

# 12

## Synthesis:

### prospects for organic agriculture in a global context

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## Introduction

As discussed by Knudsen *et al.* (Chapter 1) there is a rapid development in the global food chains towards increased trade and competition over long distances and very large corporate retail chains taking control over large parts of food trade. This global competition leads to a downward price pressure and demands for large volumes, standardization, specialization and high production efficiency and productivity for agricultural systems all over the world.

This industrialization of the agricultural sector leads to increased externalities in terms of emissions of nutrients and pesticides, loss of biodiversity and reduced animal welfare. Moreover, even though food production has increased significantly over the last decades and most countries engage in the global food trade, there are still  $\frac{3}{4}$  billion food-insecure people globally many of who live in countries with net food exports. Add to this the fact that some regions like Europe have a surplus of food production based on high level of subsidies. Some of this surplus is being dumped at foreign markets at prices with which the local producers cannot compete, leading to unfair pressure on local farming systems.

Organic agriculture (OA) is an alternative, which builds on a non-industrialized understanding of the relationship between food production and nature. Organic farming therefore has a potential for a more sustainable development. However, challenges from global trade with organic products may also threaten the sustainability in organic agriculture and threaten to dilute some of its basic principles and ideas and the benefits that it holds. Trade in organic food across continents is increasing and organic products from developing countries like Brazil, Egypt and Uganda are being exported to e.g. Europe. Increasingly governments in developing countries are creating conditions in support of organic export (Scialabba and Hattam, 2002). Moreover, agricultural development organizations such as IFAD (IFAD, 2002; Giovannucci, 2005), FAO and NGOs are becoming open to the idea that OA should be considered as one beneficial development pathway for smallholder farmers.

The increased globalization is a consequence of the general political and economical development in the world, which has both positive and negative socio-economic effects and there are no simple solutions to avoid the negative effects in the agricultural sector. However, through increased knowledge and understanding of these complex relationships we hope that it may be possible to point out more sustainable pathways and – in this context – to better define the potential role of organic agriculture.

As described in the preface, the work that led to this book was initiated by five questions. We can now, on the basis of the work, synthesize these to two key questions, namely:

1. How may certified organic farming meet the challenges of the increased globalization of organic food chains in order to offer a significant alternative to mainstream food production in the future?
2. What prospects and solutions do certified and non-certified organic agriculture offer to general sustainability problems in the global food system and to the improvement of smallholder farmers' livelihood in developing countries?

The two strands of organic agriculture, certified and non-certified, face very different challenges and offer different opportunities. 'Non-certified organic agriculture' is characterized by the same agro-ecological principles as certified organic agriculture, and therefore results in the same benefits for soil fertility etc. But the production is consumed locally and not based on market premiums; the costs of certification do not apply; and the practice is governed by other means than organic certifiers. The present chapter gives an overview and synthesis of the previous chapters, treating the two key questions in turn in the two main sections of this chapter. In accordance with the book title we first discuss the challenges and then the prospects, since the future prospects of organic agriculture will depend very much on how the present challenges are met. The book presents a rich picture of different perspectives on the questions and different ways to address them. Wanting to synthesize this rich picture, it seems clear that no homogeneous message can be found. In order to provide a fair treatment of the above questions, we therefore need to work consciously with the range of perspectives in the book. This is the subject of the following section.

### **Three perspectives on the challenges and prospects of organic agriculture**

In Chapter 2, Byrne *et al.* describe three positions with different perspectives on globalization and sustainable development: growth without borders, growth within limits, and growth and ecological injustice. This threefold distinction has played an important role in the creation of the present book and provides a useful structure to retain the range of perspectives in this synthesis. Table 12.1 shows the three perspectives and examples of how the key questions above are answered from each perspective.

**Table 12.1.** Three basic perspectives on globalization and sustainable development.

	<b>1. Growth without borders</b>	<b>2. Growth within limits</b>	<b>3. Growth and ecological injustice</b>
Focus	Market solutions	Ecological system limits	Individuals and local communities
Relevant discipline	Neo-classical and environmental economics	Ecological economics	Political ecology
Characteristic concepts	Free trade, internalizing external costs	Sustainable scale, finite ecosphere, functional integrity	Ecological justice, fairness with regard to the common environment
How may certified organic agriculture meet the challenges of globalization?	Develop globally recognized principles and regionally adapted standards; create a space for organic agriculture in free trade institutions, e.g. the 'green box' in WTO	Enforce principles of ecology and sustainability in the organic certification standards to resist ill effects of market pressures	Include ecological justice in the organic certification standards to resist ill effects of e.g. distant trade, corporate involvement and large-scale cash-cropping
How can certified organic agriculture offer a solution?	Provide alternative products in the market and increase consumer choices	Provide means to promote sustainability in non-localized food systems with global trade	Provide means to promote ecological justice in non-localized food systems; create alliance with fair trade
How can non-certified organic agriculture offer a solution?	Through institutional protection of vital local primary production systems and markets	Provide a more sustainable strategy to development of local agriculture in low-income countries	Provide local food systems that promote ecological justice; institutional support for their further development

The first perspective, growth without borders, is the dominating perspective of modern, Western culture, whereas the second and, in particular, the third are generally less prevalent. Within the organic movement the two last are of key importance, even though organic agriculture is also very much seen through the glasses of the first and influenced by it. They both focus on problematic aspects of the present development that are not visible in the first: the ecological limits to economic growth and differences in how environmental deterioration impacts on different individuals and local communities. From the first perspective, certified organic agriculture simply provides yet another alternative in the market to the benefit of consumer choice and the standards are an alternative to internalizing

the external costs of production. The main requirement for free trade is to distinguish organic products in the market by way of internationally recognized non-discriminatory standards. The challenge to certified organic agriculture is then to work for preferential treatment in free trade institutions on this basis, and to argue that 'non-discriminatory' in the context of organic agriculture implies regional differences in the standards due to importantly different conditions.

