundings. This co-evolution of people and nature has generated local knowledge and practices which are vitally important in allowing societies to adaptively manage their farming systems, natural resources, biocultural landcapes and social life. In turn, culture, memory and identity have become embedded in the land and waters, with human agency co-creating biodiversity with nature – from crop genetic diversity to the species composition of humanized ecosystems and biocultural landscapes (Gómez-Pompa and Kaus, 1992; Posey, 1999).

Diverse worldviews and unique knowledge systems have emerged through this reciprocal interplay between biological and cultural diversity. Toledo's description of the intimate relationship between nature and culture in Mexico is relevant for other countries where cultural diversity among rural inhabitants is high:

> Each species of plant, group of animals, type of soil and landscape nearly always has a corresponding linguistic expression, a category of knowledge, a practical use, a religious meaning, a role in ritual, an individual or collective vitality. To safeguard the natural heritage of the country without safeguarding the cultures which have given it feeling is to reduce Nature to something beyond recognition; static, distant, nearly dead.
>
> *(Toledo, 1988)*

Languages embody the knowledge, intellectual heritage and frameworks for each society's unique understanding of life. This is one of the main reasons why the disappearance of languages is a major concern. It is estimated that half the world's languages will disappear within a century (UNESCO, 2010). And an even higher number of languages are losing the 'ecological contexts' that sustain them as vibrant languages (Mühlhäusler, 1996; Posey, 1999).

Biocultural diversity also offers a normative vision for the future – an antithesis to the controllable uniformity favoured by corporations and governments committed to the relentless pursuit of economic growth and a singular idea of modernity. It is therefore not surprising that there are convergences and overlaps between initiatives that seek to enhance biocultural diversity and the struggles for agroecology and food sovereignty.

For example, many indigenous peoples and local communities are on the frontline in the struggle to sustain, protect, restore and defend the commons and its biocultural diversity. Communities focus in particular on the territories and areas they live in and collectively conserve on the basis of their traditional knowledge and customary practices, law and institutions. The term Indigenous Peoples' and Community Conserved Territories and Areas (ICCAs) is used to describe these grassroots efforts to enhance biocultural diversity (Borrini-Feyerabend and ICCA Consortium, 2012). The International Union for Conservation of Nature (IUCN) defines ICCAs as 'natural and/or modified ecosystems, containing significant biodiversity values, ecological benefits and cultural values, voluntarily conserved by indigenous peoples and local communities, both sedentary and mobile, through customary laws or other effective means' (IUCN-CEESP, 2008).

In its connection to a well-defined territory, the community is the major actor in making decisions about the local adaptive management of the territory's biocultural diversity. This decentralized governance implies that local institutions have – *de facto* and/or *de jure* – the capacity to develop and enforce decisions (Borrini-Feyerabend *et al.*, 2007). Other actors may collaborate as partners, especially when the land is owned by the state. But local decisions and self-determination in the management of ICCAs are predominant.

The decentralized and distributed network of ICCAs helps to conserve critical ecosystems and threatened species as well as maintain essential ecosystem functions (e.g. carbon sequestration in soils, the renewed availability and quality of water, keystone species for pollination). The scale of these community-led efforts

is significant: the global coverage of ICCAs has been estimated to be comparable to that of the official network of protected areas, which now covers 15.4% of the world's total land area (Kothari *et al.*, 2012; Juffe-Bignoli *et al.*, 2014). However, the conscious objective of community management is usually different than conservation *per se.* Unlike conventional conservation that excludes people from protected areas and restricts resource use by local populations (Colchester, 2004; Dowie, 2009; Ghimire and Pimbert, 1997a; Vidal, 2016), in ICCAs community decisions and efforts are usually geared to sustaining the material basis of livelihoods as well as safeguarding the diversity of cultural and spiritual places. Moreover, networks of ICCAs that rely on agroecological farming actually create a mosaic or matrix in which the landscape is shared by agriculture and biodiversity conservation (Perfecto and Vandermeer, 2017). This 'nature's matrix' model does not assume that agriculture is necessarily harmful to biodiversity. It is the *kind* of farming and land use that matters along with an approach that simultaneously embraces biodiversity conservation, food production and food sovereignty as interrelated and mutually supportive goals (Perfecto *et al.*, 2009). By helping to reconcile conservation with the satisfaction of fundamental human needs, ICCAs provide the basis of economic livelihoods and culture for millions of people (Kothari *et al.*, 2012; www.iccaconsortium.org). Locally available resources (food, water, fodder and energy) are valued and used to generate the means of life and income, as well as plural definitions of human wellbeing and spirituality (Pimbert and Pretty, 1998; Posey, 1999).

There are also some noteworthy international initiatives that link biocultural diversity with agroecological models of production and land use. For example, the Program on Globally Important Agricultural Heritage Systems (GIAHS) has championed agroecology and biocultural landscapes from within the UN Food and Agriculture Organization (Koohafkan and Altieri, 2012). Agricultural heritage systems are complex, highly diverse and locally adapted agricultural systems and biocultural landscapes. They have emerged over centuries of cultural and biological co-evolution and embody the accumulated experiences and traditional – but evolving – knowledge, practices and technologies of rural peoples. According to the FAO, today agricultural heritage systems cover about five million hectares and generate multiple social, cultural, ecological and economic benefits to communities throughout the world.[14]

Sustaining biocultural diversity is essential for the future of agroecology, food sovereignty and of a plural world. Advancing knowledge on the links between biological and cultural diversity can help ensure that diversity finds a central place in policy agendas for food, agriculture, environment and human wellbeing. Several chapters in this book address some of the critical gaps in knowledge identified at a workshop on biocultural diversity organized by UNESCO and The Christensen Fund (UNESCO, 2008): biocultural landscapes – including their dynamics and management (Chapters 3 and 4); the recognition and protection of knowledge systems (Chapters 4 and 6); and the values of diversity (Chapters 4, 6 and 7).

Contesting and constructing knowledge for food sovereignty, agroecology and biocultural diversity

Battlefields of knowledge and contested modernity

Food and agriculture development projects can be seen as 'social arenas' in which numerous actors with different interests, knowledge and values interact. Norman Long has emphasized the centrality of knowledge and power in contesting, defining and shaping the outcomes of these interactions between different social actors (Long and Long, 1992). Far from being innocent intellectual games, discussions and disputes over what knowledge counts – and whose knowledge should prevail – are usually intense, often brutal, sometimes violent and ultimately have huge consequences for the wellbeing of people and the land. Indeed, Long has aptly described the development and modernization process as a 'battlefield of knowledge' (Long and Long, 1992).

The dominant development paradigm envisions having fewer people farming and depending on local food systems and biodiversity-rich landscapes. It encourages an exodus of people from rural areas to work in industry and urban-based trade and services (Delgado Wise and Veltmeyer, 2016; Perez-Vitoria, 2015; Pimbert *et al.*, 2006). Many development policies are indeed based on the belief that family farmers and other small-scale producers who continue to farm, fish, harvest forests and rear livestock on common property lands should 'modernize' as quickly as possible. The policies imply they should become fully commercial producers by applying industrial food and farming technologies that allow for economies of scale (Perez-Vitoria, 2005, 2015; Desmarais, 2007). Those who cannot make this transition should move out of farming and rural areas to seek alternative livelihoods.

This modernization agenda is seen as desirable and inevitable by most governments today. The ideologies of both Marxist and capitalist nation states have similar views on the future of peasants in modern industrial society. As Walden Bello says:

> The two dominant modernist ideologies of our time give short shrift to the peasantry. In classical socialism, peasants were viewed as relics of an obsolete mode of production and designated for transformation into a rural working class producing on collective farms owned and managed by the state. In the different varieties of capitalist ideology, efficiency in agricultural production could only be brought about with the radical reduction of the numbers of peasants and the substitution of labour by machines. In both visions, the peasant had no future.
>
> *(Bello, in Desmarais, 2007)*

As a vision for universal progress, this idea of modernity also facilitates and legitimizes the global restructuring of agri-food systems in which a few transnational corporations gain monopoly control over various links in the food chain (Clapp and Fuchs, 2009; ETC, 2016), thereby extending capitalism in the web of life (Moore, 2015). An important part of this process of corporate control 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. They do so by appropriating the components and means of life that enable people to cope on their own, thus undermining freedom and cultural diversity (Illich, 1973).

