



Secretariat HLPE, c/o FAO
Viale delle Terme di Caracalla
00153 Rome, Italy
Tel: 0039 06 5705 2762
Website : www.fao.org/cfs/cfs-hlpe
E-mail : cfs-hlpe@fao.org

HLPE reports 1-10

Summaries and Recommendations

Contents

HLPE #1 PRICE VOLATILITY AND FOOD SECURITY	4
Principal observations	4
Recommendations.....	7
HLPE #2 LAND TENURE AND INTERNATIONAL INVESTMENTS	11
Context	11
Principal observations	11
Recommendations.....	13
HLPE #3 FOOD SECURITY AND CLIMATE CHANGE.....	17
Principal observations	17
Recommendations.....	19
HLPE #4 SOCIAL PROTECTION FOR FOOD SECURITY	29
Principal observations	29
Recommendations to policy-makers	33
Recommendations to the CFS	34
HLPE #5 BIOFUELS AND FOOD SECURITY	36
Summary	36
Recommendations	42
HLPE #6 INVESTING IN SMALLHOLDER AGRICULTURE FOR FOOD SECURITY	45
Main observations	45
Recommendations.....	50
Recommendations to the CFS	53
HLPE #7 SUSTAINABLE FISHERIES AND AQUACULTURE FOR FOOD SECURITY AND NUTRITION	54
Main findings.....	54
Recommendations.....	59
HLPE #8 FOOD LOSSES AND WASTE IN THE CONTEXT OF SUSTAINABLE FOOD SYSTEMS.....	63
Main findings.....	63
Recommendations.....	68
HLPE #9 WATER FOR FOOD SECURITY AND NUTRITION	72
Main findings.....	72
Recommendations.....	81

HLPE #10 SUSTAINABLE AGRICULTURAL DEVELOPMENT FOR FOOD SECURITY AND NUTRITION: WHAT ROLES FOR LIVESTOCK?.....	87
Summary	87
Recommendations.....	93

HLPE #1 PRICE VOLATILITY AND FOOD SECURITY

[Download the HLPE Report #1 here](#)

Summary and Recommendations for policymakers

Food price volatility over the last four years has hurt millions of people, undermining nutritional status and food security. The level of price volatility in commodity markets has also undermined the prospects of developing countries for economic growth and poverty reduction. After staying at historic lows for decades, food prices have become significantly higher and more volatile since 2007. A first price spike occurred across almost all commodities in 2007/2008. After a drop in 2009/10, prices are now climbing again and volatility remains high. Periods of high or low prices are not new. In fact, price variability is at the core of the very existence of markets. Since 2007, however, the degree of price volatility and the number of countries affected have been very high. This is why food price volatility in the context of higher food prices has generated considerable anxiety and caused real problems in many countries.

Global and national responses to this unprecedented food price trend have been remarkable. There have been numerous governmental and intergovernmental initiatives to protect vulnerable populations from the negative consequences of higher food prices. In October 2010, the recently reformed Committee on World Food Security (CFS) asked the High Level Panel of Experts on Food Security and Nutrition (HLPE) to prepare a report on price volatility that covers *“all of its causes and consequences, including market distorting practices and links to financial markets, and appropriate and coherent policies, actions, tools and institutions to manage the risks linked to excessive price volatility in agriculture. This should include prevention and mitigation for vulnerable producers and consumers, particularly the poor, women, and children, that are appropriate to different levels (local, national, regional and international) and are based on a review of existing studies. The study should consider how vulnerable nations and populations can ensure access to food when volatility causes market disruptions”*.

Principal observations

1. Price volatility has a strong impact on food security because it affects household incomes and purchasing power. Simply put, it can transform vulnerable people into poor and hungry people. Price volatility also interacts with price levels to affect welfare and food security. The higher the price, the stronger the welfare consequences of volatility for consumers, while the opposite is true for producers. This interaction implies that focusing only on price spikes will not address overall welfare consequences. Thus, this report addresses both dimensions of price behaviour.
2. To better understand the underlying causes of recent food price behaviour, three interlinked explanations – relating to short, medium, and long-term factors – are discussed. The first explanation defines food price increases as a problem of ‘agricultural price volatility’ (implicitly suggesting that high prices will not last) and as a quasi-natural and constant problem in agricultural markets. To understand if this explanation is consistent with recent trends, one needs to assess if the price volatility seen since 2007 has been out of the ordinary. There appears to be a consensus that price volatility in the last five years has been higher than in the previous two decades, but lower than it was in the 1970s. Because of the liberalization of markets over the past 20 years, however, domestic prices in many countries are more connected to international prices than they were in the 1970s. For some developing countries, liberalization has also meant a significant increase in the level of imports in the total food supply, making international food price volatility even more a concern than it would have been in the 1970s.
 - a. Based on the view that volatility is the normal state of agricultural markets, three possible causes of international food price volatility are discussed in the report: demand elasticity, trade policies and speculation. Of these three, the role of

speculation in the futures market is clearly the most controversial. Nobody contests the dramatic increase in the volume of non-commercial transactions on the futures market. However, conclusions diverge widely as to whether increased non-commercial transactions led to the formation of price bubbles. By contrast, the effects of both the demand from the biofuel industry and the use of restrictive trade measures (mostly export bans) on prices are far less controversial. But both issues are very sensitive politically. Biofuel support policies in the United States and the European Union have created a demand shock that is widely considered to be one of the major causes of the international food price rise of 2007/08. Similarly, the restrictive trade measures adopted by many countries to protect consumers during that time are widely seen as having accelerated price increases. Both biofuel support policies and export restraints have led many governments to question whether they can rely on international markets as part of their food security strategies.

- b. Increasing volatility may also be related to a decrease in price elasticity of demand as a result of increased income. The richer a consumer is, the less likely it is that s/he would reduce food consumption because of a price increase. This is because the share of staple food in the total expenditure of relatively rich people is smaller relative to their income. As a result, an increase in prices does not necessarily lead to a decrease in demand. Given the overall growth in world incomes, food demand is now less price sensitive, which, as price theory shows, can lead to more volatility. This observation raises an international equity issue. In the international markets, consumers with very different income levels compete for access to food. Consumers in poor countries are much more sensitive to price changes than consumers in rich countries. This is true of richer and poorer consumers within countries as well. It also means that, when supplies are short, the poorest consumers must absorb the largest part of the quantitative adjustment necessary to restore equilibrium to the market. While a spike in food prices forces the poorest consumers to reduce their consumption, richer consumers can maintain more or less the same level of consumption, increasing inequity in the overall distribution of food. Biofuel support policies tend to reinforce this uneven division of the quantitative adjustment because they make the biofuel industry less sensitive to higher commodity input prices.
3. The second explanation of the current behaviour of international food prices points to the fact that there have been periodic food crises (1950s, 1970s, and present) that can be explained by the dynamics of agricultural investment. High prices trigger a rush of investment and technological development that succeeds in raising production and lowering prices. In contrast, persistence of low prices leads to a reduction of public interest and waning investment. This situation persists until supply is so low that prices begin to spike, which again triggers a new round of investment. From the end of the 1970s to the mid-1990s, the growth of world Agricultural Capital Stocks (ACS) slowed, ultimately stabilizing at a low growth level. Several developed regions even experienced a process of decapitalization in agriculture. In developing regions, the growth of ACS stayed positive, but slowed and is still slowing in Latin America, sub-Saharan Africa, and south Asian countries. The slowing of agricultural investment growth occurred during a period of restricted public support for agriculture in developing countries. Calculated as a percentage of agricultural Gross Domestic Product (GDP), public spending decreased from 11 percent in 1980 to 8 percent in 1990 before returning to 10 percent in 2002. This is much lower than in developed countries, where the share of public support to agriculture is often more than 20 percent of agricultural GDP. This general slowing of government expenditure adversely affected agricultural research. Nor did financial aid to developing countries from OECD countries and multilateral agencies counter this trend. Indeed, ODA certainly contributed to the trend away from public investment in agriculture in the poorest countries.
4. The third explanation sees the current price increases as an early signal of a long-lasting scarcity in agricultural markets. According to this explanation, the world could be facing the end of a long period of structural overproduction in international agricultural markets, made possible by the extensive use of cheap natural resources (e.g. oil, water, biodiversity, phosphate, land) backed by farm subsidies in OECD countries. In other words, we might be at the end of a

period of historically unprecedented growth in agricultural production that relied on a strategy akin to mining. At the same time, new demands for biomass are emerging. Biofuels are just the most visible part of increasing demand for biomass to provide not only food but also building materials, heat, and transportation. This explanation of rising food prices in terms of scarcity is not new; it was much discussed in the 1970s. But our understanding of the environment has deepened. Today, we see more clearly the costs of industrial agriculture, including the associated pollution, depletion of freshwater aquifers and loss of biological diversity. We also see the costs of long-term under-investment in agriculture and agricultural research. We are asking new questions about what to expect from climate change and how the introduction of potentially unlimited demand on agricultural resources from the energy sector will play out. We can be optimistic that human ingenuity will find solutions, but only if we are prepared to learn from our past mistakes. The long-term challenges confronting agriculture today on both the supply and the demand side are very real.

5. Although rising international food prices represent a serious threat to vulnerable people in developing countries, it is domestic food price inflation and volatility that determine the poverty and food security impacts of international food crises. In most developing countries, the 2007/08 international food price rise was transmitted to domestic prices, although not evenly and in some cases with significant delays. Moreover, the subsequent drop in international prices was only partially transmitted – average consumer prices in developing countries remained up to 50 percent higher than they were before 2007/08. The international price rise that started in 2010 and continues today was transmitted to domestic markets even more quickly than the 2007/08 price spike. However, the uneven transmission of international price spikes to domestic prices across countries, commodities, and time periods means that each case will require careful characterization of the transmission in order to appropriately formulate price stabilization and food security policies.
6. In many poor countries, price volatility on domestic markets for locally grown products is the result of both the transmission of international price volatility and of purely domestic (sometimes called endogenous) sources. Even when international prices are stable (as they were between 2000 and 2007) many poor countries exhibited very high price volatility across space and time. Again, there is a large heterogeneity with respect to the mix of imported and domestic sources of volatility. Each country should therefore accurately identify the sources of its own price volatility. Appropriate policies to stabilize, manage, and cope with domestic price volatility can be quite different depending on the sources of price volatility.
7. The Food and Agriculture Organization (FAO) has estimated that the 2007/08 price spike increased the number of undernourished people from about 850 million in 2007 to about 1023 million in 2009. These estimates are contested on several grounds however, including the failure to account for the specific conditions of countries with protected domestic markets, such as India and China, where there was little transmission of higher global prices and have had strong income growth. Furthermore, FAO estimates do not account for the gains from the higher prices commodities (non-cereal) on which millions of people in developing countries rely for their livelihood. To date, there is no institutional mechanism that systematically collects and analyzes data with a view to informing a global and dynamic vision of the actual impact of food price crises on vulnerable populations.
8. There is considerable heterogeneity across countries in terms of how increased price volatility could affect a given country. Key sources of heterogeneity include: agro-ecological conditions and connectivity (e.g. landlocked countries may be affected differently from those with coastal access), preferences of staple food (e.g. diversified versus single staple focus), institutional capacity to implement policies, and macroeconomic health. There is consequently no 'one policy response fits all' approach. This finding has the following implications:
 - a. The feasibility and effectiveness of some of the most commonly recommended policy prescriptions for poor countries – such as scaling up social safety nets and introducing weather insurance programmes for risk management – will vary from country to country. Therefore, information regarding cross-country heterogeneities needs to be assessed in order to make these policies work.

- b. It will be necessary to work with a typology of countries that helps to identify country-specific contexts with respect to impacts and policy responses. One category of particular focus in the typology should be poor, highly food-insecure countries. For each country within this category, it will be important to develop a typology of households to characterize differential channels of the impact of price volatility on welfare. This will involve assessing the net seller–net buyer position of the household in term of staple food markets.
- c. Every country will need to design its own comprehensive food security strategy. This will involve objective assessment of the existing food security policies and programmes, identification of gaps, and working towards building the internal institutional capacity to address them.