From the second and third perspective, the challenge for certified organic agriculture is to fully address the problems of sustainability and ecological justice in its principles and standards. Certified organic agriculture suggests a way to solve these problems in a globalized market by way of certifying the process behind the products and providing the consumers with a choice of more sustainable and just products. But this can only work in so far as the proper goals and principles are actually implemented successfully in the organic practices and in so far as the consumers are aware their choices and willing to take on the responsibility of buying the environmentally and socially friendly, but more expensive, products. Non-certified organic agriculture have a prospect of solving the same problems in less economically developed areas by building on local resources as an alternative to high-input agricultural development strategies such as the 'green revolution'. The first perspective on the other hand, with its focus on market solutions, seems blind to the prospects of non-certified organic agriculture. It seems clear, however, that these prospects will depend on the willingness to create institutional protection of vital local primary production systems, on the basis of their special status in contrast to industrial production, and in parallel to e.g. the WTO 'green box'.

In the following sections we will discuss the two questions building on the framework in Table 12.1.

### **How may certified organic farming meet the challenges of the increased globalization of organic food chains?**

There is a tendency for OA – like conventional food systems – to be influenced by globalization trends such as global competition and increasing free trade linked with demands for harmonization and supply-on-demand leading to long distance trade, specialization, economics of scale, commodification of common goods and lack of transparency. Entering into global trade on these terms threatens to dilute the special characteristics of OA. In this section we discuss these challenges and suggest ways to address them by strengthening the principles of OA.

***The dilemma: the globalization of certified food chains may compromise organic principles***

The organic food system has over the past two decades been transformed from a loosely coordinated local network of producers and consumers to a globalized system of formally regulated trade, which links socially and spatially distant sites of production and consumption (Dabbert *et al.*, 2004; Raynolds, 2004). Organic farming is also included in 'Codex Alimentarius' (Chapter 5). Though preferences for local organic food persist, Northern countries are increasing their reliance on organic imports, particularly from the global South, including products competing with locally produced conventional products (Rigby and Brown, 2003; Raynolds, 2004; see also Chapter 1). At the same time, supermarket sales of organic products have been increasing, dominating sales in the UK, Switzerland and Denmark (Dabbert *et al.*, 2004). This will again put pressure on organic farms towards increased specialization and large-scale production, which will then be at the cost of diversity both in terms of farms and in terms of numbers of enterprises per farm.

This development could result in the same basic social, technical and economic characteristics: specialization and enlargement of farms (Milestad and Darnhofer, 2003), decreasing prices, increasing debt loads with increasing capital intensification, increased use of external inputs and marketing becoming export-oriented rather than local (Hall and Mogyorody, 2001; Milestad and Hadatsch, 2003). The 'conventionalization' of organic farming thus includes different issues that may be linked but each can be considered on its own: lack of transparency and trust among producers and consumers, increasing food miles and dilution of the 'nearness' principle, specialization and concentration of production at the cost of smallholders and reduction in diversity in crops and farm types. Finally, to the extent to which the organic products are produced as a response to demands expressed in the Developed countries through intermediaries there might not always be a strong ownership to the organic certification schemes or embedment of the organic principles among the local farmers. As discussed by Hauser (Box 3.1), some types of organic production do not build on a thorough understanding of organic principles embedded in the local farmer organization.

The problems of conventionalization has been recognized and discussed within IFOAM for a number of years (Schwartz, 2002; Woodward *et al.*, 2002; Rundgren, 2003) and efforts are made to find solutions that facilitate the strengthening of small-scale farmers' role in the certification process and their ownership to organic principles. But it seems difficult for the movement to agree on specific policies against the conventionalization pressure arising from supermarket sales and large-scale production entering the global organic market. The situation raises questions concerning the future sustainability of OA such as:

- What is the risk that fundamental organic principles on nearness and ecology are compromised? and
- How may this be avoided by adopting new principles such as ecological justice or fair trade?
- What are the different possibilities for OA to secure a specific and sustainable role in the global trade system as seen from different perspectives such as free trade rules (WTO), fair trade and principles of ecological justice and the commons regime?

In the following we will discuss the potential tools and measures that could support a positive development of organic farming from the viewpoints of different perceptions of global trade and sustainability as presented in Table 12.1 and based on the previous chapters. The aim is to synthesise how a strengthened organic sector and movement may contribute to solving some of the problems in the conventional food chain as presented in Chapter 1, based on the concepts of fair trade, resource sufficiency, functional integrity, asset building, resource maintenance and ownership. We will argue that very different views and measures are needed vis-à-vis the export oriented certified OA in developing countries vs. the non-certified OA in developing countries.

### ***The concepts and the tools to revitalize the OA sector***

#### *Certified organic farming as a 'green box' in WTO*

It is not easy as a consumer to get an overview of the farm structure in the organic sector – especially related to overseas trade – nor to which degree this matters for the social and environmental benefits that consumers may expect to support when paying the price premium. Therefore, in order to secure the trustworthiness of the OA sector in the long run, more clear principles and rules should be developed. And more studies of the actual positive effects on e.g. biodiversity and socio-economics of the price premium on certified organic products from developing countries are needed. There is a need for a strategic renewal of organic principles and rules in light of the global development and for a debate of the feasibility of encompassing all forms of OA in one concept.

