

Oxfam Research Reports

# Who Will Feed the World?

The production challenge

**Lucia Wegner**

*Senior development economist and independent consultant*

**Gine Zwart**

*Oxfam Novib*

**April 2011**

[www.oxfam.org](http://www.oxfam.org)



# Contents

Executive Summary .....	3
<b>1.</b> Introduction: Is the global agricultural system ready to feed the world in 2030?.....	6
<b>2.</b> What is the best model to drive sustainable agricultural growth and improve food security?.....	12
<b>2.1</b> Where the debate stands.....	14
<b>2.2</b> Models of farming systems.....	15
<b>2.3</b> Small-scale Farming: pros and cons.....	20
Advantages/opportunities of small farmers compared with large farmers	
Risks/challenges of small farmers compared with large farmers	
<b>2.4</b> Large-scale farming: pros and cons.....	25
Advantages/opportunities of large farmers compared with small farmers	
Risks/challenges of large farmers compared with small farmers	
Evidence so far	
<b>2.5</b> Low External Input (LEI) agriculture and High External Input (HEI) agriculture: pros and cons.....	32
<b>3.</b> A four-pronged approach to feed the world in 2030.....	39
<b>3.1</b> Support subsistence (family) farmers.....	39
<b>3.2</b> Empower small investor farmers to exploit their full potential.....	41
<b>3.3</b> Make large-scale farming pro-poor.....	46
<b>3.4</b> Build on complementarities between small and large farming systems.....	49
<b>4.</b> Conclusion.....	53
Sources and references .....	58
Notes.....	61
Acknowledgements.....	66

## Executive Summary

Against a background of increasing food insecurity, agriculture in developing countries must undergo a significant transformation in order to increase production and respond to climate change. It is estimated that feeding 8.2 billion people – an additional 1.4 billion – in 2030 would require raising overall food production by some 50 per cent between 2005/07 and 2030. Feeding a larger urban population in a context of increasing scarcity of land and water, while also adopting more sustainable production methods, is a daunting challenge. In Africa, where it is predicted that population levels will double during the same period, the challenge will be even more acute.

The uncertainty concerning the future of food supply has propelled a growing number of investors and finance companies to acquire large parcels of productive land in many developing countries, particularly in Africa, for the purposes of commercial production, long-term investment, or speculation. Investors expressed interest in 42 million ha of land globally in 2009 – of which 75 per cent were in sub-Saharan Africa. A conservative estimate is that at least 6 million ha of additional land will be brought into production each year up to 2030.

It should be noted that hunger and malnutrition are due not so much to the unavailability of food as to the inability of the poorest members of society to access it at an affordable price. Feeding the world by 2030 requires on the one hand efforts to increase food production and therefore food availability, and on the other measures to ensure that the poorest and most marginalised sectors of society have the purchasing power to access what food there is available.

Seventy-five per cent of the world's poor and undernourished people are located in rural areas and depend on agriculture directly or indirectly for their livelihoods. Five hundred million smallholder farms worldwide are supporting around two billion people, or one third of humanity. There is an extensive literature and persuasive evidence to suggest that measures to improve smallholder farmers' capacity to increase food production and productivity, as well as to link to markets, will not only enhance their purchasing power but also increase wider food availability and so contribute to global food security.

Nevertheless, this vision does not go unchallenged. The surging investors' interest in Africa has triggered a debate over the relative advantages and disadvantages in Africa, and worldwide, of large-scale versus small-scale farming models. The debate has been further stimulated by the leading development economist Paul Collier, who argued that much of the focus on smallholders might actually be hindering large-scale poverty reduction, and that current policies ignore one essential factor for labour-productivity growth: successful migration out of agriculture and rural areas. According to Collier, the international food system and agricultural production technology have changed in favour of larger-scale ventures. The benefit of size is that it facilitates commercialisation.

Debates which polarise small-scale versus large-scale models, or, if we consider the systems of production, 'LEI – Low External Input' agriculture versus 'HEI – High External Input' agriculture have obscured the potential of building on complementarities and the existence of multiple pathways to achieve agricultural growth and sustainability. Betting on one model only and adopting a one-size-fits-all approach is unlikely to be appropriate, given the heterogeneity of institutions, and agro-ecological, farming and demographic conditions across developing countries.

Achieving the objectives of increased food production and food accessibility, and at the same time protecting the environment, requires adopting a different blend of policies, a four-pronged approach, aimed at the following:

- Supporting subsistence (family) farmers to cope with risks and vulnerability.
- Empowering small investor farmers with the necessary capacity, finance, and regulation to increase their productivity, production, and competitiveness, and in turn to contribute to food security.
- Making large investments pro-poor, by setting the right framework.
- Building on complementarities between large and small farms, when possible.

A four pronged approach is instrumental at achieving food security from the production angle, increasing productivity, resilience and sustainability of farming systems. It should be noted though that important gains can be achieved also looking at demand side, processing of food, waste management, consumption patterns and habits. Nevertheless, the analysis of these important aspects goes beyond the scope of this paper.

Starting from a definition of small-scale farmers (which include subsistence (family) farmers, and small investor farmers) and large-scale farmers, as well as a definition of production systems (LEI and HEI agriculture), Section 2 of this paper will attempt to compare the advantages and constraints of these systems and assess the economic, social, and environmental impacts so far.

A major challenge confronting farmers is to increase agricultural productivity on existing farmland, both to meet growing demand for food and to offset the climate-change yield losses. Adopting LEI farming methods is crucial to achieving future food-security and climate-change goals. Scale does not dictate the approach to be adopted. Indeed, LEI agriculture approaches may lead to successful results when applied in both large-scale and small-scale farming.

In terms of prospects for developing countries' agriculture, supporting small-scale farmers would achieve the greatest impact in terms of income creation and food security, in

particular when associated with LEI agriculture methods. Section 3.1 will therefore discuss strategies to reduce the vulnerability of subsistence (family) farmers, while Section 3.2 will provide a review of ways and lessons learned to help small investor farmers to overcome limitations of capacity, finance, and infrastructure that hamper their growth.

In countries where labour supply constrains smallholder expansion, large-scale industrial farming can be a successful option to promote food security (through a reduction in prices, thanks to high productivity) and reduce poverty (through the creation of employment). In addition, when LEI methods are applied, they minimise harm to the environment. However, evidence so far proves that unless strong regulation is in place to secure property rights, discipline land acquisition, and ensure transparent and participatory negotiations, adverse social and environmental effects outweigh the benefits. Section 3.3 will discuss how to ensure that large-scale farming benefits poor people.

The need for investment in technology, infrastructure, market access, and institutions suggests that private investment could contribute in many ways which do not involve large-scale land acquisitions. On the contrary, a variety of institutional arrangements can be used to combine the assets of investors (capital, technology, markets) with those of local communities and small farmers (land, labour, and local knowledge). Greater opportunities and important economies of scale for private domestic or foreign investors can be achieved in terms of output processing, packaging, and marketing, rather than in production. These measures include a wide range of more collaborative arrangements between large-scale investors and local small-scale farmers and communities. As discussed in Section 3.4, private investment through inclusive out-grower schemes can promote smallholder diversification into high-value crops and export-market production, and can support productivity gains. There are pros and cons in all these different approaches, and the conditions for success or failure are very context-specific and contingent on a country's institutions, tenure, policy, culture, and demographic considerations.

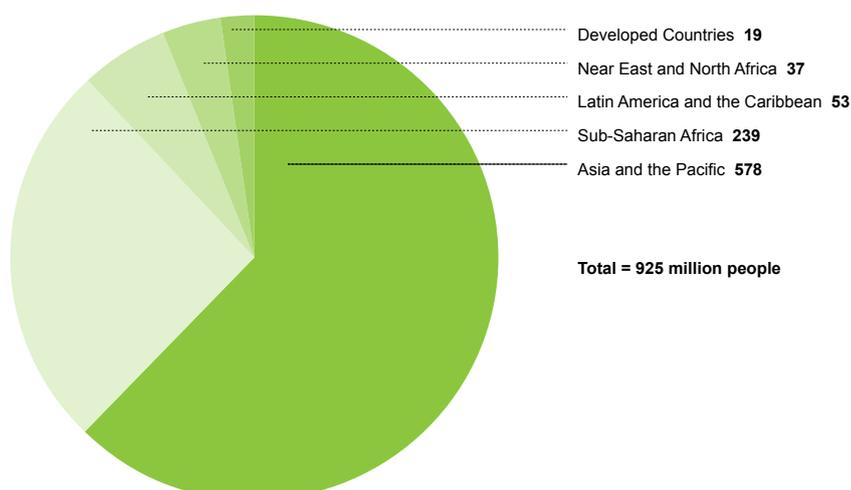
Whatever mix of the four-pronged approach is adopted, major commitment and investment by governments, development agencies, and private-sector actors, reversing the trend of the past 20 years, will be essential to achieving sustained agricultural growth and to making a major dent on poverty and hunger.

# 1. Introduction: Is the global agricultural system ready to feed the world in 2030?

**The number of undernourished people remains unacceptably high.** The Food and Agriculture Organization of the United Nations (FAO) estimates that 925 million people are undernourished worldwide. The percentage of undernourished people is higher than it was before the 2007/08 crises, and higher than 800 million, the level that prevailed when the hunger-reduction target was agreed at the World Food Summit in 1996.<sup>1</sup>

**In numerical terms, undernourishment is found mostly in Asia, and in percentage terms it is mostly found in sub-Saharan Africa.**<sup>2</sup> Developing countries account for 98 per cent of the world's undernourished people. Two-thirds live in just seven countries (Bangladesh, China, the Democratic Republic of the Congo, Ethiopia, India, Indonesia, and Pakistan), and more than 40 per cent live in China and India alone.<sup>3</sup> (See Figure 1.)

**Figure 1: Undernourishment by region**



Source: FAO country statistics

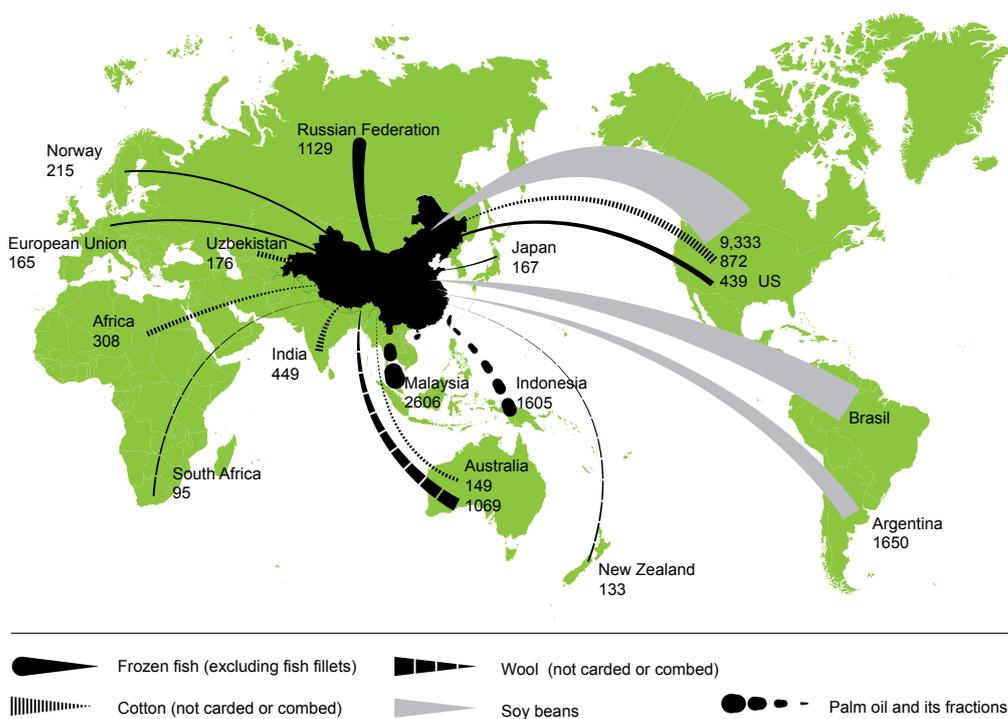
**Production in developing countries would need to almost double.** Feeding 8.2 billion people – an additional 1.4 billion – in 2030, and 9.1 billion in 2050, would require raising overall food production by some 50 per cent between 2005/07 and 2030, and by 70 per cent by 2050.<sup>4</sup> Population growth, rising income, and urbanisation will boost demand for food products. According to FAO, annual cereal production, for instance, would have to grow by almost one billion tonnes, and meat production by over 200 million tonnes to a total of 470 million tonnes in 2050, 72 per cent of which would be consumed in the developing countries, up from the 58 per cent consumed there today.<sup>5</sup>

**Trade in agricultural commodities is also expected to expand considerably.** For example, net cereal imports into the developing countries would increase almost three-fold to reach nearly 300 million tonnes by 2050 and, by then, would account for some 14 per cent of their cereal consumption, up from 9.2 per cent in 2006/08.<sup>6</sup>

Africa, the region which is (together with the Middle East) the most heavily dependent on food imports, is predicted to see a widening of its net import position.<sup>7</sup> This raises concerns for low-income net-importing African countries: their vulnerability to shifts in international food prices can have serious negative effects on hunger and poverty, as shown by the recent food-price hikes. At the other extreme, Latin America and the Caribbean, areas where a net deficit in cereals prevails at present, are expected to become fully self-sufficient, reflecting the surplus-production potential of major countries in the region.<sup>8</sup>

In general, traditional North–South trade relationships will increasingly lose their dominance in favour of South–South trade flows. China and India in particular are expected to play a driving role on the demand side in the global food market,<sup>9</sup> while on the supply side the importance of Brazil, in particular, will grow.<sup>10</sup> Approximately one third of the world population lives in China and India; these countries have very scarce suitable land and clean water for growing additional food commodities.<sup>11</sup> Figure 2 illustrates the growing importance of China and Latin America in the international food-commodity trade.

**Figure 2: China’s agricultural imports in 2008 (in USD million)**



Source: based on Rabobank data

Increased commodity trade could help to mitigate imbalances of demand and supply, but securing a sustainable global food supply will require more efforts and investment to increase production and productivity. Against a background of increasing land and water scarcity, feeding a larger urban population while also adopting more sustainable production methods will become a challenge. In Africa, where it is predicted that population levels will double over the same period, the challenge will be even more acute.<sup>12</sup>

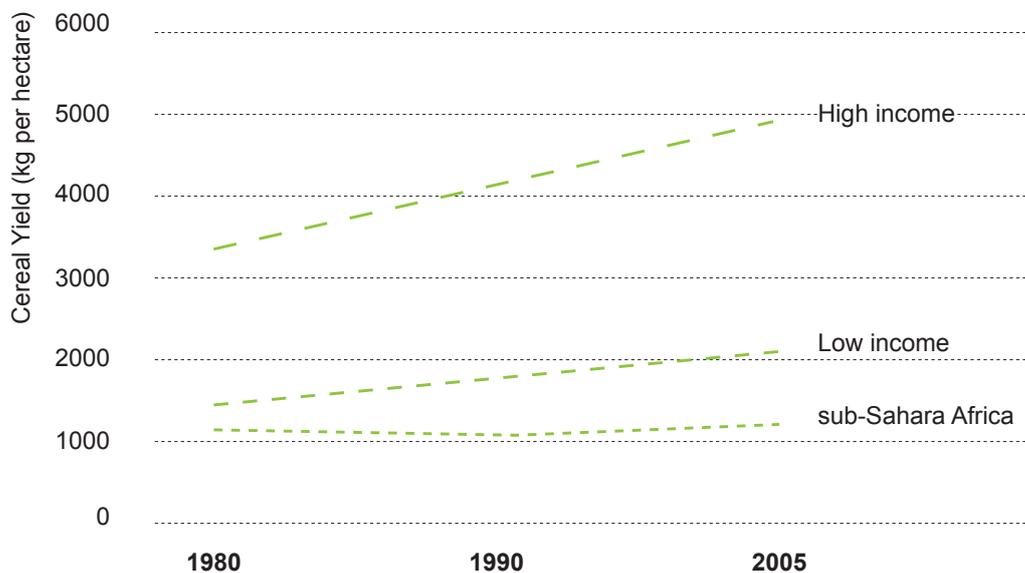
**Climate change, in addition, is threatening the ability of entire regions, particularly those dependent on rain-fed agriculture, to maintain actual levels of agricultural production.** In sub-Saharan Africa, as well as in Eastern Asia and South Asia, climate change will affect rainfall, increase the frequency of droughts, increase average temperatures, and threaten the availability of fresh water for agricultural production.<sup>13</sup> The greatest impact will come from deforestation and changes in human land use. Loss of non-timber forest resources could directly affect 90 per cent of 1.2 billion forest-dependent people who live in extreme poverty.<sup>14</sup> The UNDP reports an estimate according to which by 2080 the number of additional people at risk of hunger could reach 600 million, as a direct result of climate change. Globally, according to the International Monetary Fund,<sup>15</sup> the overall impact of baseline global warming by the 2080s is a reduction in agricultural productivity of 25 per cent without carbon fertilisation, and 10–15 per cent if carbon fertilisation<sup>16</sup> is included.

**Land acquisition is on a steep rise.** Although not a new phenomenon – from 1990 to 2005 land cultivated expanded by 2.7 million ha per year<sup>17</sup> – large-scale expansion is on a steep rise. Recently, there have been many media reports about land acquisition in developing regions, and particularly in Africa. ‘Land grab’ was triggered by several factors, including the move towards the production of agrofuels as an alternative to fossil fuels, a development encouraged by fiscal incentives and subsidies in developed countries; the growth of population and urbanisation, combined with the exhaustion of natural resources, in certain countries, which therefore see large-scale land acquisitions as a means to achieve long-term food security; and speculation on future increases in the price of farmland.<sup>18</sup>

According to latest estimates, investors expressed interest in 42 million ha<sup>19</sup> of land globally in 2009 – of which 75 per cent was in sub-Saharan Africa.<sup>20</sup> Sub-Saharan Africa is targeted because of the perception that it has plenty of land available, because the climate is favourable to the production of crops, because local labour is inexpensive, and because land there is still relatively cheap.<sup>21</sup> The global rush for land has therefore prompted renewed attention on a global scale on questions of rights to land and natural resources, and their role in efforts to overcome hunger and poverty.

However, studies show that increasing productivity on existing farmland would have a much bigger impact on output and welfare for the poorest groups than simply expanding the land area at current yields. **Indeed, productivity gaps in existing farmland remain huge.** At present, sub-Saharan Africa’s agricultural productivity is the lowest in the world (see Figure 3), stagnating in sub-Saharan Africa over the past 30 years while it has increased in most high-income countries. Farmers in Mozambique and Madagascar achieve less than 25 per cent of potential yields, and area cultivated per rural inhabitant remains well below 1 ha, due to deficiencies in technology, capital markets, infrastructure, and public institutions, including property rights, in turn all reflecting long-standing under-investment in agriculture.<sup>22</sup> Increasing agricultural productivity is crucial, both to meet growing demand for food and to offset the climate-change yield losses that are projected in many developing countries.

**Figure 3: Agricultural productivity: greatest growth in high-income countries; stagnation in sub-Saharan Africa**



Source: World Development Indicators dataset 2008

**Policy matters more than geography and history.** It should be noted, however, that global cereal harvests have been strong for the past several years, even as the number of undernourished people has been rising.<sup>23</sup> Hunger and malnutrition are due less to the unavailability of food and more to the inability of the poorest members of society to access food at an affordable price. Food availability, while certainly a necessary condition for the enjoyment of the right to adequate food, is not a sufficient condition. Indeed, food insecurity exists even in countries where there is food in abundance.<sup>24</sup> For example, in Bangladesh the share of imports to consumption for paddy rice and wheat flour in 2003–2005 were respectively equal to 4 per cent and zero per cent. In Tanzania, the share of imports to consumption for maize flour and dried cassava was equal to zero per cent over the same period.<sup>25</sup> This shows that although both Tanzania and Bangladesh are self-sufficient in food production, they suffer from food insecurity. On the contrary, Gulf countries, characterised by endemic food deficits, are not equally affected by high levels of food insecurity.<sup>26</sup> In other words, hunger and malnutrition have much less to do with food availability, and much more to do with food accessibility, with the recognition that both are intertwined. In addition there is a wide variation among countries. Levels of food security, and indeed of the factors that lead to food security — food availability, access to food, and utilisation of food — vary greatly. This suggests that the issues are not defined by geography or history, but rather are matters of policy.<sup>27</sup>

**Food waste is enormous.** While this paper will consider ways to achieve food security from the production angle (increasing the productivity, resilience, and sustainability of farming systems), it should be acknowledged that important gains can be achieved also on

the demand side (food processing, waste management, consumption patterns and habits). Indeed, according to the United Nations Environment Programme (UNEP) Environmental Food Crisis report,<sup>28</sup> more than half of the food produced today is lost, wasted, or discarded as a result of inefficiency in the human-managed food chain. The report estimates that losses and food waste in the United States could be as high as 40–50 per cent; in Australia, food waste makes up half of that country's landfill; almost one-third of all food purchased in the United Kingdom every year is not eaten. Food losses in the developing world are also considerable, mainly due to spoilage and pests. For instance, according to UNEP, in Africa the total amount of fish lost through discards, post-harvest loss, and spoilage may be about 30 per cent of landings. More than a third of the world's cereal harvest is used as animal feed; by 2050 this proportion will rise to half. Reduction of these losses, through recycling and the adoption of new technologies, would be the most logical target to pursue.<sup>29</sup> Nevertheless, the analysis of these important aspects goes beyond the scope of this paper.