Recommendations

1. **Trade rules:** Building a rules-based multilateral trading system able to guarantee food access for every country is now a major challenge for the international community. Since the Uruguay Round, negotiations regarding agriculture have been conceived and conducted in the context of a structural overproduction. This means that the focus has been on how to limit trade conflicts amongst exporting countries and how to open up protected economies to more imports. The objective of the rules was to guarantee fairness of competition between suppliers and to protect market access for exporters. Access to world markets was *not* negotiated for importers and export restrictions were hardly disciplined. The increase in international food prices and the breakdown of the Doha negotiations opens the possibility of a new project in which confidence in international markets would not be based on unrestricted free trade. The food price crisis showed that sovereign states are not prepared to serve international markets at the expense of domestic priorities. This political ‘reality check’ suggests that trade policies, and the multilateral rules that frame them, need to be reconsidered. Multilateral rules are more essential than ever.
 - a. ***Governments should continue to focus on building a transparent, accountable and rules-based multilateral trading system. However, these rules need to give a larger place to public policy concerns regarding food security, better account for the heterogeneity of World Trade Organization (WTO) member states and taking into account special needs of poor and vulnerable countries or social groups.***
 - b. ***Measures to consider include disciplines on export restrictions, safeguarding measures to protect against import surges, measures to better ensure that commercial actors respect contractual obligations, and exemptions for genuine responses to food emergencies (food aid practices continue to require further reforms as well).***
 - c. ***Distinct rules for low-income food-deficit countries (LIFDCs) should be explored.***
2. **Stocks:** The relationship between stock levels and price volatility is well established: low stocks are strongly associated with price spikes and volatility. It is likely that some international coordination of stocks would also make an important contribution to restoring confidence in international markets.. Empirically, a minimum level of world stocks seems to be a sufficient condition to avoid price spikes. Experience also shows that, in a crisis, access to financing mechanisms may not secure stocks during supply shortages. Past experience

shows that managing world stocks for price stability is difficult as this requires inter-government cooperation and information. This needs international agreement regarding complex issues - among other issues - when to stock, governance of the systems, location, coordination and ensuring that the stocks reach those who need it most.

- a. The current context is different from the past, therefore, it is recommended that the CFS continues to explore forms of international cooperation regarding world food stocks and food security including the establishment of guidelines for the efficient management of such stocks.*
 - b. Better and transparent information systems are essential for policy decisions and management of stocks. The [AMIS] system proposed by the Inter-agency Report for the G20 is welcomed.*
3. **Speculation on the futures market:** Even though the evidence on the impacts of increased speculative activities on prices is inconclusive, the risks of the formation of price bubbles and the exclusion of commercial actors, because of higher costs of participation in a deregulated commodity futures market, are well documented. This implies that tighter regulation is warranted, at least as a precautionary measure. Increasing transparency, by requiring exchange trading and clearing of most agricultural commodity contracts, and setting lower limits for non-commercial actors could be the first set of measures taken by the countries that house major commodity exchanges.
 - a. Action regarding transparency in futures markets and tighter regulation of speculation is necessary.*
4. **Demand for food products:** It appears increasingly clear that the unlimited demand of rich consumers for food products generates negative pecuniary externalities for the poorest consumers. Demand tends to be presented as an exogenous variable (like the weather) that cannot be negotiated. This is not true. Indeed, we know that the consumption levels of the world's richest countries cannot be extended to everyone in a world that looks set to grow to include nine billion people. Demand is significantly affected by public policy choices and can be reduced. . The significant expansion in the production of animal products also raises questions as a number of associated costs are not internalized in prices, and because industrial meat production places significant demands on cereal stocks and freshwater reserves. Moreover, the livestock industry makes a significant contribution to greenhouse gas emissions. By generating a new demand for food commodities that can outbid poor countries and food-insecure populations, industrial biofuels highlight the tension between a potentially unlimited demand (in this case for energy) and the constraints of a world with finite resources. Several proposals linked to changes in existing mandates could reduce the likelihood of biofuel production contributing to price spikes..
 - a. Given the major roles played by biofuels in diverting food to energy use, the CFS should demand of governments the abolition of targets on biofuels and the removal of subsidies and tariffs on biofuel production and processing.*
 - b. Governments should explore incentives for the reduction of waste in the food system including addressing post harvest losses.*
5. **Investing in agriculture:** Investing in agriculture with a long-term view is necessary to prevent a repetition of the food crisis. It is also necessary to guarantee a transition from food and agricultural systems that deplete natural resources to sustainable food and agricultural systems that reduce the use of fossil energy and pollution. New public and private investments are necessary in both research and development. Preservation of agro-biodiversity and the creation of new varieties should be promoted by international and national agronomic research centres, as should research aimed at maximizing biomass on diversified agricultural production systems. Agro-ecology offers an important and complementary base of experience and perspectives for such a transition that is particularly suited for producers with limited access to chemical inputs. Collaboration between international agronomic research

centres and agro-ecology supporting organizations should be encouraged. Public support is also necessary to help farmers to engage in more ecologically sustainable systems. With these investments, national governments should reinforce local capacity and resilience of food production systems. Investment at all levels should respect the plurality of knowledge systems, including women's knowledge and the knowledge of indigenous peoples.

- a. Stable and sustainable long-term investment in agriculture is a necessary condition for addressing the challenges in food security.**
 - b. A significant global expansion in funding for agricultural research and development is recommended. Strengthening the current reform process of the CGIAR and support for national research systems will contribute to long-term solutions to food insecurity, especially in the context of land degradation, water scarcity and climate change.**
6. **Incorporating externalities in the cost of food production:** High food prices are an opportunity to promote internalisation of externalities to create incentives for improving the efficiencies of production systems. In addition to new public investments, institutional devices aimed at increasing the cost of using non-renewable natural resources are essential to effect a transition to more sustainable production models. Such incentives should be selected on the basis of a comparative evaluation of their implementation, monitoring and information costs. Better cost accounting for industrial agriculture will go a long way in ensuring that agribusiness pays its share of the cost for agriculture, while allowing the economic and ecological efficiencies of small-scale producers to ensure a fairer return.
 - a. It is recommended that this issue should be considered in food security debates. Further research is needed to identify and test such incentives.**
7. **Promoting food security strategy programmes:** Food security is a complex and multidimensional issue and a national responsibility. Therefore countries need an national comprehensive food security strategy in line with the specificities and special characteristics of each country. Such strategies should include policies to reduce, manage and cope with price volatility. These strategies should be developed and managed in an inclusive manner with civil society, Farmers' Organisations and in partnership with the private sector. The elaboration of a food security strategy should be based on robust data collection and analysis. Regular policy review is necessary. Policies should be coherent. Governments need information systems to be able to assess hunger and malnutrition, provide early warnings and target appropriate assistance effectively. Elaboration of food security strategies is consistent with the Rome Principles

Two categories of policies and programmes can be contemplated at the national level to solve the volatility problem in relation to food security. The first aims at stabilizing prices. The second aims at reducing the impact of price volatility on incomes and purchasing power. This can be divided into two further categories: steps taken in anticipation of price shocks (*ex ante*) to reduce their impact, and steps taken after the shocks occur (*ex post*) to help people and businesses cope with price volatility. The policy and programme instruments can be divided into three groups corresponding to the roles of the market, state, and civil society in development: market-based instruments, direct state interventions in markets, and interventions through civil society organizations. Combining the three policy objectives (stabilization, management, and coping) with the three categories of instruments (market, state, and civil society) gives nine classes of instruments. The proposed typology constitutes a convenient way of organizing the multitude of policy instruments used by developing countries and advocated by different analysts during the recent world food price swings.

- a. The CFS should encourage and support the establishment or review of existing national food security strategies in each member country. This should include**

human and institutional capacity to develop, implement and monitor food security.

- b. There should be an inter-sectoral national coordination structure, including civil society representatives and farmers' organisations representatives, to coordinate implementation of the national strategies.*
 - c. The vast array of instruments (such as those identified in this paper including social protection) should be combined to achieve the maximum impact and to fit the food security strategy of each particular country.*
 - d. It is recommended that a typology of countries and vulnerable groups may help policy makers in selecting the most appropriate policy instruments. This should include consideration for the various stages of the human life-cycle.*
8. **The role of the CFS:** The recent food crisis shows that there is a need and an opportunity to reduce the occurrence and severity of food crises by better management of information, learning, and coordination of policy interventions at a world level. The CFS could play a major role in these three domains.
- a. The CFS should ensure that the information on food security is appropriately managed as well as the coordination of policy interventions at the global level.*
 - b. The CFS could play a role in the establishment of the Agriculture Market Information System (AMIS) and the Rapid Response Forum (RRF) proposed by the G20. It is recommended that the AMIS market information be extended to include food crops other than the usual global cereals, including livestock and fish. AMIS should also include reliable, disaggregated and accurate information on hunger to support the achievement of food security. The AMIS could play a role in early warning.*
 - c. The CFS should coordinate short and long term policy measures taken in relation to price spikes (considering trade barriers, food aid, input subsidies, stocks, etc...).*
 - d. The CFS should also serve as a body where donors and governments make long term commitments to public investments in food security and a body where those commitments are monitored and enforced.*
 - e. The CFS should contribute to better inter-governmental coordination, including emergency policy measures taken in relation to price volatility.*
 - f. The CFS, as the highest governance body on world food security should stimulate and facilitate debate and learning on food security issues, including as a forum for more open debate on how agricultural trade rules could support food security.*
 - g. The CFS should establish codes of conduct on food security issues for better international cooperation.*
 - h. More studies are required on global governance on agriculture and food security, to inform the Global Strategic Framework on Food Security and Nutrition.*

HLPE #2 LAND TENURE AND INTERNATIONAL INVESTMENTS

[Download the HLPE Report #2 here](#)

Summary and Recommendations for policymakers

Context

The Committee on World Food Security (CFS) at its meeting of October 2010 requested the High Level Panel of Experts on Food Security and Nutrition (HLPE) to conduct a study on land tenure and international investments in agriculture and to present the findings at its next session in October 2011. The study of the HLPE is to undertake analysis and formulate policy recommendations in the following three areas: (i) the respective roles of large-scale plantations and of small-scale farming, including economic, social, gender and environmental impacts; (ii) review of the existing tools allowing the mapping of available land; and (iii) comparative analysis of tools to align large scale investments with country food security strategies.

Given the breadth of this topic, the study team chose to focus on large scale investment in land. We recognize that pressures on land stem from both domestic and international investment, and the two are often linked. However, the international dimension is particularly important because of the very unequal access to resources which exists at global level. Land is becoming a global asset to be traded just like any other commodity. Yet land is different, since it provides a livelihood to more than 2 billion smallholders, many of whom are poor and food insecure. Land is also different due to the valuable environmental services it provides, and its strong social, and cultural attributes.

The last five years have witnessed growing investor interest in land and agriculture. While definitive statistics are hard to obtain, widely quoted figures assert that between 50 and 80 million hectares of land have been subject to negotiations by international investors, much of it in low income countries. It is generally agreed that more investment is needed in agriculture to address the needs of current and future generations. The report recognizes the diversity of experience between regions and countries, in terms of land availability, property rights, and public policy. But if such widely quoted figures are correct, there is good reason for concern about the impact of such land acquisitions on the food security of people in many of the countries hosting such investments. Can this large scale investment bring positive outcomes, or is it bound to damage the livelihoods of local people, and generate social and environment costs? Given the central role of government in managing and negotiating such inward investment, their role is key to setting the terms and conditions for ensuring a proper balance of interests between local land users and investors, and enforcing such contractual agreements. This report sets out recommendations for governments, international institutions and investors to address the serious concerns raised by this heightened interest in land acquisition.

Principal observations

1. Widely quoted figures assert that over recent years an estimated 50-80 million hectares of land in middle and low income countries have been subject to negotiation by international investors, seeking to buy or lease this land. At the same time, close on one billion people are short of food and another billion suffer from various forms of malnutrition in middle and low income countries, despite sufficient global food production. Since late 2010, food prices have risen to levels comparable to the food price spike of 2007-08, pushing more people into hunger.
2. It is widely recognised that increased agricultural investment is needed to raise yields as a means to improve food security in many parts of the world. Can such international investment in land be a means to improve agricultural productivity and rural livelihoods? Evidence from this land rush to date shows very few such cases. Rather, large scale investment is damaging the food security, incomes, livelihoods and environment for local people.