One strategy could be to strengthen and clarify the organic principles and seek to establish a special niche within the global trade in food products. Some proponents argue for OA to find its place in the world of increasingly free trade, e.g. by working to get a special treatment under the WTO. Bach (Chapter 5) explains why the free-trade rules under the WTO agreements may be an obstacle for the goals to secure organic products a special treatment in the global trade: due to the non-discrimination principle which is the core of the international trade law it is generally not allowed to discriminate between products that are

physically alike. This means that it is difficult to get acceptance of measures, which gives special treatments of products based on the way they are produced if this is not expressed in the appearance of the product itself. Obviously, this is a potential barrier for future initiatives of eco-labelling and special trade and tax policies favouring organic products (e.g. lower taxes or import toll on organic products). On the other hand, recently there has been some positive developments in the definition and use of standardized voluntary eco-labelling schemes that are either life-cycle based or based on rules for the production methods, where OA would fit under the second type. Under the overall term Multilateral Environmental Agreements it may be possible to establish rules with priority over the general WTO rules thus allowing for special treatment of environmentally friendly products. But this requires as a minimum that 'Environmental standards and policies must be developed in the appropriate environmental organizations but recognized by the WTO as being necessary and consistent with the WTO rules' (Bach, Chapter 5). Therefore, from this perspective the organic movement should seek to strengthen international agreements and definitions of organic farming including clear objectives and criteria. A starting point may be the organic food guidelines under the 'Codex Alimentarius', which acknowledge that organic farming standards are a legitimate means of recognizing product quality rather than a technical barrier to trade.

In order to get a general acceptance of agri-environmental support schemes targeted at organic farming in e.g. the EU by WTO members, stronger efforts are needed to convince also developing countries, that this is not a new form of protectionism against their products. This is more likely to succeed if efforts are made to help developing countries to establish their own organic certification schemes, which are affordable and manageable for smallholder farmers. Therefore, it is a challenge for the organic movement to strengthen the international dialogue and supply assistance and capacity building to developing countries in order to secure an acceptance of the organic niche within the global free trade rules. IFOAM has supported the development of this for a while but more efforts are needed to help building national and regional institutions and regulations that may support the development and certification of organic farming in developing countries.

This obviously presupposes that increased global trade is considered a positive scenario for the development of organic farming, which is an opinion not necessarily shared by all stakeholders. Contrary to the attempts to secure OA a special niche in the global trade, that there are important parts of the OA movement find that organic food systems should focus on local markets, both in form of non-certified OA in developing countries and in developed countries as expressed by the 'foodshed' movement (Boxes 1.4 and 1.5).

*The idea of ecological justice and the tools of ecological economics*

There is, as explained, no consensus regarding the future direction of OA development. This points to the need for a conceptual discussion and for tools to analyse the advantages of OA in the global context. Ecological justice (EJ) may serve as an overall (normative) framework for such a conceptual discussion. EJ covers many of the issues at stake when discussing organic farming and its potential to offer alternative solutions to the problems associated with the globalization of agriculture and food systems (Alrøe *et al.*, Chapter 3). In combination with the idea of managing important local resources under a commons regime (Byrne *et al.*, Chapter 2), EJ may prove a step in the direction of revitalizing the specific features of organic farming. This is based on a view of OA as an alternative to mainstream agriculture with a potential to solve a broad range of environmental, animal welfare, food security and livelihood problems in agriculture. Ecological Justice has been proposed as one of four basic principles in the ongoing work to redefine IFOAM's principles (Alrøe *et al.*, Chapter 3).

Having accepted this idea the next question is then, to what extent does OA in its many different forms conform with the idea of EJ, how is this best assessed and involving which stakeholders and how is this ensured in the future development of OA in all its different forms. In other words, how is EJ to be specified? We see two distinct and complementary ways of implementing EJ within the OA movement. The first is through a more detailed set of principles and rules guiding both the development of organic farming systems and food chains (column 3 in Table 12.1). The second is through analyses of different choices and strategies for organic food chains based on the tools of ecological economics (column 2 in Table 12.1).

One main aim of OA is to find another balance of the conflict between economical pressures to reduce nature's time and labour time using external inputs on the one side and the resulting impact on biological and environmental systems on the other as described by Kledal *et al.* (Chapter 4). This raises two relevant questions: (i) How may the methods used in ecological economics provide a better framework for describing the benefits of organic farming? (ii) How may such positive attributes of OA be acknowledged within international trade rules allowing for a special treatment?

Ecological economics offers itself as the scientific tool (or discipline) for this purpose, encompassing both quantitative questions related to the scale of production and related externalities and qualitative questions related to the definition of multiple objectives and involvement of stakeholders and institutions. Ecological economics includes tools for combined assessment of resource use and production from an economic and environmental point of view using a range of measures or indicators to compare the outcome of a production system and chain with multiple objectives. Examples of analyses are the comparisons of energy use efficiency in organic and conventional farming (Refsgaard *et al.*, 1998) and other assessments of the relation between intensity

of production, resource use efficiency and externalities (Halberg *et al.*, 1995, 2005; Rasul and Thapa, 2004; see also Chapter 1).

The discussion of the acceptability of long distance transport may benefit from life cycle based assessments of the importance of the environmental impact of the transport itself in comparison with other environmental impacts from food production (Halberg *et al.*, 2005). Life cycle assessment will possibly show that intercontinental sea transport – in contradiction to air transport – has only marginal significance compared with the total environmental impacts from a food chain. And such analyses may again be used to determine rules for transport forms and distances within certification schemes. This way a more precise definition of ‘nearness’ may help to distinguish between organic products where long distance trade is less a problem than others. In this respect one should distinguish between products and the different choice situations consumers face. A large group of the organic products traded long distance in fact substitute comparable, imported products, which are exotic at the place of consumption (e.g. organic vs. conventional bananas or coffee purchased in Europe). In this respect OA may have a positive environmental and socio-economic effect in the country of origin given the right certification scheme without affecting total global trade or increasing food miles. Another group of imported organic products compete with or replace locally produced organic or conventional products of the same time (e.g. apples are grown widely in Europe but still organic apples are imported from outside Europe). These are the products that may compromise OA principles and increase the total food miles. As described by Knudsen *et al.* (Chapter 1), large amounts of conventional substitutable food products are cross-traded, that is, products such as beef or cereals are imported AND exported to and from countries in different continents.