The scale and impacts of the rural transformations associated with this vision of modernity are staggering for human security and the environment. This is mainly because modernizing development primarily targets for displacement *the vast majority of small-scale producers on which much of the world's food security and environmental care depends.* According to the latest data available, there are more than 570 million farms worldwide, most of which are small and family-operated (FAO, 2014; Lowder *et al.*, 2016). Of these 74% are located in Asia, with China alone representing 35% and India 24% of all farms. Moreover, 72% of the world's farms are smaller than one hectare (ha) in size (family farms – Box 1.2); 12% are one to two ha in size (small farms); and 10% are between two and five ha.[15] Only 6% of the world's farms are larger than five ha. Small farms manage around 12% and family farms about 75% of the world's agricultural land. In their careful analysis of the number, size and distribution of the world's farms, Lowder *et al.* (2016) conclude that family farms work 75% of the world's agricultural land and are responsible for most of the world's food and agricultural production.[16] Family farmers are also responsible for the largest share of investment made in agriculture on a day-to-day basis on their farms (Lowder *et al.*, 2015) – public sector support is relatively small and outside investment from aid programmes and private enterprises is marginal (Figure 1.1).

In Chapter 5, Eric Ross analyzes the enduring influence of Thomas Malthus's *Essay on the Principle of Population* and how it has enabled the continuous process of enclosure, displacement of subsistence producers and environmental degradation that continues today. He shows how the Malthusian paradigm[17] in contemporary development thinking continues to legitimize the spread of commercial agriculture that massively displaces small and family farming as a source of food security, local innovation, as well as biocultural and ecological diversity.

Eric Ross's work offers a careful analysis of past history that illuminates the present: from the enclosures and the consolidation of capitalism in eighteenth- and nineteenth-century Britain, the Irish potato famine in the middle of the nineteenth century, the spread of colonialism and modernity outside of Europe, to current development practice. The methods of critical anthropology and comparative historical analysis used by Ross are also relevant for understanding current 'battlefields of knowledge' on the future of food and agriculture, including the vision of modernization and productivism promoted by G8 governments and corporations that are part of the New Alliance for Food Security and Nutrition in Africa (McKeon, 2014; European Parliament, 2016). Chapter 5 thus offers intellectual resources for citizens to counter the recurrence of Malthusian thinking that blames peasants for their backwardness and inability to control their sexual urges, causing

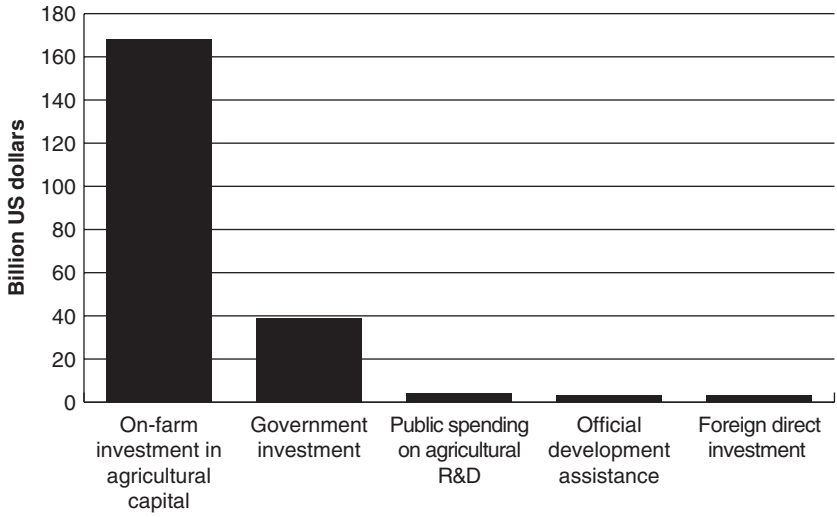

FIGURE 1.1 Who invests in agriculture?

Source: Lowder *et al.*, 2015.

them to have too many children. Ross's contribution also shows how misrepresentations of the life of peasant family farmers and pastoralists are selectively useful in furthering the interests of powerful actors in programmes designed to combat HIV/AIDS in Africa.

More generally, Malthusian thought has been closely associated with the construction of an economic science committed to a modernity based on the commodification of nature and social relations (Rist, 2011, 2013). In Chapter 7, Rist explores some of the circumstances that prevailed when neo-classical economics was invented as a science that claims to be valid for all people and places.

As enduring belief systems, both modern economics and variants of Malthusian thought continue to play a key role in the long history of blaming peasants for economic and social backwardness. Jim Handy has shown how the 'almost idiotic wretchedness' of peasants has been imagined and institutionalized in eighteenth-century Britain and in the global South during colonialism and twentieth-century development (Handy, 2009). Apart from blaming them for their propensity to have too many children, political and economic elites have also dismissed peasants for not being sufficiently enamoured with consumption – they stifle economic development because their needs are far too easily met. Peasants everywhere tend also to be viewed as inefficient because they do not use land and capital effectively – they are seen as lazy and should be compelled to work harder. Peasants need to be swept off the land because they delay economic growth and the necessary process of capital intensification of the land. And last but not least, peasants and other small-scale food producers are dangerous and unruly – they need to be incorporated into nation states as lawful and responsible citizens (Berger, 1978; Handy, 2009; Thompson, 1991).

In the current 'battlefields of knowledge' for conservation and development, these 'faulty imaginings' (Handy, 2009) of peasants serve to promote social, economic and environmental policies that are designed to expel them from the land and turn them into wage labourers and migrant workers (Delgado Wise and Veltmeyer, 2016; Ghimire and Pimbert, 1997a; Handy and Fehr, 2010). Launched in 1843, *The Economist* magazine was an influential voice in providing the intellectual rationale for what has become an enduring vision of modernity based on free trade in agriculture, capital-intensive 'scientific' agriculture and the accumulation of land in private property – land not held in private property was 'inconsistent with a civilised state' (*The Economist*, 1851, cited in Handy, 2009).

However, the idea that peasant farmers 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 are increasingly disputed and rejected by social movements. For example, in response to a development model geared to ensuring the extinction of family farmers and other small-scale food providers, La Vía Campesina is redefining what it means to be a 'peasant'.[18] A process of 're-peasantization' is slowly unfolding as more people proudly embrace the term 'peasant' to describe themselves, projecting an alternative identity rich in meaning and hope for the future (Desmarais, 2007; Perez-Vitoria, 2015). People's knowledge is being mobilized from below (Chapter 8) to challenge the inevitability of progress and the end of the peasantry.

Central to this process of 're-peasantization' is the constant struggle for autonomy (Pimbert, 2008; van der Ploeg, 2009).[19] Embraced by a growing number of youth who seek to regenerate autonomous 'life worlds' (Habermas, 1984) in rural and urban spaces, the construction of this alternative modernity also 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 (Chapter 7; Latouche, 2011; Kothari *et al.*, 2014).

Institutionalized bias in research: lessons from the uneven development of agroecology and genetic engineering

The development of ideas in the sciences and humanities has had its own complex intellectual history and sociology, in which certain theories were able to rise and prevail. Following the sociologist Karin Knorr Cetina, it is essential to ask how do 'the machineries of knowledge construction' arise and selectively favour the production of certain types of knowledge whilst actively excluding others? How do particular framings[20] of the problem, research technologies, social configuration of scientists' funding contexts, as well as laboratory and research settings combine to form 'epistemic cultures', which Knorr Cetina describes as: 'amalgams of arrangements and mechanisms – bonded through affinity, necessity, and historical coincidence – which, in a given field, make up how we know what we know' (Knorr Cetina, 1999).