Figure 4: Where does the debate stand?

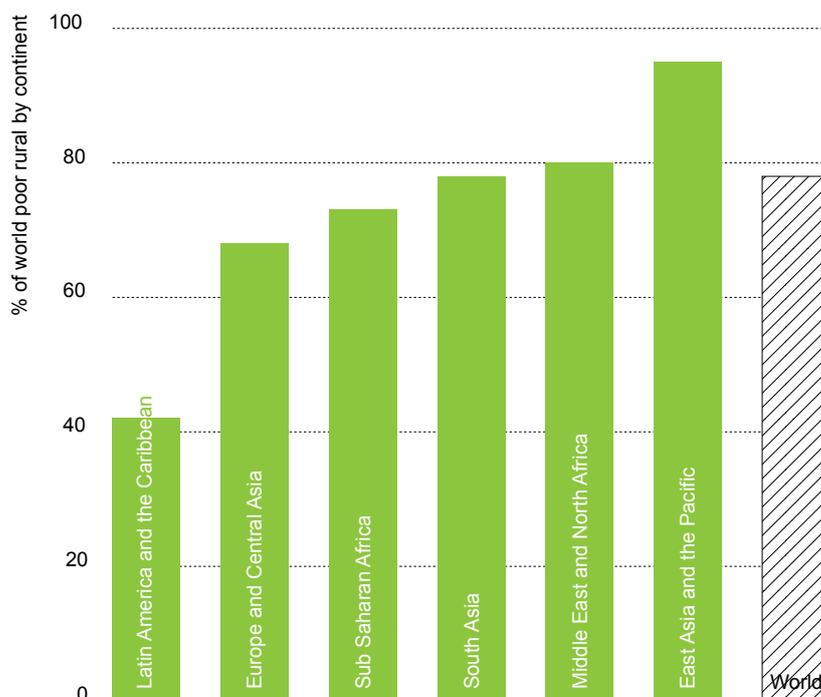


## 2. What is the best model to drive sustainable agricultural growth and improve food security?

Feeding the world by 2030 requires on the one hand efforts to increase food production and therefore food availability, and on the other hand measures to improve food accessibility,<sup>30</sup> ensuring that the poorest have the purchasing power to access food and the ability to absorb nutrients consumed (through adequate access to water and sanitation, adequate nutrition and nutritional information). Ultimately, given the scarce land and water resources available, and climate-change challenges, it is crucial to adopt sustainable production methods which protect the environment.

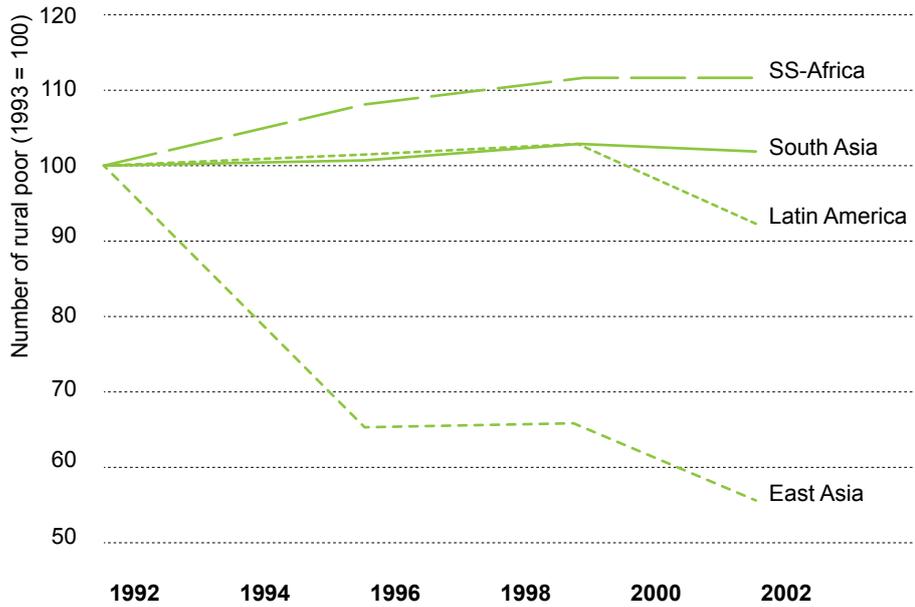
In order to respond to these challenges, it is crucial to identify the **actual target groups**. According to the World Bank's *World Development Report 2008*, most undernourished people in the world live in developing countries, in rural areas, and depend on agriculture directly or indirectly for their livelihoods. Fifty per cent of the world's undernourished people are smallholders, living off 2 hectares of cropland or less. Twenty per cent are landless labourers. Ten per cent are pastoralists, fisherfolk, and forest users. The remaining 20 per cent are the urban poor.<sup>31</sup> At the FAO High-Level Expert Forum On How To Feed The World in 2050, held in October 2009, it was acknowledged that while the share of urban population is growing, rural areas will continue to be home to the majority of the world's poor and undernourished: 75 per cent of the world's poor are still rural (see Figures 5 and 6).<sup>32</sup>

**Figure 5: Seventy-five per cent of the world's poor people live in rural areas**



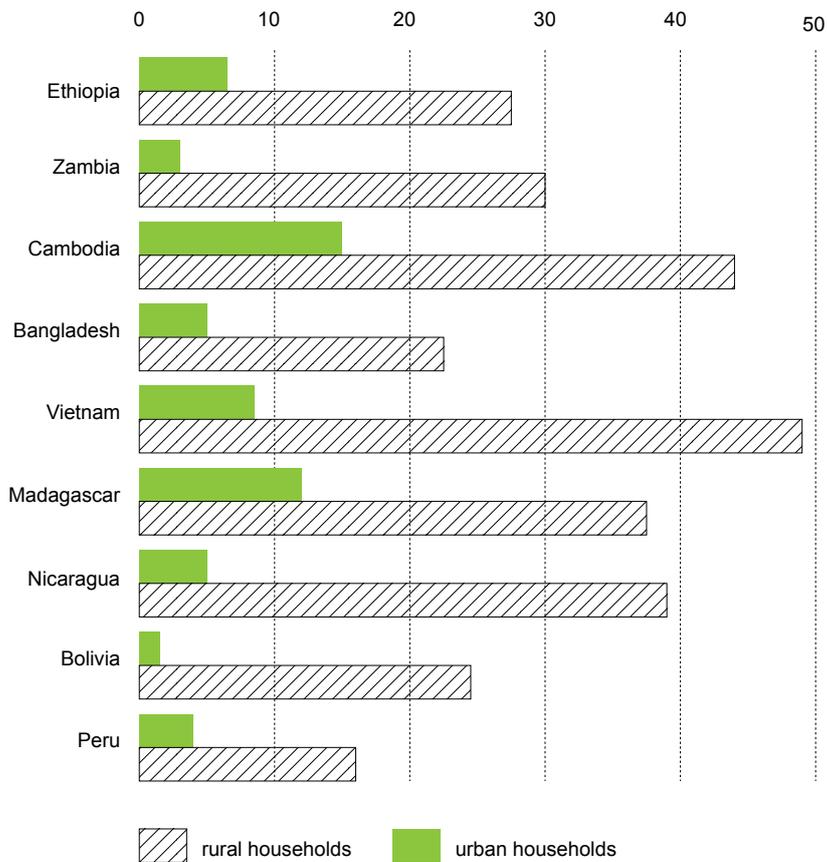
Source: based on presentation by Alain de Janvry at the 2050 FAO High-Level Forum, October 2009

**Figure 6: Rural poverty is rising in sub-Saharan Africa and South Asia**



Source: based on a presentation by Alain de Janvry at the FAO HLF 2050 (October 2009)

**Figure 7: Percentages of households who are net sellers of staple crops, in selected countries**



Source: based on Ivanic and Martin (2008)

Five-hundred million smallholder farms worldwide are supporting around 2 billion people, or one third of humanity. These people are undernourished because they are mostly net buyers<sup>33</sup> of food, and their incomes, which are on average significantly lower than those of the non-rural populations,<sup>34</sup> are insufficient to buy food that they do not produce themselves. Globally not more than about 40 per cent of the rural households are net sellers of food. Consequently about 60 per cent of the farmers are either purchasing food or can just meet their own food requirements.

High food prices experienced since 2007 have exacerbated this situation, because poor households tend to spend more than half their incomes on food. The World Bank predicts that food prices may increase by 30–50 per cent within decades, forcing those living in extreme poverty to spend 90 per cent of their income on food. In general, the urban poor were affected worse than the rural poor, because they benefit only indirectly from farmers' higher revenues and associated long-term gains to the agricultural sector. For very poor people, reducing consumption from already low levels, even for a short period, has severe long-term consequences. Higher food prices during 2008 alone may have increased the number of children suffering permanent cognitive and physical injury due to malnutrition by 44 per cent.<sup>35</sup>

## 2.1 Where the debate stands

There is an extensive literature and persuasive evidence to suggest that measures to improve smallholder farmers' capacity to increase food production and productivity, as well as to link to markets, will not only enhance their purchasing power but also increase wider food availability and so contribute to global food security. For instance, the report of the International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD), entitled 'Agriculture at a Crossroads', launched in 2008 by 64 governments, and authored by 400 scientists from 100 countries, provided a clear rationale and framework for supporting family farming as a central pillar of future agricultural production.<sup>36</sup> This vision was echoed by the G20 Seoul Summit in 2010. The development consensus and action plan reports: '*We are committed to promoting increased procurement from smallholder producers and to strengthen their access to markets, in line with domestic and regional strategies.*'

**This vision does not go unchallenged.** The surging investors' interest in Africa has triggered a debate about the relative advantages and disadvantages in Africa of large-scale versus small-scale farming models. The debate has been further stimulated by the leading development economist Paul Collier, who argued that much of the focus on smallholders might actually be hindering large-scale measures to reduce poverty, and current policies ignore one key necessity for labour-productivity growth: successful migration out of agriculture and rural areas. According to Collier, the international food system and agricultural production technology have changed in favour of larger-scale ventures.<sup>37</sup> The benefit of size is that it facilitates commercialisation. The innovations of recent decades have made the rapid adoption of technology, access to finance, and high-speed logistics more important, and in the process given large-scale industrial agriculture a substantial advantage over the smallholder mode of production.<sup>38</sup>

Debates which polarise small-scale versus large-scale models, or, if we consider the system of production, ‘high external input’ agriculture versus ‘low external input’ agriculture, have obscured the potential benefits of building on complementarities and the existence of multiple pathways to achieve agricultural growth and sustainability. Betting on one model only and adopting a one-size-fits-all approach is unlikely to be appropriate, given the heterogeneity of agro-ecological conditions, tenure, policy, culture, and history, as well as demographic considerations, across developing countries. As argued by de Janvry:<sup>39</sup> ‘different models can be pursued to achieve food security depending on the specificities of each country, they all can be mobilized, building on complementarities:

- Setting safety nets and risk management measures for subsistence farmers, better preparedness to successful migration, and social safety nets for risk-taking and universal food security
- Boosting competitiveness of a smallholder sector where rising market opportunities serve as a powerful instrument for increased commercialization and poverty reduction;
- Promoting commercial agriculture with supply response originating mainly in medium to large farms and with the labor market serving as a key instrument for poverty reduction;
- Facilitating an effective coexistence between smallholder farming and larger farms where each capitalizes on its own specific advantage and complements the other.’

The objective of this paper is therefore to look at ways in which a blend of these models can be instrumental in improving food security and broad-based growth in general. Starting from a definition of farming systems and production methods, the following section sheds light on advantages and disadvantages of small-scale farming versus large-scale farming, looking at success and failures and at the conditions that might help both models to increase food production, reduce poverty, and protect the environment.

## 2.2 Models of farming systems

In order to understand how small and large farming can contribute to achieving a sustainable global food system, we should first look at their specific features. It is not only scale but also different uses of labour and other inputs, and access to technologies, markets, information, that characterise the players in agriculture.

### Small-scale farmers

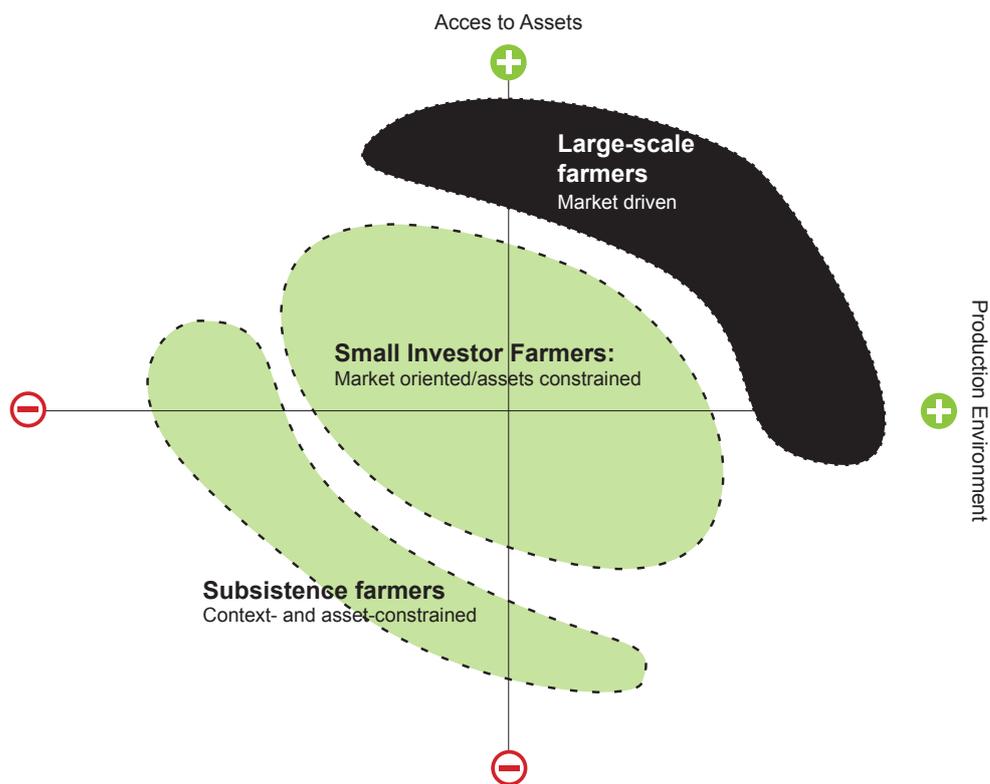
**Subsistence (family) farmers**<sup>40</sup> (context- and asset-constrained see Figure 8). These are households – fisherfolk, pastoralists, smallholders, as well as landless labourers and households requiring social assistance, for whom food security is the main concern. Small production units are almost totally focused on home consumption. These are among the most disadvantaged and vulnerable rural groups: the share of smallholder households falling ►

below the poverty line in Mozambique is 97 per cent.<sup>41</sup> This group includes what Oxfam has described as ‘forgotten farmers’:<sup>42</sup> many women and female-headed households, who are among the poorest and most exposed in rural areas. As indicated in Figure 8, subsistence farmers have very little land (e.g. less than a hectare), lack most types of asset apart from unskilled labour, and, at the same time, operate in unfavourable environments. They are focused on a subsistence economy and face major obstacles in their efforts to improve their situation, because they are ill-equipped to participate in cash-crop production or marketing activities. Given the very limited endowment of agricultural assets, even significant long-term increments in agricultural productivity will usually have a very small impact on total household income. They are generally supported by NGOs and charitable organisations.

**Small investor farmers**<sup>43</sup> (market-oriented/asset-constrained, see Figure 8). These are rural households and small agricultural firms engaged in farming as a business. Their production is based on family labour, although in the more entrepreneurial farms the owner and perhaps other family members are in charge primarily of management and supervision, while the bulk of the labour input is provided by hired farm workers (typically including several permanent full-time employees). They hold cultivated land for both commercial and subsistence agriculture and produce for the market. To cope with price and climatic shocks, they diversify production (maize, soya, vegetables, poultry, cattle, pigs, etc.). They exhibit high production efficiency (with a labour-intensive technology), but their assets are limited: constraints of capacity, legal status, marketing, infrastructure, and capital hinder their growth and full participation in the market.

**Large-scale farmers**<sup>44</sup> (market-driven, see Figure 8). These are medium to large firms engaged in high-value, export-oriented agriculture. They account for a very small percentage of rural players in developing countries. Management may be local or foreign. There is a permanent staff of full-time hired farm workers, who are to some degree specialised (drivers, for example). In addition to their land and other holdings, firms in this category have direct access to the finance, modern risk-management instruments, information, and infrastructure necessary to remain competitive in their business operations. They can produce indirect effects on poverty reduction: high adoption rates result in rapid improvements in productivity, driving food prices down on a global scale, and they can create employment.

Figure 8: **Models of farming systems**



Source: Berdegú, J.A., G. Escobar (2002)

Notes to Figure 8: **Assets:** land distribution, access to credit, training, education and health programmes, strong community organisations. **Production environment:** roads, irrigation, good local-government capacity, efficient markets.

Table 1: **Mean farm sizes worldwide: predominance of small-scale farmers**

Region	Mean size (ha)	% < 2 ha
Central America	10.7	63
East Asia	1	79
Europe	32.3	30
South America	111.7	36
South Asia	1.4	78
South-east Asia	1.8	57
Sub-Saharan Africa	2.4	69
United States	178.4	4
West Asia & North Africa	4.9	65

Source: based on World Bank 2010

As shown in Table 1, in most countries, both rich and poor, the average farm size is quite small. According to World Bank analysis, the main reason is that, unlike marketing, agricultural production has few technical (dis)economies of scale, implying that a range of production forms can coexist. In contrast, processing and distribution are characterised by significant economies of scale which have given rise to consolidation and often high levels of industry concentration.<sup>45</sup>

Table 2 sketches the main features of small-scale and large-scale farming in order to highlight respective pros and cons. All the different dimensions listed in the table are the object of a deeper analysis in Sections 2.3 and 2.4 of this paper.

Small and large farms operate across a variety of ecosystems and encompass very diverse production patterns. These may include polycultures or monocultures, mixed crop and livestock systems. In Africa alone, there are at least 20 major farming systems combining a variety of agricultural approaches, be they LEI (Low External Input) agriculture or HEI (High External Input) agriculture. A more detailed description of these two approaches will be presented in Section 2.5.

**Table 2: Small-scale versus large-scale agriculture**

		 Small scale agriculture	 Large scale agriculture
Objective	Detailed info		
 Production efficiency	Land and Capital productivity	+	-
	Labour productivity	-	+
 Marketing efficiency	Economies of scale	-	+
 Use of technology	<i>e.g. fertilisers, agrochemicals, irrigations</i>	-	+
 Access to Markets and information		-	+
 Poverty reduction	Employment provider	+	⊖
	Food Price reduction		+
	Gender impact	+	-
 Access to modern risk management tools	<i>e.g. insurance, and finance to cope with weather and price risks</i>	-	+
 Maintain biodiversity		+	-
 Environmental cost	<i>e.g. water contamination, soil degradation</i>	⊖	+
 GHG emissions Reduction		+	-
 Resilience to climate change		+	-

## 2.3 Small-scale farming: pros and cons

### Advantages/opportunities of small farmers compared with large farmers

**Efficiency in terms of production per hectare.** The efficiency of smaller production units in most developing countries is demonstrated by an impressive body of empirical studies showing an inverse relationship between unit size and land productivity.<sup>46</sup>

There are increased incentives for household farmers to work hard and manage their enterprises efficiently, and these incentives are at the root of the productivity advantage. These farmers tend to think in terms of whole jobs or livelihoods rather than hours worked, and they are less driven by wage rates at the margin than hired workers. Small farmers exploit labour by using technologies that increase yields (hence land productivity), and they use labour-intensive methods rather than capital-intensive machines.<sup>47</sup> As a result, their land and capital productivities are higher, and their labour productivity is typically lower, than those of large production units.<sup>48</sup>

This does not mean, however, that smallholders are the most efficient producers of all commodities: as discussed later, economies of scale are found in the plantation crops and among highly perishable commodities that must be processed and/or shipped quickly.<sup>49</sup> Indeed, while moving up in the value chain, productivity gains of small farmers are outweighed by significant inefficiencies in domestic logistics (transport, processing, and storage infrastructure) due to poor linkages to markets as well as constraints relating to finance, capacity, and infrastructure.

**Contribution to poverty reduction.** In poor, labour-abundant economies, small producers are not only more efficient but – because they also account for large shares of the rural and total poor – development of small production units can achieve win–win results for growth and poverty reduction. For instance, despite significant costs imposed on the environment (in terms of water pollution, soil erosion, and loss of biodiversity), Asia's Green Revolution showed how agricultural growth that reached large numbers of small units could transform rural economies and raise enormous numbers of people out of poverty.<sup>50</sup> Other studies demonstrated that a more equal distribution of land not only leads to higher economic growth but also helps to ensure that the growth achieved is more beneficial to the poor.<sup>51</sup> For example, Viet Nam has gone from being a food-deficit country to being a major food exporter, and it is now the second largest rice exporter in the world. It achieved this largely through development of its smallholder farming sector. Seventy-three per cent of Viet Nam's population lives in rural areas, and agriculture is their main source of income.<sup>52</sup> In 2007 the poverty rate fell below 15 per cent of the population, compared with 58 per cent in 1979.