There are however a number of conceptual and methodological obstacles for such a ‘scientific’ approach to the characterization and regulation of organic food chains.

First of all, certification of OA was never meant to be based on assessments of the outcome but on the production methods used. These are supposed to build on the intentions to enhance specific values and objectives by adhering to certain principles such as recycling, improving soil fertility as a mean to improve health of plants etc. Therefore, according to some proponents, future certification of OA should not focus on the analysis of specific product chains and their relative environmental benefits using e.g. LCA but rather on an extension of the generic rules and a local adaptation of rules to cover the overall organic food system.

Second, a number of social and environmental aspects are not easily measured with current methodologies and would therefore not allow for a product-based assessment of OA. This includes the goal of securing the farm family’s livelihood and social justice, enhancement of biodiversity (Noe *et al.*, 2005) and soil fertility (Schjønning *et al.*, 2004). Moreover, this scientific – or technocratic – approach to defining ‘nearness’ may not satisfy all critics of global trade.

Third, there are some potential impacts related to the implementation of certain techniques, which are very uncertain or hitherto unforeseen. This is why OA adheres to the precautionary principle (Alrøe *et al.*, Chapter 3) and thus avoids techniques such as GMO without engaging into a specific risk analysis or cost benefit assessment. Therefore, the possible window for OA in WTO regulations and the credibility of OA among consumers cannot rest on documentation of environmental and social benefits for each specific product. There is a need to acknowledge the specific principles and rules within OA as the basis for a 'green box' or trade rules as discussed in Chapter 5.

Having said this, there is still from our point of view a need to develop the future principles and rules for organic farming in a continuous assessment of the potential outcomes in relation to social and environmental goals. This may be controversial within the organic farming movement and so far there has been little will to strengthen the rules regarding trade etc. (Rundgren, 2003). As discussed by Woodward and Vogtman (2004), there has been a tendency to dilute the organic principles for both recycling, demands for use of local resources and for animal welfare. As an example of stronger principles, some supermarket chains in e.g. UK have formulated a policy favouring local products over imported organic products, where such a choice in fact exists, e.g. procuring fruits and vegetables from conventional UK growers rather than importing similar organic products (Wright, 2004). It would be wise for the organic movement to formulate its own policy on this question, which could give guidance to the retail sector.

Some inspiration for a policy, which includes social and ecological justice more explicitly, may be gained from the fair trade movement as it has been debated for some time within IFOAM (Cierpka, 2000). Certified fair trade is an alternative form of trade that, like certified organic, has the potential to work across globalized food networks in distant trade relations, and which goes some way towards meeting the principle of ecological justice (see Alrøe *et al.*, Chapter 3; Byrne *et al.*, Chapter 2). But both organic and fair trade fall short of the target in some respects. Fair trade goes further in specifying the social conditions and costs of production, but is lacking in ecological considerations. Organic trade, on the other hand, goes further in detailing the ecological conditions and costs of production, but is lacking in social considerations. However, the organic and fair trade movements cannot simply combine forces to meet their ecological and social ideals and fulfil the prospects of ecological justice. Both standards omit, for instance, considerations on distant transport. Major challenges in the development of a future organic fair trade policy are to secure ecological justice to those outside the trade network as well as those within, and to resolve the potential conflict between the benefits of fair global trade to low-income areas and the inherent disadvantages of distant trading.

Assuming that the OA movement finds ways to counteract the conventionalization of organic farming systems and food chains, there is a potential also in the future to demonstrate an alternative agricultural

development, which is more in harmony with societal goals for environment, resource use, animal welfare etc. One such development could be to link with attempts to recycle nutrients from urban settlements and using alternative household waste management (see below).

### **What solutions do certified and non-certified organic agriculture offer to sustainability problems in the global food system?**

As discussed above and in Chapter 1, the development of mainstream food systems are strongly influenced by the globalization process, which creates both socio-economic improvements and negative socio-economic and ecological externalities. One example of these complex relations is the recent developments in Brazil and Argentina where huge areas have been converted from either traditional mixed farming systems or natural vegetation into soybean monocropping over a period of 5–8 years. More than 14 million ha of land in Argentina alone are now grown with a few Glyphosate-tolerant GMO soybean varieties in a pesticide-dependent system, which seems to be an unplanned ecological experiment of overwhelming dimension (Pengue, Box 1.1). Besides the very low degree of diversity in this agro-ecological system and its dependence on a specific pesticide there is also evidence of a rapid concentration of land on fewer and larger farms (due to the quickly adopted and very efficient no-till technology linked with the Glyphosate tolerance), rapid loss of a traditional farming system and of P-mining of the soils. The harvest and mining of P with soybeans mainly for export is linked with the opposite problem of P-surplus and eutrophication in the soy-cake importing countries in Europe (Knudsen *et al.*, Chapter 1). This is thus a good example of the short sighted, economically powered globalization of food systems without recognition of the externalities, which is where ecological economics offers another assessment of the costs and benefits (Kledal *et al.*, Chapter 4). From the political ecology point of view this global one-way transport of P is another example of ecological injustice (Byrne *et al.*, Chapter 2). Organic farming – presuming a closer adherence to ecological justice principles – may offer an alternative development pathway in relation to this example.