As a story of the 'history of the present' (cf. Foucault, 1991), the example of agroecology is particularly instructive in this regard. Despite the growing recognition of

the many benefits of agroecology, it remains largely unsupported and marginalized in public research and development (R&D):

- According to a recent analysis done by the Union of Concerned Scientists and partners, just 15% of funding granted in 2014 by the US Department of Agriculture for research and education incorporated any element of agroecology (Union of Concerned Scientists, 2015). The agency allocated even less funding to projects emphasizing agroecological research or implementation. Systems-based projects that included both agroecological farming practices and connections between producers and consumers to support a socio-ecological transformation of the food system were particularly poorly funded (4%), as were agroecology R&D projects that included complex rotations (3%), spatially diversified farms (3%), integrated crop-livestock systems (1%), rotational or regenerative grazing (1%), or agroforestry (<1%) (DeLonge *et al.*, 2016; Union of Concerned Scientists, 2015).
- Funding for agroecological research in the UK represents a tiny 1.5% of the total UK budget for agricultural R&D. The percentage of funds for the development of agroecological solutions is even lower in the UK's official aid programme for Africa, Asia and Latin America. Agroecological research projects receive less than 0.1% of the UK's Department for International Development's budget for official aid on food and farming (Moeller and Pimbert, unpublished data based on publicly available DFID reports from 1995 to 2016).

It is noteworthy that both genetic engineering and agroecology were insignificant or non-existent scientific branches before the early 1970s. They were both seen as two fields of research with the potential to improve food and agricultural systems. However, from the 1930s onwards influential actors such as The Rockefeller Foundation selectively favoured research in molecular biology and a strategic re-organization of the life sciences (Kay, 1997) that made it possible for genetic engineering to harness 'life as a productive force' (Yoxen, 1981). Since the 1960s, the science of genetic engineering has received by far the largest share of research funding and government support, and continues to do so throughout the world.[21] After the first product of genetic engineering became commercially available in 1995, powerful corporate actors, such as Monsanto[22] and Syngenta, have worked to promote and legitimize the rapid – albeit contested – proliferation of the science and products of genetic engineering. A recent study of the legitimation strategies of Monsanto shows that for nearly two decades, this powerful corporation has systematically used discursive resources that have concealed details about actors and actions, including in scientific research and risk assessments (Lamphere and East, 2016). Monsanto's own documents published over an 18-year period have fundamentally reshaped narratives to promote the company, its products and genetic engineering as the solution to hunger and sustainability problems (Lamphere and East, 2016; see also The Monsanto Tribunal, 2016).

But the failure of research to produce knowledge for agroecological solutions cannot be fully explained by funding decisions and corporate influence

alone – important as they are. In Chapter 2, Gaëtan Vanloqueren and Philippe Baret describe the institutionalized bias and some of the systemic reasons that help explain why research favours scientific and technological regimes that develop genetic engineering and 'lock out' agroecological innovations. The authors identify the determinants of innovation and factors that influence choices within agricultural research systems. They show how the interactions between funding priorities, public-private sector partnerships, the assumptions and cognitive routines of scientists and other key determinants of innovation, construct a technological regime that favours genetic engineering and hinders the development of more holistic agroecological approaches to farming and land use. In turn, this systemic bias in research acts in combination with wider political structures and agricultural markets to 'lock out' agroecology from society and keep industrial agriculture in place (see IPES-Food, 2016).

In describing the politics of knowledge involved, Vanloqueran and Baret offer a comprehensive analytical framework that helps better understand why, when and how agroecological knowledge can be constructed. The authors also provide valuable insights into the constraints that need to be addressed to develop agroecological knowledge and innovations.

More generally, the methodology used in Vanloqueran and Baret's analysis of 'lock-in' and institutionalized bias in research is highly relevant for social movements and scholars who seek to contest, construct and transform other areas of knowledge for food sovereignty and biocultural diversity.

Disabling knowledge and bureaucracies undermine indigenous and peasant tenure rights

Secure tenure rights and equitable access to land, fisheries and forests are important means and pre-requisites for eradicating hunger and poverty. This is widely recognized by *The Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security,* which were officially endorsed by the Committee on World Food Security on 11 May 2012 (FAO, 2012). Since then, implementation of these guidelines by national governments has been encouraged by the G20, Rio+ 20 and the United Nations General Assembly.

However, in practice the rights of access, use and tenure of indigenous peoples, pastoralists, family farmers and other small-scale producers continue to be largely ignored and overruled by the imperatives of modernization and economic development. In several ongoing projects designed to modernize the countryside and 'scientifically' manage the land, the rights of access and use of small-scale producers and custodians of biocultural landscapes are actively suppressed as part of their forced displacement (see for example http://ejatlas.org). In many other cases, local communities receive minimal compensation for their loss of tenure rights as part of schemes designed to 'encourage' them to migrate to cities for alternative means of livelihood. According to the UN Council for Human Rights, women are the most harmed by these developments.[23] Moreover, these processes of organized exclusion

also undermine the livelihoods of many more rural people because each link in the food chain offers economic niches for millers, butchers, carpenters, tool makers and mechanics, bakers, local milk processors, fishmongers, small shopkeepers and collectors of food losses and waste. With the demise of the local economies, ecologies and food systems that provide livelihoods, employment and socio-cultural meaning, this potentially large share of the active working population also has no choice but to migrate to urban areas.[24]

The *Global Atlas of Environmental Justice* documents some of the socio-environmental conflicts responsible for the forced displacement and outward migration of peasant farmers and other rural people living in forests, farmland, pastures, rangelands, mountains, wetlands, common lands and peri-urban areas (Temper *et al.*, 2015; http://ejatlas.org). This online interactive map also tracks the 'spaces of resistance' which local communities define as 'mobilizations against particular economic activities in which environmental impacts are a key element of their grievances' (Temper *et al.*, 2015). Powerful actors who benefit from these modernizing schemes all rely on knowledge that both drives and legitimizes what Harvey (2004) has called 'accumulation by dispossession'. These might range from land and water grabs for the expansion of industrial agriculture and agrofuel plantations (Borras *et al.*, 2011; Mehta *et al.*, 2012; van der Ploeg *et al.*, 2015); to conservation-induced displacements of indigenous and local communities living in ICCAs and protected areas (Corpuz, 2016; Brockington and Igoe, 2006; Ghimire and Pimbert, 1997b; Vidal, 2016); to foreign investments in carbon markets and REDD+[25] schemes (Lohmann, 2011; Moreno *et al.*, 2015) as payments for ecosystem services (Sullivan, 2011); and to 'green grabbing' (Fairhead *et al.*, 2012) and new forms of commodification of nature (Büscher *et al.*, 2014; Moore, 2016).

In the current crisis of capitalism (Harvey, 2015) and its need to secure access to ever more land, water, energy and mineral resources for its continued expansion, peasant family farmers and other small-scale producers are thus increasingly harmed by the knowledge embedded in the discourse, law, coercion and violence used to deny them of their tenure rights over land and natural resources. In this context, misleading, simplistic and ahistorical perspectives (see Chapters 4, 5 and 7) and policy narratives are widely used by external actors and science-based bureaucracies to blame people for environmental degradation and to justify the imposition of standard environmental management packages which damage their livelihoods (Leach and Mearns, 1996). For example, public policy and interventions designed to modernize nomadic pastoralism and rangeland management in Africa and Asia are based on dominant views of equilibrium ecology that stress the damaging potential of livestock grazing, the threats of degradation and desertification and the need to control livestock numbers and grazing movements (Chapter 4; Scoones, 1994). The loss of forests, soil erosion, desertification, climate change, the mismanagement of water and the destruction of wildlife and fisheries are all problems that are seen to require intervention to prevent further deterioration (Corpuz, 2016; Homewood, 2008; Leach and Mearns, 1996; Molle, 2008; Pimbert and Gujja, 1997; Pimbert and Pretty, 1995). Local misuse of resources and the environment is consistently defined

as the principal cause of destruction. All too often, 'by depicting resource users (the local ones) as wild, destructive (or illiterate, uneducated, backward or non-innovative), state resource management agencies think they can justify their use of militaristic environmental protection' (Peluso, 1993).

Much of this 'dominant knowledge' rests on a series of myths that manifest themselves through the neglect of local people – their knowledge, priorities, management systems, local institutions and social organization. It also rests on highly questionable scientific concepts, unproven assumptions and outdated knowledge. For instance, notions of climax ecology together with Malthusian views have sustained a flawed theory that relic forest on the northern margins of Guinea's forest zone in West Africa is degraded and degrading. Vegetation forms that ecologists and policy makers have used to indicate forest loss, such as forest patches in savannah, are – according to historical evidence and the knowledge of local resource users – the result of landscape enrichment by people (Fairhead and Leach, 1996).