Technological advances and proper regulatory reforms were essential to achieving improved agricultural production and poverty reduction. For example, in Viet Nam and Thailand the availability of previously uncultivated land, combined with land policies (clarification of property rights), allowed small farmers to expand cultivated areas rapidly in response to market opportunities. Improved agricultural technologies, such as short-duration cassava ►

varieties and improved soil-management practices, enabled Thailand to become a major exporter also of sugar, cassava, and maize, in addition to rice. (See Box 1.) The government's investment in rail and road infrastructure reduced the cost of market access.<sup>53</sup> These policies had a major impact on poverty reduction and gradual increases of farm size, as non-agricultural growth accelerated as well.

### Box 1: Green Revolution in Thailand: impact on poverty

The expansion of commercial agriculture in Thailand was based on smallholder farming, including settlement of previously uninhabited land, and involved land reform that secured the settlers' rights. Thailand's Green Revolution brought positive social impacts overall. Even though income distribution became more concentrated in the North-East Region as a whole over the period 1980–2002 (the Gini ratio increasing from 0.474 to 0.527), concentration of incomes declined in the agricultural sector, with the Gini ratio falling from 0.416 to 0.396, which is lower than in other regions of Thailand. Absolute incomes rose for both farmers and farm labourers: between 1977 and 2001, real farm incomes increased by 119 per cent, and real farm wages by 103 per cent. As a consequence of the broad-based income growth, the headcount poverty rate, which stood at 56 per cent in the North-East Region in 1988, had plunged to 17.2 per cent by 2004.

*Source: World Bank (2009)*

As shown by Table 3, when compared with large-scale farming, smallholder cultivation has advantages on equity grounds. Smallholders' income is between two and ten times greater than what they could obtain from wage employment only.

**Table 3: Farm incomes for smallholders relative to wage employment on large-scale farms**

	Smallholder farm		Comparison	
	Family labour (days/year)	Farm income (US\$/year)	Wages for equivalent large farm area (US\$/year)	Farm income-to-wage ratio
<b>Sugarcane</b>				
Zambia 1 ha irrigated	598	2118	348	6.09
<b>Oil Palm</b>				
Indonesia 2 ha out-grower	322	2067	990	2.09
Indonesia 2 ha low input	192	873	990	0.88
Cameroon 2 ha independent	200	1770	580	3.05
<b>Rubber</b>				
Malaysia 1 ha independent	72	810	624	1.30
<b>Grains</b>				
Nigeria 5ha (maize) independent	100	1563	500	3.13
Zambia 5 ha (maize) independent	260	1316	290	4.54
Cameroon 5 ha sorghum	490	1526	154	9.91

*Source: World Bank (2010)*

**Better knowledge of local contexts.** Producers themselves know most about local resources and risks, and they know which technical changes are, or are not, compatible with local livelihoods. Local knowledge is indigenous to a specific area and embedded in the culture and activities of particular people. Indigenous knowledge processes applied by subsistence and small investor farmers tend to be non-formal (even if systematic and rigorous), dynamic, and adaptive. Information about such knowledge is usually transmitted orally. Field studies of knowledge processes of indigenous peoples, their empirical traditions of enquiry, and technology-generation capabilities establish that these can be highly effective at both farm and landscape scales. Local knowledge related to agriculture and natural-resource management is assessed today as a valuable individual and social asset which contributes to the larger public interest and is likely to be even more needed in respect of efforts to mitigate and adapt to climate-change effects.<sup>54</sup>

### **Box 2: How the Biodiversity Fund supports local practices to conserve agro-biodiversity**

Established in 2000 by Oxfam Novib, Hivos, and the Dutch government, the Biodiversity Fund focuses on biodiversity relevant to livelihoods, which includes the genetic diversity contained in 'domesticated' or farmed species of plants and animals (also known as agro-biodiversity) as well as the diversity present in fisheries and forest resources (timber and non-timber products). The Fund supports biodiversity-sustaining intervention programmes that benefit primary producers in marginal areas, enhancing the application of local knowledge. It focuses on helping farmers, fishing communities, and forest dwellers to develop new technologies and manage their own plant and animal genetic resources, through wide dissemination of good local practices. It does this by offering funding and aiding the institutional development of international and regional organisations that work to revive and expand sustainable production, collection, and fishing methods, and widen the markets available for biodiversity-conserving products in a politically enabling environment. At the same time, the Fund helps to protect the rights and interests of the farmers, fishers, and collectors of forest products who not only rely on biodiversity for their livelihoods and health but also play a vital role in its conservation. Eight years of experience from activities supported by the Biodiversity Fund have shown that promoting biodiversity-conserving production not only conserves biodiversity for future generations but can also enhance livelihoods in both the short term and the long term.

*Source: Hivos and Oxfam Novib (2009)*

**Generating employment for rural youth.** As noted earlier, smallholder production, because it is labour-intensive, provides employment to a large share of the rural population. In addition, when proper conditions are in place to enable small farms to grow and obtain access to markets, off-farm employment increases as well. The Asian experience shows that the commercialisation of small farmers in Thailand stimulated rapid expansion of off-farm segments of many agricultural value chains. Off-farm enterprises in Thailand did not have access to highly subsidised credit, so they avoided labour-displacing technology and consequently generated large numbers of jobs. The number of 'factories' in the North-East Region, 78 per cent of which were rice mills, expanded from 1908 in 1975 to 43,747 in 2000, at which time they accounted for more than 324,000 jobs. The rapid expansion of both agricultural and non-agricultural employment also induced labour migration into the area from neighbouring Laos, mainly consisting of poor, young, single women.<sup>55</sup>

**Contribution to food security in undeveloped areas.** Small producers contribute to greater food security, particularly in subsistence agriculture and in undeveloped areas where locally produced foods avoid the high transport and marketing costs associated with many purchased foods.<sup>56</sup>

**Multiplier effects in the rural economy.** Small farmers have more favourable expenditure patterns for promoting growth of the local rural economy, including rural towns. They spend higher shares of incremental income locally on construction, services, and manufacturing than do large production units,<sup>57</sup> thereby creating additional demand for the many labour-intensive goods and services that are produced in local villages and towns. These demand-driven growth links provide greater income-earning opportunities for small producers and landless workers.<sup>58</sup>

The multiplier effects of agriculture on the economy are estimated to be in the range of 1.35 to 4.62,<sup>59</sup> although those for sub-Saharan Africa are at the lower end (Box 3).<sup>60</sup>

### **Box 3: What impact can higher agricultural-sector productivity have on reducing poverty?**

The answer is: a lot. A review of studies on the topic shows the following:

- A 10 per cent increase in crop yields leads to a reduction of between 6 per cent and 10 per cent of people living on less than US\$ 1 a day.
- The average real income of small farmers in South India rose by 90 per cent, and that of landless labourers by 125 per cent, between 1973 and 1994 as a result of the Green Revolution.
- A 1 per cent increase in agricultural GDP per capita led to a 1.61 per cent gain in the per capita incomes of the lowest fifth of the population in 35 countries.
- A 1 per cent increase in labour productivity in agriculture reduced the number of people living on less than US\$ 1 a day by between 0.6 and 1.2 per cent.

*Source: OECD (2006)*

## **Risks/challenges of small farmers compared with large farmers**

**Informal and personalised operations.** Many small farmers are engaged in informal or non-formalised operations. The level of influence remains relatively low. In such cases, farmers' bargaining power is determined by the quality and volume of their produce, competition from other farmers, their level of organisation, and experience of deal making and other strategic decisions. In non-formalised environments, farmers' influence on value-chain coordination remains weak, with unpredictable results in terms of their interests.<sup>61</sup>

**Lack of access to assets and capital, higher transaction costs, problems in adapting and responding quickly to market developments.** The vast majority of small farmers lack access to key inputs and services, including credit and extension, and they do not have the information or knowledge necessary to exploit beneficial technologies. In many developing countries, the private sector has failed to fill gaps created by the withdrawal of public services, because of the inherently risky nature of agriculture and because governments have failed to generate positive and stable enabling environments.<sup>62</sup>

**Small-volume trading, variable and sub-standard quality products to sell, and lack of market information and links with buyers in the marketing chain.** Inefficient domestic logistics restrict the competitiveness of small farmers. Transaction costs are high, owing to deficiencies in transport, processing, and storage infrastructure; lack of competition in vehicle import and trucking industries; cumbersome transport regulations; and the need to pay bribes at border crossings and police checkpoints.<sup>63</sup>

**Vulnerability to climatic and price shocks, limited use of modern risk-management tools.** Small farmers face a full range of agriculture-related risks: drought, heavy and/or untimely rainfall, variable soil conditions, pest and disease outbreaks, and volatility in market prices. In the face of these risks, many of those working small, family plots do not specialise in higher-value cash crops; instead, they take a diversified and subsistence approach to their livelihood, to try to meet the basic consumption needs of their households, and then market any surplus, if they achieve one.<sup>64</sup>

**Unfair competition in local, regional, and global markets.** Many small producers compete in markets that are very demanding in terms of quality and food safety, and distorted by OECD agricultural subsidies and the trade barriers of OECD and other developing countries.<sup>65</sup>

**Poor organisation and lack of bargaining power in the marketplace to influence national, regional, and global agricultural policies.** A long-standing issue is the restricted dialogue between the government and small farmers. Small farmers are not influential at the political level. This translates into a lack of mutual understanding with respect to their relative roles and responsibilities in addressing the multiple constraints faced by smallholders. As analysed later, farmers' organisations represent a powerful means of achieving influence in policy making and gaining market power in contracting. Nevertheless, in some cases their potential is limited by technical and capacity weaknesses and lack of cohesion.

**Possible negative consequences for the environment.** According to the IAASTD report, small-scale cropping involves tillage operations that may cause accelerated soil erosion. Small-scale farming can damage the environment, particularly when practised under increasing population pressure and with scarce suitable land, involving shortened fallow periods and expansion of cropland areas into unsuitable environmental situations such as steep slopes. Also, the doubling of cereal production in the Asian Green Revolution between 1970 and 1995<sup>66</sup> imposed a heavy cost on the environment, accelerating the rate of erosion of plant genetic resources.<sup>67</sup> Widespread use of irrigation, improved varieties, and fertiliser resulted in water pollution, which affects human and animal health and indirectly damages ecosystems.<sup>68</sup> An example is the intensive and continuous monoculture of rice-wheat systems in the Indo-Gangetic Plain of India and Pakistan, which led to soil and water degradation that has cancelled the gains from the Green Revolution.<sup>69</sup>

## 2.4 Large-scale farming: pros and cons

As noted earlier, foreign investment in agricultural land is not a new phenomenon. During the colonial period and early post-colonial period, large foreign-owned plantations were established in many parts of Africa, Asia, and Latin America. They were used to produce crops such as bananas, sugar, tea, groundnuts, and coffee.<sup>70</sup> However, the biofuel boom and the uncertainty surrounding the future of food and fuel supplies have prompted a renewed interest in land-based investments. A growing number of investors and finance companies have acquired large parcels of productive land in many developing countries, particularly in Africa, for commercial production, long-term investment, or speculation purposes. On the one hand, such large-scale international investments can supply infrastructure, create employment, increase public revenues, and bring technology and skills to local farmers. On the other hand, they can also threaten food security, lead to the eviction of local land users and loss of access to land for indigenous groups, as well as generating competition for vital resources among local populations. Countries that have attracted investors' interest include those with uncultivated arable land and those with weak land governance. Importantly, however, uncultivated land is very likely to be already occupied or used by local populations who use the land for non-arable uses such as pastoralism or hunting and gathering.<sup>71</sup> It is therefore of the utmost importance that local institutions protect vulnerable groups from the loss of land on which they have legitimate (if not formally recognised) claims<sup>72</sup> or set up appropriate compensation mechanisms.

As investment in the expansion of cultivated areas is not new, it is important to draw lessons from past experience. This section attempts to compare the advantages and constraints of this model versus small-scale farming and provide some evidence in terms of the economic, social, and environmental impacts so far. As will emerge from the review, the extent to which benefits can be reaped by the country and adverse impacts mitigated depends very much on government policies and capacities and the setting up of proper regulations.

### Advantages/opportunities of large farmers compared with small farmers

**Potential to reverse long-standing under-investment in agriculture in countries with large areas of fertile land.** According to recent World Bank analysis, large-scale investment can be instrumental when relatively fertile land must be developed in areas of very low population density (for instance, vast tracts of Guinea Savannah land). Without a large agricultural population representing a potential labour force, expansion into these areas will necessarily require mechanisation. Although mechanisation of smallholder agriculture is possible through the use of draft animals or hired machinery services, even if these technologies can be made available, development of relatively unpopulated areas may still require significant in-migration from areas of higher population density, to which there may be political obstacles. Under such conditions, large-scale mechanised farming may be the best model, even for the production of staple foods.<sup>73</sup>

**High quality standards assured.** Large-scale farming might be better suited when producers must compete in overseas export markets that have very stringent quality requirements and demand backward traceability of output all the way to the farm level, and in which contract farming is not feasible (for example, because of poor enforcement of contracts). As noted earlier, producers face a number of obstacles in competing in international commodity markets, including OECD subsidies (cotton) and phytosanitary barriers to exports. In the case of horticulture, it is increasingly the private grades and standards imposed by supermarket chains that determine whether or not a supplier can participate in the market. According to World Bank case studies in Kenya and Senegal, large-scale horticultural producers are much better placed to satisfy these standards than smallholders.<sup>74</sup> (See Box 4.)

#### Box 4: Horticulture in Kenya

The Kenyan horticulture sector stands out as the one case where an African enterprise (Flamingo Holdings / Homegrown) has established itself as a major global player (in both vegetable and cut-flower production), integrating forward into European wholesaling and supermarket management. The Kenyan horticulture industry has achieved a degree of 'critical mass' – with smaller firms benefiting from the pioneering efforts of industry leaders – such that competitive equipment and service providers have now grown up to supply horticultural enterprises. The competitive and specialist nature of these service providers means that the cost of running a horticultural enterprise is lower in Kenya than in Zambia or other newer entrants into the horticultural export arena. Half the EU wholesale price of fresh produce from Africa is accounted for by transport, storage, and handling costs. Therefore, to survive, a sector must have efficient logistics (including cold storage). Kenya is fortunate in that its areas of good agro-ecological potential for horticulture production are relatively close to its international airports. In addition, in its early years, the industry benefited from the regular airline traffic to and from Europe stimulated by the Kenya tourism industry. Now the industry has expanded to a size that supports competing, specialised charter airfreight companies. Similarly, dedicated cold stores have now been built at Nairobi airport, rather than holding produce in refrigerated trucks until it can be loaded. It should be noted, however, that the Kenyan horticulture sector is not free from environmental costs in terms of extensive water use and pollution in turn, diverting water from other domestic and industrial users.

*Source: World Bank (2008a)*

**Economies of scale.** Economies of scale are important in some plantation crops grown for export (for example, sugar, palm oil, tea, bananas, and many horticultural crops). After harvesting, these crops need to be processed very quickly and/or transferred to a cold-storage facility; otherwise, they decline rapidly in quality and hence value. If the farm operations of planting and harvesting can be successfully co-ordinated with the off-farm operations of processing and shipping, the economies of scale associated with the processing and/or shipping of these crops are transmitted to the farm level.<sup>75</sup>

The counterargument is that in reality there are few economies of scale in contexts apart from plantation farming. As noted earlier, the productivity advantage of small farmers is not so much associated with smaller farm size *per se*, but with the incentives available to management and labour. The recurring empirical finding that primary agricultural production is usually characterised by decreasing economies of scale shows that the

### Box 5: Organisational model for plantation crops

Plantation crops are usually produced according to one of the following organisational models: (1) production takes place on a large-scale farm or plantation over which the processing firm has direct control; or (2) production is assured by small-scale family farmers working under contract to the processor; or (3) production is assured by a mix of the two farm types, usually constituted as a nucleus estate surrounded by family farmers. In Thailand, the contract-farming model is universally practised for plantation crops. The economies of scale that can be realised through the use of agricultural machinery are achieved in Thailand and in many other parts of the developing world through the use of contract-hire services for machinery. In Thailand and elsewhere, access to information and credit is provided by specialised institutions that cater to smallholders, and infrastructure is provided by the public sector. All three modes of organisation can be found also in African sugar, palm oil, and tea production.

*Source: World Bank (2009)*

advantages conferred by these greater incentives are in practice rarely offset by the lower information, financing, and marketing costs and other advantages typically enjoyed by larger-scale operations.<sup>76</sup> In other words, while economies of scale can be achieved in processing and marketing, this is less common in production, particularly for perennial crops. Family-operated farms are widely accepted to be economically much more efficient than plantations operated by wage labour.<sup>77</sup>

Some proponents of the large-scale farming model have argued that even if large-scale farming is not more productive, it is easier to introduce and easier to scale up rapidly, making it more suitable for jump-starting agricultural growth. This argument is not supported by empirical evidence, however. Over the past 15 years and more, rapid growth in agriculture has not been positively correlated with large-scale farming models. Over this period, the agricultural growth rate of Brazil, based on the large-scale farming model, has been exceeded by that of China, Viet Nam, and no fewer than eight sub-Saharan African countries (Angola, Benin, Burkina Faso, Côte d'Ivoire, Ghana, Liberia, Mozambique, and Nigeria), all of which feature agricultural sectors dominated by small-scale farming.<sup>78</sup>

**Provision of access to markets and technologies to smallholders.** In Mexico some large investors (Nestlé, Bimbo, Maseca, Comercial Mexicana, Monsanto, and Pepsi) increased access to technical packages and markets through partnerships with local groups. As a result, the livelihood of the participating communities improved in terms of increased incomes for maize producers and a decline in out-migration. Large-scale investment also reduced farmers' risk, thus providing a secure outlet for produce. There are cases in which investors brought in technology that raised yields dramatically, provided machinery services, and shared technical advice with local people. In Paraguay there are successful examples of generating opportunities for local entrepreneurship.<sup>79</sup>

**Employment generation.** Local people often identify jobs as the most important and immediate benefit of investments. However, case studies of large-scale investment in seven developing countries (mainly African)<sup>80</sup> suggest that high expectations of employment

generation were not in fact commensurate with the investment or with the qualifications of the local populace. There are some successful examples: in Liberia, a case study reveals that the creation of full-time jobs for 400 unskilled workers led to reduced crime and prostitution. Nevertheless, in some cases jobs did not materialise because projects were not viable economically, and/or progress with implementation was lagging. The failure was particularly acute in cases where jobs were expected to provide compensation for land, and where vulnerable groups lost access to some livelihood resources but did not benefit in terms of jobs. In addition, in some large investment projects the employment conditions did not conform to the original contract: jobs were offered on a contract basis (day labour) with unclear terms and conditions. This is particularly worrisome, given that agricultural workers are among the most socially vulnerable groups, are the least organised into trade unions, are employed under the poorest health, safety, and environmental conditions, and are the least likely to have access to effective forms of social security and protection. Rural workers are more subject to forced labour than other categories of worker. Wages are lower than in other sectors. Real wages have been rising in Asia and Africa, and declining in Latin America.<sup>81</sup>

**Higher export revenues.** The rise of large-scale industrial agriculture in the Cerrado region of Brazil translated into a huge trade surplus for Brazil—ranging from US\$ 10 billion per year during the 1990s to US\$ 40 billion per year during the early 2000s. This surplus was critical in ensuring Brazil's solvency and helped the country to avoid the long and deep recessions (with major impacts on the poor) that many other emerging economies faced during this period.<sup>82</sup>

**Support for social infrastructure.** A direct way to share the benefits of large-scale agriculture investment is through the provision of public goods, including schools, transport (maintenance of access paths and local roads), access to water, and providing access to inputs and outputs markets. For instance, a Dutch–Tanzanian joint venture to produce livestock in Tanzania has put in place a social fund of 150,000 US dollars devoted to social infrastructure projects (such as schools, dispensaries, teachers' houses, and village halls). Another large foreign investment in the Democratic Republic of Congo (for the production of rubber, coffee, and cocoa) has employed all previous workers, 1286 people, and provides them with a 230-bed hospital, clean water, electricity, and primary and secondary schools.<sup>83</sup>

### Risks/challenges of large farmers compared with small farmers

**Lack of attention to existing land users:** deficient process for local consultation, and in turn an increased likelihood of conflicts over resources. According to case studies,<sup>84</sup> the allocation of land without prior consultation or agreement on the amount or type of compensation, and without local involvement in the concession, has led to significant tensions that have affected project operations (for instance, timber and rice projects in Liberia, see Box 6). In a number of other cases, including Ukraine, such conflicts required costly restructuring of plans and court actions that could have been avoided if projects had been better conceptualised and local residents had been consulted. In Liberia, Mozambique (sugar-cane for ethanol), and Zambia (export-oriented crops) conflicts ensued after the government without effective consultation transferred land that communities considered theirs.

### Box 6: Expulsion of smallholders in Liberia

Country studies report several cases in which the absence of (or the failure to adhere to) social agreements has led to displacement of local people from their land, without proper compensation. In Liberia, a rice investor initially agreed to leave untouched the fertile lowland area crucial for food security to the local community. However, after failing to develop the allocated lands, which were not as fertile, the investor reneged on the agreement and began cultivating the wetlands. This forced 1000 farmers (30 per cent of the local population) to relocate in nearby areas and put a further 1500 at risk of being displaced by continuing expansion.