Even though the origins of OA go back long before environmental problems came on the agenda (Woodward and Vogtman, 2004), it is fair to say that the broad public support and spread of OA – especially in Europe – has been linked with the increased awareness of environmental and animal welfare problems connected to intensive agricultural production in combination with the food safety problems in the 1990s (Dabbert *et al.*, 2004). Supporting OA has been proposed as a means to internalizing externalities in the food chain and reducing food surplus in high input agricultural areas (Dabbert *et al.*, 2004; see also

Chapter 1), and giving back some control over the food chain to smaller agents (Box 1.4 and 1.5). The motives for supporting OA differs from Northern to Southern Europe and probably also between political decision members and the individual consumer. At the policy level the problems of overproduction and land abandonment have been motives for supporting conversion to organic farming and the EU commission now uses the inventories of 'agricultural area with OA' as an environmental indicator (EEA, 2005). At the level of the individual consumer the motives for buying organic products include animal welfare aspirations, personal health and food safety objectives and expectations of better taste (Dabbert *et al.*, 2004). In developing countries with low input agriculture OA may improve local food production (Chapters 6 and 10) and asset building (Box 3.1) in smallholder families (Box 1.4) and soil fertility (Chapter 8). It is a challenge for OA to deliver on all these prospects and this will need a strengthening of the adherence to the principles as well as increased efforts in research, innovation and development (Egelyng *et al.*, Chapter 11).

Documented benefits of organic farming include lower resource use, environmental protection, reduced energy use, preservation of biodiversity and landscape values (Refsgaard *et al.*, 1998; Hansen *et al.*, 2000; Scialabba, 2000; Stolze *et al.*, 2000; Scialabba and Hattam, 2002; Dabbert *et al.*, 2004). In a non-industrialized context, valid evidence on these benefits is fragmented (Pretty, 2002; Scialabba and Hattam, 2002; Uphoff, 2002; Rasul and Thapa, 2004; Parrot *et al.*, Chapter 6). While lower environmental impact of OA as compared with intensive conventional farming systems has been documented when evaluated per farm or hectare, this is not always the case when comparing the environmental impact per kg product (De Boer, 2003; Halberg *et al.*, 2005). The general question of the environmental benefits of OA has been discussed in Chapter 1. In the following sections we will focus on selected topics related to how OA may play a significant role in defining viable alternatives to the current mainstream development. First, the consequences for global food security of large-scale conversion to OA are considered followed by a discussion of the potential for non-certified OA in low input regions. Then follows sections on the soil fertility aspects of introducing organic farming and the long-term possibilities for recycling nutrients in household wastes based on the respective chapters. Finally, the potential of reducing medicine use and residuals in livestock products through organic practices is summarized.

### ***Large-scale conversion to organic farming: impacts on food security and sustainability***

The organic movement's own vision is to eventually convert all agriculture into organic farming; this is not surprising. However, from other sources outside this movement it is also considered to support a development towards a large-scale conversion to organic farming in both Europe and North America and

developing countries motivated by other objectives as explained above. Organic farming would – from one perspective – fit into a European policy of reducing agricultural surpluses, maintaining important semi-cultural landscapes and biodiversity and reducing environmental pressure from intensive farming (Chapters 1 and 10). But conversion of large parts of high input/high yielding agricultural areas would result in decreased yields in the years immediately after conversion and could therefore potentially have a negative impact on poor people's food security – in areas with net import of food – due to increased world prices. The long-term effect would depend on the proportion of land converted to OA and the future growth rates to be realized in OA crop yields. There may be a potential to increase organic yields per hectare faster compared with conventional over the next decades by increased research into soil fertility and plant nutrition, plant breeding and improved weed management in organic systems.

If large areas in Europe and North America were converted, corresponding to a mixed crop rotation with sufficient grasslands to act as both a main fodder input to most of the dairy production and soil fertility building for cash crops in the rotation, the overall impact on production levels would probably be acceptable. Such a partial but large scale conversion of for example 40% of agricultural land in Europe and North America would be possible without significant impact on world market prices and global food security in the year 2020 compared with a baseline development as projected with the global food policy model IMPACT (Halberg *et al.*, Chapter 10). This, however, presupposes that yields in OA increase 25–50% more than in conventional farming over the next 1–2 decades, which would be a challenge to research and development of OA. If yields in OA continue to be only 65% of conventional yields then world market prices will be app. 5–10% higher than in the baseline scenario for cash crops such as maize and wheat in 2020. But even this would have very little impact on food security on a global scale according to IMPACT because other factors than global food availability are determining the number of food insecure families.

As described by Knudsen *et al.* (Chapter 1), many countries with large populations of food-insecure people depend on food import (and some of these actually export food). It is too simplistic to add up a nation's food production and divide by the population in order to calculate food security (Conway, 2001; Halberg *et al.*, Chapter 10). Food security is not only a matter of producing sufficient food. The majority of food-insecure people are poor rural inhabitants living in South Asia and sub-Saharan Africa. These families are lacking food mainly due to poverty and lack of knowledge and assets to produce either food or gain sufficient income. These large groups of people will benefit from increased local food production (and/or employment opportunities) and this is where non-certified organic farming – as well as other types of locally adapted low-input farming systems – has a major role to play.

Scenarios for large-scale conversion to OA in low input regions such as sub-Saharan Africa (SSA) shows that it is possible to improve the overall food supply and reduce dependence on food imports towards the year 2020 if the many positive experiences from case studies are possible to scale up. This builds on the assumptions of moderately higher yields in OA after conversion of low-input farming systems and maintaining identical or higher yield growth rates compared to the yield improvements in conventional crops. A conversion of 50% of agricultural land under these assumptions would lead to a combination of 2–12% lower world prices on staple food and increased local consumption according to the IMPACT model. However, in its present form the model cannot take into account distributional effects between income groups within the regions or the positive effects on the sustainability of farming systems. From the *functional integrity* point of view on sustainability (Chapters 3 and 10) OA has an advantage in so far that soil fertility and farm-level biodiversity is being enhanced. From this perspective it seems less important if the yields for some time mostly will suffice for home consumption (self-sufficiency farming).