In Chapter 4, Sian Sullivan and Katherine Homewood focus on knowledge about pastoralism in African drylands, exploring how problematic the notions of 'non-equilibrium ecology' and 'nomadism' are for scholars and policy makers. They ask why equilibrium concepts have been so strongly naturalized within science and policy communities, to the detriment of the possibilities for self-determination by the peoples who live in these environments. And why are non-equilibrium framings of dryland dynamics apparently so threatening to states and experts? Sullivan and Homewood's remarkable chapter shows how the un-muting of other peoples' knowledge and realities can help transform the nature of knowledge (its concepts, categories and embodied values) to support the goals of self-determination, food sovereignty and biocultural diversity.

However, the policy (or crisis) narratives enabling today's new cycles of capital accumulation and dispossession are robust, hard to challenge and slow to change (Roe, 1991). They play a key role in policy and project-level decision making. They help frame research, structure options, define relevant data and exclude other views within bureaucracies and professional circles. Orthodox views on economic progress and dominant environmental crisis narratives endure across time and space, despite the concerted challenges made to basic concepts and practices (Chapters 4, 5 and 7; Hoben, 1995; Leach and Mearns, 1996; Rist, 2013; Roe, 1991).

Natural resource management bureaucracies in particular do not easily reassess, update or transform the scientific and environmental knowledge which frames and legitimizes their operational procedures and policies for the governance and management of forests, water and land (Chapters 3 and 4). Knowledge about people-environment interactions is a central element of their organizational culture (the combination of the individual beliefs, opinions, shared knowledge, norms and values of the members of an organization). A majority of theorists argue that organizational culture is the most fundamental level at which transformation needs to take place (Goetz, 1997; Michael, 1995; Reed, 2006). No matter how radically processes, structures and systems are reformed within natural resource management bureaucracies, the changes will remain largely superficial and ultimately without

effect if environmental knowledge and other aspects of organizational culture are left untouched (Long and Long, 1992; Westley, 1995).

These crisis narratives and disabling organizational cultures are thus major constraints for the implementation of the FAO's guidelines (FAO, 2012) and the proposals contained in the draft *United Nations Declaration on the Rights of Peasants and Other People Working in Rural Areas* (Golay, 2015; La Vía Campesina, 2008b) as well as the *United Nations Declaration on the Rights of Indigenous Peoples* (UNDRIP, 2007).

Transforming the culture and practices of natural resource management bureaucracies and research organizations must therefore go hand in hand with the construction of knowledge for agroecology, biocultural diversity and food sovereignty (Chapter 8).

Experts and ignorance-based management of ecosystems and natural resources

Appropriate transdisciplinary knowledge that embraces the inherent uncertainty, dynamism and complexity of ecosystems is key for designing pathways to sustainability and building resilience to change. Such knowledge can help understand how complex systems adapt and recover from large-scale instabilities such as climate change and global market volatility, as well as from more localized disturbances like floods, pest outbreaks, fires and tornadoes. Theories that explain non-linear dynamics and surprises in the behaviour of complex ecosystems are especially important as bases for adaptive approaches to the management of landscapes and natural resources (Gunderson *et al.*, 2012).

Competing knowledge and theories of ecosystem dynamics – from equilibrium-centered views to co-evolutionary perspectives – generate sharply different management regimes. In Chapter 3, Kristen Blann and Stephen Light maintain that the persistence of the equilibrium-centered view in most science-based natural resource management agencies leads to short-term policies and practices that jeopardize the long-term sustainability and resilience of ecosystems and landscapes. They argue that it is essential that the adaptive management and governance of landscapes and natural resources be underpinned by a co-evolutionary perspective. This views human and natural systems as complex entities that are continually adapting and co-evolving through cycles of change. This co-evolutionary perspective on ecosystem dynamics can guide the transition to sustainability and socio-ecological resilience by emphasizing the need for adaptive social learning and a move away from maximum sustained yield targets.[26] Adaptive ecosystem management is thus key for sustaining the Earth's continued capacity to support contemporary human societies, especially at a time when planetary limits are being exceeded in terms of nitrogen loads, biodiversity loss, global temperature increases and other critical indicators (Smith *et al.*, 2015; Steffen *et al.*, 2015; World Meteorological Organization, 2017).

With the increasing frequency and severity of natural and human-made disasters across the world (Brauch *et al.*, 2011), it has become more urgent to understand the features and qualities of a system that must be maintained or enhanced in order

to achieve sustainability and resilience (Walker and Salt, 2012). Current knowledge emphasizes the possibility of building resilience through community self-organization and agency: paying particular attention to people-place connections, values and beliefs, knowledge and social learning and economic diversification (Berkes and Ross, 2013; Gómez-Baggethun *et al.*, 2012). Community-owned solutions through community peer-to-peer exchange are identified as essential for long-term success and sustainability (Holt-Giménez, 2002; Rotarangi and Stephenson, 2014; Tschirhart *et al.*, 2016). This body of knowledge also stresses the importance of subsidiarity, the sharing of power in collaborative management and the vital contributions of polycentric and horizontal networks of local organizations in the local adaptive management and governance of ecosystems and natural resources (Borrini-Feyerabend and ICCA Consortium, 2012; Ostrom, 1990, 2010; Pimbert, 2008; CBD, 2004). Regenerating the material basis of food sovereignty, agroecology and biocultural diversity depends on communities using this transdisciplinary knowledge in the local adaptive management of landscapes (farmlands, forests, rangelands, wetlands, commons etc.) and their ecosystem functions (water purification, pollination, recycling of nutrients, carbon sinks etc.).

For example, family farmers, pastoralists and indigenous agricultural and forest-based communities manage biodiversity at various scales (FAO, 1999; Netting, 1993; Oldfield and Alcorn, 1987; Zimmerer, 2010). Their local organizations co-ordinate the knowledge and collective action that helps create dynamic and heterogeneous landscape mosaics of fields, gardens, orchards, pastures, woodlands, agroforestry and ecosystem patches. Although this agricultural biodiversity and the local knowledge associated with its management are essential for landscape resilience to climate change, their roles and those of local organizations are largely neglected or overlooked by researchers and policy makers around the world (Global Alliance for the Future of Food, 2016; Mijatovićć *et al.*, 2013). Although complexity and resilience thinking are beginning to be widely embraced by academics and professionals who see them as necessary for tackling today's pressing social-ecological challenges (Rogers *et al.*, 2013), in practice there is still little official recognition of the importance of local organizations and their roles in the adaptive management of ecosystems and resources (Bigg and Satterthwaite, 2005).

More generally, outdated equilibrium-centered views of ecosystem dynamics persist and continue to justify short-term management policies that undermine long-term sustainability. At least five mutually reinforcing factors keep many national governments locked into this natural resource management regime: reductionist science; top-down command-and-control approaches; a mismatch between reality and the economic assumptions of policy decisions; market fundamentalism;[27] and engineering-dominated capital-intensive solutions (Chapter 3). Furthermore, non-equilibrium thinking may well generate a subliminal resistance because it radically undermines the superior positioning of 'experts' by emphasizing a fundamental 'unknowability' in predicting the behaviour of complex systems. As Sullivan and Homewood point out for pastoral landscapes, non-equilibrium thinking also creates huge problems for conservationists and land-use planners who wish to clear

(purify) landscapes of people and livestock so as to return these environments to a desired (imagined) pristine state (Chapter 4).

Worldwide, the largely sectoral, expert-centered ecosystem-management institutions need to be fundamentally transformed (Biggs *et al.*, 2010; Borrini-Feyerabend *et al.*, 2007; Finger-Stich and Finger, 2002; Pimbert, 2004). To address this epistemological and political challenge, Blann and Light (Chapter 3) reflect on how a science for ecosystem sustainability and socio-ecological resilience could be co-produced by different knowledge holders (scientists, family farmers, pastoralists and other small-scale producers). They emphasize in particular the importance of pedagogical, organizational and policy changes to construct knowledge for ecological sustainability and resilience, and embrace 'ignorance-based' management in the face of uncertainty and unpredictability.