*Source: World Bank (2010)*

**Negative distributional and gender effects.** Distributional concerns arise when the procedure for transferring land does not take into account the full spectrum of land users' rights (such as those of women, and the temporary rights of pastoralists). There are several examples of groups at the margin of affected communities that have been completely excluded from processes of local consultation – with negative effects on their livelihoods. Large investment projects can have a strong negative effect in terms of gender equality, as they might provide compensation to individuals who might not be the actual users of the resources. In most cases, land rights are in the name of men only, leaving women without a voice in consultations in the community. In Kenya, for example, only 5 per cent of landowners are women, despite the fact that African women produce the largest share of the continent's food.<sup>85</sup> Women and other vulnerable groups (such as pastoralists) are also less likely to obtain employment from investors, or be included in decision-making processes concerning the investment. In addition, negative distributional impact can arise as local people lose control over food production and acquisition.<sup>86</sup>

**Public-sector constraints on the collection of land taxes and monitoring of investors' compliance with agreements made with local communities.** Consultation with local rights holders is in some cases superficial, with lack of prior information and no written agreements that would clarify the various parties' responsibilities and be cited when agreements are not adhered to. In turn, government capacity to monitor compliance is severely limited.<sup>87</sup>

**Rent-seeking behaviour/short-term interest.** There might be fluctuations in financial and economic benefits and short-term profitability that might lead to the implementation of large projects that are not desirable from the country's perspective, for instance in the case of land acquired for speculative reasons. In addition, major investment can lead to economic rents<sup>88</sup> being captured exclusively by large farmers, instead of being fairly shared with the local population. Large-scale foreign investment in agriculture may create opportunities to capture rent, for instance in the case of excess profits taken by individuals and firms directly engaged in farming, attributable to high farm-gate prices; by agricultural suppliers (e.g. of seed of patented crop varieties) because of monopoly or oligopoly conditions; and by buyers of agricultural commodities because of monopsony or oligopsony conditions (e.g. supermarket chains and estates using smallholders as out-growers).<sup>89</sup>

**Negative environmental impacts.** More intensive and/or large-scale production is associated with a number of negative environmental impacts, including deforestation, loss of biodiversity, heavy demands on scarce water, negative impacts on human health and water quality from excessive or inappropriate application of pesticides, and increased consumption of fossil fuels. Indeed, increased specialisation at the field, farm, and landscape levels produces monocultures that potentially increase environmental risks, because they reduce the number of and variability within species biodiversity, ecosystem functions, and ecological resilience, and they may be highly vulnerable to climate change.<sup>90</sup> Examples include the clearing of forests in the Amazon basin, where most of the land was not put into productive use. This problem is further exacerbated in many developing countries, and in particular in Africa, by the fact that governments rarely have both the capacity and the will to take a lead on improving the environmental performance of Industrial agriculture, especially where this entails confronting powerful commercial interests.<sup>91</sup>

**Evidence so far.** The evidence of several new ventures in Africa suggests that many large investment projects, particularly recent ones, were socially, technically, or financially not viable and in turn failed to provide benefits to the local populations. Many attempts to jump-start agricultural growth through large-scale farming, as in Sudan, Tanzania, Cambodia, and Zambia, were largely unsuccessful. This happened in particular because the new wave of investment had been implemented in environments where capacity was weak, property rights were ill defined, infrastructure and institutions were not well equipped to handle an upsurge in investor interest, and weak protection of land rights led not only to uncompensated land loss but also to land being given away well below its true social value. In some cases, the approval criteria applied were not sufficiently rigorous in situations where government was involved in screening projects and transferring land. In addition, progress in the implementation of projects was quite limited, due to unanticipated technical difficulties, tensions with the communities, reduced profitability, and changed market conditions.

According to the World Bank, from 2004 to 2009 there were more proposals than approved deals, and many investments were speculative: *'Even some of the profitable projects did not generate satisfactory local benefits (local people suffered asset losses and received few or none of promised benefits in terms of jobs and net investment).'*' World Bank (2010), *op cit*.

On this ground there is little evidence to suggest that the large-scale farming model is either necessary or even particularly promising for Africa, with the exception of some high-value crops (such as fruits, flowers, vegetables sugar, and tea). Of course, there have also been successful large-scale farming sectors in Latin America, as well as in Eastern and Southern Africa, but studies show that the early spread of Industrial agriculture in Latin America (see Box 7 on Brazil) and in the settler economies of Kenya, South Africa, and Zimbabwe involved the systematic appropriation of high-quality land by settlers, combined with displacement of the indigenous population to areas with typically lower soil fertility and locational disadvantages. To further undermine the competition from indigenous farmers, smallholders were often prohibited from producing cash crops, or excluded from marketing cash crops via monopolistic marketing boards. In addition, settler farmers benefited from ►

high levels of state support in the form of preferential policies, subsidies, and supporting investments. More recent attempts to foster large-scale farming in Africa, including those pursued by the Commonwealth Development Corporation (CDC), were hardly more encouraging. Analysis of industrial farming in Africa suggests that there is not a single case where large-scale farms, outside the settler economies, have ever achieved competitiveness in the export of food crops.<sup>92</sup> The main reason for these failures lies in the high cost of machinery and high overheads costs associated with expatriate management.

**Box 7: Lessons learned from Brazil:  
economic and social impacts of large-scale investment**

Agriculture developments in the Cerrado region relied on large-scale mechanised production methods, land policies that allowed consolidation of vast tracts by individual owners, credit and marketing services that were especially favourable to businesses, and subsidies on agricultural machinery that were channelled through rural credit programmes. All those factors helped to transform the Cerrado into a leading global supplier of soybeans. Large welfare gains accrued to a significant group of the Brazilian poor inside the Cerrado region and in other regions, who benefited from large reductions in the prices of basic staples that resulted from the huge expansion of agricultural production in the Cerrado. The real value of the consumer price index for food declined by a total of 80 per cent in the 30-year period before 2005. This translated into a substantial increase in the real incomes of the poor. Rapid population growth, combined with increasing mechanisation of agriculture, resulted in substantial urbanisation and related growth of non-agricultural activities. The high rates of agricultural and non-agricultural growth fuelled substantial investments in health and education infrastructure. But these social benefits came at a cost. Some of the region's indigenous peoples and many early settlers—smallholder farmers as well as landless farm labourers—lost their lands, livelihoods, and in some cases their lives as the result of the expansion of large-scale mechanised agriculture. Furthermore, large-scale industrial producers substituted capital for labour, fuelled by heavy credit subsidies that made capital artificially cheap and reduced the employment impacts of the expansion in rural areas. Finally, although agricultural industrialisation in the Cerrado led to strong overall income growth throughout the region, the distribution of income followed the general pattern of increasing concentration seen elsewhere in Brazil. The increasing concentration of income in the face of strong income growth was caused by the steady concentration of landholdings, along with the policy-induced agricultural mechanisation that prematurely reduced employment of unskilled labour in agriculture.<sup>93</sup>

*Source: World Bank (2008a)*

Evidence suggests that large-scale investment does not necessarily have to result in the conversion of small-scale agriculture to large-scale agriculture. The need for investment in technology, infrastructure, market access, and institutions suggests that private investment could contribute in many ways which do not involve large-scale land acquisitions. According to recent value-chain analysis, for the foreseeable future greater opportunities and important economies of scale for private domestic or foreign investors can be achieved in output processing, packaging, and marketing, rather than in production. These include a wide range of more collaborative arrangements between large-scale investors and local small-scale farmers and communities.

## 2.5 Low External Input (LEI) agriculture and High External Input (HEI) agriculture: pros and cons

As noted earlier, productivity gaps, especially in African countries, remain huge: yields are one-quarter of the global average. Increasing agricultural productivity is crucial, both to meet growing demand for food and to offset the climate-change yield losses that are projected in many developing countries.

The mounting pressures to increase food security, respond to climate-change challenges, and halt biodiversity decline have prompted an intense debate on which approach to production could bring better results. On the one hand there is High External Input (HEI) agriculture, and on the other hand Low External Input (LEI) agriculture.<sup>94</sup>

In general terms, HEI agriculture refers to industrial agriculture, a system of production that is characterised by high inputs of capital and intensive usage of technologies (modern machineries) and chemicals per land area, without taking into account environmental externalities. Conversely, LEI agriculture is associated with sustainable production methods. It involves a relatively low input of capital but is more labour-intensive, relative to the area of land farmed, and focuses on maintaining the long-term ecological health of farmland.

In many cases, large-scale farming is associated with industrial agriculture. It should be noted, however, that the adoption of LEI or HEI practices is not necessarily dependent on scale. Indeed, the Green Revolution in Thailand was driven by small farmers adopting HEI methods, and currently in Brazil there are large-scale farms using LEI practices. Table 4 summarises the main features of both approaches.

**Table 4: Comparing LEI and HEI agriculture**

	<b>LEI agriculture</b>	<b>HEI agriculture</b>
		
<b>Main features</b>	<p>Low use of external inputs, based on natural systems (nitrogen fixing legumes)</p> <p>Agroforestry</p> <p>Water harvesting</p> <p>Conservation agriculture</p> <p>Integrated pest management</p> <p>Intercropping</p> <p>Diversity of crops</p>	<p>Use of fertilisers, agrochemicals, high yielding varieties (rice, maize and wheat)</p> <p>Irrigation</p> <p>Ploughing</p> <p>Monocultures</p>
 <b>Knowledge</b>	<p>Local knowledge</p> <p>Locally adapted systems</p> <p>Women play a crucial role</p>	<p>Formal R&amp;D:</p> <p>Public and mainly private</p>
 <b>Productivity</b>	<p>Very Labour intensive</p> <p>High land productivity</p>	<p>Very capital intensive</p> <p>High labour productivity</p> <p>Skilled labour and machines</p>
 <b>Maintain biodiversity</b>	<p>Yes</p> <p>Farmers, esp. women considered as stewards and innovators of biodiversity.</p>	<p>No</p> <p>Spread of high yielding hybrid rice varieties has accelerated the rate of erosion of plant and animal genetic resources.</p>
 <b>Use of soil</b>	<p>Soil is a supplier of ecosystem Functions(such as carbon capture, nutrient cycling, reduction in temperature and hydrological functions)</p>	<p>The soil is perceived as a chemical component in the process.</p>
 <b>Impact on environment</b>	<p>Enhances soil fertility</p> <p>Protects soils against water erosion</p> <p>Increases water productivity (e.g. System for Rice Intensification (SRI) in India, water savings up to 40 per cent )</p> <p>Decreases carbon dioxide emissions and higher carbon sequestration</p> <p>Reduces fuel consumption</p> <p>Recharges underground aquifers</p>	<p>Soil degradation</p> <p>Water pollution</p> <p>Human and animal health risks</p> <p>Vulnerability to climate change</p> <p>Risks and costs shed on surrounding environment and communities</p>
 <b>Impact on food security and poverty</b>	<p>Increases productivity, food security and livelihood opportunities of small farmers and especially of woman.</p> <p>Agroforestry systems in Africa and SRI methods in India have tripled yields per ha.</p>	<p>Large productivity gains in Asia to cope with population growth</p> <p>Brazil (large scale): welfare gains due to large reductions in the prices of basic staples</p> <p>Significant poverty reduction especially when smallholders participated in the Green Revolution (Thailand )</p>

### Box 8: LEI farming practices

There are several types of LEI practice that can be used to improve the stocks and use of natural capital in and around agro-ecosystems. They are as follows.

Integrated pest management, which uses ecosystem resilience and diversity for pest, disease, and weed control, and seeks to use pesticides only when other options are ineffective.

Integrated nutrient management, which seeks to balance the need to fix nitrogen within farm systems with the need to import inorganic and organic sources of nutrients, and seeks also to reduce nutrient losses through erosion control.

Agro-forestry, which incorporates multi-functional trees into agricultural systems, and collective management of nearby forest resources. It is estimated that trees occur on 46 per cent of all agricultural lands and support 30 per cent of all rural populations.<sup>95</sup>

Aquaculture, which incorporates fish, shrimps, and other aquatic resources into farm systems, for example irrigated rice fields and fish ponds, and so leads to increases in protein production.

Water harvesting in dryland areas, which may mean that formerly abandoned and degraded lands can be cultivated, and additional crops can be grown on small patches of irrigated land, owing to better rain-water retention.

Livestock integration into farming systems, such as dairy cattle, pigs, and poultry, including using zero-grazing cut and carry systems.

Conservation agriculture, which reduces the amount of tillage, sometimes to zero, so that soil can be conserved and available moisture used more efficiently. It consists of four broad intertwined management practices: (1) minimal soil disturbance (no ploughing and harrowing); (2) maintenance of permanent vegetative soil cover; (3) direct sowing; and (4) sound crop rotation.

Organic, ecological and biological farming systems use a combination of the above techniques and link these to market standards.

Proponents of the HEI approach, citing the success of the Green Revolution, argue that increased efficiencies in the use of light, water, and nutrients, together with mechanisation, will double world food production. Nevertheless, adopting an agriculture-intensification approach of the sort that spread the Green Revolution is not applicable in today's Africa, given wide diversities in agro-ecological conditions, institutions, and technologies (see Box 9); but also because, as mentioned earlier, the Green Revolution was not free of environmental costs, such as water contamination and soil degradation, which simply cannot be repeated today.

In the case of LEI agriculture, while it is widely recognised that it has the potential to improve productivity while conserving the natural-resource base, there are divergent views regarding its sustainability and feasibility in resource-poor areas.<sup>96</sup> Most information is from temperate countries, and the technological needs in low-potential areas are not addressed. LEI practices require a high level of managerial knowledge, the ability to protect crops from pests and diseases, and compliance with production-process requirements. Certification is ►

### Box 9: The Green Revolution – no simple transfer to Africa

The conditions that led to the success of the Asian and Latin American Green Revolutions do not pertain in Africa today, and for this reason simple transfers of those experiences are impossible and too costly for the environment. In Asia, considerable homogeneity of production conditions existed over extensive areas of irrigated land with similar agro-ecological conditions and cropping patterns dominated by only a few crops, mainly rice and wheat. Markets were largely in place for inputs and products, as well as basic institutions for financial services, and a supportive state which provided price support. These conditions allowed the trigger of technology (high-yielding seeds, fertilisers, agro-chemicals, and irrigation) to unleash rapid adoption and create large productivity gains.

In Africa the farming system is particularly complex, given the wide range of agro-ecologies, climates, and cultures. Moreover, African soils are poorer and more degraded than were Asia's, requiring more complex systems of natural-resource management to restore and sustain them. At the macro level, infrastructure and institutions that serve agriculture in Africa are much weaker than those that prevailed in pre-Green Revolution Asia, and the same is true of government policy support. Many African agricultural institutions were downsized, if not eliminated, under Structural Adjustment programmes and have not yet recovered. Therefore, location-specific innovations must be complemented by the development of supportive policies and the rebuilding of capacity.

Brazil and Thailand provide important lessons for the overcoming of such constraints. Arguably the most important lesson of all relates to the role of the state. In Brazil and Thailand, successive governments played a vital role by establishing a supportive enabling environment, characterised by favourable macro-economic policies, adequate infrastructure, a strong human-capital base, competent government administration, and political stability. This enabling environment was a critical factor: central and local governments of Brazil and Thailand engaged effectively with private investors, farmers' organisations, rural communities, and civil-society organisations.

*Source: World Bank (2008a)*

one of the most important cost items. Reliable and independent accreditation and control systems are essential to enforce organic standards and regulations, and to meet phytosanitary standards and general quality requirements.<sup>97</sup> However, recent assessments conclude that although these systems have limitations, better use of local resources in small-scale agriculture can improve productivity and generate production and energy-use efficiencies on a per area basis, and on both these criteria they may outperform conventional HEI farming.<sup>98</sup> Despite having lower labour efficiencies than (highly mechanised) HEI farming, and despite experiencing variable economic efficiency, latest calculations indicate a capability of producing enough food on a per capita basis to provide between 2640 and 4380 kilocalories/per person/per day (depending on the model used) to the current world population.<sup>99</sup>

A debate which polarises HEI versus LEI approaches is in any case very unproductive. Indeed, adopting a one-size-fits-all approach is inappropriate, especially in Africa, where soils are highly variable and may require biological techniques as well as increased fertiliser use, given that its use on the continent remains extremely low.<sup>100</sup>

There are many pathways towards agricultural sustainability, and no single configuration of technologies, inputs, and ecological management is more likely to be widely applicable than another. Agricultural sustainability implies the need to fit these factors to the specific circumstances of different agricultural systems. As Pretty argues:<sup>101</sup>

*‘The idea of agricultural sustainability does not mean ruling out any technologies or practices on ideological grounds. If a technology works to improve productivity for farmers and does not cause undue harm to the environment, then it is likely to have some sustainability benefits.*

*‘... Evidence shows that successful agricultural sustainability initiatives and projects arise from shifts in the factors of agricultural production (e.g. from use of fertilizers to nitrogen-fixing legumes; from pesticides to emphasis on natural enemies; from ploughing to zero-tillage). The critical question centres on the ‘type of intensification’. Intensification using natural, social and human capital assets, combined with the use of best available technologies and inputs (best genotypes and best ecological management) that minimise or eliminate harm to the environment, can be termed ‘sustainable intensification’.<sup>102</sup>*

An interesting example of sustainable intensification is provided by the System for Rice Intensification (Box 10).

#### **Box 10: The System for Rice Intensification (SRI)**

One of the most interesting examples of LEI agriculture to have emerged in recent years is the System for Rice Intensification (SRI). SRI is a set of alternative crop-management practices, developed in the 1980s in Madagascar to benefit farmers with small landholdings. SRI increases the productivity of resources used in rice cultivation, reducing requirements for water, seed, synthetic fertilisers, pesticides, herbicides, and often labour—especially tasks performed by women. The benefits of SRI have been seen already in 40 countries, with increased production of both improved and local rice varieties. While SRI has been largely a civil-society innovation, embraced by hundreds of national and local NGOs as well as many international NGOs, the governments of Cambodia, China, India, Indonesia, and Vietnam—where more than two-thirds of the world’s rice is produced—have given explicit endorsement of SRI methods in their national food-security programmes.

With World Bank assistance, farmers in the Indian state of Tamil Nadu have already applied SRI methods to more than 600,000 hectares of rice land, with average water savings of 40 per cent. SRI methods are giving yields of 6 to 9 tons per hectare, instead of the current average yield of 3.5 tons. Farmers, with less expense, are able to produce more rice to eat or sell, to the benefit of both their food security and their income, while their own health and that of the environment is improved by using less water and fewer agrochemicals. With SRI methods, water use for irrigated paddy cultivation is reduced by 25–50 per cent. Using less water for rice production can free up water for other crops, promoting crop diversification, and for other sectors such as domestic, industrial, and environmental uses. SRI’s lower water requirements also mean that farmers can continue to grow rice in regions experiencing diminishing water availability. In addition, field studies at the Bogor Agricultural University in Indonesia have confirmed that SRI methods significantly reduce methane emissions. Evaluations of the greenhouse-gas effects of SRI management with organic fertilisation have found little or no increase in nitrous oxide emissions in the various SRI field trials. Although developed for transplanted irrigated rice production, SRI concepts and methods are being extended to direct-seeded and rain-fed rice-cropping systems, and increasingly to other crops.

*Source: Oxfam America (2010)*

According to IAASTD, the application of agro-forestry practices such as nitrogen-fixing leguminous trees and shrubs can enable small-scale farmers to restore depleted soil fertility and improve crop yields, at the same time reducing the use of fertilisers. Especially in Africa, short-rotation (two–three years), improved fallows with nitrogen-fixing trees/shrubs can increase maize yield three- or four-fold on severely degraded soils. Agro-forestry systems in Africa have increased maize yields by 1.3 and 1.6 tons per hectare per year.<sup>103</sup> According to FAO, the use of trees and shrubs in agricultural systems helps to tackle the triple challenge of securing food security, mitigating and reducing vulnerability, and increasing the adaptability of agricultural systems to climate change (see Box 11).

#### **Box 11: Mozambique: the Nhambita community carbon project**

Initiated in 2003, the project pays 1000 smallholder farmers in the buffer zone of the Gorongosa National Park in Sofala Province for sequestering carbon through adoption of agro-forestry practices, and for reduced emissions from deforestation and degradation (REDD) of miombo woodlands. Farmers are contracted to sequester carbon on their farmlands through adoption of agro-forestry practices from a 'menu' which includes planting horticultural tree species, maintaining woodlots, intercropping food crops, planting native hardwoods around the boundary of their farmlands, and planting fruit trees within the homestead. In all, different project activities yield carbon offsets equal to 24,117 tCO<sub>2</sub>e per annum over an area of about 20,000 hectares. Farmers receive carbon payments at a rate of US\$ 4.5 per tCO<sub>2</sub>, or in the range of US\$ 433/ha to \$808/ha over seven years. The project shows that carbon sequestration through land use, land-use change, and forestry can both promote sustainable rural livelihoods as well as generate verifiable carbon-emissions reductions for the international community.