Viewed from a *food sufficiency* or *resource productivity sustainability* perspective the focus should be on the need for high yields per hectare in order to secure a surplus for the growing urban populations in developing countries. The discussion on whether to build development strategies in e.g. SSA on increasing the use of external input (HEIA) or on low external input sustainable agriculture (LEISA) and OA strategies has both a pragmatic and a quasi-ideological dimension (Halberg *et al.*, Chapter 10; Pender and Mertz, Chapter 8). The different views build on different perceptions of sustainability and (possibly) on different interpretations of the potential to overcome structural and economic problems to make fertilizer etc. accessible and affordable for smallholder farmers. But the fact is that the fertilizer use and the food production per capita in SSA have not increased significantly over the last 3 decades (Knudsen *et al.*, Chapter 1; Pender and Mertz, Chapter 8; Halberg *et al.*, Chapter 10). Therefore, as long as this is not the case for huge numbers of smallholder farmers with poor market access, there are good reasons for focusing development efforts on the improved use of local resources as in organic farming. This presupposes that methods are developed to secure and restore the soil nutrient availability, including methods to improve the low phosphorus status on weathered soils in e.g. SSA.

Moreover, the agro-ecological methods and the capacity building towards improvement of agro-ecological knowledge are not in themselves a barrier to a switch to more input intensive agricultural practices if this should be attractive for the smallholder farmers at a later stage, when they can afford the risk and if market conditions are in favour. Therefore, supporting OA seems as one development pathway, which should be considered along with other LEISA options. There are, however, important constraints for a large uptake of OA as discussed below.

If organic farming should represent a sustainable solution for a large scale conversion worldwide it will have to develop and adjust both its principles and its technical performance including productivity in order to produce sufficient food. A key factor will be the involvement of local stakeholders in the adaptation of OA methods to the large variation in agro-ecological conditions existing especially across the African continent using experiences from participatory methods for development of natural resource management (Sutherland *et al.*, 1999; Onduru *et al.*, 2002). A key question not addressed here is the need to create low-cost certification procedures for – groups of – smallholder farmers as part of securing local ownership and control over the marketing channels. Official interest in organic agriculture is emerging in many countries and 57 countries have a home-based certification organization (Willer and Yussefi, 2004), but producers often have to comply with foreign standards not necessarily adapted to their country conditions (Scialabba, 2000). The development of certified OA in some tropical countries has been driven by demands from companies and organizations with the aim of supplying consumers in the North and conventions involved with certification often do not address tropical agro-ecological and socio-economic realities (Barrett *et al.* 2002; Reynolds, 2004).

### *Non-certified organic agriculture in developing countries*

As argued above, organic agriculture has a high potential in particular in developing countries. It is, however, important to be aware that the societal benefits of organic farming practices are different in developing countries and the domestic market for certified organic products is very small. Because the organic standards are mostly developed for the Northern markets there is also a need for adaptation of the standards for tropical conditions. It may therefore be relevant to introduce the term 'Non-certified organic agriculture' (NC-OA) as a concept specifically suited for promoting and protection of organic agricultural production, which is marketed locally without premium prices.

NC-OA is characterized by the same agro-ecological principles as certified organic agriculture, and therefore results in the same benefits for soil fertility etc., but the production is consumed locally and not based on market premiums; the costs of certification do not apply; and the practice is governed by other means than organic certifiers. As discussed by Hauser (Box 3.1) non-certified OA may comply more with IFOAM principles than certified organic cash crop schemes. This is especially true in relation to the different degrees of nearness, where the non-certified OA obviously are *localized food systems* where the proximity of consumers and producers allow a relatively deep insight in the production forms (Figure 3.2). This is by far always the case for the newly globalized certified organic farming systems as discussed above.

For smallholder farmers using no or very little fertilizer and pesticides, NC-OA have a potential for improving yields given the right training and local

adaptation of methods. In areas where the focus is on improvement of the farming systems, diversifying and increasing yields of crops for home consumption or local markets, the role of NC-OA is to organize capacity and asset building around the principles of agro-ecology. This has the potential for improvement of the food security and stability of many smallholders in large parts of SSA, Asia and Latin America and thus can lead to an improvement of their health and livelihood. FAO and others have reported how the introduction of input intensive and capital intensive methods among poor smallholders without appropriate micro-finance schemes may worsen their economic problems and lead to a focus on short term returns as opposed to asset building (increased soil fertility, diversity and food security) on the smallholder farms (Knudsen *et al.*, Chapter 1). These are important reasons for some development agents to focus on improved agricultural methodologies that depend less on capital and external inputs such as NC-OA.

Empirical evidence shows that it has been possible to raise yields considerably under very different agro-ecological conditions and in different farming systems with relatively low cost techniques such as the 'Zai' system where Sorghum is planted in pits supplied with manure and water, rather than broad sowing (cit. f. Pretty, 2002, p. 91). Non-chemical pest management has also been developed, such as the push and pull method to avoiding maize bugs and parasitic weeds in smallholder low input farms (Khan *et al.*, 2000). But more research is needed to verify to what extent these case stories may be feasible solutions for larger regions, even after adaptation to agro-ecological differences.