2. Research institutions, CSO and media sources are fast gathering information on large scale land acquisitions. Despite this, accurate data on important aspects, like scale, terms of the contracts and impacts from investment are limited. Roughly two-thirds of the estimated 50-80 million hectares acquired as investments are in sub-Saharan Africa. Data are poor in part because of secrecy from both investors and host governments over the scale of allocations and the terms on which land is acquired.
3. The range of interests behind large scale land investments include multinational companies engaged in a variety of investments including biofuels and extractive industries, foreign governments seeking an assured food supply, commercial farmers expanding into neighbouring countries, and financial institutions wanting to broaden their asset portfolio. Domestic investors are also important in many countries, sometimes in partnership with foreign capital.
4. More than three quarters of the land deals announced have yet to demonstrate tangible investment in terms of agricultural output. Part of this may be due to speculative behaviour. Delays in finalising land transfers, the time taken to raise capital funding, and conclusion of negotiation with governments will also account for some of this gap.
5. In many countries hosting large scale acquisitions, the government claims ownership of land, water and other natural resources. Hence, government is central in encouraging inbound investment, making land available, and negotiating with investors as well as enforcing contractual agreements. Given the scale of international interest in land investment, a number of governments in Latin America are now imposing new controls on foreign land investment to protect citizen interests.
6. Growing demand for food, feed, and biofuels as well as minerals and timber is driving large scale international land investments. Governments of countries that rely on food imports want to secure their nation's food security by buying productive foreign land. Policies to substitute biofuels for petroleum for transport in the EU and elsewhere are generating strong and unsustainable demand for oil palm, sugar cane and jatropha.
7. Ecological stress, such as water shortages and drought, combined with environmental policy, such as nature conservation, and carbon sequestration projects like REDD+, are also prompting increased international investment in land. All of these drivers are likely to increase over the next several decades, and intensify with the shifting impacts of climate change on agricultural production, putting ever greater pressure on land and water resources.
8. The finance sector is a relative newcomer to farmland acquisition. Its interest has been generated by rising prices for food and other agricultural commodities, the perception that the value of land and water is increasing, and the emergence of farmland as a global asset in a portfolio of other investments, offering a return less affected by the latest international financial crisis.
9. Global surveys of bio-physical potential show that considerable reserves of land exist, especially in Latin America, sub-Saharan Africa and the Former Soviet Union. Yet, such reserves are not necessarily "available". Much land already has other uses, such as cultivation and livestock grazing, as well as providing vital environmental services (as do tropical forests, grasslands and wetlands). The satellite and aerial imagery used in bio-physical surveys is blind to the rights and institutions that govern how land is actually used on the ground.
10. Much land in middle and low income countries is productively occupied and used, but does not have formal paper title, rendering such customary rights vulnerable to dispossession. Rights of women, social groups relying on the commons (grazing, woodland, wetlands), ethnic minorities and indigenous peoples are particularly insecure.
11. The legal status of land proposed for transfer or actually allocated to investors varies across countries and regions. State ownership is common, though government can also invoke eminent domain, on the grounds that it is acting in the public good, and reclassify private or village land to public land. The terms of acquisition also vary greatly, from short to long term leases, and freeholds. In case of leases, annual rental payments are frequently very low, though investors

may be expected to commit capital to investment in infrastructure. Many contracts refer to employment provision, but are often imprecise about the detail or consequences of non-compliance. Equally, there is frequently little in the way of binding agreements on local procurement, processing of produce, and payment of taxes. Given that these contracts are usually kept confidential, it is very difficult for performance to be scrutinised or investors held to account by government agencies, parliament, local people, CSOs, or media.

12. Community consultation is usually required of the investor, but is frequently carried out at speed and without proper information, with benefits oversold and adverse impacts downplayed. The different actors – investor, government, local people – enter the negotiations with highly asymmetric information and power. Consequently, local people usually lose out, and governments lose both revenue and opportunities to achieve long term benefits for their populations.
13. This report was specifically tasked with reviewing the relative roles of small- and large-scale agricultural production systems, and there has been long-standing debate on their relative merits. The evidence shows that most crops can be grown just as productively by smallholders as in large commercial estates, although there may be significant economies of scale in the subsequent processing and marketing. The question therefore arises of whether and how large and small-scale production systems can co-exist and bring benefits to all parties. Disagreement revolves around the feasibility of such —win-win-winll solutions, and ways to ensure the rights and interests of local communities are central to agreements currently drawn up by governments and investors, often in secret. The huge number of smallholders in many middle and low income countries and the role they play in generating food, employment and livelihoods for more than 2 billion people should put them at the heart of agricultural development strategies. Yet they are often ignored. Rather than displacing them, governments should invest financial, human and scientific resources for improving small scale production, assist them achieve the necessary scale to access local and regional markets and improve their living conditions.
14. Many of the problems surrounding international investments in land could be dealt with by ensuring smallholder farmers gain a proper say in choices made about the future of their agricultural system, the terms on which they choose to engage with international investors, and more effective enforcement of existing policy and legislation at local, national and international levels. This report summarises the many measures and tools that can be used to improve the processes and outcomes from international investment in land and agriculture. Some have the force of hard law, while others have softer influence, or aim to harness informed consumer choice. In many cases these last substitute for weak capacity in host country governments.
15. A combination of measures operating on different actors and levels is most likely to be effective. These measures and tools, and the discussion set out here, have guided a list of recommendations. These recommendations must tackle the asymmetry in power wielded by governments and large commercial interests, and often used against small farmers. Weaknesses in governance, institutions and incentives mean that a —win-win-winll solution will not happen unless much stronger action is possible from both local land users and their governments (on their behalf). It also requires appropriate compensation mechanisms. Given the likely increase in pressures on land from international (and domestic) investment, it is vital to get a better balancing of the rights and interests of less powerful groups in negotiations with governments and investors. This approach should align with the broader need to focus public investment on smallholder agriculture and alternative production systems that are socially inclusive and environmentally sustainable.

Recommendations

The actions proposed below must recognise that food security is paramount, and measures must tackle the distinct asymmetry in power wielded by land users/occupiers, governments and large commercial interests. Many of the problems surrounding international investments in land could be dealt with by more effective enforcement of existing policy and legislation at national and local levels. However, current weaknesses in governance, institutions and incentives mean that a —win-win-winll solution will not happen unless much stronger weight is given to the capacities of both local land users and host country governments. Equally, because many of the problems are complex and inter-

connected, the recommendations for policy need to be similarly differentiated in terms of sector, level and actors concerned. Given the likely increase in pressures on land in future, from international investment (as well as domestic), it is vital to get a better balancing of the rights and interests of less powerful groups, in negotiation with government and investors.

Host country governments

- 1 Decisions taken now will have major repercussions for the livelihoods and food security of many people for decades to come. Much discussion about large-scale land acquisitions has been highly polarised rather than seeing where there might be some common ground. The people who are most directly concerned by such investments must have their say. There is a need for inclusive debate in host countries concerning pathways for agricultural development and land use planning. Governments should open up this debate, rural poor people (small farmers, indigenous peoples, pastoralists, landless labourers, forest dwellers, rural women, among others) must be central to it, and continued scrutiny from autonomous civil society can help make the renewed interest in agriculture work for broad-based sustainable development. Governments should set up appropriate institutions to organize this consultation and vision development. Governments must have clear, transparent equitable land policies that are accessible, allowing for transparent transfers, equitable access, manageable systems of registration and deeds as well as open transparent heritage rights.
- 2 Host governments must recognise that their citizens have the right to free, prior and informed consent in relation to the land and natural resources on which they depend for their livelihoods. Governments must strengthen and secure rights to land for millions of land users who currently have uncertain tenure over their resources. This includes smallholder farmers, pastoralists, shifting cultivators, fisherfolk, indigenous people, and forest dwellers. Particular attention is needed to secure the access and use rights of women, ethnic minorities and indigenous peoples. Given the diversity of contexts, a multiform approach to land tenure is required, which mixes different legal and administrative modalities. Governments should learn from promising low cost decentralised systems for registering and managing rights, at both the household and community level. This must include common pool resources, which are essential for continued mixed farming, pastoral and indigenous livelihood systems in many low income countries. Given the accelerating pace of large scale land investment, and the limited capacity in many government administrations, community rights registration is vital to ensure protection of livelihoods and associated food security. In settings marked by inequality in land control and ownership, redistributive land policies (such as land reform, land restitution) should be carried out. In Africa, governments should follow the African Union's Land Policy Guidelines, which aim to transform agricultural development by strengthening land rights for smallholder farmers, improving access to land for women, and easing the barriers to land transactions. Systems for grievance and redress need construction at national and regional levels, including for human rights and environment. Robust Environmental and Social Impact Assessments (ESIA) processes are also needed. The impact on women in agriculture needs specific attention, since even a small plot of land in the hands of women strengthens household food and nutrition security.
- 3 Governments should prioritize investment in the small farm sector and in alternative food systems that are socially inclusive and just as well as environmentally sustainable, using agro-ecological principles (see Appendix). In places where large-scale land investments are underway, governments interested in promoting investment should encourage business models that involve collaborating with local farmers and generating employment opportunities, not just land acquisition. Given the major asymmetries in expertise that often characterise the negotiation of deals for agricultural investments, there is a need for legal, financial and technical advice to be available for governments as well as for local communities. One option would be for this legal advice to be provided by the FAO Land Tenure Service. Support may also be needed to rigorously scrutinise investment proposals. Robust systems must be in place that subject leases to compliance with investment plans, and existing land policies. Investment contracts should always provide a clause allowing government (on behalf of local communities) to cancel lease agreements or contracts when they fail to comply with agreed terms, or when insufficient compensation mechanisms are in place.

Support for farmer voice and civil society

- 4 Increased support is needed for farmer representation through their own organizations, with priority to social movements of the rural poor: small farmers, landless labourers, women, indigenous peoples and ethnic minorities, pastoralists and forest dwellers. Other civil society organizations who support the direct representatives of the rural poor should also be provided the needed institutional space. The rural poor's social movement organizations and relevant CSOs need to acquire stronger political weight in national and international decision-making structures. These organisations need backing at country level and internationally to ensure effective scrutiny and accountability of both national and international processes.

Improved practice by corporations

- 5 Investors and business enterprises have a legal responsibility to respect human rights, and must act with due diligence to avoid infringing human rights within their sphere of influence. Investing enterprises have the responsibility to provide adequate non-judicial access to remedy, including effective grievance mechanisms for victims of human rights abuses. States have the obligation to protect the enjoyment of human rights from being impaired by actors in their jurisdictions and to regulate business enterprises accordingly; and should provide effective judicial access to remedies from human rights abuse by investors. Home countries of business enterprises and investing nations or nations supporting investments in other nations must ensure that their actions respect and protect human rights in the host country according to applicable international and regional human rights norms and standards.
- 6 States should hold good faith consultations with local communities, before initiating any plan, project, and measure that may affect the land and natural resources on which they depend for livelihood, social and cultural activities. The procedures of these consultations should be in accordance with the Free prior and informed consent (FPIC) principles and related criteria, as well as the customary rules and decision-making structures of local communities. These procedures should facilitate access to the consultations by all affected peoples, ensuring in particular the participation of women and young people. The consultations must be conducted in a climate of trust that favors productive dialogue, according to well-established standards and oversight by independent observers.

Donor governments

- 7 Donors should align more effectively their bilateral and multilateral initiatives in the field of agricultural investment promotion, to achieve positive outcomes for local farmers. For example, some donors argue that improving productivity and market access for smallholder farming are key to achieving the MDGs while multilateral lenders have been promoting and financing inward investment, including large-scale land acquisitions. Donors should also ensure fulfillment of the G8 and G20 commitments on increased funding support to agriculture made over the last 2 years. This should include support for public infrastructure and policy development to create an enabling environment for smallholder agriculture – based on evidence showing that smallholders can be highly dynamic and competitive on global markets, and that small farm development is feasible and desirable for its impacts on poverty reduction.
- 8 International support is needed for a large increase in public funds for agricultural research and development, emphasizing agro-ecological approaches. There are major challenges ahead if we are to meet the food needs of 9 billion by 2050 in ways which can keep within planetary boundaries, address the impacts of climate change and make land use a net carbon sink. Given the need to reduce further expansion of cultivation into forest and pasture land, a particular focus is required on closing the 'yield gap', especially in middle and low income nations without forgetting the increasing need for ecological sustainability. This requires further strengthening of capacity in a range of key skills.

Governments that are home to international investors

- 9 Taking into account that it is the State's obligation to protect the enjoyment of human rights abroad against harm emanating from its own territory, as articulated by Treaty Bodies in the UN Human Rights System, home governments have a responsibility to make sure that their companies operate according to the highest standards in relation to human rights, and

environmental management. They should enact legislation which requires compliance with international human rights and environmental standards by their nationals operating overseas, and a mechanism whereby people in the country hosting the investment can hold the company to account for its actions.