*Source: FAO (2010)*

LEI approaches may produce successful results when applied in both large-scale and small-scale farming. Some examples are biological control of pests in glasshouses and, increasingly, in the field, instead of relying on pesticide applications; the use of 'green' and 'grey' water to prevent overuse of water from rivers and aquifers; and conservation agriculture. According to the IAASTD report, the United States has the longest experience in conservation-agriculture approaches, which were first implemented in large and medium-sized farms. Conservation agriculture then was widely used in diverse farming systems in Brazil and adapted to small farms in the southern part of the country. In the Brazilian Amazon, integrated zero-till/ crop–livestock–forest management is being developed for grain, meat, milk, and fibre production.<sup>104</sup> Conservation-agriculture practices have increased maize and wheat yields in Mexico by 25–30 per cent.<sup>105</sup> On the down-side, no-till systems often have a requirement for increased applications of herbicide and are vulnerable to pest and disease build-up. Conservation agriculture is a low-cost system, and this fact drives adoption in many regions. No-till can reduce production costs by 15–20 per cent, by eliminating four–eight tillage operations, with fuel reductions of up to 75 per cent. Broader adoption of conservation-agriculture practices would result in improved food security through sustainable production-intensification and enhanced productivity of resource use, and would result in numerous environmental benefits such as decreased soil erosion and water loss due to run-off, reduced carbon dioxide emissions, and higher carbon sequestration.

LEI farming takes place on more than 3 per cent of the total cultivated area in developing countries.<sup>106</sup> Climate change may further accelerate the spread of LEI practices.<sup>107</sup> Successful LEI agriculture practices already in place could provide useful lessons for developing countries, and Africa in particular. However, in order to implement it, considerable investments are needed to research and develop technologies and methodologies, and to build farmers' capacity.

### 3. A four-pronged approach to feed the world in 2030

Heterogeneity of institutions, agro-ecological conditions, and farming conditions in developing countries implies that differentiated approaches and models should be pursued, with technological and institutional innovations tailored to local contexts.<sup>108</sup> Achieving the objectives of increased food production and food accessibility, and at the same time protecting the environment, requires adopting appropriate policy blends,<sup>109</sup> based on a four-pronged approach, with the following aims:

- Supporting subsistence (family) farmers to cope with risks and vulnerability.
- Empowering small investor farmers with the necessary capacity, finance, and regulation to increase their productivity, production, and competitiveness, and in turn, contribute to food security.
- Making large investments pro-poor, by setting the right framework.
- Building on complementarities between large and small farms, when possible.

According to the evidence presented in this paper, supporting small-scale farmers, and specifically women, would provide the greatest impact in terms of income creation and food security. Section 3.1 will therefore discuss strategies to reduce the vulnerability of subsistence/family farmers, while Section 3.2 will consider ways to ensure that small investor farmers exploit their full potential. At the same time, when well regulated, large-scale industrial farming could be a viable option where labour supply constrains smallholder expansion. Section 3.3 will discuss how large-scale projects can provide social benefits while mitigating adverse environmental impact. Finally, collaborative arrangements between large-scale investors and local small-scale farmers hold great potential. As discussed in Section 3.4, private investment through ‘inclusive’ out-grower schemes can promote smallholder diversification into high-value and export-market crops and support productivity gains.

#### 3.1 Support subsistence (family) farmers

**Protect subsistence and landless farmers, ‘the chronically poor’ populations, to cope with risks and vulnerability and help them to move to higher-risk/higher-return activities.** As illustrated by Oxfam analysis, *‘any strategy that exclusively emphasizes agricultural investments in favoured areas is ill-advised, particularly in countries with limited shares of high-potential land. Investments must also reach outside of agriculture entirely to provide safety nets for those affected by climatic and market shocks and who cannot engage consistently in the economy’.*<sup>110</sup> Social-protection programmes can take the form of transfers and risk-management programmes such as weather insurance or input subsidies (see Box 12). There are of course forms of food-related social protection (not addressed in this ►

paper) that raise concerns and issues of implementation, such as provision of food aid at times of harvest, which can bias and depress local markets.

**Target female subsistence farmers.** As women constitute a large proportion of subsistence farmers, any policy effort to improve food security should aim to increase their capacity to participate productively in agriculture. Studies demonstrate that household income, when controlled by women, is more likely to be used to improve family food consumption, child nutrition, education, and overall well-being.<sup>111</sup>

#### **Box 12: Oxfam's Horn of Africa Risk Transfer for Adaptation (HARITA) project in Ethiopia**

Oxfam America has developed a comprehensive risk-management framework which includes weather-index insurance integrated with existing government and civil-society safety-net programmes, microcredit, and risk-reduction activities. In 2008 a pilot project, called Horn of Africa Risk Transfer for Adaptation (HARITA), was launched in Ethiopia, in collaboration with Swiss Re, the Relief Society of Tigray (REST), and the International Research Institute for Climate and Society (IRI). The pilot was very successful, with high take-up rates thanks to the core innovation of supporting cash-poor farmers to pay for their insurance with labour via an existing safety-net programme. The insurance-for-work (IFW) approach particularly helps women, who are often not involved in monetised activities, to access insurance. In both 2009 and 2010, just under 40 per cent of households who bought insurance were female-headed. In this IFW approach, donor funds both support risk reduction through training and labour-intensive public-works projects and provide a cost-effective and early response when a shock, such as drought, affects the community. In addition to insurance coverage, participating farmers have the option of taking micro-loans which allow them to purchase improved agricultural inputs, such as high-yield seeds. With this multi-pronged approach, farmers are able to reduce their vulnerability to agricultural shocks, improve their livelihoods, and purchase complementary insurance services that contribute to building long-term food security. Insurance companies gain access to new markets. Safety-net programmes are strengthened by integrating an array of beneficial services and training with long-term benefits for their clients. Survey data suggest that the insurance product gave many farmers more confidence to take loans to invest in their livelihoods, and reduced concern that they might have to sell livestock or rent out their land if the crops failed. Given the success of the pilot project, the objective will be to scale up HARITA in Ethiopia and test its replicability through new pilots in other countries.

*Source: Oxfam America and World Food Programme R4 rural resilience initiative, (2010)*

As discussed in Section 3.3, improved regulations for large farming investments which ensure that conditions of decent work and fair employment are in place can provide employment opportunities for landless labourers, and in turn improve their access to food. At the same time, for those for whom leaving farming would be the best choice for their livelihoods, policies need to focus on job-creation strategies in other promising sectors, and on education to upgrade skills. A detailed analysis of these policies goes beyond the aim of the present paper, but extensive analysis on this has been carried out by previous Oxfam work.<sup>112</sup>

## 3.2 Empower small investor farmers to exploit their full potential

In many developing countries, especially in Africa, the growth potential for small producers in the food-staples sector (cereals, roots, tubers, and traditional livestock products) is enormous. Cereals, in particular, account for the highest share of rural household budgets. According to OECD analysis, no other agricultural markets offer growth potential on this scale to reach huge numbers of Africa's rural poor.

*'Many small producers could double or triple their incomes if they could capture a large share of this market growth. Simulations with economy-wide models at the International Food Policy Research Institute confirm this conjecture. For Ethiopia the fastest way to reduce poverty by 2015 is through productivity growth in food staples. This approach outperforms a strategy built around increasing the production of high-value products.'*<sup>113</sup>

In higher-income countries, mainly in Asia and Latin America, and in a few African countries, agriculture-growth potential is more strongly linked with diversification into high-value crops. The challenge for smallholders is to engage in high-value agriculture on equitable terms.<sup>114</sup> As argued earlier, the main beneficiaries of high-value agriculture will be the larger and commercially oriented producers, well connected to roads and markets. The majority of small producers are likely to get left behind. Fortunately, as we shall see in Section 3.4, there are ways of building complementarities between small and large producers which increase small farmers' productivity and improve their income.

This section provides a review of ways and useful lessons learned which could help small investor farmers to exploit their potential and become more active players in achieving food security, and overcoming capacity, financial, and infrastructure constraints that hamper their growth.

**Expand local and regional markets.** Studies show that in domestic markets producers can compete with imports. High logistical costs raise prices of imported commodities and provide 'natural protection' upon which producers can capitalise. In Africa, for example, Nigerian farmers can produce and deliver soybeans to Ibadan at 62 per cent of the cost of imported soybeans, and Zambian farmers can deliver sugar to the market of Nakambala at 55 per cent of the cost of imported sugar.<sup>115</sup> The same high logistical costs that shield domestic producers are a significant barrier to exports. African producers must absorb these costs if their commodities are to compete internationally. For example, Mozambican farmers, who are highly competitive in producing cassava for the domestic market, would have to cut domestic production and logistics costs by more than 80 per cent to become competitive exporters of cassava to Europe.<sup>116</sup>

Local and regional markets therefore offer promising opportunities for expansion over the short/medium term. The combined value of domestic and regional markets for food staples within Africa – more than US\$ 50 billion p.a. – is considerably in excess of total international agricultural exports and will grow with both population and income over

time.<sup>117</sup> In addition, domestic markets for horticultural and livestock products are also growing strongly. To allow African producers to tap into this growing demand and substitute imports, governments should rapidly implement regional integration agreements in support of regional trade, such as banning arbitrary export restrictions, streamlining border logistics, and harmonising standards and regulations. At the same time, certainly, major investments are needed in road and rail infrastructure, so as to reduce the farm-gate cost of fertilisers and the cost of taking domestic produce to major local and regional markets. An increasingly promising means of overcoming infrastructural constraints is offered by the spreading of technology. Farmers and traders can quickly and affordably exchange information about potential sources of demand and supply, increasing market and production efficiency. Successful examples include the mobile-phone services provided by the Ghana Agriculture Producers and Traders Organization; and the Kenya Agricultural Commodity Exchange, which provides small-scale farmers with market information through local kiosks, radio broadcasts, email, and mobile-phone messaging. Three-quarters of farmers tapping into this system report getting better prices for what they produce.

**Empower farmers' organisations.** There is widespread evidence that small farmers need to co-operate through organisations and clusters in order to achieve competitiveness.<sup>118</sup> Participation in a farmers' organisation is indeed crucial in order to gain market power in contracting, to reduce transaction costs in accessing input and product markets, and to achieve voice in policy making at the national and international levels.<sup>119</sup> Formation of producer organisations has significantly increased over the past 20 years. Examples of successful representation of smallholder interests exist, such as the Conseil National de Concertation et de Coopération des Ruraux (CNCR) in Senegal and Mali, and Via Campesina,<sup>120</sup> which represents the interests of landless people and is active in 69 countries from Asia, Africa, Europe, and the Americas. International co-ordination is gaining strength through, for instance, the Pan African Farmers Forum (PAFFO), which includes the Southern African Confederation of Agricultural Unions (SACAU) in the SADC region, the Réseau des Organisations Paysannes et de Producteurs Agricoles (ROPPA) in West Africa, the Eastern Africa Farmers Federation (EAFF), and the Union maghrébine des Agriculteurs (UMAGRI). However, organisations remain insufficiently representative and weak in their financial and technical capacities. In many developing countries, farmers' organisations have been co-opted by government and are used for political control and clientelism. A major effort needs to be made to reconstruct autonomous organisations that are owned by their members and effective in their functions. To be effective in participating in sophisticated markets and complex negotiations, these organisations need trained leaders and technical personnel. Governments and NGOs have a key role to play in training and coaching farmers' organisations to negotiate with the rest of the value chain, to strengthen technical/quality control of production, and to conduct impact evaluation of projects and training.

**Provide training in new technologies and in 'farming as a business'.** In parallel with the under-investment in agriculture over the last 20 years, there has been a big deficit in training for entrepreneurship at farm level. Training in farming as a business is crucial to enable ►

farmers to identify market opportunities for their products and gain insight into the costs and margins involved in the value chain. As discussed in depth in Section 3.4, links with agribusiness companies (through out-grower schemes) can enable a transfer of technical expertise and build smallholder capacity to participate in the supply chain (see Box 13).

### **Box 13: Training in farming as a business**

Golden Food Products (GFP) is a processing company based in Arusha, Tanzania, where it processes and packages organic spices for export. It works with 625 farmers. GFP has signed contracts with Kiwi Consultants and Faida Mali for the organisation and training of farmers, with funding from Cordaid. Training has been provided in subjects such as farming as a business, record keeping, good cultivation practices, erosion-control measures, weed and pest control, pruning, fertilisation, and crop rotation. Through training, farmers gain insight into the costs and risks involved in the entire spices value chain, and improved agricultural practices enable them to achieve higher crop productivity and income. Training also builds farmers' trust and loyalty. GFP also provides organisational support. Through their links with GFP and the training offered to them, farmers are gradually establishing their own association, which enables them to reduce transaction costs and have a common say in their negotiations with the company and service providers.

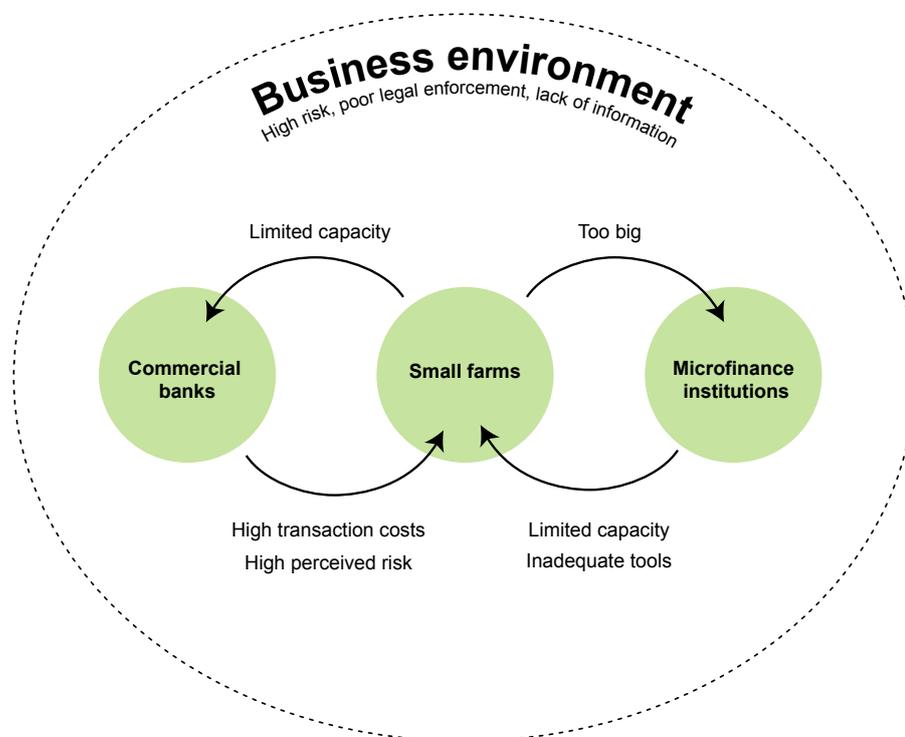
*Source: Case study presented at the Sustainable Spice Conference, 12 October 2010, at the Royal Tropical Institute, Amsterdam*

In addition, rural households should be trained in the basic skills needed to access and master new production technologies and cope with climate change. Farmers' Field Schools for accessing and evaluating new agricultural technologies represent an interesting method, originally developed and widely promoted in Asia; they enable farmers to analyse problems, conduct experiments, try out technical solutions through facilitated, hands-on sessions in fields allocated by the farming community for study,<sup>121</sup> and consequently engage in policy reform. In Indonesia, Farmers' Field Schools are being used to facilitate the use of climate information in order to increase farmers' effectiveness in coping with extreme climate events, by tailoring crop management to forecast information.

**Improve access to finance.** Access to finance is central to help small farms to build their production capabilities to produce at a sufficient scale, to be attractive enterprises and trading partners, and to enable subsistence farms to cope with risks more effectively. Nevertheless, there has been very little progress, especially throughout most of Africa, in creating self-sustaining rural financial systems. Small farmers can rarely meet the conditions set by financial institutions, which see them as a risk because of poor guarantees and lack of information about their ability to repay loans. While private banks service the needs of large farms, small producers who want to finance the purchase of inputs or access new markets often have to rely on self-financing or household financing, or sell livestock and other assets, borrow from local money lenders, use remittances from household members, or resort to savings and credit associations. Non-bank financial intermediaries, such as microfinance institutions (MFIs), have proved to be a help in lending money to family farms (especially when credit is given to female-headed households),<sup>122</sup> but more often than not they lack the necessary skills to assess project proposals and develop ►

or adopt innovative financial tools. Confronted with the obstacles posed by large banks on one side and microcredit institutions on the other, small farms face a big gap in terms of access to agricultural finance<sup>123</sup> (see Figure 9).

**Figure 9: Small farms – the missing middle**



*Source: adapted from OECD/AfDB (2005)*

Additional research on the topic has defined 12 key challenges for rural financial services provision; they include vulnerability constraints (e.g. market risk and credit risk), operational constraints (e.g. low investment returns, high geographic dispersion), capacity constraints (e.g. infrastructural capacity, technical capacity, and training), and political and regulatory constraints (e.g. political and social interference).<sup>124</sup>

Improving business conditions, developing vertical linkages in the financial sector, and strengthening links between farmers will permanently increase small farms' access to finance. Proper information, which is essential for deciding whether to make a loan, would be helped by adopting clear accounting standards, setting up independent, competent, and reputable accounting firms, and creating more credit bureaux to supply data on the solvency of small farmers. An impartial legal system that can help with drafting and clarifying land titles and settle contract disputes is crucial for the financial security of small farmers.

Some financial instruments can help to provide missing information or reduce the risk stemming from some small farms' lack of transparency. Several donors have pump-primed innovative financing mechanisms, such as warehouse-receipt financing, in which loans are guaranteed by agricultural production held in storage (see Box 14).

#### Box 14: Warehouse-receipt financing programme in Zambia

This programme is implemented by USAID in collaboration with the Zambian Agricultural Commodity Agency (ZACA). The farmers who benefit from a loan deliver the commodities to be stored in a bonded and insured warehouse, and the warehouse operator issues warehouse receipts. The credit company uses the warehouse receipts as guarantees, advancing to the borrower a specified percentage of the value of the commodity stored. Beneficiaries have accessed more than \$700,000 in bank-encashable warehouse receipts against their commodities stored in ZACA-certified warehouses. To encourage and support local banks, the USAID-funded Development Credit Authority provides a 40 per cent guarantee to the loan. In the medium term, the objective is to encourage the creation of farmers' associations to pool their demand for credit, minimise transaction costs, and allow for mutual responsibility. The ultimate aim would be to complement the warehouse-receipt financing mechanism with hedging tools, developing a commodity stock market in Lusaka.

*Source: OECD/AfDB (2005)*

This financial mechanism can be supplemented with hedging tools, as is already the case in South Africa. At the South African Futures exchange, 65 per cent of grain crop is pre-financed by commercial banks, using options to hedge the price risk. These mechanisms require a well-developed financial system, however, and therefore its implementation in most African countries remains limited. As discussed in Section 3.4, links with large farms can also help small farmers to get export credits, which are especially important in countries with weak institutions, since commercial partners are better informed than other creditors (especially financial institutions) about the ability of their customers to repay debts. Export credits have been proved useful in Zambia's agro-food industry.

In general, removing the obstacles for small farms' access to finance requires close co-operation between commercial banks, MFIs, community groups, and NGOs providing business-development services (BDS). Promoting agreements between MFIs and BDS suppliers will help to ease MFIs' capacity constraints and reduce costs by a more efficient division of labour. The BDS supplier makes the initial choice of projects on a purely technical basis, and the MFI assesses financial viability. The financial sustainability of MFIs can be also strengthened by working more closely with formal banks. Co-operation in Benin between PAPME (Association pour l'Appui et la Promotion des Petites et Moyennes Entreprises) and Bank of Africa, based on a transfer of clients to the banks as their financing needs have increased, is a good example of a mutually beneficial outcome.<sup>125</sup> Specific legal provisions may help MFIs to extend their lending activities to small farms, mainly by increasing the maximum loan amount and by extending the maximum loan maturity. Following such changes, some MFIs are developing into fully fledged rural banks and expanding their service to include savings accounts and insurance (such as weather-index insurance or insurance for commodity-market prices).

### 3.3 Make large-scale farming pro-poor

In countries where labour supply constrains smallholder expansion, and in-migration is limited, investment in large farms could be a viable strategy to increase production. Nevertheless, in order for these investments to contribute effectively to national policy objectives of broad-based growth and poverty reduction, it is necessary to ensure that the wealth created by industrial agriculture is shared widely. As indicated by The UN Special Rapporteur on the Right to Food:<sup>126</sup> *‘It is only to the extent that investments can improve local food security by increasing productivity and serving local markets, while avoiding an increase in inequalities of incomes in rural areas, that they are justified.’*

**The public sector needs to put in place a supportive policy, legal, and regulatory framework** to discipline land acquisition and ensure that the environmental externalities as well as the undesirable social and distributional changes within or beyond the project area are mitigated. In particular, mechanisms need to be put in place to ensure the following:

**Investors’ proposals that are technically and economically viable, consistent with local visions.** In order for investment to provide local benefits, an independent and rigorous check of its technical and economic viability is needed, to assess also the consistency with local use plans and taxation regime. Projects should be consistent with countries’ broader development strategies. This is particularly important, because providing complementary public services and infrastructure can significantly increase the benefits and attractiveness of such investment. In addition it enables food security to be addressed by setting priorities for the expansion of particular land uses over others. This can be done by establishing minimum criteria and guidelines for private investment and local government, to prevent priorities being set *ad hoc* by investors with poor consideration of broader goals.