Along with Pimbert (Chapter 8), Blann and Light argue that the construction of knowledge(s) for agroecology, biocultural diversity and food sovereignty partly depends on fundamental changes in the 'ways of knowing' and 'ways of working' of research institutions and natural resource management bureaucracies. Reversals in normal professional practice and inclusive citizen participation in decision making are key for transformation.

Epistemic injustice undermines peoples' knowledge and agency

The idea of building on the diversity of peoples' knowledge is at the heart of the practice of food sovereignty and agroecology (Boxes 1.1 and 1.4). Moreover, the inextricable link between biological and cultural diversity is mediated by the knowledge of indigenous and local communities. By valuing and working with peoples' knowledge, advocates of agroecology, biocultural diversity and food sovereignty seek to reverse what Boaventura de Souza Santos describes as 'cognitive injustice' and 'epistemicide' – the failure to recognize the fundamental right of different knowledges and ways of knowing to exist and give meaning to peoples' lives (Santos, 2014).

In Chapter 6, Nina Moeller's ethnographic study of access and benefit sharing (ABS) negotiations by a bioprospecting project in the Ecuadorian Amazon highlights the challenges of realizing epistemic justice in practice. Moeller's account describes the encounter between the Kichwa-speaking Napo Runa peoples and ProBenefit, a large bioprospecting project funded by the government of Germany. At one level, Moeller's careful study of this microcosm highlights some of the attitudes, beliefs and behaviours that continue to marginalize and suppress both peoples' knowledge and their ways of knowing. The Kichwa's account of the subtle – and sometimes overt – prejudice, racism and paternalism of 'scientific' professionals largely echoes the contemporary experience of many wo/men indigenous peoples, pastoralists, artisanal fishers and peasant family farmers. In this regard, descriptions and critiques of development biases against local and gendered knowledge (e.g. Chambers, 1983; Harcourt, 2016; Kabeer, 1994; Richards, 1985; Smith, 1999) continue to be relevant today.

At another level, Moeller's description of Kichwa ways of knowing highlights what are often incommensurable values between scientific and indigenous knowledge systems. For the Kichwa people, knowledge is constructed through 'plants that speak' and the *experience* of their intimate relationship with the forest, which acts like a teacher and helper. Their knowledge thus depends on the continued existence of the plants and the forests that sustain Kichwa livelihoods, culture and spirituality. Similarly, the Quechua communities in the Potato Park in the province of Cusco (Peru), have described the indivisibility of this biocultural heritage as the 'knowledge, innovations and practices of indigenous and local communities that are collectively held and are inextricably linked to traditional resources and territories, local economies, the diversity of genes, species and ecosystems, cultural and spiritual values, and customary laws shaped within the socio-ecological context of communities' (ANDES and IIED, 2005).

These insights into the indivisible nature of indigenous and peasant knowledge systems have major implications for the protection of traditional knowledge and ABS agreements[28] encouraged by the Convention on Biological Diversity,[29] the World Intellectual Property Organisation (WIPO)[30] and the International Treaty on Plant Genetic Resources for Food and Agriculture.[31]

For example, Moeller (Chapter 6) argues that no matter how fair and equitable, bioprospecting and ABS schemes directly contribute to the destruction of the very foundations of traditional knowledge because the value of the latter is calculated solely in market terms and human motivation is reduced to an economic cost-benefit analysis. In situations where the conditions of people's autonomous subsistence are being destroyed, bioprospecting and ABS agreements reduce the protection of traditional knowledge to a hegemonic economic construct compatible with the needs of capital accumulation and expansion of the global market economy (see also Chapters 4 and 7). Assigning a market value to traditional knowledge ultimately facilitates ABS regimes that are extractive, unfair, patent friendly and easily captured by corporations involved in seeds, pharmaceuticals, new natural product development and the life industry (Baumann *et al.*, 1996; ETC, 2011; GRAIN, 2012).

As nature becomes increasingly linked to a tradeable and financialized world, valuable indigenous and peasant knowledge is thus drawn into financial circulation in hitherto unprecedented ways. In this global process of financialization, ontologies and categories of ecology along with the episteme of peoples' knowledge are being replaced by those of 'natural capital' and 'ecosystem goods and services' (Sullivan, 2011). For example, the web portal 'Ecosystem Marketplace' offers information updates and investment and price trend data on carbon, water and biodiversity markets. The website states 'We believe that … markets for ecosystem services will one day become a fundamental part of our economic system, helping give value to environmental services that, for too long, have been taken for granted'. The aim of the information portal is to 'spur the development of new markets' and 'facilitate transactions' (Ecosystem Marketplace, 2016). Ideas and understandings of nature are thus being reconfigured through the production of hegemonic knowledge and this unfolding global process of financialization. These ideas are then institutionalized

by powerful organizations like the World Bank, international conservation NGOs and the Convention on Biodiversity (Brockington and Duffy, 2010; Corson and MacDonald, 2012; Moore, 2016; Sullivan, 2011, 2013; IUCN and UNEP, 2012). For example, it is unlikely that 'payments for ecosystem services' (PES)[32] would exist today without the particular framing of global environmental problems by the Millennium Ecosystem Assessment[33] in the early twenty-first century (Kosoy and Corbera, 2010; Fairhead *et al.*, 2012). Conservation and development projects based on PES and ABS schemes are problematic precisely because they introduce market valuations on traditional knowledge protection into areas of life which had previously been oriented by different values. The commodification of ecosystem services denies the multiplicity of culturally specific ways of knowing and valuing nature since it requires that a single exchange-value is adopted for trading (Kosoy and Corbera, 2010).

More generally, policies that aim to protect *only* the intellectual component of knowledge systems are inappropriate for most indigenous and local communities. They fail to take into account more holistic worldviews and practices in which knowledge is closely dependent on and intimately linked with the biological, cultural and landscape components of peoples' knowledge systems (Posey, 1996; UNDRIP, 2007). Traditional and indigenous knowledge systems need to be protected and strengthened as a whole, including all interlinked elements involved in inter-generational transmission (e.g. languages, customary norms and practices, spirituality) as well as traditional territories and resources. Mutually constitutive and ongoing interactions among language, culture, local institutions, landscapes, natural resources and territories are vital for protecting and sustaining traditional knowledge. The holistic nature of indigenous knowledge systems thus calls for approaches that protect bundles of rights over tangible and intangible attributes that are of spiritual, aesthetic, cultural, ecological and economic value to indigenous and local communities (Posey, 1996; Posey and Dutfield, 1996). These alternative approaches stress the importance of engaging in value practices that construct the 'outside' of capitalism as a counter-hegemonic form of traditional knowledge protection which truly safeguards the conditions in which traditional knowledge can flourish (Moeller, in Chapter 6).

Holistic approaches to the protection of indigenous and peasant knowledge are thus essential for the realization of 'cognitive' or 'epistemic justice' (Santos, 2014; Fricker, 2007). Cognitive justice emphasizes the right for different forms of knowledge and their associated practices, livelihoods and socio-ecological contexts to coexist. As Visvanathan argues, cognitive justice is 'the constitutional right of different systems of knowledge to exist as part of a dialogue and debate' (Visvanathan, 2005). This implies the continued existence of 'the ecologies that would let these forms of knowledge survive and thrive not in a preservationist sense but as active practices' (Visvanathan, 2005). But it is not just the continued existence of the ecology of these places that matters. The roles which they play in people's lives and the meaningful relationships which people maintain with these place-based ecologies are more important in this context.

Articulating and claiming this right to cognitive justice *by, for* and *with* hitherto excluded actors is a key challenge for the proponents of food sovereignty, agroecology and biocultural diversity. Two questions stand out here. The first – explored by Rist in Chapter 7 – asks to what extent does the realization of cognitive justice depend on regenerating modern subsistence economies that are not exclusively characterized by market rationalities and values, and largely consist of self-provisioning practices through which the fundamental needs of people are satisfied?[34] The second is explored by Pimbert in Chapter 8, and asks how can ideas of cognitive justice help transform the production of knowledge and research on food, agriculture and human wellbeing?