The Committee on World Food Security

- 10 The CFS shall ask governments to report each year on actions being taken to align international (and domestic) investment in land with food security concerns, including measures to prevent speculative pressures on land, such as leases conditional on proven investment plans.
- 11 Given the major role played by biofuels expansion in accelerating investments on land, the CFS should demand of governments the abolition of targets on food based fuels, and the removal of subsidies and tariffs on biofuel production and processing.
- 12 Since many deals and investments are so recent and, according to World Bank's prediction —the 'land rush' is unlikely to slow (Deiniger et al., 2011), following the approval of its Voluntary Guidelines for the Responsible Governance of Land, Fisheries and Forests, the CFS shall seek to establish at the FAO an observatory for land tenure and the 'right to food' to monitor the processes of access to land and the implementation of the Voluntary Guidelines, ensuring that the investments will result in decreased hunger and poverty in host communities and countries.
- 13 The CFS should encourage further support to regional processes, such as the African Union's Land Policy Initiative, to link these to national policy reform (e.g. through the Pan African Parliament and the African Court of Human Rights).
- 14 During the 12 month process for consultation on the principles for responsible agricultural investment being led by the CFS, attention should also be given to the best means by which investment can contribute most effectively to promoting food security, especially in low and middle income countries, and that all players are involved.

HLPE #3 FOOD SECURITY AND CLIMATE CHANGE

[Download the HLPE Report #3 here](#)

Summary and Recommendations

With many of the resources needed for sustainable food security already stretched, the food security challenges are huge. Climate change will make it even harder to overcome them, as it reduces the productivity of the majority of existing food systems and harms the livelihoods of those already vulnerable to food insecurity. The likelihood of the nations of the world being able to meet the 2°C target of maximal average temperature rise set by the UNFCCC negotiations in Cancun is diminishing with time. If negotiations for global climate policies fail, temperature rises of the order of 4°C by the end of the century, corresponding to the best estimate of the higher emissions scenarios of the IPCC, cannot be discarded. While some might benefit, people in some regions will be affected more than others by changes in average temperature and precipitation. In addition, the likelihood of increased variability and extreme events means that management of risk, both locally and internationally, will be even more important than it is today.

Population growth will continue through 2050 and be accompanied by unprecedented rates of urbanization. These changes will take place mostly in today's developing countries, many of whom will very likely achieve middle-income status. The outcome will be rapid growth in demand for food, both in quantity and quality. Government policies to raise the share of biofuels in energy consumption increase the challenges to our collective ability to achieve sustainable food security.

Contemporary climate change is a consequence of greenhouse gas (GHG) emissions from human activities. According to the IPCC, most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic GHG concentrations. Agricultural activities including indirect effects through deforestation and other forms of land conversion account for about one third of total global warming potential from GHG emissions today so reducing the direct and indirect emissions from agriculture is an essential part of the larger effort to slow the pace of climate change.

Principal observations

1. Food security vulnerability to climate change begins with biophysical effects at the level of individual farms on plants and animals and the systems in which they are managed. These effects alter livelihoods in rural areas directly and urban areas indirectly. International markets transmit the effects of climate change elsewhere and can affect local food security, both for better and worse, by altering domestic prices and influencing livelihoods.
2. Climate change affects plants, animals and natural systems in many ways. Changes in temperature and rainfall regime may have considerable impacts on agricultural productivity. Average temperature effects are important, but there are other temperature effects too. Little is known in general about the impacts of climate change on the pests and diseases of crops, livestock and fish, but they could be substantial. Climate change will result in multiple stresses for animals and plants in many agricultural and aquatic systems in the coming decades. There is a great deal that is yet unknown about how stresses may combine. Irregular precipitation that already affects the livelihood and production of a large number of rural families is expected to become more serious in the face of climate change.
3. A social vulnerability lens is essential to understand why certain individuals, households, or communities experience differences in food insecurity risks, even when they are in the same geographic region. Vulnerability to food insecurity arises both from biophysical and socio-economic reasons with both nutritional and livelihood effects. Pre-existing conditions of vulnerability make poor people more exposed to the effects of climate change, as social, economic and agro-environmental circumstances may become more severe with climate change.

4. The poor and other vulnerable groups are likely to be at high risk to food insecurity brought about by climate change. Who are the poor? They are people who have few assets and low income earning potential. They include small-holders and landless people in the countryside and marginalized ethnic and Indigenous Peoples. Today they are likely to be located in rural areas and be female and children, but the share of urban poverty is growing and the poor are urbanizing more rapidly than the population as a whole. From a geographic perspective, the vast majority are located in two regions – Sub-Saharan Africa and South Asia - where climate change is likely to be especially pronounced. But food insecurity is reported even in the richest countries and it is possible that development pathways that worsen inequality ignore marginalized groups, or result in degradation of the environment will make more people susceptible to food insecurity from climate change in the future. Small-scale farmers and landless laborers, with limited resources of their own and also likely to be underserved by public and private activities, are particularly susceptible to the socioeconomic effects of climate change, especially if increased variability is not accompanied by improved social safety nets (see the HLPE Report on Social Protection for Food Security). Dryland agriculture in arid and semi-arid regions, where over 40 percent of the world's population and more than 650 million of the poorest and most food insecure people live, is particularly vulnerable to the risks of climate change and variability, drought in particular. In some regions of the world, significant agricultural production takes place in low-lying coastal areas and where current population densities are high. In these regions, and particularly in small island states, a major threat of climate change is from saline intrusion, sea level rise and increased flooding.

5. Adaptation of the food system will require complex social, economic and biophysical adjustments to food production, processing and consumption. Such changes will be most difficult for the poorest and most vulnerable regions and populations. Moreover, climate change models suggest that severe effects are likely to be felt in tropical regions, especially the expected further drying of the arid tropics. Many of the poorest countries are found in these regions and hence the nations least able to adapt may be the most affected. Any hope of making substantial progress on the poverty and hunger Millennium Development Goals thus requires successful adaptation in least-developed countries. But all countries will eventually be challenged by climate change.

6. There are important uncertainties in the way climate will change, magnified at regional and local scales where individual decisions are made. Adaptation should thus be seen in the broader context of building a more resilient food system. Lack of sustainability in food production is a key threat to resilience and needs to be addressed by changes in the way we produce food, by moderating demand for foods such as ruminant products whose production generates especially large contributions to GHG emissions, and in the design of national and international food system governance. Identifying and supporting food production and distribution practices that are more resource efficient *and* have fewer environmental externalities should be high priority. Considering the diversity of environmental and social settings in which food production takes place, solutions for improving sustainability will differ. No single approach will be universally applicable and a much better and sophisticated evidence base is needed to help guide the implementation of the most appropriate, context-specific measures. The communities at greatest risk of food insecurity tend to be in low-income countries. Most measures that facilitate sustainable development with an emphasis on improving the livelihoods of the poorest sectors of society will increase general resilience and assist in climate change adaptation.

7. Examples of strategies for community based adaptation include improving water management practices such as building infrastructure for more efficient irrigation systems and small-scale water capture, storage and use, adopting practices to conserving soil moisture, organic matter and nutrients, using short-cycle varieties and setting up community-based seeds and grain banks. Farmers and food producers alone cannot adapt successfully to climate change. They need to be supported by government and by the private sector, and there is also an important role for civil society organisations.

8. Agriculture is an important driver of climate change. Crop and livestock agriculture globally accounts for about 15 percent of total emissions today. Direct GHG emissions from agriculture include methane (CH₄) emissions from flooded rice fields and livestock, nitrous oxide (N₂O) emissions from the use of organic and inorganic nitrogen fertilizers, and carbon dioxide (CO₂) emissions from loss of soil organic carbon in croplands as a result of agricultural practices and in pastures as a result of increased grazing intensity. Agriculture also causes emissions that are accounted for in other

sectors (industry, transport, and energy supply, etc.), from production and transport of fertilizers, herbicides, pesticides, and from energy consumption for tillage, irrigation, fertilization, and harvest. Land use change, much of which is driven by expansion of agricultural area, adds another 15 to 17 percent. And future income and population growth will increase agricultural emissions dramatically unless low-emissions growth strategies for agriculture are found.

9. The dramatic effect of land use change on GHG emissions¹ emphasizes the importance of finding agricultural development strategies that reduce conversion of non-agricultural land to agricultural activities.

10. In the future, most direct increases in agricultural GHG emissions can be expected to take place in regions where crop and livestock production increases, leading to more CH₄ and N₂O emissions. Hence policies and programs to manage CH₄ and N₂O emissions will be particularly important.

11. To compare practices and systems there is a need to consider all emissions generated both directly and indirectly. There is an urgent need for a better assessment of various farming systems taking into account all emissions, direct and indirect.

12. Producing animal products from vegetal and feed input involves biological processes and associated energy requirements and losses, meaning that 1 calorie of animal product requires the production upstream of more than 1 calorie of plant origin to feed the animal. Therefore the proportion of livestock products in a diet is one of the key drivers of its emissions. Slowing the global growth in consumption of livestock products will help to slow the growth of agricultural and food sector emissions. However, many livelihoods depend on livestock, and ruminant animals are very valuable since they can digest cellulose and agricultural residues. Furthermore, in developing countries where indigenous diets include animal protein, high quality protein from livestock products (milk, meat and eggs) will help to improve nutrition.

13. Reduction of food losses and waste could also contribute significantly to mitigate GHG emissions.

14. The last decade has seen a very large increase in the amount of cropland devoted to growing crops for biofuels, both ethanol and biodiesel. Biofuel policies have been criticized on the grounds that they can lead to increased food prices (and hence reduce food security) and that they do little to reduce and may even increase greenhouse gas emissions. There is little evidence that the majority of current policies associated with first generation biofuels contribute to climate change mitigation. The HLPE will review the role of biofuels with respect to food security in a study to be released in 2013.

Recommendations

1. Integrate food security and climate change concerns

Policies and programs designed to respond to climate change should be complementary to, not independent of, those needed for sustainable food security. Climate change is one of a variety of threats to food security. Interventions designed to increase general food system resilience are highly likely to contribute to climate change adaptation as well. Efforts to increase expenditure just on adaptation would be better directed toward increasing overall expenditures on sustainable food security with particular attention being paid to the unique and uncertain threats from climate change that require action today (public, private and other sectors). In doing so, farmers should be put at the center and location-specific approaches ensuring the needs of communities devised, and taking advantage of their knowledge.

1 a) Increase immediately investments for food security and resilience to climate change

Even without the threats from climate change, meeting food security goals will require substantially more investments to increase productivity. They should also be aimed at increasing the general resilience of the food system.

¹ Other negative consequences include loss of biodiversity and changes in ground and surface water availability.

Investment in the physical infrastructure that allows food producers to be connected to markets and for large urban areas to be supplied with food is critical for general food system resilience and food security. Investments are needed to improve the transportation and marketing infrastructure.

The likely greater frequency of extreme events will increase the risk of disruption of supply networks and place an increased premium on diversified sourcing. Food chain intermediaries and retailers may need access to greater reserve stocks. Investments are also needed to facilitate stock holding and reduce food losses.

1 b) Refocus research for adaptation and mitigation to address a more complex set of objectives, and invest in public research for adaptation.

Research on agriculture should fully integrate climate adaptation and mitigation aspects. Though research to increase yields is essential to meet broader food security goals, a continuing and accelerating refocusing of research to address a more complex set of objectives is required to meet the challenges of making food production sustainable and responding to climate change. Assessment of neglected crops, fruit and vegetable productivity; effects of stress combinations; biodiversity and agrosystem efficiency and the efficient provision of ecosystem services, deserve more attention.

Research on mitigation practices should take into account their impacts on food security.

Refocusing research will require meaningful engagement and involvement from the start with farmers and the intended beneficiaries, and a genuine dialogue to understand their needs, taking into account the difficulties that can exist in obtaining the views of women and disadvantaged groups.

1 c) Modernize extension services

Modern revitalized extension services based on different funding models that can involve the public, private and civil society sectors, are urgently needed to face the food security challenges from climate change. To make sure that productivity and resilience enhancing technologies are adopted, extension programs should target those who make the management decisions. A 21st century extension service should work closely with research and the private sector and civil society to increase skills in raising yields sustainably and in dealing with the challenges of climate change.

1 d) Build capacities

In many countries, the physical, institutional, social, biological, and human capacity to deal with climate change and food security challenges is not adequate. Also essential is investment in human capital, particularly education and health infrastructure to build resilience to food insecurity and be aware of and respond effectively to climate change risks.

Information for adaptation and mitigation is an essential element in building resilience and the capacity of populations and nations to anticipate and manage climate change. Knowledge systems with regard to climate change are dynamic and emerging as more information and research become available. Governments and other actors need to strengthen their capacity for responsive and innovative information collection, management and dissemination systems, which can reach everyone, with particular focus on the most vulnerable groups.