**Clear definition of land rights and policies for transfer and joint ventures.** Land policy, legislation, and implementation arrangements, more than any other factors, determine the pattern and distributional consequences of agricultural growth. Secure, transferable land rights are needed to protect the interests of local populations and to enable entrepreneurial farmers to acquire unused land in regions with small populations. Secure land rights also provide incentives to invest in increasing land productivity.<sup>127</sup> For instance, Mexico, Viet Nam, and Ethiopia have recognised customary rights and allowed their registration, greatly empowering right holders. In addition, clarity on land rights facilitated large-scale landscape restoration in the Loess Plateau in China, and reforestation and drastic reductions in illegal logging in Albania. In Tanzania, where land rights are firmly vested within villages, fewer than 50,000 ha were transferred to investors between 2004 and 2008. By contrast, in Mozambique about 2.7 million were transferred, but about 50 per of this land was not used.<sup>128</sup>

**A gendered approach to land titling.** As mentioned earlier, unequal ownership of land is also a critical factor which creates and maintains differences between women and men, with consequences for the coming generations. A World Bank policy research report, ‘Land Policies for Growth and Poverty Reduction’ (2003), concludes that increased control by women over land titles could have *‘a strong and immediate effect on the welfare of the next* ▶

*generation and on the level and pace at which human and physical capital are accumulated.*

Ensuring that women have secure rights to land is thus critical in many respects, including the challenges arising in the context of the HIV/AIDS epidemic, where the absence of secure land tenure for women who have lost their husbands has been shown to be a key reason for costly conflict and additional hardship.<sup>129</sup>

**Identification of land available with potential for development** through mapping of suitable land by local communities and governments. Interesting examples of participatory mapping and land-use planning are offered by Mexico and Tanzania. Existing regulations if implemented in a participatory way can provide the basis not only for the demarcation of land rights by villages and their population, but also for the recognition of pastoralists' secondary rights.<sup>130</sup>

**A clear process for the acquisition or transfer of public and private land, with appropriate compensation.** For instance, the use of transparent and competitive auctions to transfer public land in Peru's coastal region generated jobs and helped the country's emergence as a major force in high-value agro exports. Auctions of 235,500 hectares have brought almost US\$ 50 million in investment to Peru's coastal region over the past 15 years.<sup>131</sup> Conversely, in countries where there is a poor record of formally recognised rural land tenure, there is a strong need for public disclosure and broad access to information on existing deals, and vigilant civil-society monitoring is also needed.

**Participatory dialogue with local communities to inform and increase capacity.** Communities who are educated about their rights or potential land values will be better equipped to anticipate and contest investments that are not sustainable or may lead to conflicts. Mexico provides useful examples of community consultation and internal decision-making mechanisms where local communities are informed about different opportunities and contractual options available to them (for example, model contracts, amount of compensation based on potential land rentals, etc.).<sup>132</sup>

**Transparency and free access to information on prices, contracts, rights, and land-use plans** to help local communities to monitor performance of investment and to help governments to devise strategies and revise them during implementation. It will be also beneficial for investors who want to know what has worked or not in the past. For instance, despite the significant progress made by Liberia in improving land and forest governance, original concession agreements were often not publicly available, thus making it difficult to assess the potential impact of plantation development or resolve broader disputes.<sup>133</sup>

**Larger shares of land taxation retained by local governments.** Local governments which benefit from taxation revenue will have a greater interest in selecting investments that are profitable to the local area and generate tax proceeds that can be used to provide physical and social infrastructure. While establishing mechanisms for local taxation of lands does not present major technical challenges, past experience shows that this process is jeopardised by financial incentives, tax breaks, and exemptions established at central level which significantly limit the revenue at local level. In Ghana, far-reaching tax breaks imply that even profitable ►

companies will pay almost no taxes, thus reducing the incentive and ability of local government to provide complementary public goods.

**Respect by private investors and host countries of a range of human rights in connection with agro-investment.** The UN Special Rapporteur<sup>134</sup> has presented 11 principles on how large-scale land acquisitions and leases relate to the right to food. They include recommendations to host states and investors on transparent participatory negotiations and indications to carry out impact assessments on the following aspects: local employment and incomes, access to productive resources by local communities, new technologies and investments in infrastructure, environmental risk (giving priority to LEI agriculture practices), and availability and adequacy of food (ensuring that a certain minimum percentage of the crops produced is sold on local markets).

**Adoption of guidelines on land policies and governance by international and regional organisations.** An initiative is currently under way within the FAO, in collaboration with its partners, including UN-Habitat, the World Bank, IFAD, governments, and civil society, to work towards voluntary guidelines on responsible governance of tenure of land and other natural resources. The process of elaboration of these guidelines is inclusive, and it seeks to build ownership of the guidelines, in particular by states, through a number of regional consultations.<sup>135</sup>

**Increased oversight of labour-standards compliance by large firms.** For farm labourers, decent wages and working conditions are key to improving their livelihood<sup>136</sup> and promoting their food security. Brazil has designed clear rules for rural labourers. Any economically significant investment project has to comply with Brazilian labour legislation. These laws set maximum working hours and minimum wages, weekly rest days and yearly vacations, while guaranteeing collective representation and social-security benefits, and protecting against abuses of women's and children's labour. To enforce labour regulation, the Ministry of Labour in Brazil created a national list of employers who have been convicted of using forced labour. Enterprises on this list, which is made public and regularly updated by the Ministry and social organisations, cannot obtain public loans or other benefits.

**Sensible environmental safeguards.** As previously mentioned, the environmental risks associated with the transformation of uncultivated farmland into industrial farming are very high. Negative externalities should not outweigh potential benefits. For instance, areas not suitable for expansion need to be protected from encroachment, and any indigenous rights on them must be respected. Experience from many parts of the world, including Brazil and Thailand, shows that the environmental costs associated with the development of industrial agriculture can be reduced and managed through use of appropriate technologies, combined with vigilant monitoring of environmental impacts, backed by effective enforcement of environmental rules and regulations. Interesting examples are offered by the use of taxes, payment for environmental services, and other incentives in Indonesia; and ensuring compliance with environmental safeguards in Brazil.<sup>137</sup> Importantly, as mentioned earlier, the adoption of LEI agriculture practices by large-scale farming is crucial to mitigate adverse environmental impacts.

In many developing countries, and particularly in Africa, while efforts should be made to increase state capacity for environmental regulation, in the short to medium term civil society has a crucial role to play in assisting communities in the effective exercise of their rights, in negotiating and monitoring investment projects, and to act as a watchdog. This is a challenging task, because land acquisitions are taking place mainly in countries characterised by weak governance, where the space for civil society is very limited. International organisations should help to integrate information on large-scale acquisition in countries' development planning and strategies, offer technical and financial support for capacity building, and support stakeholders' convergence around responsible agro-investment principles.

### 3.4 Build on complementarities between small and large farms

**The key question is whether large and small farms can build on complementarities, instead of one displacing the other.** As argued above, private domestic or foreign investors can play a role in input provision and output processing, packaging, and marketing, rather than in land acquisition and direct production. These forms of support include a wide range of more collaborative arrangements between large-scale investors and local small-scale farmers and communities, such as diverse types of contract farming schemes (out-grower schemes), joint ventures, and management contracts.<sup>138</sup> There are pros and cons in all these different approaches, and even in this case the conditions for success or failure are very context-specific and contingent on a country's institutions, and considerations of tenure, policy, culture, and demography.

Private investment through out-grower schemes can promote diversification into high-value and export-market production and directly support smallholder productivity. Especially in places with the potential for higher-value crops and access to expanding markets, small and large farmers can complement each other.

### Box 15: Out-grower schemes – pros and cons

Out-grower schemes involve pre-agreed supply agreements between farmers and buyers. Usually, small farmers grow and deliver agricultural produce of a specified quantity and quality at an agreed date. In exchange, the company provides up-front inputs, such as credit, seeds, fertilisers, pesticides, and technical advice, all of which may be charged against the final purchase price; and agrees to buy the produce supplied, usually at a specified price. The mechanism can be a way of assuring a market for farmers, and assuring quality and quantity of supply for buyers. Theoretically, the arrangement should reduce the risk to both parties. However, the negotiating power of large-scale investors and farmers and farmers' organisations, and the way in which the contract is designed, are key to determine the outcome. Out-grower schemes may be a vehicle for providing support and improving market access for smallholders, or an exploitative relationship where smallholders are effectively providers of cheap labour and are expected to carry production risks. Better-resourced farmers may capture the contracts, while poorer farmers work as labour on the contracted farms. In India, issues raised about contract farming at a recent consultation facilitated by Oxfam included delayed payments for outputs, provision of faulty seeds, lack of formal contracts, and non-delivery of technical assistance.<sup>139</sup> An additional risk identified from experience of past out-grower schemes is that, in the longer term, land access may shift from women, who cultivated subsistence crops, to men, who are more likely to sign contracts for cash crops with agribusiness. Shifts in land access may also favour local elites that are better positioned to make the most of the new market opportunities created by out-grower schemes.<sup>140</sup>

*Source: Vermeulen and Cotula (2010)*

**Out-grower schemes work only when there is long-term business interest and the development of mutual trust.** Indeed, the imperative for large investors lies in making business 'inclusive': tackling yields, quality, skills development, and supply-chain linkages simultaneously, as advocated by the World Business Council for Sustainable Development (WBCSD). An important aspect is the capacity and negotiating power of smallholders in their relations with large investors. As mentioned earlier, strong farmers' organisations are crucial in this respect, as is the security of local land rights. Only a level playing field between different actors can build trust. In addition, long-term relations and trust can reduce the problems of side selling (selling to firms other than the original input provider),<sup>141</sup> motivated by farmers' need for an immediate income. As documented by an evaluation of an out-grower scheme supported by Cordaid in Tanzania, '*... gaining access to finance is key. Indeed, farmers aren't selling their produce to local traders because the price offered is attractive but because they need cash immediately to cover other needs ... Contracts alone do not work and other incentives are needed to get the commitment of farmers.*' In the organic market, there are innovative ways and incentives put in place by out-grower schemes to build an inclusive business model.

### **Box 16: Elephant Pepper: Improving food security while protecting wildlife**

Started by an Australian businessman in 2003, the Elephant Pepper project aimed at the establishment of trade opportunities for marginalised communities in Zambia and Mozambique, where ecological conflict (in this case with elephants) was undermining food security and ecological sustainability. Elephant Pepper has trained more than 6000 farmers and many partner organisations in the use of chili-based deterrents, keeping crops and people safe from elephants, and the elephants safe from farmers. Fields of chilies were cultivated around food crops. The next phase of the business was to seek solutions based on increasing livelihood opportunities for the farmers. This resulted in the launch of the Elephant Pepper brand (10 per cent of total business). The focus of this operation was the manufacture and sale of chili sauces and other branded products (Tabasco Mash), using chilies grown by the same small-scale farmers. This model is attractive, as the out-grower networks enable Elephant Pepper Mozambique to increase overall production, volumes, and ultimately turnover without significantly increasing its own costs. Out-growers benefit from a guaranteed market and price, providing a clear incentive to invest in capabilities and achieving the highest yields possible. Elephant Pepper is also facilitating skill transfers. With the support of local NGOs, it provides training in basic agriculture practices that can be applied to other types of more high-value crops. This project has a very positive impact on women's labour participation: 90 per cent of the pickers are women. Elephant Pepper promotes women where possible into management positions, due to their reliability and general work attitude. An important positive impact is visible: women are in a position where they can make decisions (what to grow, how to grow it) and decide how to use their money.

**Income generation:** One of the most important impacts of the model is the disposable income for farmers. For example, farmers confirmed that the project has significantly improved their living standards (enabling them to pay school fees, obtain medical treatment, and purchase groceries). People now have access to savings and knowledge on savings. The increased buying power of the farmers has benefited the local traders (small village shops).

**Environmental-awareness creation:** Farmers have a better understanding of the environment where they are living and thus are more able to protect it or use it in an ecological and sustainable way.

**Market structure:** Elephant Pepper guarantees to buy 100 per cent of the chilies available, but farmers are free to sell to other buyers. Elephant Pepper competes for this business in a market-driven environment. Farmers attract the attention of other buyers and NGOs which provide market-linkage training. Elephant Pepper does not discourage this interaction.

*Source: case study presented at the Sustainable Spice Conference, 12 October 2010, at the Royal Tropical Institute, Amsterdam*

Governments, development agencies, and civil society can play an important role in building inclusive models, for instance in providing loan guarantees or financing for the community's equity participation in a joint venture, or more generally acting as brokers and facilitators. (See Box 17.)

### Box 17: the Zambia Agribusiness Fund

In order to foster links between small-scale producers and commercial agribusiness, USAID launched the Zambia Agribusiness Technical Assistance Centre. Addressed, in particular, to farmers who produce all-year-round crops, the centre provides technical assistance and supervises an investment fund which extends credit lines to farmers to buy irrigation equipment. Big commercial agribusinesses buy the crops (at a price net of the cost of the loan) and pay back the loan to the fund. Highly successful, this pre-financing export facility extends credits in US dollars, applying an interest rate averaging 8–10 per cent, compared with that in local currency of 35–40 per cent, and presents the advantage of ensuring the predictability of funds and repayment. The US\$ 1 million fund has benefited about 3000 small-scale honey, horticultural, and dairy producers, and it is already self-sustaining. The next step envisaged would be to convert credits into equities. In parallel, USAID and other donors are financing local NGOs or technical-assistance business associations, such as the Zambia Chamber of Small and Medium Business Associations in charge of providing business development services, to create market linkages between farmers, agribusiness, and urban consumers, and ensure training in business skills.

*Source: OECD/AfDB (2005)*

**Increasingly, large farmers are subcontracting organised smallholders to meet supermarket demands.** According to previous analysis by Oxfam, where small farmers do participate in these markets, they tend to earn higher incomes than non-participating farmers. Studies have shown that returns per hectare of French beans in Kenya are 6 to 20 times higher than they are for maize-bean intercropping.<sup>142</sup>

### Box 18: Supermarkets across Southern Africa

The rapid proliferation of supermarkets across East and Southern Africa is transforming food systems. In South Africa, supermarkets account for more than 55 per cent of national food retail and 1700 supermarkets for 35 million people. Kenya alone has some 200 supermarkets and 10 hypermarkets, accounting for up to 30 per cent of food retailed in the country. These supermarkets already buy three times more produce from local farmers than the volume of produce that Kenya exports. Even though others caution that the supermarket share of fresh-food retailing is much lower than for processed and packaged food, it certainly shows that local markets are considerable, and that food-supply systems are changing.

*Source: Reardon (2003)*

Nevertheless, important obstacles remain. Supermarkets also exercise enormous buyer power and may offload price pressures and demand fluctuations on to their suppliers through abusive buying practices. These are passed on along the supply chain, ultimately being borne by the weakest actors, both small farmers and agricultural labourers, most often women.<sup>143</sup> Governments can put in place a number of policies to help retailers to contribute to the development of an inclusive business model. These include, for instance, enforcing appropriate regulations in the supermarket sector, such as policies to promote competition in oligopolistic chains such as those found in Latin America; upgrading the infrastructure and services provided to retailers and farmers in wholesale markets; helping farmers to organise to become suppliers to supermarkets; and implementing and enforcing internationally accepted labour standards.<sup>144</sup>

## 4. Conclusion

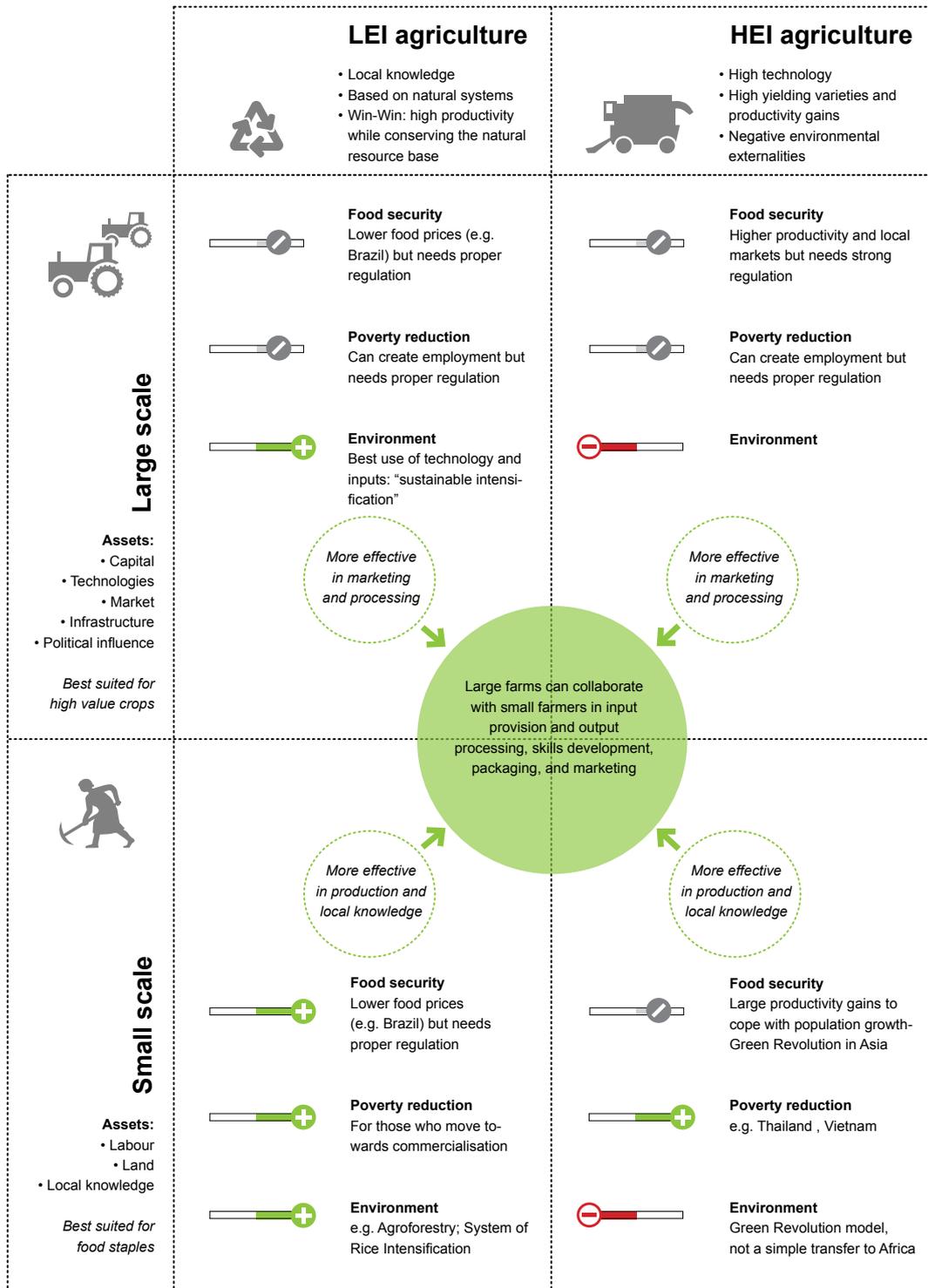
**Develop a country-led long-term vision.** As emerged in the previous chapter, there are multiple pathways to ensure food security, poverty reduction, and protection of the environment. Technologies and institutional innovations must be tailored to the local context and involve broad consultations among the large number of players involved. It is crucial to develop a shared vision and a long-term strategy to identify the proper balance between the state, the market, and civil society. Broad consultations with empowered farmers' organisations, civil society, and private investors are essential for the setting up of clear strategies, with a definition of investment priorities. These are the crucial prerequisite to mobilise the necessary support, from both public resources and international donors. There are lessons to be learned from experiences of managing these broad consultations, for instance with policy processes such as the PRSP, formulation of an agriculture-development strategy in Sierra Leone, drafting of the Law on Sustainable Rural Development in Mexico, and formulation of an integrated food-security and nutrition programme in South Africa.

In terms of prospects for the agriculture of developing countries, supporting small-scale farmers would provide the greatest impact in terms of income creation and food security, in particular when associated with LEI agriculture methods (see Figure 10). Adopting sustainable farming methods is crucial to improve productivity while conserving the natural-resource base and responding to climate-change challenges.

In countries where labour supply constrains smallholder expansion, large-scale industrial farming can be a successful option to promote food security (through a reduction in prices, thanks to high productivity) and reduce poverty (through the creation of employment). In addition, when LEI methods are applied, they minimise harm to the environment (see Figure 10). However, evidence so far suggests that unless strong regulation is in place to secure property rights, discipline land acquisition, and ensure transparent and participatory negotiations, adverse social and environmental effects outweigh the benefits.

The need for investment in technology, infrastructure, market access, and institutions suggests that large-scale investment could contribute in many ways which do not necessarily have to result in the conversion of small-scale agriculture to large-scale agriculture. On the contrary, a variety of institutional arrangements can be used to combine the assets of investors (capital, technology, markets) with those of local communities and smallholders (land, labour, and local knowledge). Rather than in production, greater opportunities and important economies of scale for private domestic or foreign investors can be achieved in output processing, packaging, and marketing. These include a wide range of more collaborative arrangements between large-scale investors and local small-scale farmers and communities. Private investment through 'inclusive' out-grower schemes can promote smallholder diversification into high-value and export-market crops and support productivity gains.

Figure 10: Who will feed the world?