Decolonizing economics

Social movements for agroecology, biocultural diversity and food sovereignty do not reject trade and economic exchanges *per se.* However, they are highly critical of current policies for growth because they are responsible for the economic genocide of unprecedented numbers of family farmers and rural livelihoods throughout the world (Chapter 5; Bello and Baviera, 2011; Perez-Vitoria, 2005). Women in particular have been more harmed than men by the deepening inequalities, insecure employment and social unrest that have marked the last four decades of neo-liberalism. At the same time, the degradation of living conditions in poorer households nearly everywhere has translated into an increase in levels of violence, particularly domestic and sexual violence, of which women are the main victims (UN Women, 2015).

A 'decolonization of the mind' is needed to construct another economics capable of working for the wellbeing of people and the planet:

> What is needed is a new creation of the imagination that is of unprecedented importance […] a creation which would put at the centre of human life other meanings than the mere expansion of production and consumption, one which would offer goals in life that are recognized by other human beings as being worthwhile. […] This is not only necessary to avoid the final destruction of the planet's environment, but it is also and especially needed to rescue fellow human beings from psychological and moral misery.
>
> *(Castoriadis, 1996)*[35]

In Chapter 7, Gilbert Rist draws on a wealth of historical and anthropological evidence to show how mainstream economic science rests on quasi-religious beliefs and assumptions that are deeply committed to commodifying social relations and nature. Rist demonstrates that 'economic science' is highly ethnocentric and reflects parochial views that prevailed in Europe between the late eighteenth and mid-nineteenth century. Mainstream neo-classical economics rests on a set of half-truths and presuppositions that are shown to be either obsolete or just plain wrong – including the idea that all individuals are self-interested and rational calculators

with unlimited wants. This construction of a universal *Homo economicus* makes it possible for economic policies to sanctify the market as the device for regulating human interaction (Marglin, 2010; Latouche, 2003). The superiority of 'economic efficiency', the 'commodity economy' and 'financial markets' are celebrated and imposed in discourse, policy and practice to the detriment of the 'care economy', where women traditionally have a predominant responsibility (Carrasco, 1999; Guerin, 2003; Mies and Bennholdt Thomsen, 1999; Praetorius, 2015).

Rist undermines the faith of economics at the deepest level. By inviting us to think outside the box, he awakens our social imagination to the possibility of creating forms of economics that can nurture diverse definitions of wellbeing and begin to heal the 'metabolic rift' (cf. Marx, 1981; Wittman, 2009) between society and nature (Chapter 7; Rist, 2011, 2013). His critical analysis of the history of economic anthropology offers intellectual resources for exiting the dismal 'science of economics' that props up capitalism and modernizing development (Hill, 1986). For example, Rist reminds us that throughout history, economic exchange has been based on radically different principles such as reciprocity, solidarity and gift relations that have all helped to embed economics in society (Mauss, 1966; Polanyi, 1957). In turn, these highly varied forms of economic organization have supported cultural diversity and plural definitions of human wellbeing (Latouche, 1998; Polanyi, 1968; Rahnema, 2003; Rahnema and Bawtree, 1997).

Chapter 7 thus addresses a central question for the future of food security and human wellbeing: what kind of economic knowledge(s) can be constructed for new models of economic exchange that directly support the spread of food sovereignty, the uptake of agroecology and increases in biocultural diversity? A key challenge for activist scholars and social movements is to re-invent 'economics' by building on Rist's radical critique and other traditions of knowledge, including solidarity economics (Utting, 2015), the economics of de-growth (Latouche, 2003; D'Alisa *et al.*, 2014), feminist economics (Waring, 1988; Gibson-Graham, 2016), Gandhian economics (Kumarappa, 1951), participatory economics (Hahnel, 2005, 2016) and anarchist economics (Shannon *et al.*, 2012).

Today this fundamental re-thinking of economics is urgent. Throughout the industrial food system and its related sectors (energy, manufacturing, infrastructure etc.), there is a direct relationship between the increases in productivity made possible through the use of automated technology, bio-science innovations, re-engineering and downsizing on the one hand and the permanent exclusion of growing numbers of people from employment and decent livelihoods on the other. The ecological crisis and this erosion of the link between job creation and wealth creation call for alternative economic paradigms that support for example:

1. local autonomous spaces and opportunities for the generation of use values rather than exchange values (Illich, 1973; Granstedt, 2012);
2. a more equitable distribution of productivity gains through a significant reduction in working hours and a fair sharing of work and free time between men and women (Gollain, 2004; Méda, 1998);

3. 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 (Laville, 2013; Merlant *et al.*, 2003; Passet, 2012);
4. the rethinking of money and the use of alternative local currencies, time banks, barter and cooperative exchange to turn scarcity into sustainable forms of abundance in re-territorialised economies (Lietaer and Hallsmith, 2011; Lietaer and Dunne, 2013);
5. a guaranteed and unconditional minimum income for all (Murray and Pateman, 2012; Mylondo, 2010);
6. diverse forms of tenure based on co-operative, communal and collective rights of access, use and control over land, water, forests, seeds and knowledge – with clear limits on private property rights that all too often enable the enclosure of the commons and public goods by powerful actors (Almeida *et al.*, 2015; Cabannes, 2014; Dardot and Laval, 2014);
7. a shift from globalized, centralized and increasingly corporate-controlled linear food systems to decentralized and locally controlled circular economy systems that link food and energy production with water and waste management in both rural and urban areas (Bookchin, 1986; Jones *et al.*, 2012; Pimbert, 2012; Webster, 2015);
8. a reduction in carbon and ecological footprints to maintain a good quality of life in rural and urban areas through a controlled process of de-growth in consumption and production based on the '8 Rs': Re-evaluate, Re-conceptualize, Restructure, Redistribute, Re-localize, Reduce, Reuse, Recycle (D'Alisa *et al.*, 2014; Latouche, 2009, 2011; Sinai, 2013);
9. an equitable process of contraction and convergence in carbon footprints and resource consumption (energy, minerals…) which recognizes that whilst fundamental human needs are universal, their satisfiers vary according to culture, region and historical conditions (Max-Neef *et al.*, 1989).

Democratic deficits in the production of knowledge

Whilst much scientific, technological and policy research is done in the name of small-scale producers – and claimed to be for their ultimate benefit – there is usually no meaningful participation of small-scale producers in deciding key research questions with scientists, in co-producing and validating knowledge and in risk and sustainability assessments of research and innovations. And women everywhere are the most excluded from the governance of research – despite the fact that they comprise 43% of the world's agricultural labour force (and up to 70% in some countries) and are vitally important custodians of knowledge on food, farming and land stewardship (FAO, 2016).

Given this democratic deficit, it is not surprising that today's politics of knowledge do not support the construction of alternatives to industrial food and agriculture. Dominant machineries of knowledge production ensure that agri-food

systems continue to be geared towards maximizing productivity and yield through processes of homogenization, industrialization, inclusion in global markets, vertical integration and de-territorialization (IPES-Food, 2016). Institutional lock-in situations severely hinder or stop the development of knowledge for transformation – not just in agroecology (Chapter 2), but also in other fields of knowledge important for the expansion of food sovereignty and biocultural diversity. Overall, the current relations of forces between food sovereignty movements and the power of capital are tipped against food providers and food consumers in favour of corporate interests, often with substantial support from both the neo-liberal capitalist and socialist state.

Powerful corporate actors in the private sector increasingly control the directions and outcomes of food and agricultural research in the natural and social sciences. Globally, the private sector accounts for at least 45% of the world's total spending on food and agricultural R&D (Fuglie *et al.*, 2016). In OECD countries the private sector is by far the largest funder of agricultural research, accounting for over 50% of research spending (Alston *et al.*, 1998). For example, in the UK private sector funding amounts to 61% of the total spend on research in agricultural science and technology (HM Government, 2016). Moreover, large corporations have been able to disproportionately influence the directions and outcomes of agricultural research in the public sector too. Substantial funds from philanthropic capitalist foundations such as The Gates Foundation,[36] private-public sector partnerships, patents and other intellectual property rights all ensure that agricultural research selectively favours the production of knowledge and innovations that reflect and reinforce the interests of agri-food corporations and their shareholders (e.g. hybrid seeds, proprietary technologies, neo-liberal food and agricultural policies etc.).