Deliberate efforts to build these capacities are urgently needed.

2. Increase resilience of food systems to climate change

Adverse effects of climate change are already apparent in some regions and the eventual effect in all regions is likely to be very negative. Increasing resilience of food systems must be done at every level, from the field to landscape and markets. It generally involves a comprehensive set of actions which have to be coordinated. Farmers and food producers alone cannot adapt successfully to climate change. They need support from government and from the private sector, and there is also an important role for civil society organisations. Climate-change adaptation will certainly require new practices and changes in the livelihood strategies of most if not all food producers as well as other actors throughout the food chain, involving farmers, retailers and intermediaries in the food chain,

agri-business, the financial sector and civil society. It will require action and oversight by governments, international organizations, and civil society organizations concerned with food security and sovereignty, hunger and sustainable development. Adaptation measures have to be specific to local circumstances. Climate change adaptation must take into account socially disadvantaged groups, gender differences and in particular the role of women as decision makers in food systems. Many of the recommendations below would be no-regret as they contribute to sustainable food security even without considering climate change, but all have increased urgency with the growing effects from climate change

2 a) Base adaptation measures on assessment of risks and vulnerabilities

Anticipatory adaptation to climate change requires regular assessment of both risks and vulnerability, updated as more information becomes available. Middle- and high-income countries are increasingly carrying out regular assessments but nations without this capacity need external assistance. Careful communication of the inevitable uncertainties to policy makers and more broadly is of great importance.

2 b) Facilitate exchange of practices

Examples of strategies for community based adaptation include improved water management practices such as building infrastructure for more efficient irrigation systems and small-scale water capture, storage and use, adopting practices to conserving soil moisture, organic matter and nutrients, using short-cycle varieties, and setting up community-based seeds and grain banks. The main issues here are dissemination of existing information and knowledge, improving human and social capacity and putting in place the policies that support best practices.

2 c) Facilitate greater diversity in the field and give broader access to genetic resources

Diversification of production is a way to increase resilience of farming systems to shocks in an environment of increasing uncertainties. Efficient adaptation will require access (both physical and legal through appropriate intellectual property rules) to genetic resources, both of existing crops, livestock and their wild relatives, as well as varieties that may be used in the future. Crop genes for drought and flood tolerance should be identified and shared. Yield stability traits of species under variable conditions are particularly important domains where more understanding and research is needed. Food producers, public and private sector institutions, research communities, and governments need to increase cooperation and ensure dissemination, distribution and creation of knowledge and transfer of technologies to characterize, conserve and curate genetic resources both *in situ* and in seed banks, germplasm stores and related facilities to support adaptation to climate change. All that is possible must be done to minimize genetic erosion of the remaining biodiversity both *in situ* and in gene banks. Adoption by all countries of the International Treaty on Plant Genetic Resources for Food and Agriculture, as well as urgent implementation of its articles 5 (conservation), 6 (sustainable use) and 9 (farmers' rights) would be positive steps in this regard. To increase agricultural biodiversity, measures to develop markets for underutilized species and educate consumers about the importance of dietary diversity would help. The Commission on Genetic Resources for Food and Agriculture could consider identifying priority measures and developing a plan of action on the conservation and use of genetic resources for adaptation to climate change. There is an on-going debate on whether the current intellectual property rights regimes support or hinder development and use of improved plant and animal varieties and agriculture biodiversity. The issue of genetic resources, including intellectual property rights and farmers' rights, is a topic the CFS may wish to recommend for an HLPE study.

2 d) Make weather forecasting available to farmers

One of the challenges of climate change is likely to be coping with a more variable pattern of weather. Access to weather forecasting can improve farmers' ability to cope with increased variability and extreme events provided the information can be disseminated in time to those who need it. Suitably resourced and designed information and communication technology (ICT) can provide this link to national meteorological services.

2 e) Develop integrated land-use policies for adaptation

Efficient climate change adaptation will put a greater premium on the development of integrated land-use policies. Changes in precipitation patterns (in particular the frequency of extreme events) and in seasonal rivers flows will increase the importance of optimising water resources at catchment and aquifer scale. Passive policy measures such as the preservation of forests and mangroves can be as important as active interventions. Mechanisms such as REDD (to protect forests) and other means of payment for ecosystem services should also be included among the tools to increase ecosystem and community resilience to climate change. Urban and peri-urban agriculture can also play an important role in the adaptation of cities.

2 f) Facilitate access of farmers to financial services

To enable farmers to make the necessary changes in their systems, governments need to make financial markets more accessible to small-holders. This includes better access to credit and to insurance schemes to cover these investments and better manage financial consequences of weather risk.

2 g) Promote an international trading regime that incorporates the concept of food security and contributes to the resilience of food systems

As a result of the food crisis of 2008, food security has become a more critical issue in agricultural trade negotiations than in the past. The notion of access to supplies is considered today as important as the traditional notion of access to markets. Current WTO provisions and rules are unclear or deficient regarding food security matters and the Doha negotiating mandate does not allow much room to make progress in addressing these concerns. Moreover, climate change will make the challenge of achieving food security much harder, and it is clear that global food trade will have an important role to play in a world facing climate change. Incorporating all these important issues in any future agricultural trade negotiations would be a step in the right direction.

2 h) Prioritize the actions proposed in National Adaptation Programs of Actions (NAPAs)

Adapting agriculture to climate change and having national adaptation plans is globally very important. The NAPAs, submitted to the UNFCCC by the least developed countries, have highlighted agriculture and food security investments as a priority. They provide a starting point for prioritizing new national investments. Priority measures designed by LDCs in their NAPAs should be financed and implemented. Countries should build upon the experience of the NAPAs to prepare national adaptation plans.

2 i) Food and water security in inland areas

Setting up drought contingency funds and building regional strategic grain reserves, as well as farm and household level grain storage facilities, will be important for food security under climate change.

Both the increase of supply and demand management of water should receive concurrent attention for strengthening water security for crops, farm animals, domestic needs and industry. A sustainable water security system should be developed for each agro-ecological region. There should be a participatory water management system that includes farm families, so that local communities have a stake in both water conservation and sustainable and equitable use.

2 j) Ensure people are more resilient to climate-change enhanced water availability risks

Water is a limited natural resource and a public commodity fundamental to life and health, essential to the realization of the right to adequate food. CFS and national governments should promote and develop research and support programmes aiming at promoting universal access to good quality and sufficient water in rural areas. Participatory methodologies and a leading role for communities are key elements in development of efficient and equitable means of collecting, storing, managing and distributing clean water in ways that respect and protect biomes, preserve natural resources and stimulate the recovery of degraded areas.

2 k) Climate change and water in coastal areas

Nearly one third of the human population lives along the coast. Sea level rise is likely to adversely affect both coastal agriculture and the livelihood security of coastal communities. Anticipatory research and action will be needed to prepare coastal communities to meet the challenges from sea level rise and saline water intrusion. Anticipatory action plans for coastal ecological and livelihood security should include the following: (i) Mangrove bio-shields along seacoasts in compatible agro-climatic zones; (ii) Breeding saline-tolerant rice and other crop varieties; (iii) Development of agro-forestry and coastal aquaculture systems of land and water management; (iv) Conservation and use of halophytes – plants that are adapted to high concentrations of salt. Appropriate organizations, such as the CGIAR, may be encouraged to support and participate in such initiatives.

Nearly 97 percent of the global water resources is seawater and there is need for research on sea water farming involving the spread of agri-aqua farms. The cultivation of economically valuable halophyte and salinity tolerant fish species will help to strengthen the food and livelihood security of coastal communities. We therefore recommend the launching of a scientifically designed seawater farming for coastal area prosperity movement, along coastal areas and small islands.

3. Develop low-emissions agricultural strategies that do not compromise food security

Under a “Business as usual” scenario, an increase in food production will mechanically translate into an increase in emissions, but there are many options possible to enable a decoupling of food security and emissions. In considering mitigation policies and programs for agriculture, care should be taken to choose those that do not negatively affect food security. Fortunately, many of these options create synergies between mitigation and enhanced food security.

Considerable GHG emissions from agriculture can be mitigated by better efficiency in the use of resources (particularly land, livestock and fertilizers) and by good management practices that in many cases also increase productivity and enhance resilience. Public policies and programs should target the development and dissemination of these practices and systems.

Mitigation options must not increase vulnerability to food insecurity. Incentive-based systems that target the vulnerable while mitigating emissions and increasing climate change resilience have multiple benefits.

3 a) Reduce land use change for agriculture

Land use change from systems with extensive above-ground carbon (particularly forests) is second only to fossil fuel emissions as a source of atmospheric CO₂ and much of that conversion is into croplands and pastures. Improving crop yields from land already under cultivation is nearly always a more effective way to mitigate GHG emissions from agriculture than expanding cultivated land area. Ending most conversion of forest to cultivation should be a mitigation priority. Any new land brought under production should adhere to the good practices outlined below.

3 b) Adopt farming and grazing practices to, prevent loss of soil carbon and build carbon soil carbon banks and to prevent land degradation

Soil organic carbon content in agricultural lands is highly dependent on management practices. With well-chosen agro-ecological practices, degraded lands can be restored, contributing to food security, adaptation and to mitigation by increased carbon sinks. Urban organic wastes free from pollutants should be brought back to agricultural land to improve agricultural productivity and mitigate climate change, taking into account the direct and indirect costs of doing so.

Policies and programs that increase nitrogen use efficiency have multiple benefits – reducing simultaneously farm input costs, direct and indirect GHG emissions, and off-farm damage to the environment

3 c) Improve livestock and manure management

Emissions associated with livestock agriculture are likely to grow rapidly because of population growth and diet change. Improving productivity to allow farmers to reduce substantially the GHG emissions

per unit of output (meat and milk) should be a priority. The benefits of converting manure into bioenergy/biogas and fertilizers through biogas plants include lower net emissions, substitutions of emissions, improved availability of local energy sources, and higher quality fertilizers. Further research is needed in this regard.

3 d) Improve water management in rice fields

Modifying irrigation schemes can significantly reduce emissions from rice fields while saving water and without reducing yields.

3 e) Assess and compare farming systems

There is an urgent need for better assessments and comparisons of various farming systems taking into account all emissions, direct and indirect.

3 f) Manage food consumption for lower emissions in food systems

The role of diet change in reducing the demand for the most GHG intensive food types needs greater attention. Governments should promote responsible consumption, efficiencies throughout the food chain, and reduction of food waste. The private sector should be encouraged to develop products and distribution systems that result in fewer GHG emissions.

3 g) Assess the contribution of various types of biofuels to mitigation and food security

Accounting for the GHG efficiency of biofuels is very complex and compounded with many uncertainties, due to the direct and indirect use of energy in irrigation, inputs, transportation, process, especially nitrogen for the first-generation biofuels, as well as the induced loss of land carbon stocks in case of conversion of forests, wetland, carbon-rich lands in order to grow biofuel crops. Concerns have also been raised on the impact of biofuels on the other environmental challenges including biodiversity, often due to associated conversion to mono-cropping, to the increase of deforestation, threats to natural reserves, and to increased pressures on water supply and water quality problems. Efforts to assess the contribution of various types of biofuels to mitigation are important and must be continued.

3 h) Support farmers to adopt technologies with multiple benefits

Farmers need to be supported to adopt practices that enhance their resilience and food security and that also provide long-term climate benefits. Implementing these changes generally requires an enabling environment, including services and institutions to support farmers, for instance extension services. Also, even if the new practices provide better future incomes, there are barriers to their adoption: up-front costs, income foregone or additional risks during the transition period. These costs have to be covered.

Great expectations have been put in carbon finance to bring additional sources of financing, from emitters in developed countries to individual farmers in exchange of emission reduction or carbon storage. However experience has shown that these mechanisms are difficult to implement and not well suited for smallholder agriculture due to the small size of enterprises which increase transaction costs, difficulty and costs of measurement and reporting, and carbon price volatility. Amongst finance tools, market and non-market mechanisms are being explored with different governance schemes (voluntary carbon schemes, Green Fund, etc.). Whatever the type of support or incentives for improving the overall efficiencies of the food system and internalizing the externalities associated with GHG emissions and sinks, it is recommended that mechanisms take into account both the conditions of small holders and the need for prioritizing measures that improve food security while contributing to mitigation.