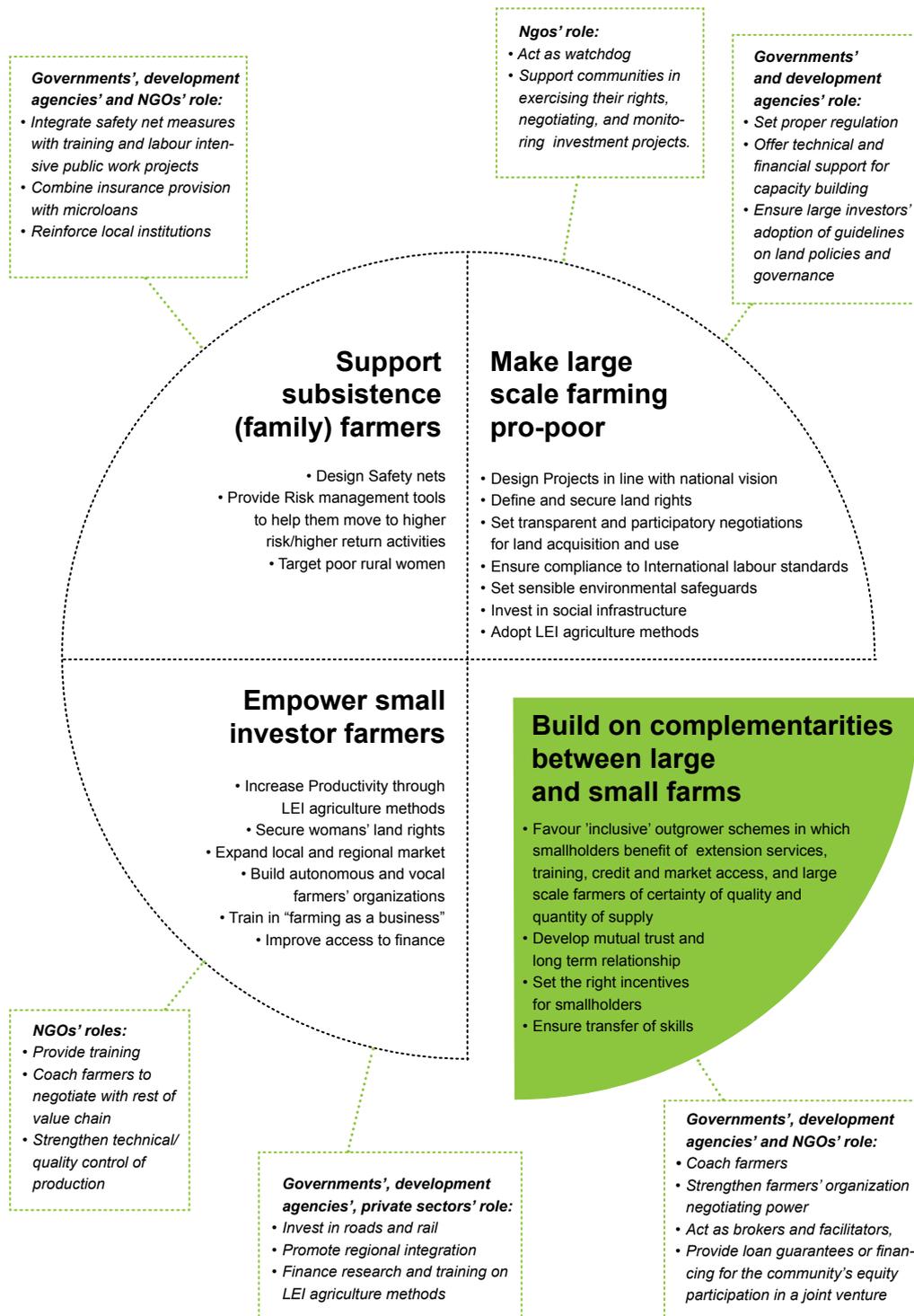


**Need for renewed commitments by governments and international donors.** To sum up, in order to ensure that food availability and accessibility keep pace with population growth, while enhancing resilience and achieving sustainability, national and international donor agriculture policies must include the following measures:

- Support subsistence farmers to cope with risks and vulnerability.
- Empower smallholder farmers, especially women, with capacity, finance, and a regulatory framework that encourages organisation and enhances productivity.
- Regulate agro-industrial operations to enhance social benefits and good environmental stewardship.
- Promote synergies between smallholder and agro-industrial operations, building on complementarities and linkages wherever possible.

Whatever mix of the four-pronged approach is adopted, major commitment and investment by governments, international donors, and private-sector actors, reversing the trend of the past 20 years, will be crucial. Much of the failure of agriculture to achieve its potential is institutional. Support by the state has been unresponsive to the needs of the poor, and inefficient in marketing producers' output, sometimes preventing the natural development of markets for producers. Public institutions need to be strengthened in their capacity to develop an appropriate blend of policies, regulatory frameworks, and investments to re-launch the agricultural sector.

Figure 11: A four-pronged approach – what we can do





## Sources and references

**Alliance for Green Revolution in Africa**, AGRA  
<http://www.agra-alliance.org/>

**Ali, M. and D. Byerlee** (2002) 'Productivity growth and resource degradation in Pakistan's Punjab: a decomposition analysis', *Economic Development and Cultural Change* 54 (2002): 839-64.

**Badgley, C. et al.** (2007) 'Organic agriculture and the global food supply', *Renew. Agric. Food Syst.* 22 (2): 86-108.

**Berdegú, J.** (2001) 'Cooperating to Compete: Peasant Associative Business Firms in Chile', Ph D thesis, Department of Social Sciences, Communication, and Innovation Group, Wageningen University.

**Berdegú, J. A. and G. Escobar** (2002) 'Rural Diversity, Agricultural Innovation Policies and Poverty Reduction', AgREN Network Paper 122, London: Overseas Development Institute, available at <http://www.odi.org.uk/resources/details.asp?id=4275&title=agricultural-knowledge-information-systems-akis-rural-livelihood-diversity>

**Brussaard, L. et al.** (2010) 'Reconciling biodiversity, conservation and food security: scientific challenges for a new agriculture', *Current Opinion in Environmental Sustainability*, 2 (1-2): 34-42.

**Cline, W. R.** (2008) 'Global warming and agriculture', *Finance & Development* (March), International Monetary Fund.

Collier, P. and S. Dercon (2009) 'African Agriculture in 50 Years: Smallholders in a Rapidly Changing World?', conference paper, 'How to Feed the World in 2050. Proceedings of a Technical Meeting of Experts', Rome, Italy, 24-26 June 2009

**Cotula, L., N. Dyer, and S. Vermeulen** (2008) 'Fuelling Exclusion? The Biofuels Boom and Poor People's Access to Land', International Institute for Environment and Development (IIED), available at <http://pubs.iied.org/pdfs/12551IIED.pdf>; and FAO, and Grain Briefing (2008): 'Seized: The Land Grab for Food and Financial Security'.

**Deininger, K. and L. Squire** (1998) 'New ways of looking at old issues: inequality and growth', *Journal of Development Economics* 57/2: 259-87.

**de Janvry, A. and E. Sadoulet** (2008) 'Agriculture for Development in Africa: Business-as-Usual or New Departures?', University of California at Berkeley; available at <http://are.berkeley.edu/~sadoulet/papers/Entebbe6-08.pdf>

**de Koning, M. and B. de Steenhuijsen Piters** (2008) *Farmers as Shareholders: A Close Look at Recent Experience*, Amsterdam: Royal Tropical Institute (KIT).

**De Schutter, O.** (2009a) 'Large-scale Land Acquisitions and Leases: A Set of Core Principles and Measures to Address the Human Rights Challenge', Report of the Special Rapporteur on the Right to Food, UNHCR; available at <http://www2.ohchr.org/english/issues/food/docs/BriefingNotelandgrab.pdf>.

**De Schutter, O.** (2009b) Interim Report of the Special Rapporteur on the Right to Food, presented to the 63<sup>rd</sup> session of the United Nations General Assembly; available at <http://www.righttofood.org/new/PDF/A62289.pdf>.

**De Schutter, O.** (2009c) 'The Right to Food and the Political Economy of Hunger', conference paper, Colombia Law School, New York, 20 October 2009.

**Embrapa** (2006) Sistemas de produção sustentáveis para a amazônia legal. [http://www.embrapa.br/publicacoes/index\\_htm](http://www.embrapa.br/publicacoes/index_htm).

**Evenson, R. E. and D. Gollin** (2003) 'Assessing the impact of the Green Revolution, 1960 to 2000', *Science* vol. 300, no. 5620: 758-62.

**FAO** (2006) 'World Agriculture: Towards 2030/2050', Interim Report, Rome; available at [http://www.fao.org/fileadmin/user\\_upload/esag/docs/Interim\\_report\\_AT2050web.pdf](http://www.fao.org/fileadmin/user_upload/esag/docs/Interim_report_AT2050web.pdf).

**FAO** (2009) Report of the FAO Expert Meeting on how to Feed the World in 2050, Rome, 24-26 June; available at [http://www.fao.org/fileadmin/templates/wsfs/docs/EM\\_report/EM\\_report.pdf](http://www.fao.org/fileadmin/templates/wsfs/docs/EM_report/EM_report.pdf).

**FAO** (2010) "Climate-Smart" Agriculture Policies, Practices and Financing for Food Security, Adaptation and Mitigation', FAO; available at <http://www.fao.org/docrep/013/i1881e/i1881e00.htm>.

**FAO** (September 2010) 'Undernourishment', Economic and Social Development Department.

FAO statistics – country data sheets <http://www.fao.org/economic/ess/food-security-statistics/food-security-statistics-by-country/en/>

**FAO/WFP** (October 2010) 'The State of Food Insecurity in the World: Addressing Food Security in Protracted Crises'; available at <http://www.fao.org/publications/sofi/en/>.

**Grosskurth, J.** (2010) *Futures of Technology in Africa*, The Hague: STT (Study Centre for Technology Trends).

**Hazell, P. B. R. (2003)** 'Is There a Future for Small Farms?'; Washington DC: International Food Policy Research Institute; available at <http://www.ecsocman.edu.ru/data/846/660/1219/151.pdf>.

**Hazell, P.** (2004) 'Smallholders and Pro-Poor Agricultural Growth'; OECD POVNET Agriculture Task Team.

**Hazell, P., C. Poulton, S. Wiggins, and A. Dorward** (2007) *The Future of Small Farms for Poverty Reduction and Growth*, 2020 Vision Discussion Paper No. 42, Washington, DC: International Food Policy Research Institute (IFPRI).

**Heltberg, R.** (1998) 'Rural market imperfections and the farm size–productivity relationship: evidence from Pakistan', *World Development* 26: 1807–26.

**Hivos and Oxfam Novib** (2009) 'Biodiversity, Livelihoods and Poverty: Lessons Learned from 8 Years of Development Aid through the Biodiversity Fund'; available at <http://www.hivos.nl/eng/Hivos-Knowledge-Programme/Themes/Small-Producer-Agency/Publications/Biodiversity-Livelihoods-and-Poverty-Policy-Brief>.

**IFAD** (2009) 'Food Security 2009: Achieving Long-term Solutions'; presentation to Chatham House conference, London, 2–3 November 2009.

**International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD)** (2009) 'Agriculture at a Crossroads', presentation at Intergovernmental Plenary Session in Johannesburg, South Africa, in April 2008; available at [http://www.ukfg.org.uk/agriculture\\_crossroads/](http://www.ukfg.org.uk/agriculture_crossroads/).

**Ivanic, M. and W. Martin** (2008) 'Implications of Higher Global Food Prices for Poverty in Low-income Countries', Policy Research Working Papers, New York: World Bank.

**Kameri-Mbote, P. and K. Mubuu** (2002) 'Women and Property Rights in Kenya: A Study on Trends in Ownership, Control and Access to Land and Productive Resources in Agricultural Communities in Select Districts'.

**McGarry, D.** (2005) 'Mitigating Land Degradation and Improving Land and Environmental Condition Via Field-practical Methods of Conservation Agriculture', 3rd Congress on Conservation Agriculture, Nairobi.

**Miller, C.** (2004) 'Examining Design and Innovations in Rural Finance for Addressing Current and Future Challenges', FAO Rural Finance Workshop, SEEP Pre-event, October.

**Msangi, S. and M. Rosegrant** 'World Agriculture in a Dynamic Changing Environment: IFPRI's Long-term Outlook for Food and Agriculture under Additional Demand and Constraints', FAO Expert Meeting on How to Feed the World in 2050, Rome; available at <ftp://ftp.fao.org/docrep/fao/012/ak970e/ak970e00.pdf>.

**OECD** (2006) 'Promoting Pro-poor Growth: Agriculture'; available at <http://www.oecd.org/dataoecd/9/60/37922155.pdf>.

**OECD** (2009) *Turning African Agriculture Into a Business: A Reader*, OECD Publications.

**OECD** (2010) 'Draft Policy Framework for Investment in Agriculture: Reaping the Benefits of Investment in Africa's Agriculture through an Integrated Policy Framework'.

**OECD/AfDB** (2005) 'African Economic Outlook: Financing Small and Medium Enterprise Development'; available at <http://www.oecd.org/dataoecd/57/59/34908457.pdf>.

**OECD/AfDB/UNECA** (2008) Case studies on Agribusiness development for Zambia, Mozambique, South Africa, Burkina Faso, Senegal, Mali carried out by Lucia Wegner in the framework of the African Economic Outlook projects.

**Oxfam America** (2010) 'More Rice for People More Water for the Planet – System of Rice Intensification (SRI)'; available at [http://www.agroecologic.com/images/SRI\\_layoutFINAL-LoRes.pdf](http://www.agroecologic.com/images/SRI_layoutFINAL-LoRes.pdf).

**Oxfam International** (2009a) 'Harnessing Agriculture for Development', Research Report; available at <http://www.oxfam.org/en/policy/harnessing-agriculture-development>.

**Oxfam International** (2009b) 'Investing in Poor Farmers Pays, Rethinking How to Invest in Agriculture', Briefing Paper; available at <http://www.oxfam.org.uk/resources/policy/trade/investing-in-agriculture.html>.

- Oxfam International** (2009c) 'The Missing Middle in Agricultural Finance: Relieving the Capital Constraint on Smallholder Groups and Other Agricultural SMEs', Briefing Paper; available at [www.oxfam.org.uk/resources/policy/trade/missing-middle-agricultural-finance.html](http://www.oxfam.org.uk/resources/policy/trade/missing-middle-agricultural-finance.html).
- Oxfam International** (2009d) 'People-Centered Resilience. Working with Vulnerable Farmers Towards Climate Change Adaptation and Food Security', Briefing Paper; available at <http://www.oxfam.org/en/policy/people-centered-resilience>.
- Oxfam International** (2010) 'Climate Change Adaptation. Enabling People Living in Poverty to Adapt', Research Report; available at [http://www.oxfam.org.uk/resources/policy/climate\\_change/climate-change-adaptation.html](http://www.oxfam.org.uk/resources/policy/climate_change/climate-change-adaptation.html).
- Oxfam Novib** (2008) 'The Right to a Sustainable Rural Livelihood. Strategies, Lessons Learned and Actions (2008–2010)'; available at [http://www.wemanglobal.org/documents/ON\\_Economic%20Justice.pdf](http://www.wemanglobal.org/documents/ON_Economic%20Justice.pdf).
- Pretty J.** (2006) 'Agroecological Approaches to Agricultural Development', Rimisp–Latin American Center for Rural Development; available at <http://www.rimisp.org/getdoc.php?docid=6440>.
- Pretty J.** (2008) 'Agricultural sustainability: concepts, principles and evidence', *Philosophical Transactions of the Royal Society of London, Series B, Biological Sciences*, 363 (1491): 447–65.
- Ravallion, M. and G. Datt** (2002) 'Why has economic growth been more pro-poor in some states of India than others?', *Journal of Development Economics* 68/2: 381–400.
- Reardon, T.** (2003) 'The Rise of Supermarkets across Africa Threatens Small Farmers – Opportunities and Challenges in a Changing Market', paper presented at the FAO Workshop on Globalization, Urbanization, and Food Systems in Developing Countries, Rome, 8 October 2003.
- Rosegrant, M. W. and P. B. R. Hazell** (2001) 'Transforming the Rural Asian Economy', Washington, DC: International Food Policy Research Institute (IFPRI).
- Rosegrant, M. W. and S. Fan** (2008) 'Investing in Agriculture to Overcome the World Food Crisis and Reduce Poverty and Hunger', Washington, DC: IFPRI; available at <http://www.ifpri.org/publication/investing-agriculture-overcome-world-food-crisis-and-reduce-poverty-and-hunger>.
- Sileshi, G. et al.** (2008) 'Meta-analysis of maize yield response to woody and herbaceous legumes in sub-Saharan Africa', *Plant and Soil* 307 (1&2): 1–19.
- Staatz, J. M. and N. Dembele** (2007) 'Agriculture for Development in Sub-Saharan Africa', background paper for the *World Development Report 2008*, Michigan State University.
- Taylor, M. and T. Bending** (2009) 'Increasing Commercial Pressure on Land: Building a Coordinated Response', discussion paper, International Land Coalition Secretariat, Rome; available at [http://www.commercialpressuresonland.org/wp-content/uploads/09\\_07\\_cpl\\_discussionpaper.pdf](http://www.commercialpressuresonland.org/wp-content/uploads/09_07_cpl_discussionpaper.pdf)
- Thirtle, C. et al.** (2001) 'Relationship between Changes in Agricultural Productivity and the Incidence of Poverty in Developing Countries', report commissioned by the Department for International Development, London; available at <http://www.povertyenvironment.net/node/683>
- Tripp, R. and C. Longley** (2006) *Self-sufficient Agriculture: Labour and Knowledge in Small-scale Farming*, London: Earthscan.
- UN Millennium Project** (2005) 'Halving Hunger: It Can be Done, Summary Version of the Report of the Task Force on Hunger', New York: The Earth Institute at Columbia University; available at [http://www.unmillenniumproject.org/documents/HTF-SumVers\\_FINAL.pdf](http://www.unmillenniumproject.org/documents/HTF-SumVers_FINAL.pdf)
- Vermeulen, S. and L. Cotula** (2010) 'Making the Most of Agricultural Investment: A Survey of Business Models that Provide Opportunities for Smallholders', FAO and IIED; available at [http://www.ifad.org/pub/land/agri\\_investment.pdf](http://www.ifad.org/pub/land/agri_investment.pdf)
- Wegner L.** (2006) 'Microfinance: How Bankers Could Buy Back Their Soul', OECD Development Centre; available at <http://ideas.repec.org/p/oec/devaac/31-en.html>.
- Wiggins, S.** (2009) 'Can the Smallholder Model Deliver Poverty Reduction and Food Security for a Rapidly Growing Population in Africa?', London: Overseas Development Institute; available at <ftp://ftp.fao.org/docrep/fao/012/ak982e/ak982e00.pdf>
- World Bank** (2008a) 'Competitive Commercial Agriculture in Sub-Saharan Africa (CCAA) Study', Washington, DC: World Bank.

**World Bank** (2008b) *World Development Report 2008: Agriculture for Development: Agriculture and Development*, Washington, DC: World Bank.

**World Bank** (2009) *Awakening Africa's Sleeping Giant. Prospects for Commercial Agriculture in the Guinea Savannah Zone and Beyond*, Washington, DC: World Bank.

**World Bank** (2010) *Rising Global Interest in Farmland: Can it Yield Sustainable Benefits?*, Washington, DC: World Bank.

**Zomer R. J., A. Trabucco, R. Coe, and F. Place** (2009) 'Trees on Farm: Analysis of Global Extent and Geographical Patterns of Agro-forestry', Nairobi: World Agro-forestry Centre.

## Notes

- <sup>1</sup> FAO/WFP (October 2010) 'The State of Food Insecurity in the World: Addressing Food Security in Protracted Crises'.
- <sup>2</sup> In Asia and the Pacific, an estimated 578 million people are suffering from chronic hunger; in sub-Saharan Africa 239 million; in Latin America and the Caribbean 53 million; in the Near East and North Africa 37 million; and in developed countries 19 million, according to FAO's annual hunger report.
- <sup>3</sup> FAO/WFP (October 2010), op. cit.
- <sup>4</sup> Ibid.
- <sup>5</sup> FAO (2009) Report of the FAO Expert Meeting on How to Feed the World in 2050, Rome, 24–26 June.
- <sup>6</sup> Ibid.
- <sup>7</sup> Ibid.
- <sup>8</sup> Ibid.
- <sup>9</sup> Per capita demand for meat in China has been projected to increase by 60 per cent (or 29 kg per capita) during the period 2000–2050, while demand for meat in developing countries as a whole is expected to grow by 20 per cent (or 6 kg per capita) in the period 2000–2050 (S. Msangi and M. Rosegrant, 'World Agriculture in a Dynamic Changing Environment: IFPRI's Long-term Outlook for Food and Agriculture under Additional Demand and Constraints', FAO Expert Meeting on How to Feed the World in 2050, Rome, 2009). The consumption of dairy products (excluding butter) in the form of fresh milk etc. in developing countries will also rise substantially by more than 70 per cent (or 33 kg per capita) in the period 2000–2050 ('World Agriculture: Towards 2030/2050', Interim Report, FAO, Rome, 2006).
- <sup>10</sup> Rabobank Group (2010) 'Sustainability and Security of the Global Food Supply Chain'.
- <sup>11</sup> Ibid.
- <sup>12</sup> OECD (2010) 'Draft Policy Framework for Investment in Agriculture: Reaping the Benefits of Investment in Africa's Agriculture through an Integrated Policy Framework'.
- <sup>13</sup> However, not all changes in climate will necessarily produce negative impacts. Some studies show, for example, that the growing seasons in certain areas (for example, parts of the Ethiopian highlands and parts of southern Africa such as Mozambique) may lengthen under climate change, due to a combination of increased temperature and rainfall changes. See P. K. Thornton et al. (2006) 'Mapping Climate Vulnerability and Poverty in Africa', International Livestock Research Institute, Nairobi.
- <sup>14</sup> Oxfam International (2009a) 'Harnessing Agriculture for Development', Research Report.
- <sup>15</sup> W. R. Cline (2008) 'Global warming and agriculture', Finance & Development (March), International Monetary Fund.
- <sup>16</sup> Carbon fertilisation: increased plant growth due to an increase in carbon dioxide in the atmosphere. Plants absorb carbon and convert it to oxygen as part of photosynthesis.
- <sup>17</sup> World Bank (2010) *Rising Global Interest in Farmland: Can it Yield Sustainable Benefits?*, Washington DC: World Bank.
- <sup>18</sup> O. De Schutter (2009a) 'Large-scale Land Acquisitions and Leases: A Set of Core Principles and Measures to Address the Human Rights Challenge', Report of the Special Rapporteur on the Right to Food, UNHCR.
- <sup>19</sup> According to press reports, foreign investors expressed interest in around 56 million ha of land globally in less than a year. Of these, around two-thirds (29 million ha) were in sub-Saharan Africa. Oxfam and ILC preliminary research reports even higher figures.
- <sup>20</sup> World Bank (2010) op. cit.
- <sup>21</sup> O. De Schutter (2009a), op. cit.
- <sup>22</sup> J. Grosskurth (2010) 'Futures of Technology in Africa', The Hague: STT (Study Centre for Technology Trends).
- <sup>23</sup> FAO (September 2010) 'Undernourishment', Economic and Social Development Department .
- <sup>24</sup> O. De Schutter (2009b) Interim Report of the Special Rapporteur on the Right to Food, presented to the 63rd session of the United Nations General Assembly.