Direct corporate interference in science is also deep and widespread. Extensive monitoring by the Union of Concerned Scientists (UCS) shows how corporations in the USA seek to influence every step of the scientific and policy-making process in order to shape decisions to suit their interests, and avoid regulatory oversight. According to a major study by the UCS, corporations rely on several abusive methods to discipline knowledge and punish disobedient scientists (Union of Concerned Scientists, 2012; see also www.ucsusa.org). These include:

1. Corrupting the science: corporations suppress research, intimidate scientists, manipulate research designs and results, ghostwrite scientific articles and selectively publish results that favour their interests and priorities.
2. Limiting the effectiveness of regulating bodies: companies attack and undermine the science behind policy and risk assessments, hinder the regulatory process, corrupt advisory panels, exploit the 'revolving door' between corporate and government employment and withhold information from the public.
3. Exploiting the law and judicial pathways: corporations have collectively expanded their influence on the judicial system and actively use the courts to undermine science as well as bully and silence scientists.

It is also noteworthy that close-knit groups of high-level scientists and scientific advisors, with deep links to industry and politicians, organize highly effective campaigns to mislead the public and deny well-established scientific knowledge on the dangers of global warming and pesticides. Historians of science have shown how in the USA these 'merchants of doubt' have acted to trivialize, marginalize, vilify and silence scientific evidence established over the last four decades by public-funded research (Oreskes and Conway, 2010). Their discourses not only vehemently deny accepted scientific knowledge; they also provide the rhetoric and stories needed to legitimize an unflinching commitment to growth economics and productivist industrial agriculture.

Towards new ways of knowing

Given this increasingly organized and networked power of business and science (Castells and Cardoso, 2005; Vitali *et al.*, 2011), social movements are faced with the challenge of democratizing research and reclaiming control over the production of knowledge for the public good. This requires a radical shift from the existing top-down and increasingly corporate-controlled research system to an approach which devolves more power and control to food providers and citizen-consumers in the governance of research and production of knowledge. In Chapter 8, Pimbert suggests that inventing more democratic ways of knowing depends on two complementary approaches:

1. democratizing science and technology research, with increased funding for public research and transdisciplinary approaches that include peoples' knowledge; and
2. de-institutionalizing research for autonomous learning and action, with an emphasis on strengthening horizontal networks of grassroots research and innovation as well as citizen oversight over the production of knowledge.

In this book's concluding chapter, Pimbert critically discusses changes in research methodologies, organizations, policies and practices that can facilitate the transformation of knowledge for food sovereignty, agroecology and biocultural diversity.

In this context, actively developing more autonomous and transdisciplinary ways of knowing to produce new and relevant knowledge depends on forms of participation that resonate with visions of a more direct democracy:

> Pursuing civilisation today would therefore mean allowing each potential citizen-subject within society to become real subjects, by offering them [….] a genuine autonomy to exercise their ability to give themselves laws and construct rules with others. […] More specifically, this implies giving to individuals the means to participate […] in the daily construction of the rules of living together, and to rethink political, social and economic relationships in

> order to civilize them at a deep level, through the permanent exercise of the freedom to participate.
>
> *(Méda, 2000)*

This understanding of participation is consistent with one of the clearest demands of the food sovereignty movement: the ability of citizens to exercise their fundamental human right to decide their own food and agricultural policies – including framing policies for research and setting priorities for the production of knowledge.

In sum, this book builds on Pierre Bourdieu's idea that 'political subversion presupposes cognitive subversion' (Bourdieu, 1982). Contributing authors offer transformative knowledge in areas that can help realize the mutually supportive principles of food sovereignty, agroecology and biocultural diversity:

- equitable rights of access to territories and a socially just use of resources (Chapters 3, 4, 5 and 7);
- farming and land use in the image of nature, the protection of ecosystems and natural resources (Chapters 2, 3 and 4);
- the assurance of the right to food, water and the benefits of ecosystems as basic human rights rather than commodities to be purchased through trade and global markets (Chapters 5, 6 and 7);
- cognitive justice for the protection of peoples' knowledge and ways of knowing (Chapters 4, 6 and 8); and
- citizens' and peoples' fundamental human rights to contest and construct the knowledge that underpins their food, agricultural, economic, environment and social policies (Chapter 8).

Notes

1 The editor of this volume acknowledges the influence and intellectual contributions of the thousands of wo/men family farmers, indigenous peoples, pastoralists and other small-scale food providers involved in over 17 years of participatory action research on the regeneration of local food systems, ecologies and livelihoods (www.diversefoodsystems.org) and the democratic governance of agricultural research (www.excludedvoices.org).
2 In this volume the term 'governance' refers to the set of political, social, economic and administrative systems, rules and processes (1) which determine the way decisions are taken and implemented by various actors; and (2) through which decision makers are held accountable.
3 A food system includes all the elements (environment, people, inputs, processes, infrastructures, institutions etc.) and activities that relate to the production, processing, distribution, preparation and consumption of food and the outputs of these activities, including socio-economic and environmental outcomes (adapted from a range of other definitions: Ericksen *et al.*, 2010; HLPE, 2014; Tansey and Worsley, 1995).
4 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 volume I use the word citizen in this broad sense to include all people living and working in a given country.

5 La Vía Campesina is an international movement that brings together peasant organizations of small and medium-sized producers, agricultural workers, landless people, women farmers, migrants and indigenous communities from Africa, Asia, the Americas and Europe. It is an autonomous, pluralistic movement, independent of all political, economic or other denominations. La Vía Campesina (LVC) comprises about 164 local and national organizations in 73 countries and represents about 200 million farmers altogether. For more details see: https://viacampesina.org/en.

6 The World Food Summit in 1996 adopted the following as a definition of food security: 'Food security exists when all people at all times have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life' (FAO, 1996). This definition is based on four dimensions of food security. Food availability: the availability of sufficient quantities of food of appropriate quality, supplied through domestic production or imports. Food access: access by individuals to adequate resources (entitlements) for acquiring appropriate foods for a nutritious diet. Utilization: utilization of food through adequate diet, clean water, sanitation and health care to reach a state of nutritional wellbeing where all physiological needs are met. Stability: to be food secure, a population, household or individual must have access to adequate food at all times.

7 The organizers of the Nyéléni 2007 Forum on Food Sovereignty were: La Vía Campesina, see http://viacampesina.org; ROPPA: Le Réseau des Organisations Paysannes et de Producteurs de l'Afrique de l'Ouest (Network of farmers and producers organizations of West Africa), see www.roppa.info and www.cnop-mali.org; The World March of Women, see www.worldmarchofwomen.org; Friends of the Earth International, see www.foe.co.uk; World Forum of Fish Harvesters and Fishworkers (WFFP), see http://worldfisherforum.org; NGO members of the Food Sovereignty Network, see www.peoplesfoodsovereignty.org/; and IPC – International NGO/CSO Planning Committee for Food Sovereignty, see www.foodsovereignty.org.

8 The right to the city can be understood as the collective right to democratically control the production and use of urban space and urban processes. 'To claim the right to the city … is to claim some kind of shaping power over the processes of urbanization. Over the ways in which our cities are made and remade, and to do so in a fundamental and radical way' (Harvey, 2012).

9 Indigenous peoples are defined by the Special Rapporteur of the UN Economic and Social Council Sub-Commission on Prevention of Discrimination and Protection of Minorities as follows: 'Indigenous communities, peoples and nations are those which, having a historical continuity with pre-invasion and pre-colonial societies that developed on their territories, consider themselves distinct from other sectors of the societies now prevailing on those territories, or parts of them. They form at present non-dominant sectors of society and are determined to preserve, develop and transmit to future generations their ancestral territories, and their ethnic identity, as the basis of their continued existence as peoples, in accordance with their own cultural patterns, social institutions and legal system' (UN ECOSOC, 1986). According to the UN International Labour Office (ILO), indigenous peoples constitute about 5% of the world's population, or nearly 370 million people spread across over 70 countries (www.ilo.org/global/topics/indigenous-tribal/lang–en/index.htm).

10 A policy discourse is an ensemble of norms, rules, views, ideas, concepts and values that govern practice and behaviour, and help interpret social and environmental realities.