The organic farming movement and proponents of LEISA share the same vision to 'maintain and encourage agricultural and natural biodiversity on the farm and surrounds' (IFOAM, 2002) as a method for stabilizing yields and promote natural regulation of pests. For the organic movement this is also part of the responsibility for recognizing the wider ecological impact of farming on the natural cycles and living systems, i.e. in compliance with principles of ecological justice. It is, thus, very important to state that our suggestion for NC-OA goes beyond the farm and includes local consumption of the products in order to ensure local development and food security. Maintaining biodiversity contributes to resilience in yields and can be considered an insurance against catastrophically poor yields due to climatic fluctuations or pest epidemics (Perrings, 2001). However, promoting biodiversity systematically and adopting soil improvement technologies and agroforestry methods is a challenge for poor smallholder farmers and uptake of these methods is often slow and small if they do not give benefits to the farm family in the short run (Pender and Mertz, Chapter 8). Many poor families cannot afford to take risks or to manage their land with a long-term fertility perspective if it does not also yield an immediate food output. Other constraints to adoption of LEISA and non-certified OA technologies are labour constraints, too low return to labour use or other costs and lack of seeds or seedlings of key: e.g. nitrogen fixing) species and a well functioning extension service.

Summing up, the concept of NC-OA is targeted towards developing local sustainable food systems that also protect the environment and avoid over-exploitation of local resources. To make the concept viable there is a need for support to capacity building, improving local marketing and increased participatory research in order to develop locally adapted agro-ecological methods.

### *Improving soil fertility*

In large areas of Africa south of the Sahara (SSA) soil fertility is being depleted due to declining use of fallow in combination with insufficient application of nutrients and organic matter among others (Pender and Mertz, Chapter 8). Organic farming can play a positive role in reversing negative soil fertility developments and thus solve productivity constraints, but only as part of the solution and care should be taken to assess the socio-economic conditions as described above. Pender and Mertz (Chapter 8) state 'in order to be environmentally sustainable [soil improvement and farming] technologies must not undermine future productivity by degrading the resource base or the supporting ecosystem'. In areas with low input agriculture NC-OA may improve soil fertility, increase and stabilize yields and improve poor farmers' asset building as discussed in Chapters 5, 8 and 11. Pender and Mertz (Chapter 8) suggest that non-certified OA can be considered as one form of LEISA, but with more specific requirements for using soil and water conservation and recycling to improve soil fertility. LEISA and OA methods according to Pender and Mertz (*ibid.*) offer solutions to the needs for intensification under difficult agro-ecological conditions in Africa, Asia and Latin America and is especially relevant in areas with low to medium yield potential and limited access to markets.

The development of OA may have significant positive impacts on e.g. soil fertility, but in the long run this may not be sufficient to sustain high yields on poor soils due to lack of nitrogen and possibly phosphorus. Specifically, large areas in sub-Saharan Africa are phosphorus (P) deficient from a plant nutrition point of view and OA limits the options for P inputs. As discussed by Pender and Mertz (Chapter 8), P fertilizer in the form of rock phosphate may be profitable to use in areas near sedimentary deposits but deposits of suitable quality are scarce in large regions of the developing world. Transporting rock phosphate with low concentrations of P over long distances on poor roads in e.g. Africa is neither economically realistic nor wise from a resource use point of view. It may be a solution to use agro-forestry principles (e.g. trees with deep roots that can recycle P from below the root dept of annual crops) in some areas. But this will probably not be a possibility in all areas with P-deficient soils and therefore it should be considered to use more concentrated (by chemical treatment) P fertilizer in situations where P is severely limiting yields – and given that this is

economically feasible for farmers. Such a non-dogmatic approach to the adjustment of OA principles and rules is necessary and recommendable also in light of the history of OA as developed and formulated in the North under different agro-ecological conditions from the older and more weathered soils in many tropical countries. This should be less problematic in projects promoting non-certified OA but in projects with certified production for marketing under a label it would be necessary to grant exceptions and allow for (chemically) treated P fertilizer if this appears to be the only solution to sustained OA.

### ***Organic farming as showcase for recycling nutrients from households?***

While OA builds on ideas of improving soil fertility and recycling nutrients this has almost only been considered at the farm level or as collaboration between farms. Few, if any, OA projects have focused on recycling of nutrients leaving the farms with products, i.e. to get the nutrients in household waste back to the soils. There is an increasing focus on the development of techniques for the treatment of human waste (so-called black water) and household waste (grey water) with the aims of recycling nutrients and scarce water resources to crop growth and reducing costs in waste water treatment. Examples of this given by Refsgaard *et al.* (Chapter 7) demonstrate the feasibility of such an approach in a wide diversity of countries based on a combination of traditional waste collection systems and new technologies. The larger part of N and P excreted by humans is found in urine, while faeces together with the grey water could add more organic material to soils in order to enhance long-term fertility. This is interesting in developing countries because of the urgent needs for low-cost solutions to handle black and grey water in the rapidly increasing urban settlements. Hygienic considerations should be taken seriously and methods for this exist. Managed correctly, the development of such technologies could be a win-win situation for urban settlements and for farming systems and the OA movement should consider to become part of this development. Likewise, as several examples show, there is a potential for saving large costs to establish traditional household waste water facilities in developing countries if alternative handling systems were to be used more widely in new settlements and when old structures need total restoration.

The topic of recycling nutrients between cities and the soils could be an interesting area for OA to demonstrate alternative solutions. But in areas with intensive livestock production and surplus of N and P in manure the incentive for recycling human waste will be low. Moreover, there are health aspects to consider seriously together with risks of odour when treating and spreading the waste products. But the most important barrier for the use of recycled human waste in OA is probably the risk for contamination of soils with other, toxic substances. Presently, rules for OA in e.g. Denmark prohibit the reuse of sewage sludge from urban settlements even though the national law favours the

spreading of sludge on farmed land within a maximum limit of P-supply and the National Environmental Agency declares that risks of e.g. heavy metal contamination are very small.

Moreover, the question of whether to consider nutrients in human waste an organic fertilizer or a non-organic import (parallel to imported pig slurry from conventional farms) has to be solved before such an idea could be implemented.