- <sup>25</sup> FAO statistics – country data sheets <http://www.fao.org/economic/ess/food-security-statistics/food-security-statistics-by-country/en/>
- <sup>26</sup> IFAD (2009) 'Food Security 2009: Achieving Long-term Solutions', presentation to Chatham House conference, London, 2-3 November 2009.
- <sup>27</sup> S. Wiggins (2009) 'Can the Smallholder model deliver poverty reduction and food security for a rapidly growing population in Africa?', London: Overseas Development Institute.
- <sup>28</sup> United Nations Environment Programme (UNEP) (2009) 'Environmental Food Crisis'.
- <sup>29</sup> Ibid.
- <sup>30</sup> IFAD (2009), op. cit.
- <sup>31</sup> UN Millennium Project (2005) 'Halving Hunger: It Can be Done, Summary Version of the Report of the Task Force on Hunger', New York: The Earth Institute at Columbia University.
- <sup>32</sup> A. de Janvry and E. Sadoulet (2008) 'Agriculture for Development in Africa: Business-as-Usual or New Departures?', University of California at Berkeley.
- <sup>33</sup> The World Bank (World Development Report 2008) compares the representation among the poor smallholders of net buyers of food, self-sufficient or net sellers: in all seven countries surveyed (Bolivia, Ethiopia, Bangladesh, Zambia, Cambodia, Madagascar, and Vietnam), the two first categories are a strong majority among the poor smallholders.
- <sup>34</sup> In all developing countries, rural households have lower average incomes than non-rural households. The ratio of rural incomes to non-rural incomes ranges from 40 to 75 per cent, a relationship that remains consistent across groups of developing countries. See M. Ataman Aksoy (2005) 'The Evolution of Agricultural Trade Flows', in *Global Agricultural Trade and Developing Countries*, ed. M. Ataman Aksoy and John C. Beghin, Washington: World Bank.
- <sup>35</sup> Global Economic Prospects (2009) 'Commodities at the Crossroads', <http://www.worldbank.org/gep2009>.
- <sup>36</sup> M. Taylor and T. Bending (2009) 'Increasing commercial pressure on land: building a coordinated response', discussion paper, International Land Coalition Secretariat, Rome.
- <sup>37</sup> P. Collier and S. Dercon (2009) 'African agriculture in 50 years: smallholders in a rapidly changing world?', paper presented at conference, 'How to Feed the World in 2050. Proceedings of a Technical Meeting of Experts', Rome, Italy, 24–26 June 2009.
- <sup>38</sup> FAO (2009), op. cit.
- <sup>39</sup> A. de Janvry and E. Sadoulet (2008), op. cit.
- <sup>40</sup> Based on five rural-world definitions as indicated in OECD (2006) 'Promoting Pro-poor Growth: Agriculture', as well as on the definition of competitive commercial agriculture in 'Competitive Commercial Agriculture in Sub-Saharan Africa (CCAA) Study' (World Bank, 2008a), and the definition adopted by Oxfam International (2009a), op. cit.
- <sup>41</sup> Oxfam International (2009a), op. cit.
- <sup>42</sup> Oxfam International (2009b) 'Investing in Poor Farmers Pays, Rethinking how to Invest in Agriculture', Briefing Paper.
- <sup>43</sup> See note 40.
- <sup>44</sup> See note 40.
- <sup>45</sup> World Bank (2010), op. cit.
- <sup>46</sup> R. Heltberg (1998) 'Rural market imperfections and the farm size–productivity relationship: evidence from Pakistan', *World Development* 26: 1807–26.
- <sup>47</sup> P. B. R. Hazell (2003) 'Is There a Future for Small Farms?', Washington DC: International Food Policy Research Institute.
- <sup>48</sup> Empirical data from all over the world have consistently shown that large farms dependent on hired managers and workers are less productive and less profitable (per hectare) than small farms managed by families and operated primarily with family labour.
- <sup>49</sup> World Bank (2008a) 'Competitive Commercial Agriculture in Sub-Saharan Africa (CCAA) Study', Washington DC: World Bank.
- <sup>50</sup> M. W. Rosegrant and P. B. R. Hazell (2001) 'Transforming the Rural Asian Economy', Washington DC: International Food Policy Research Institute (IFPRI).
- <sup>51</sup> K. Deininger and L. Squire (1998) 'New ways of looking at old issues: inequality and growth', *Journal of Development Economics* 57/2: 259–87, and M. Ravallion and G. Datt (2002) 'Why has economic growth been more pro-poor in some states of India than others?', *Journal of Development Economics* 68/2: 381–400; quoted in OECD (2006) 'Promoting Pro-poor Growth: Agriculture'.
- <sup>52</sup> IFAD (2009), op. cit.
- <sup>53</sup> World Bank (2010), op. cit.
- <sup>54</sup> International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) (2009) 'Agriculture at a Crossroads', presentation at Intergovernmental Plenary Session in Johannesburg, South Africa, in April 2008.
- <sup>55</sup> World Bank (2009) *Awakening Africa's Sleeping Giant. Prospects for Commercial Agriculture in the Guinea Savannah Zone and Beyond*, Washington DC: World Bank.
- <sup>56</sup> OECD (2006), op. cit.
- <sup>57</sup> P. Hazell and A. Roell (1983) 'Rural Growth Linkages: Household Expenditure Patterns in Malaysia and

- Nigeria', Research Report 41, International Food Policy Research Institute, Washington, DC.
- <sup>58</sup> OECD (2006), op. cit.
- <sup>59</sup> C. Thirtle et al. (2001) 'Relationship between Changes in Agricultural Productivity and the Incidence of Poverty in Developing Countries', report commissioned by the Department for International Development, London.
- <sup>60</sup> OECD (2006), op. cit.
- <sup>61</sup> M. de Koning and B. de Steenhuijsen Piters (2008) 'Farmers as Shareholders: A Close Look at Recent Experience', Amsterdam: Royal Tropical Institute (KIT).
- <sup>62</sup> OECD (2006), op. cit.
- <sup>63</sup> World Bank (2009), op. cit.
- <sup>64</sup> Oxfam International (2009c) 'The Missing Middle in Agricultural Finance: Relieving the Capital Constraint on Smallholder Groups and Other Agricultural SMEs', Briefing Paper.
- <sup>65</sup> OECD (2006), op. cit.
- <sup>66</sup> Cereal yields rose by an impressive 2.8 per cent a year in 1961–2004, much higher than the 1.8 per cent growth in industrialised countries (Evenson and Gollin (2003) 'Assessing the impact of the Green Revolution, 1960 to 2000', *Science* 2 May 2003: 758–62).
- <sup>67</sup> Hivos and Oxfam Novib (2009) 'Biodiversity, Livelihoods and Poverty: Lessons Learned from 8 Years of Development Aid through the Biodiversity Fund'.
- <sup>68</sup> Evenson and Gollin (2003), op. cit.
- <sup>69</sup> M. Ali and D. Byerlee (2002) 'Productivity growth and resource degradation in Pakistan's Punjab: a decomposition analysis', *Economic Development and Cultural Change* 54: 839–64.
- <sup>70</sup> M. Taylor and T. Bending (2009), op. cit.
- <sup>71</sup> Ibid.
- <sup>72</sup> World Bank (2010), op. cit.
- <sup>73</sup> World Bank (2009), op. cit.
- <sup>74</sup> World Bank (2008a), op. cit.
- <sup>75</sup> World Bank (2009), op. cit.
- <sup>76</sup> Ibid.
- <sup>77</sup> Taylor and Bending (2009), op. cit.
- <sup>78</sup> P. Hazell, C. Poulton, S. Wiggins, and A. Dorward (2007) 'The Future of Small Farms for Poverty Reduction and Growth', 2020 Vision Discussion Paper No. 42, Washington, DC: International Food Policy Research Institute (IFPRI).
- <sup>79</sup> World Bank (2010), op. cit.
- <sup>80</sup> Ibid.
- <sup>81</sup> Oxfam International (2009a), op. cit.
- <sup>82</sup> World Bank (2009), op. cit.
- <sup>83</sup> World Bank (2010), op. cit.
- <sup>84</sup> Ibid.
- <sup>85</sup> P. Kameri-Mbote and K. Mubuu (2002) 'Women and Property Rights in Kenya: A Study on Trends in Ownership, Control and Access to Land and Productive Resources in Agricultural Communities in Select Districts'.
- <sup>86</sup> World Bank (2010), op. cit.
- <sup>87</sup> Ibid.
- <sup>88</sup> 'Economic rent' refers to income earned by the producer above the amount that is theoretically needed in order to make the production happen.
- <sup>89</sup> Taylor and Bending (2009), op. cit.
- <sup>90</sup> International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD), (2009), op. cit.
- <sup>91</sup> World Bank (2008a), op. cit.
- <sup>92</sup> Ibid.
- <sup>93</sup> World Bank (2009), op. cit.
- <sup>94</sup> Many different expressions have been used to define or describe LEI agricultural systems. These include eco-agriculture, sustainable, biodynamic, community-based, agro-ecological, environmentally sensitive, extensive, and organic farming. It refers to an holistic production-management system which promotes and enhances the health of agro-ecosystems, including biodiversity, biological cycles, and soil biological activity. It emphasises the use of management practices in preference to the use of off-farm inputs, taking into account that regional conditions require locally adapted systems.
- <sup>95</sup> FAO/WFP (October 2010), op. cit.
- <sup>96</sup> FAO (2009), op. cit.
- <sup>97</sup> Ibid.
- <sup>98</sup> Rabobank Group (2010), op. cit.
- <sup>99</sup> OECD (2010), op. cit.
- <sup>100</sup> According to IFPRI, inputs such as fertiliser and high-yielding seeds are required to achieve rapid productivity growth in African agriculture. The use of fertiliser is necessary because phosphorus deficiency is widespread and is one of the main constraints to food production in sub-humid and semi-arid Africa.
- <sup>101</sup> J. Pretty (2006) 'Agroecological Approaches to Agricultural Development', *Rimisp-Latin American Center for Rural Development*.
- <sup>102</sup> J. Pretty (2008) 'Agricultural sustainability: concepts, principles and evidence', *Philosophical Transactions of the Royal Society of London, Series B, Biological Sciences*, 363 (1491): 447–65.

- <sup>103</sup> Cline (2008), op. cit.
- <sup>104</sup> World Bank (2010), op. cit.
- <sup>105</sup> De Schutter, O. (2009a), op. cit.
- <sup>106</sup> It is in developing countries that some of the most significant progress towards sustainable agro-ecosystems has been made in the past decade. The largest study comprised the analysis of 286 projects in 57 countries. In all, some 12.6 million farmers on 37 million hectares were engaged in transitions towards agricultural sustainability in 286 projects. See Pretty (2008), op. cit.
- <sup>107</sup> Grosskurth (2010), op. cit.
- <sup>108</sup> FAO (September 2010) 'Undernourishment', Economic and Social Development Department.
- <sup>109</sup> The four-pronged approach is instrumental in achieving food security in terms of production, increasing productivity, resilience, and sustainability of farming systems. It should be noted, however, that important gains can be achieved also by paying attention to the demand side, food processing, waste management, consumption patterns and habits. Nevertheless, the analysis of these important aspects goes beyond the scope of this paper.
- <sup>110</sup> Oxfam International (2009b) 'Investing in Poor Farmers Pays, Rethinking how to Invest in Agriculture', Briefing Paper.
- <sup>111</sup> Oxfam International (2009a) 'Harnessing Agriculture for Development', Research Report.
- <sup>112</sup> Oxfam Novib (2008) 'The Right to a Sustainable Rural Livelihood. Strategies, Lessons Learned and Actions (2008–2010)'.
- <sup>113</sup> P. Hazell (2004) 'Smallholders and Pro-Poor Agricultural Growth', OECD POVNET Agriculture Task Team.
- <sup>114</sup> Oxfam International (2009a), op. cit.
- <sup>115</sup> World Bank (2009), op. cit.
- <sup>116</sup> Grosskurth (2010), op. cit.
- <sup>117</sup> World Bank 2008(a), op. cit.
- <sup>118</sup> J. Berdegue (2001) 'Cooperating to Compete: Peasant Associative Business Firms in Chile', Department of Social Sciences, Communication, and Innovation Group, Wageningen University.
- <sup>119</sup> Oxfam International (2009b), op. cit.
- <sup>120</sup> de Janvry and Sadoulet (2008), op. cit.
- <sup>121</sup> Oxfam International (2009b), op. cit.
- <sup>122</sup> IFAD successfully supports micro-credit projects through women farmers' groups in Uganda.
- <sup>123</sup> Oxfam International (2009b), op. cit.
- <sup>124</sup> C. Miller (2004) 'Examining Design and Innovations in Rural Finance for Addressing Current and Future Challenges', FAO Rural Finance Workshop, SEEP Pre-event, October 2004.
- <sup>125</sup> OECD/AfDB (2005) 'African Economic Outlook: Financing Small and Medium Enterprise Development'.
- <sup>126</sup> de Schutter (2009a), op. cit.
- <sup>127</sup> World Bank (2009), op. cit.
- <sup>128</sup> World Bank (2010), op. cit.
- <sup>129</sup> OECD (2006), op. cit.
- <sup>130</sup> World Bank (2010), op. cit.
- <sup>131</sup> Ibid.
- <sup>132</sup> Ibid.
- <sup>133</sup> Ibid.
- <sup>134</sup> De Schutter (2009a), op. cit.
- <sup>135</sup> Ibid.
- <sup>136</sup> Oxfam Novib (2008), op. cit.
- <sup>137</sup> World Bank (2009), op. cit.
- <sup>138</sup> S. Vermeulen and L. Cotula (2010) 'Making the Most of Agricultural Investment: A Survey of Business Models that Provide Opportunities for Smallholders', FAO and IIED.
- <sup>139</sup> Oxfam International (2009a), op. cit.
- <sup>140</sup> Vermeulen and Cotula (2010), op. cit.
- <sup>141</sup> Oxfam International (2009a), op. cit.
- <sup>142</sup> Ibid.
- <sup>143</sup> Ibid.
- <sup>144</sup> Oxfam International (2009b), op. cit.

**Lucia Wegner**, the main author, is an independent consultant in the field of development economics. From 2001 to 2009 she worked at the OECD Development Centre, managing the African Economic Outlook project and conducting research on economic, social, and political trends in African countries. While at the OECD, and in her current consultancy activity, she has carried out and published original studies on crucial issues for African development, including the financing of small and medium enterprises; access to drinking water and sanitation; developing technical skills; governance and political instability; the impact of globalisation; energy and poverty; promoting and financing transport infrastructure; food security and agricultural value-chain financing.

Before joining the OECD, Lucia worked as a Research Associate in the Treasury department of the European Bank for Reconstruction and Development and as Project Officer at the Development Co-operation Office of the Italian Embassy in Hanoi (Vietnam), co-ordinating and monitoring projects financed by the Italian ODA (Official Development Assistance). She has also worked at UNCTAD, Geneva and at the UN Division for Sustainable Development, New York.

Her research interests include African economic development, agricultural value-chain development and financing, and technical skills development. She currently lives in Amsterdam, The Netherlands.

**Gine Zwart** is a senior policy adviser with Oxfam in the Netherlands. She worked on this report as a co-author and manager of the process in close cooperation with Madelon Meijer, also working at Oxfam Novib in the Netherlands.

## Acknowledgements

The authors would like to thank the following Oxfam colleagues who gave invaluable support and feedback, Robert Bailey, Stephanie Burgos, Constantino Casabuenas, Luca Chinotti, Mark Fried, Duncan Green, Kate Geary, Lina Holguin, Gigi Manicad, Bruno Molijn and Marita Wiggerthale. In addition, in carrying out this project the authors benefited from exchanging different points of view with various external experts. They would especially like to thank Federico Bonaglia, Senior Policy Analyst, OECD Development Co-operation Directorate; Jasper Grosskurth, project leader of the project 'Technology in Africa' of STT (Stichting Toekomstbeeld der Techniek); Mans Lanting, Senior Consultant, Sustainable Agricultural (Chain) Development; Roberto Longo, Policy Co-ordinator, Policy and Technical Advisory Division, IFAD; and Ruby Rabbinge, University Professor in Sustainable Development and Food Security at Wageningen University.

Graphics: Roelant Meijer, Tegenwind. [www.tegenwind.eu](http://www.tegenwind.eu)

## Oxfam Research Reports

Oxfam Research Reports are written to share research results, to contribute to public debate and to invite feedback on development and humanitarian policy and practice. They do not necessarily reflect Oxfam policy positions. The views expressed are those of the author and not necessarily those of Oxfam.

© Oxfam International April 2011

This report was written by Lucia Wegner and Gine Zwart. Oxfam acknowledges the assistance of Catherine Robinson and Roelant Meijer in its production. It is part of a series of research reports written to inform public debate on development and humanitarian policy issues.

This publication is copyright but text may be used free of charge for the purposes of advocacy, campaigning, education, and research, provided that the source is acknowledged in full. The copyright holder requests that all such use be registered with them for impact assessment purposes. For copying in any other circumstances, or for re-use in other publications, or for translation or adaptation, permission must be secured and a fee may be charged. E-mail [publish@oxfam.org.uk](mailto:publish@oxfam.org.uk).

For further information on the issues raised in this paper please e-mail [advocacy@oxfaminternational.org](mailto:advocacy@oxfaminternational.org).

The information in this publication is correct at the time of going to press.

[www.oxfam.org](http://www.oxfam.org)

Published by Oxfam GB for Oxfam International under ISBN 978-1-84814-833-8 in April 2011.  
Oxfam GB, Oxfam House, John Smith Drive, Cowley, Oxford, OX4 2JY, UK.

Oxfam is an international confederation of fourteen organizations working together in 99 countries to find lasting solutions to poverty and injustice:

Oxfam America ([www.oxfamamerica.org](http://www.oxfamamerica.org)),

Oxfam Australia ([www.oxfam.org.au](http://www.oxfam.org.au)),

Oxfam-in-Belgium ([www.oxfamsol.be](http://www.oxfamsol.be)),

Oxfam Canada ([www.oxfam.ca](http://www.oxfam.ca)),

Oxfam France - Agir ici ([www.oxfamfrance.org](http://www.oxfamfrance.org)),

Oxfam Germany ([www.oxfam.de](http://www.oxfam.de)),

Oxfam GB ([www.oxfam.org.uk](http://www.oxfam.org.uk)),

Oxfam Hong Kong ([www.oxfam.org.hk](http://www.oxfam.org.hk)),

Intermón Oxfam ([www.intermonoxfam.org](http://www.intermonoxfam.org)),

Oxfam Ireland ([www.oxfamireland.org](http://www.oxfamireland.org)),

Oxfam Mexico ([www.oxfammexico.org](http://www.oxfammexico.org)),

Oxfam New Zealand ([www.oxfam.org.nz](http://www.oxfam.org.nz)),

Oxfam Novib ([www.oxfamnovib.nl](http://www.oxfamnovib.nl)),

Oxfam Quebec ([www.oxfam.qc.ca](http://www.oxfam.qc.ca))

The following organizations are currently observer members of Oxfam International, working towards full affiliation:

Oxfam India ([www.oxfamindia.org](http://www.oxfamindia.org))

Oxfam Italy ([www.oxfamitalia.org](http://www.oxfamitalia.org))

Oxfam Japan ([www.oxfam.jp](http://www.oxfam.jp))

Please write to any of the agencies for further information, or visit [www.oxfam.org](http://www.oxfam.org).

Email: [advocacy@oxfaminternational.org](mailto:advocacy@oxfaminternational.org)

[www.oxfam.org](http://www.oxfam.org)