11 Pers. comm., Ibrahim Coulibaly, President of the Coordination Nationale des Organisations Paysannes (CNOP), 2015.

12 For reviews of the relevant literature see IAASTD, 2009 and IPES-Food, 2016.

13 See www.ethnobiology.net/what-we-do/core-programs/global-coalition-2/declaration-of-belem.

14 See www.fao.org/giahs/giahs-home/en.

15 Analysis of farmland distribution by country income level shows that in the richest countries farms larger than 20 ha operate 70% of land, while in the poorest countries

70% of land is operated by farms smaller than five ha (Adamopoulos and Restuccia, 2014).

16 While comprehensive, this analysis underestimated the contributions of *all* small-scale producers to food security and agricultural investments because it did not include information on nomadic pastoralists, forest dwellers, fisherfolk or indigenous hunter gatherers, for example. Although limited by the data available, it is estimated that worldwide these different categories of food providers (family farmers, pastoralists, artisanal fishers, indigenous forest dwellers etc.) collectively produce around 70% of the total food – with about 80% of this produce consumed locally or in the country (Pimbert, 2008; FAO, 2014).

17 Thomas Malthus argued that: 'By nature human food increases in a slow arithmetical ratio; man himself increases in a quick geometrical ratio unless want and vice stop him. The increase in numbers is necessarily limited by the means of subsistence. Population invariably increases when the means of subsistence increase, unless prevented by powerful and obvious checks' (Malthus, 1798). The Malthusian paradigm generally advocates population control programmes, to ensure resources for current and future populations. Political and economic elites who feel threatened by the growing numbers of commoners consider birth control as an important means of checking future conflict over their property. Neo-Malthusian views often find favour today with the elites on the issues of overpopulation, food and resource scarcity as well as environmental degradation.

18 Among the multiple terms used to describe small-scale, family-based producers (e.g. smallholders, traditional farmers, subsistence gardeners, petty producers etc.), the term 'peasant' is often laden with negative values and prejudice in many different countries and languages. The idea that 'peasants' symbolize 'backwardness' is being contested by farmers and citizens as they envision new peasant agrarian cultures and food sovereignty (Masioli and Nicholson, 2011).

19 Referring to today's peasantries, van der Ploeg argues that 'Central to the peasant condition, then, is the struggle for autonomy that takes place in a context characterized by dependency relations, marginalization and deprivation. It aims at and materializes as the creation and development of a self-controlled and self-managed resource base, which in turn allows for those forms of co-production of man and living nature that interact with the market, allow for survival and for further prospects and feed back into and strengthen the resource base, improve the process of co-production, enlarge autonomy and, thus reduce dependency […] Finally, patterns of cooperation are present which regulate and strengthen these interrelations' (van der Ploeg, 2009).

20 Framing is a way of selecting, organizing, interpreting and making sense of a complex reality to provide guideposts for knowing, analyzing, persuading and acting (Schön and Rein, 1994).

21 Over the last 20 years, the share of biotechnologies in the agricultural research budget of the European Framework Programs has increased almost fourfold, amounting to 75% of the total budget in 2013. In contrast, the budget for research on organic agriculture has been stagnant, with 7% of the total in 2013 (Baret *et al.*, 2015).

22 Monsanto is today the world's largest seed company and owns nearly a quarter of the global seed market. For more details see www.monsanto.com.

23 According to the Advisory Committee of the UN Human Rights Council: 'Smallholder farmers, landless people, tenant farmers, agricultural labourers and people living from traditional fishing, hunting and herding activities are among the most discriminated and vulnerable people in many parts of the world. Every year, thousands of peasant farmers are victims of expropriation of land, forced evictions and displacements – a situation that is reaching an unprecedented level owing to the new phenomenon of the global 'land grab'. At the same time, traditional fishing communities are increasingly threatened by the industrialization of fishing activities; people living from hunting activities, by the creation of development projects; and pastoralists, by conflicts with farmers over land and water resources. All together, these people constitute 80% of the world's hungry; peasant

women are particularly affected by hunger and poverty, largely as a result of discrimination in access to and control over productive resources, such as land, water and credit' (UN Human Rights Council, 2012).

24 As numbers vary with country income levels, there are no accurate and comprehensive data on the numbers of people whose livelihoods depend on activities associated with the various links in the food chain and the web of local food systems.

25 Reducing emissions from deforestation and forest degradation (REDD+) is a mechanism developed by Parties to the United Nations Framework Convention on Climate Change (UNFCCC). REDD+ creates a financial value for the carbon stored in forests by offering incentives for developing countries to reduce emissions from forested lands and invest in low-carbon paths to sustainable development (www.unredd.net/about/un-redd-programme.html).

26 A level of crop production or exploitation that is maintained by restricting the quantity harvested to avoid long-term depletion. For example in fishery management, sustainable yield is defined as the number of fish that can be caught without reducing the base of fish stock.

27 Market fundamentalism is a quasi-religious faith that unregulated markets will somehow always produce the best possible results, and a strong belief that free market policies will solve most economic and social problems.

28 The concept of Access and Benefit Sharing (ABS) is derived from the Convention on Biological Diversity which, among other objectives, seeks to ensure the fair and equitable sharing of benefits arising from genetic resources. The Nagoya Protocol is a supplementary international agreement to the Convention on Biological Diversity which provides a legal framework for implementing that objective: *The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity*. See https://www.cbd.int/abs/about/default.shtml/

29 The Convention on Biological Diversity (CBD) entered into force on 29 December 1993. The full text is available at https://www.cbd.int/convention/text/default.shtml.

30 The Intergovernmental Committee of the World Intellectual Property Organization (WIPO) is currently facilitating negotiations to develop an international legal instrument on *Sui Generis* Laws on Traditional Cultural Expressions/Expressions of Folklore. See: www.wipo.int/tk/en/indigenous.

31 The International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) was adopted by the Thirty-First Session of the Conference of the Food and Agriculture Organization of the United Nations on 3 November 2001. The full text of the ITPGRFA can be accessed at www.planttreaty.org/content/texts-treaty-official-versions.

32 Payments for ecosystem services can be defined as a voluntary transaction whereby a well-defined ecosystem service, or a land-use likely to secure that service, is 'bought' by at least one buyer from at least one provider – if, and only if, the provider secures the provision of the service (IUCN and UNEP, 2012 – see http://unep.ch/etb/areas/pdf/IPES_IUCNbrochure.pdf).

33 The Millennium Ecosystem Assessment (2005) is the science-policy assessment that gave birth to the payment for ecosystem services (PES) concept. Initiated in 2001, the objective of the Millennium Ecosystem Assessment was to assess the consequences of ecosystem change for human wellbeing and the scientific basis for action needed to enhance the conservation and sustainable use of those systems and their contribution to human wellbeing (www.millenniumassessment.org/en/Index-2.html).

34 A definition of the 'good life' implies different ways of satisfying *fundamental human needs.* Max-Neef and his colleagues have identified nine fundamental human needs, namely: *subsistence* (for example, health, food, shelter, clothing); *protection* (care, solidarity, work etc.); *affection* (self-esteem, love, care, solidarity and so on); *understanding* (among others: study, learning, analysis); *participation* (responsibilities, sharing of rights and duties); *leisure/idleness* (curiosity, imagination, games, relaxation, fun); *creation* (including intuition,

imagination, work, curiosity); *identity* (sense of belonging, differentiation, self-esteem and so on), *freedom* (autonomy, self-esteem, self-determination, equality). While fundamental human needs are universal, their satisfiers vary according to culture, region and historical conditions (Max-Neef *et al.*, 1989).

35 My translation.

36 Founded by Bill and Melinda Gates, the Gates Foundation (or Bill & Melinda Gates Foundation, abbreviated as BMGF) is the largest private foundation in the world. Agricultural development is one of the largest initiatives of the BMGF. According to its website, the Gates Foundation has committed more than US $2 billion to agricultural development efforts to date, primarily in sub-Saharan Africa and South Asia. The Gates Foundation invests in strategic areas to help address the challenges faced by farmers in the developing world, including: research and development; agricultural policies; access and market systems; advocacy and strategic partnerships with donor countries, multilateral institutions, private foundations and other organizations. See www.gatesfoundation.org.

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