### ***Reducing medicine use and residuals in livestock products through organic practices***

The widespread use of antibiotics as growth promoters and preventive medicine in intensive livestock production has been questioned because of the negative side effects such as increased antibiotic resistance in pathogens. This topic is less debated in most developing countries even though high levels of preventive medicine use such as antibiotics and acaricides may create similar disadvantages for farmers and consumers in the long run. Examples of high levels of antibiotic residues in livestock products and of increased prevalence of resistant bacteria in developing countries are given by Vaarst *et al.* (Chapter 9). Organic livestock production can help reduce these problems, because the organic systems emphasize disease prevention and maintain explicit standards designed to reduce the use of medicine through breeding, feeding, housing, appropriate flock and herd sizes and active health care (chapter 9). Vaarst *et al.* state:

We consider it a very important strength and potential of organic animal farming that there is an explicit and strong focus on the health of the whole animal production system, the animals and their interactions with humans, other animals and the wider farm system. This is viewed as the primary way of reducing the risk of disease outbreaks and medicine use.

There is an important difference between the health risks to livestock in Europe and North America and in smallholder farms in tropical countries. Many diseases such as mastitis in intensive systems are related to the management and environment of livestock and the organic approach has been developed in response to this. Thus, it has been demonstrated by several studies that comparatively low levels of medicine use is in fact possible in livestock production without drastic reductions in productivity and without negative effects on the animals health or welfare as discussed in Chapter 9. However, livestock in tropical smallholder systems face severe health threats from vector borne and epidemic diseases, which are harder to control by individual management efforts except if livestock is kept in zero-grazing systems. But free range and scavenging livestock keeping is widespread in tropical countries together with pastoral and transhumance systems. In both cases medicine use is limited due to limited accessibility and financial constraints and much of the

efforts to control these diseases already build partly on ecological principles. Community approaches are an important part of these efforts in disease prevention, due to e.g. communal grazing systems. Choice of appropriate, often traditional, animal species and breeds can reduce problems of disease, medicine use and, thereby, antibiotic resistance.

On this basis one major challenge for the development of organic livestock production systems is to think the organic principles into a wide range of diverse livestock systems with very different conditions. Vaarst *et al.* (Chapter 9) propose that this should build on criteria such as the risks for different types of diseases in different environments and the potential for reducing these threats using organic methods while still maintaining the animals' opportunity to fulfil their natural behaviour.

## Conclusions

In order to illuminate the challenges and prospects of organic agriculture in a global context, we need to consider different perspectives with different views of the role of globalization, growth, trade and sustainability.

### *The challenges for organic agriculture*

- Certified OA faces a pressure from the globalization of food systems, which threatens to dilute the specific characteristics of organic food by increased specialization and reduction in diversity, standardization, long distance trade and lack of transparency.
- For certified OA to represent a sustainable alternative to mainstream food production and food chains new principles based on both social and ecological justice should be adopted, which can guide the increasing global trade in organic food.
- Attempts should be made to distinguish certified OA to such a degree that specific trade regulations may be adopted under the WTO.
- The concept of ecological justice should be better implemented in the organic standards, incorporating for instance means to avoid the commodification and unjust appropriation of land and other local natural resources, externalities connected to distant trade by different ways of transport, and securing the functional integrity of exporting production systems.
- The realization of a fair organic trade should build on experiences from the fair trade movement and include considerations regarding the livelihood of smallholder farmers and workers and the involvement of local stakeholders in the certification process. However, a simple combination of organic and fair trade standards will not be adequate to meet the aims of ecological justice.

- More analyses of the potential effects of organic farming for environmental and socio-economical sustainability should be carried out using methods from ecological economics and based on analyses of whole food chains.
- Within the overall principles of OA the specific regulation and certification should be further developed and adapted to local agro-ecological and socio-economical conditions in order to secure and promote the local embedment of the organic ideas and certification processes.
- The major challenge in organic livestock production systems is to think the organic principles into a wide range of diverse systems with very different conditions. There is a need for local adaptation of principles and rules and for integrating community-level approaches to organic livestock production and disease prevention into certification schemes or non-certified organic projects.

### *The prospects of organic agriculture*

- The two strands of OA, certified and non-certified, offer different opportunities and prospects, which should be dealt with consciously by the organic farming movement.
- Given that the challenges are met by implementing the necessary new principles, then certified organic agriculture constitutes a way to promote ecological justice through the global market by providing alternative products to consumers.
- Certified OA may provide alternative products in the market and increase consumer choices thus demonstrating in practice alternative development ways for agriculture.
- There is a potential for reducing the use of veterinary medicine and preventive use of antibiotics by promoting organic animal husbandry, especially when this is integrated with land use and food production.
- Organic agriculture has the potential to integrate the nutrients from household wastes in the nutrient cycling as a long-term goal.
- Non-certified OA is a potential development tool in areas with low input traditional farming and food insecurity and may improve the resilience and yield stability of smallholder farms as well as local communities.
- When capacity building of farmers is an integrated part of such programmes, it may improve the long-term asset building on smallholder farms and communities.
- Non-certified OA methods should be developed to accommodate the specific agro-ecological conditions including soil types. In some cases, especially with problematic soil types, LEISA types of smallholder farming will be more suitable than organic farming according to current standards.

- Large-scale conversion to OA in regions with low input agriculture has the potential to improve the food security among resource-poor people.
- Sufficient food production from OA to improve urban populations' food needs in 2020 is possible given that relatively high yield growth rates in organic crops compared with conventional can be achieved.
- Large-scale conversion to OA in high input regions will increase world food prices only slightly if organic yield per hectare improves faster than conventional yields are expected to grow. Large-scale conversion to OA in Europe/North America will have very little effect on food availability and food security among resource poor in SSA.

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