4. Collect information locally, share knowledge globally, and refocus research to address a more complex set of objectives

The information base available to facilitate policy and program developments to reduce the food security effects of climate change is woefully inadequate. National governments need to improve their efforts. But there is also a need for international data gathering on climate change and its effects to improve information on vulnerable communities, populations and regions.

Local lessons learned can be made much more valuable when shared. The knowledge already gained by farmers about practices that work in their conditions today could prove invaluable to farmers elsewhere in the future. But some consequences of climate change are outside the realm of recent human experience and focused, systematic data generation efforts are needed to develop effective response efforts. Because the benefits cross national borders, knowledge gathering and sharing requires global coordination as well as national programs.

A major increase in the quality and quantity of the biophysical, economic and social data available to policy makers is required. Particular challenges include (i) linking existing and future data sources using global metadata standards; (ii) making use of modern technology (ICT, remote sensing) to harvest real time data; (iv) enabling disaggregated data collection, including at the intra-household level, to identify drivers of social vulnerability to food security and challenges to mitigation and adaptation; and (v) improving the pipeline from data gathering, analysis and feeding into policy making.

4 a) Collect more biophysical data

Substantial genetic diversity exists in the plants and animals we use for food. But their performance under a range of agroclimatic conditions has not been systematically evaluated. Existing experimental trial data should be supplemented with collection of additional performance information and new trials set up to capture performance characteristics outside of current climate ranges. The quality of existing data about current and historical weather is mixed, with some countries doing a better job than others on collection and dissemination. More needs to be collected and much more needs to be made freely available.

4 b) Monitor existing practices and performance

Adaptation is a learning process. There is much that can be done to adapt agriculture to changing climate using existing knowledge about the social, economic and biophysical aspects of food production. Skills and knowledge currently appropriate for one region might be important in another region in the future. Rigorous evaluation of the effect of mitigation and adaptation interventions for

their impacts on the relevant outcomes as well as on food security is needed to ensure there are no unintended negative consequences. Systematic collection and widespread dissemination of this information is essential with modern ICT providing unprecedented opportunities.

4 c) Improve information about vulnerable communities/populations and regions

Major shortcomings in information affect our ability to understand the consequences of climate change for vulnerable regions or groups. Successful adaptation requires greatly improved knowledge of who the vulnerable are and where they live.

4 d) Improve models that facilitate understanding of climate change effects on agriculture

There is a need to improve models and incorporate information about vulnerable communities, populations and regions. Climate models generate vast amounts of data about possible future outcomes but not always summarized in ways that are useful to understanding potential effects on agricultural systems and vulnerable populations. Models that link climate change outcomes to biophysical effects and then to human well-being require much greater development. Modest investments would provide great support to policy makers everywhere.

There is a need for capacity building on the use of models and scenarios, including proper understanding of their limitations and uncertainties.

4 e) Organize regional sharing of experience and knowledge

Adaptation planning is country driven but, in regard to medium to long term needs, it is necessary to promote subregional and regional exchange of views, sharing of experience, cooperation, coordination on transboundary issues such as water, genetic resources, fisheries, transboundary pests and diseases, etc.

4 f) Refocusing research to address a more complex set of objectives

See recommendation 1 b)

5. Facilitate participation of all stakeholders in decision making and implementation

Addressing food security and climate change requires concerted and coordinated involvement and action of many actors, farmers, private sector, and public actors national and international, civil society and NGOs. It is especially challenging as they are very different, sometimes have conflicting interests and there is a need to work with a long term perspective while most of them have to consider short term outcomes first.

5a) Promote debate on the roles of the public and private sectors in safeguarding food security in the context of climate change

The actions of all sectors of society play a role in shaping the food security and climate situation. An important question for the future is how the different sectors of the society can mobilize efforts in the same direction for both world food security and climate change and on how they can complement one another.

Climate change implies greater focus on long-term issues and on socio-economic and environmental vulnerabilities. Given controversies over the evolving roles of the public and private sector for food security in a context of climate change, it would be wise to promote greater debate on the actual effectiveness of public-private partnerships by reviewing experiences on the ground.

The participation of the communities affected, including prior and informed consultation about risks, and the direct and indirect impacts on resilience of small-scale farmers and rural communities, should be ensured.

5 b) Involve all stakeholders in public sector decision-making

The changes on the ground needed for both adaptation and mitigation will be undertaken by many actors along the marketing chain from producers to consumers. The public sector develops and implements the policy and program environment in which private sector decisions are made. Civil society is critical in its many roles from monitor of government and private sector actions, to integrator across diverse interests, and to institutional innovator. Activities to address climate change should be done with explicit attention to addressing the needs of the disadvantaged; it is especially important to focus on the role of women as agricultural decision makers and thus integral to the planning, design, and implementation of policies and programs to address climate change challenges to food security.

5 c) Encourage public-public information- and technology-sharing partnerships to share the value of public goods developed and knowledge gained locally

International cooperation between governments on adaptation and mitigation best practices, as well as sustainable technology transfer, is essential to address the impacts of climate change on food security. Regional programs on climate change and food security can be done as part of regional integration initiatives. Learning the lessons of successful national programs that can work regionally can be shared and can help countries to develop their own programs. But lessons learned in one region today might be important in other regions in the future. Institutions that can transfer learning internationally will be needed for both adaptation and mitigation.

5 d) Increase transparency and civil society participation to improve efficiency and equity

Transparency in public sector decision-making about adaptation and mitigation policies and programs is crucial to improve efficiency and equity. Participation by farmers, fisherfolk, and foresters gives them a voice on design that fosters efficient use of resources. Participation by civil society allows other groups that might be affected by climate change, either directly or through the actions of others, to be better informed about potential activities, and to steer the process towards more equitable outcomes.

Governments should ensure that all stakeholders have a voice in order to guarantee the transparency of the process, exchange information and experiences on the relevant issues related to the policies and actions on food security and climate change.

6. Recommendations for the CFS

6 a) Include climate change recommendations in the Global Strategic Framework for Food Security and Nutrition

The CFS is currently preparing a Global Strategic Framework for Food Security and Nutrition. We strongly encourage the inclusion of the recommendations provided here as key elements of this framework.

6 b) Encourage more explicit recognition of food security in UNFCCC activities

Over the past few years of the UNFCCC negotiations, the need for agricultural adaptation and mitigation has figured more prominently. At COP17 in Durban, the negotiators solicited inputs from member countries and observers on issues related to agriculture, in a view of a decision at the COP18 in Doha (December 2012). A work program of the UNFCCC Subsidiary Body for Scientific and Technological Advice that more clearly identifies the pros and cons of various adaptation and mitigation measures and possible synergies with food security could provide a forum both for organizing existing research and motivating new research of relevance to the negotiations. We recommend it be implemented. We also recommend more progress under the Work Program on Loss and Damage, emphasizing the impacts of adverse effects of climate change in agriculture and food security. Finally, the CFS should request UNFCCC to charge national governments with reporting on how initiatives and policies that are proposed as part of the National Climate Change Action Plans and National Adaptation Plans also address food security efforts.

Developed countries have already accepted the responsibility for financial support for adaptation activities in developing countries as part of the Copenhagen Accord and the Cancun Agreement

under the UNFCCC. The CFS should endorse this position and encourage countries to design their support so that it also supports sustainable food security.

6 c) Support climate change adaptation and mitigation in international trade negotiations

The World Trade Organization has ongoing negotiations on improving the world trading regime (the Doha Round). With increasing variability in agricultural production due to climate change, and the potential for trade flows to partially compensate for climate-related shocks in agriculture, we recommend that the CFS supports inclusion of negotiating outcomes in the WTO that recognize this role. Similarly, we recommend that the CFS encourages the WTO to support trade policy reforms that facilitate rather than hinder mitigation.

6 d) Enhance the role of civil society

The CFS is unique among UN organizations in that it has an official role for civil society. We encourage the CFS to strengthen the existing channels of participation such as the CFS Advisory Group and to support more civil society activities related to the CFS, such as side events at official CFS and other UN meetings, in particular the UNFCCC conferences, to generate more publicity for, and debates on the reports published by HLPE and the decisions taken by the CFS.

6 e) Support the development of a collection sharing mechanism on international data gathering for climate change and food security

The consequences of climate change cross national boundaries. The effects can only be addressed if data gathering is coordinated internationally using commonly agreed metadata standards. Furthermore, there are great synergies to be achieved by coordinating food security data collection with that of climate change to benefit the most vulnerable regions and populations. The CFS should facilitate a dialogue on improved global data collection efforts for climate change and food security.

HLPE #4 SOCIAL PROTECTION FOR FOOD SECURITY

[Download the HLPE Report #4 here](#)

Summary and Recommendations

Food insecurity refers to both the inability to secure an adequate diet today and the risk of being unable to do so in the future. Social protection is a menu of policy instruments that addresses poverty and vulnerability, through social assistance, social insurance and efforts at social inclusion.

Social protection has risen rapidly up the development policy agenda. This report aims to review evidence and experience, and proposes recommendations for using social protection more effectively to protect and promote food security. The analysis is framed by the recognition that the right to adequate food and the right to social protection are human rights under international law, and that implementing social protection policies and programmes using a rights based approach is not only morally and legally appropriate but is likely to lead to improved food security outcomes.

People who are already poor are vulnerable to hunger because they lack the resources to meet their basic needs on a daily basis. They are also highly vulnerable to even small shocks that will push them closer to destitution, starvation, even premature mortality. The appropriate social protection response to chronic poverty-related food insecurity is social assistance linked to 'livelihood promotion' measures that enhance incomes. People who are not poor now but face the risk of future poverty are vulnerable to hunger if these risks materialise and they are inadequately protected against them (they will face transitory food insecurity). These people need effective 'social safety nets'.

Social protection systems should not be seen as 'deadweight' burdens on fiscal systems. Well-designed social protection interventions are good for growth. In particular, by preventing the depletion of assets and reducing the personal risk of investing for the poor, social protection can be a 'win-win' strategy: pro-poor and pro-growth.

Principal observations

- 1) Household-level vulnerability to poverty and hunger is most often associated with threats to livelihoods. Vulnerability can increase over time if households face repeated shocks that steadily erode their assets. One function of social protection is to install 'safety nets' to prevent this from happening – for example, by providing cash or food transfers or public works employment during periods of crisis and during the annual 'hungry season', as an alternative to poor households having to sell their productive assets or take their children out of school to buy food, thus contributing to the long run reproduction of poverty. Individual vulnerability and appropriate social protection measures can be analysed using a life-course framework. One under-appreciated feature of vulnerability is that it is persistent and recurrent, sometimes cyclical (e.g. seasonal).
- 2) Social protection covers a wide array of instruments designed to address the vulnerability of people's lives and livelihoods – through *social insurance*, offering protection against risk and adversity throughout life; through *social assistance*, offering payments and in kind transfers to support and enable the poor; and through *social inclusion efforts* that enhance the capability of the marginalised to participate fully in economic and social life and to access social protection and other social services.
- 3) A fundamental distinction must not be forgotten in social protection programming, between support to labour-constrained 'vulnerable groups' (e.g. young orphans or poor older persons), who might need long-term social assistance and have limited potential to 'graduate' out of poverty; and support to the 'working poor', who can benefit from the synergies between social assistance and growth-oriented developmental programmes, ultimately 'graduating' out of social safety nets.
- 4) Social assistance programmes that target women with social transfers or public works employment are likely to achieve greater impact on household food security than when men are targeted, because of women's dominant roles as food producers and carers within families. For this reason, women are

often registered as recipients of food or cash transfers, and gender quotas are established on many public works programmes. However, the trade-offs that women are often forced to make between their productive and reproductive roles mean that careful attention must be paid to designing programmes in gender-sensitive ways.

5) The fact that access to food and to social protection are universal human rights, recognised by most states, provides the basis for a more effective and equitable approach to implementation, especially when these rights are underpinned by appropriate national legislation and when mechanisms are introduced into programmes that reinforce these rights by upgrading a 'handout' to a justiciable claim.

6) The various causes of food insecurity can be counteracted by a large array of appropriate social protection responses, while noting that complementing these with other options such as job creation and agricultural extension services may offer more sustainable solutions in the long run. Food production by smallholder farmers can be boosted with input subsidies, while harvest failures or livestock losses can be compensated with agricultural insurance. Unemployment or underemployment can be addressed, temporarily at least, by public works programmes. Problems of market access to food can be addressed on the demand side (food price stabilisation, price subsidies) or on the supply side (grain reserve management). Inadequate access to food can be addressed directly, through transfers of food (supplementary feeding, school feeding) or of cash (conditional or unconditional). While social protection is associated mainly with social transfers, this disaggregation shows that it offers a much larger menu of options. There is now enough empirical evidence on most of these instruments to draw lessons on the design and implementation of comprehensive frameworks that effectively combine several instruments into a coherent social protection system.

7) **Input subsidies** generally have positive impacts on agricultural production and farmers' incomes, reducing rural poverty and enhancing household and national food security. Subsidies can be beneficial to women farmers, whose access to commercially purchased inputs is often constrained. Notwithstanding several success stories, national-scale input subsidy programmes are extremely expensive and inefficient if generalised, and difficult to target at poor smallholders without large leakages to better-off farmers. They can result in negative secondary impacts on trade, markets, and the environment. Once introduced, input subsidy policies tend to be politically difficult to modify or abolish.

8) In contexts of high poverty, high risks and high premiums, privately provided **crop and livestock insurance** services cannot replace publicly provided social protection in the near future. There is an important role for the public sector in nurturing these nascent insurance markets. Weather-indexed insurance could provide governments with an effective social protection mechanism in the context of climate change, but much remains to be explored in expanding the uptake of this innovative approach.

9) **Public works programmes** have proved to be an effective instrument to deal with covariate shocks (e.g. floods and droughts), enabling consumption smoothing by food insecure households, but experience varies a great deal across countries. Successful programmes have made a big difference to creating or maintaining useful infrastructure (e.g. rural feeder roads), and improving farm yields (e.g. terracing and irrigation projects), thereby enhancing the incomes and food security of the rural poor. Common criticisms of public works – that heavy manual labour reduces the net nutritional value of food or cash wages and can exclude women and the labour-constrained poor, that assets often deteriorate after the project ends, and that these programmes are susceptible to corruption – can be addressed by careful design, implementation and monitoring.

10) High food prices and price volatility have become one of the most important threats to food security worldwide. The standard recommendation given to governments is to let domestic prices adjust. However, since food represents a relatively large share of developing countries' consumption basket, rapidly rising food prices cause inflationary pressure, hurt the living standards of many (frequently the majority) of the poor and near-poor and, in quite a few instances, trigger widespread social discontent. To avoid such outcomes governments often resort to a variety of interventions designed to put a wedge between international and domestic food prices, such as price controls and general price subsidies, taxes and tariff reductions, export restrictions (from export taxes to outright export bans) and releasing buffer stocks or emergency food reserves. A thorough discussion of

policies to stabilise domestic food prices and macroeconomic responses can be found in the first HLPE report, on 'Price volatility and food security' (HLPE 2011).

11) A direct, untargeted **food subsidy** that lowers the price of a key staple for all consumers in a country tends to increase food consumption, especially by low-income consumers. Generalised food subsidies are politically more acceptable and administratively simpler than many alternative policies. However, they have many disadvantages. Their distributional impacts are regressive, inasmuch as the non-poor generally benefit more than the poor, while their costs (as a percentage of GDP) have risen so high as to be fiscally unsustainable in some countries, crowding out other essential social expenditures. Targeted subsidisation of staple food is a cheaper and less inefficient way to provide income support and food security to the poor, though accurate and cost-efficient targeting always presents challenges.

12) **Grain reserve management** was a major component of food security policies in the 1960s and 1970s. After a complex and difficult history, their role has greatly diminished, because they are often considered as a costly and inefficient mechanism. Nonetheless, the release of public food stocks did take place in many countries during the 2007/08 food price spike. National-level reserves can ensure that supplies of emergency food aid are readily available, and grain reserve management can complement other social protection instruments that support national and household food security. The appropriate form, level and financing of such reserves require careful planning, and their management – procurement, storage and release protocols – requires constant vigilance.

13) **School feeding** programmes have dual objectives: reducing hunger and improving food security, particularly for children; and increasing human capital accumulation by providing incentives for children, particularly girls, to attend school and by providing food which helps children to concentrate and improve learner performance. Studies show that school feeding does increase the food consumption of learners, and many programmes have also improved learners' micronutrient status. Most programmes rely on geographic targeting, operating in localities where poverty or food insecurity is most prevalent. Sourcing food locally – 'home grown school feeding' – has an additional food security benefit, by providing a source of effective demand for local smallholders. Set against these economic and social benefits are the costs of delivering school meals. School feeding can be a valuable component of a broader approach to addressing food insecurity, especially where target populations such as adolescent girls are hard to reach with other interventions. They have additional value where they can be scaled up in response to shocks.

14) **Supplementary feeding** is used in this report in relation to children under five years of age, including the especially vulnerable group of young children from 6 months until their second birthday in need of 'complementary feeding' while continuing on breastmilk, and pregnant and lactating women. For these groups, providing nutritious food including micronutrient supplements (vitamin A, iron and folic acid in particular) can be seen as 'intergenerational social protection'. There is concern among many in the nutrition community about a new trend to promote the use of so-called Ready-to-Use Therapeutic Foods – initially designed for severely malnourished children – also for prevention of malnutrition, with the risk of creating dependency on this type of food.

15) **Conditional cash transfers** (CCTs) have three defining characteristics: they target poor regions and identify poor households within those regions; they provide cash (and sometimes in-kind transfers such as nutritional supplements) usually to the mother or primary caregiver; and in order to receive these transfers, recipients must commit to undertaking certain actions (e.g. sending their children to school and clinic). As such, CCTs aim to reduce both short-term food insecurity and the long-term intergenerational transmission of poverty and vulnerability. Studies indicate that CCTs can improve the quantity of calories consumed and the quality of diets, as well as the levels of achievement at school. Critics of conditionality point out that it increases the administrative costs and complexity of running cash transfer programmes. Some households may find the conditions too difficult to meet, and the services to which conditions are attached might not be available, or might be low quality. From a human rights perspective, some argue that it is indefensible to attach any conditions to the receipt of social transfers. This needs to be weighed against the interests of the child, not always fully represented by parents, and the gains in political support for transfer programmes when conditionalities are attached.

16) **Unconditional cash transfers** include government-run social grants for poor and vulnerable groups, as well as small-scale pilot projects usually financed by donor agencies and implemented by NGOs. While conditional cash transfers are common in Latin America, unconditional cash transfers are more popular in Africa, where public services are often less developed. Large-scale cash transfer programmes can have substantial positive impacts on food insecurity and poverty. South Africa's seven social grant schemes doubled the share of national income received by the poorest 20%, while the Child Support Grant alone has halved the poverty gap. Several studies have found a direct impact of unconditional cash transfers on food security and nutrition outcomes. Apart from direct consumption effects, cash transfers can also stimulate investment in agriculture and other livelihood activities by relaxing liquidity constraints. Cash transfers give choice to beneficiaries and support markets and local economic development. But cash is less effective where markets are weak and food prices are high or volatile; in such cases, direct food transfers may achieve better food security outcomes.

17) The food security impacts of social protection programmes can be strengthened by linking them to **complementary interventions**. The risk of not linking social protection to sectoral programmes is that social protection will substitute for these programmes by default. This risk is exacerbated when social protection programmes are externally financed, because this reduces the incentive for government to invest either in social protection or in the under-invested sectors for which social protection programmes are compensating. This is one reason why government ownership of social protection programmes is crucial. Another reason is that government accountability follows more easily from government ownership.

18) Instead of single social protection instruments, a more effective approach is to combine several instruments that meet different needs of different groups, or the same groups at different times, into **comprehensive programmes**, thereby exploiting synergies between instruments. Examples include the Challenging the Frontiers of Poverty Reduction programme in Bangladesh, the Vision 2020 Umurenge Programme in Rwanda, and Zero Hunger in Brazil. A new proposal in this report is the 'Food Security Floor', a similar concept to the 'Social Protection Floor', but which focuses on realising the right to food.

19) Several issues and challenges arise in the process of designing and implementing social protection programmes: how to target programmes accurately? how to avoid 'dependency'? etc. – and there is a growing body of evidence on each of these topics.

20) **Targeting** is any mechanism that identifies individuals who are eligible to receive support from a programme, and screens out the ineligible. There are three powerful reasons for targeting: to transfer resources to people who are food insecure, to focus limited resources where they are most needed, and for redistributive equity. But targeting needs to be well designed and implemented, to avoid the risk of transferring resources to ineligible or non-needy people (inclusion error), or of failing to transfer resources to eligible people (exclusion errors). There are also administrative costs, depending on the targeting mechanism, that take resources away from transfers to the poor. Substantive reviews indicate that targeted programmes, compared to universal transfers, provide greater resource flows to the poor and food insecure, and that there is no universally superior way of targeting among a large array of options.

21) **Cash transfers**, in contrast to food transfers, provide recipients with the freedom to choose whatever they wish to consume, can stimulate local agricultural production and non-agricultural activities, and is often cheaper than distributing food aid. But the provision of cash requires well-functioning local food markets to avoid inflationary effects, and efficient delivery systems to minimise risks of theft or corruption. Also, recipients of social assistance should have some say in the form of assistance that they receive, but beneficiary preferences are complex. For example, nominating women as recipients of cash transfers – as many social protection programmes now do – empowers them economically, but women often prefer food as they are more likely to control food than cash within their households.

22) Governments across the world are often resistant to introducing social protection, especially social transfers, because they have concerns about creating **dependency** among beneficiaries. Evidence suggests that well-designed social protection programmes do not necessarily create dependency. Instead, they help to reduce the burden of dependency within poor families and communities in the

short-term, and can reduce dependency in the long-term by stimulating children's participation in education and adults' participation in labour markets.

23) **Graduation** refers to "a process whereby recipients of cash or food transfers move from a position of depending on external assistance to a condition where they no longer need these transfers, and can therefore exit the programme". It offers funders an exit strategy that allows programmes to be time-bound with fixed terms and fixed budgets. Unlike targeting, there is not yet a rich body of evidence to draw on to guide programme designers on appropriate graduation mechanisms. It must be recognised that some people can never graduate, that crossing a threshold does not necessarily mean the household will be self-reliant in the future, and that premature graduation could leave people worse off than before, if their informal support networks collapse because of their participation in the programme.

24) Even in countries with a well-functioning social safety net, it seems difficult to scale up this safety net to address a sudden shock such as a food price spike or an unemployment crisis. **Scaling up** means three things: introduce a new safety net programme; incorporate the new poor (as a result of higher food prices, for example); or increase the size of the transfer to compensate existing beneficiaries, at least partially, for the loss in purchasing power (when the safety net is a fixed amount of cash).

25) **Accountability** at every level is a key principle in operationalising social protection programmes in general and a human rights based approach to food security and social protection in particular. This includes putting into place accountability mechanisms at the level of both the state and service providers. To be effective, accountability has to be introduced in social protection programming, especially in government-run programmes that establish a justiciable (legally enforceable) 'social contract' between the state and citizens or residents to deliver food security and social protection, but also in projects financed and implemented by donors or NGOs. Systems must be in place to ensure that programmes are run as anticipated, and that eligible recipients are reached appropriately and are treated with dignity.

Recommendations to policy-makers

1. Every country should strive to design and put in place a comprehensive and nationally owned social protection system that contributes to ensuring the realisation of the right to adequate food for all.

Each country should develop a comprehensive social protection portfolio and action plan that seeks to address structural poverty and food insecurity, and to achieve MDG1 targets as part of a national food security and poverty reduction strategy. This process should be country-led with rigorous stakeholder consultation, including the active participation of local communities. One possible model for the social protection portfolio is the 'Food Security Floor' as proposed for consideration in this report, which would identify a minimum set of appropriate social protection and other interventions that would realise the right to food in each country. The design should start with a national food security assessment and should include: a mix of appropriate tools, goals and intended beneficiaries, targeting and registration methodologies, institutional arrangements, delivery mechanisms, accountability systems, sound monitoring and evaluation that includes impact indicators for nutrition, funding requirements and funding sources. Ensuring inter-ministerial and cross-sectoral coordination is crucial, to ensure that social protection is integrated with broader food security programming.

2. Social protection systems should pursue a 'twin-track' strategy to maximise their positive impacts on food security, by providing essential assistance in the short-term and supporting livelihoods in the long-term.

Social protection is most effective when it delivers social assistance or social insurance to food insecure people, while simultaneously protecting or building productive assets that contribute to economic growth and reduce the risk of future food insecurity. Examples are public works programmes and conditional cash transfers, which transfer food or cash while investing in physical infrastructure and human capital formation respectively. This requires strong linkages from social

protection to complementary sectors such as education, health and agriculture. Social protection should also enhance poor people's access to key institutions, including markets and financial services. Any sustainable growth strategy needs a social protection component.

3. Social protection needs to be better designed and implemented to address vulnerability to poverty and hunger, for instance by being accessible on demand to everyone who needs assistance, and by putting contingency financing in place for rapid scaling up when required.

Most social protection programmes are not well designed to manage vulnerability. Chronically vulnerable individuals might need permanent assistance, recognising that not everyone can graduate out of food insecurity and reliance on transfers. Social protection must be predictable and reliable, to counteract the unpredictability and vulnerability of livelihoods that is a fundamental source of food insecurity, and it should be appropriate and sensitive to vulnerabilities at particular stages of life. Social protection systems should be designed in such a way that they can respond quickly to shocks such as droughts, floods and food price spikes. Positive examples include demand-driven employment guarantee schemes in South Asia, and safety net programmes in East Africa that added new beneficiaries during the 2011 food crisis.

4. Social protection for food security should be underpinned by the human rights to food and social protection at every level, from governments signing up to global agreements, to national legislation and programme implementation.

The right to adequate food and the right to social protection, as recognised in international human rights law, should be incorporated into national legislation, so that governments recognise their duty to implement and deliver these basic human rights and residents have a legal basis for making food security claims on the state. Following from recommendations by the UN Committee on Economic, Social and Cultural Rights, this could take the form of a 'framework law' which spells out the targets or goals to be achieved, the timeframe for achievement of those targets, institutional responsibility for the process, national mechanisms for its monitoring, as well as possible recourse procedures. Social protection programmes should include accountability mechanisms such as grievance procedures and social audits, which effectively upgrade social protection from charity or welfare to an enforceable entitlement, leading to improved service delivery and greater effectiveness in reducing food insecurity, while building a rights based approach into social protection programming.

5. Since a large proportion of the world's food insecure people earn their living from agriculture, mainly but not only as smallholder farmers, social protection for food security should support agricultural livelihoods directly.

The majority of poor food-producing smallholders in developing countries are net food buyers. Social protection instruments that promote agriculture should therefore be considered. These include input subsidies, public works projects that create agricultural assets such as irrigation, and home-grown school feeding that purchases food from local farmers, as well as integrated programmes that link cash or food transfers to agricultural livelihood packages and extension services. The 'twin-track' principle also applies here: poor farmers need support to increase or stabilise crop yields, while the poorest need immediate protection against hunger. Support to consumers (e.g. food price subsidies) should not undermine incentives for farmers. Special attention should be paid to the roles of women as food producers and care-takers with responsibility for food provision within their families.

Recommendations to the CFS

6 The CFS should actively encourage, monitor and report on the incorporation of the provisions on the right to adequate food and the right to social protection contained in the Universal Declaration on Human Rights, and in the corresponding international human rights conventions, into national legislation and programmes supported by an enforceable legal framework in all countries.

- 7 The CFS should support the elaboration and implementation of comprehensive national **social protection portfolio and action plans** in every country, linked to broader food security or poverty reduction strategies. Progress towards developing and implementing these action plans should be monitored and reported annually. The international community should favour funding social protection programmes that have met benchmarks for good practice to be spelt out in a Guidance Note that would need to be elaborated, and might include for example that the action plan was subjected to a rigorous civil society consultation, and that all proposed programmes observe human rights principles in their design and implementation. The CFS should promote the dissemination of good practice in social protection programming for food security, including sharing lessons from country experiences on the minimum information and institutional requirements for a comprehensive social protection system; recognising the role of non-state actors in social protection provisioning – international organisations, NGOs, civil society, farmers’ organisations, the private sector, as well as informal or ‘traditional’ social protection mechanisms – and proposing coordination modalities for mobilising these actors to work together effectively.
- 8 While nationally owned social protection programmes for food security is the ideal, many governments will require **technical and financial support** from development partners and United Nations organisations, at least for an interim period. Reductions in food insecurity will be more rapid and more sustainable if the international community commits additional resources to expanding the provision of social protection, and the CFS should encourage this. The findings presented in this report provide persuasive evidence on the human and economic returns to investments in social protection for food security, so this argument is becoming easier to make as the evidence base accumulates.
- 9 The CFS should advocate for monitoring and evaluation of the impact of social protection programmes to include impact indicators for improvement in the **nutritional status** of beneficiaries. As a minimum, dietary diversity should be included as one such indicator, to provide a comparable measure of impact that can help to identify the most effective tools for addressing structural hunger and poverty. All monitoring systems and evaluations should include a gender audit, to capture potential heightened risks facing women and the girl child. More broadly, the CFS should support international efforts to improve the quality of evaluations, specifically for programmes related to food security and nutrition.
- 10 Many issues in social protection design and implementation remain unresolved, and many instruments are controversial, often because of bad experiences with weak programmes or because information is inadequate. Research into social protection is an international public good, so the costs should not necessarily be carried entirely by the implementing country. The CFS could play a role in ensuring that rigorous and credible **evaluations** are conducted – especially of innovative national social protection programmes with food security objectives – and that they receive appropriate levels of financial and technical support from the international community.
- 11 The CFS should encourage the establishment of a global system of **yearly notifications** on social protection, partly to share information and partly to create a platform for strengthening accountability. This would include reporting by countries on progress towards implementing social protection portfolios and action plans, also by international agencies on social protection activities they are supporting in each country. Such reporting could be presented in an annual ‘Social Protection Monitor’ and should include progress towards establishing the right to food and to social protection in national legislation, as well as actions taken in respect of realising these rights through policies and programmes. More generally, social spending statistics in developing countries are not reported systematically by any organisation. The CFS should recommend that the regular compilation of social spending statistics, including spending on social protection and food security programmes, be assigned to one of the multilateral organisations of the UN system.
- 12 The CFS should ensure that the recommendations included in this report are incorporated into the **Global Strategic Framework for Food Security and Nutrition**.

HLPE #5 BIOFUELS AND FOOD SECURITY

[Download the HLPE Report #5 here](#)

Summary and Recommendations

In October 2011, the UN Committee on World Food Security (CFS) recommended a “*review of biofuels policies – where applicable and if necessary – according to balanced science-based assessments of the opportunities and challenges that they may represent for food security so that biofuels can be produced where it is socially, economically and environmentally feasible to do so*”. In line with this, the CFS requested the HLPE to “*conduct a science-based comparative literature analysis taking into consideration the work produced by the FAO and Global Bioenergy Partnership (GBEP) of the positive and negative effects of biofuels on food security*”.

Analysing the relationships between biofuels and food security is especially challenging. It is at the intersection of some major global issues: energy, food, land use, and development. Biofuel production and the policies used to support its development can relate both positively and negatively with each of the four dimensions of food security – availability, access, utilization (nutrition) and stability. An appreciation of the relationships and causal impact and feedback links between biofuels and food security requires assessments at both global and local levels. It must also be situated within a dynamic perspective, given the fast changing developments, the complex and not necessarily instantaneous relationship between the drivers of biofuels’ rise and the (positive and negative) impacts on food security, and the need for projections of the future. Such an approach requires making assumptions on various parameters, ranging from the role of bioenergy, to the evolution of techniques, and to potential impacts at global and local levels.

Summary

Biofuel policies

1. Public policies have played a central role in the rise of biofuel production, with two major implications. First, biofuels have assumed quite different profiles in each country or region, given the diversity in institutions and natural endowments, which in turn has given rise to varied national biofuel plans and policy toolkits. Second, as a consequence of the national determination of biofuel policies, countries have often been inclined to regulate imports of biofuels, for example by applying tariffs and barriers, in order to protect their internal market. Exports have also been similarly subject to policy stimuli.
2. Policy tools that can be mobilized are quite diverse.
 - They can act on the demand and market creation side: tax exemptions or mandates for the incorporation of biofuels into petroleum fuels (obligations for fuel distributors or filling stations), public procurement (fuel or vehicles), user incentives such as car fleet subsidies among others. They may also act on the side of support for production and distribution: blending or transformation subsidies to compensate for the additional cost over petroleum fuels, agricultural subsidies for biofuel crops, public bank support to investors in the biofuel production chain, in installation and infrastructure, public support for research and development (R&D), energy crop production zoning (e.g. in Europe, the possibility of using set-aside lands where these existed).
 - In addition, some tools are trade-related regulation measures, either shielding domestic markets (e.g. import tariffs, eligibility requirements, quotas) or preventing exports (export tariffs, quotas).
 - A final set of tools is related to environmental and technical criteria, such as blending walls, fuel quality regulations and fuel certification tools.

3. Modern biofuel markets emerged in response to the two oil price hikes in the 1970s. Various countries responded with proposals for alternative fuels policies, but the two countries that created a biofuels ethanol market and a biofuels production sector in this period were Brazil and the United States of America (US), the former using sugar cane and the latter corn/maize. In both cases, this was done taking advantage of existing agricultural production capacities when low commodity prices encouraged the search for alternative outlets. Broader strategic goals were also central, such as reducing levels of dependence on energy imports and, especially in the case of Brazil, improving the balance of payments at a time of high oil import bills.
4. These biofuel policies went beyond issues of regulation and involved the creation of markets via obligatory or highly stimulated blending targets/mandates coupled with a range of tax exemptions, subsidies and favourable credit.
5. In Brazil, the sugar-cane sector responded well to the PROALCOOL Program launched in 1975: the programme addressed both supply and demand, with a mix of R&D support, supply or investment subsidies, mandatory installment of ethanol pumps, taxation of gasoline and regulatory policies. Production rose rapidly, reaching 12 billion litres/year within a decade.
6. In the US, interest for alternatives to petroleum fuels peaked during crisis situations, such as the First and Second World Wars, and the energy crisis in the 1970s. Ethanol production, however, only rose substantially in the 1980s in the wake of the Energy Tax Act of 1978, which introduced a subsidy for blending ethanol into gasoline, and the 1980 Energy Security Act, which offered insured loans for small ethanol producers, price guarantees and federal purchase agreements, and established a tariff on foreign ethanol. Biofuels were initially promoted in the corn-producing regions where ethanol was a co-product of corn syrup.
7. When a new surge in biofuel promotion took off in the early years of 2000, the policies of these two countries had already consolidated a biofuels demand, a biofuels market and a biofuels industry. In the course of the first decade of this century, the Brazilian sugar/ethanol sector was now able to operate without direct controls and in response to movements in relative prices, and analysis has suggested that US ethanol production, given continuing high oil prices and the ban on the methyl tertiary butyl ether (MTBE) oxygenate (since 2003), could also survive without mandates.
8. In the European Union (EU), given that half the light vehicle fleet and in some countries well over half of all new car sales are equipped with diesel engines, biodiesel is more central to biofuel policy. From a feedstock perspective, this has involved giving greater weight to oil crops (over cereals and sugar beet) for the production of biofuels. EU targets cannot be fully met using only EU domestic biomass. The EU biofuel policy, therefore, has triggered the creation of an increasingly globalized biofuels and biofuels feedstock market, involving a key role for developing country agriculture. Currently, Latin America and Asia dominate these flows. At the same time, such production must conform to the “sustainability” criteria (e.g. the Fuel Quality Directive and the Round Table on Sustainable Biofuels – RTSB, among others) that underpin this market.
9. Biofuel policies in the US and EU are now at a turning point, with similar proposals to put a ceiling on food-based biofuels at around their existing levels.
10. Many more countries (over 50 at the time of writing) have now adopted biofuels policies, and the combined automobile fleets of China and India are now approaching that of the US with much faster growth rates and a concomitant preoccupation with greenhouse gas (GHG) emissions and urban pollution. In the biofuel policies of these emerging countries, food security has quickly become a central conditioning criterion for biofuels promotion, with explicit policies in China, India and South Africa not to base biofuels on food crops or on lands used for food. Hopes were based in the former two cases on the eminently non-food crop jatropha (the poison nut), which, in addition, was considered to thrive on marginal lands. South Africa, for its part, relied on the untapped resources of the homelands, marginalized during the apartheid regime. However, in all three cases, the potential of the chosen crop and of the marginal lands to grow biofuel feedstock efficiently has to date proven to be illusory.

Biofuels and the technology frontier

11. The degree to which the promotion of biofuels enters into competition with food production, raising questions of food security, depends on a variety of factors:
 - choice of feedstock;
 - natural resources (especially land and water) involved;
 - relative efficiencies (GHG emissions, yields, costs) of different feedstocks;
 - processing technologies adopted.Concern over competition between biofuels and food production has been particularly acute given the overwhelming use of food- and feedcrops for both ethanol and biodiesel.
12. The choice of preferred feedstock and technology determines much of the impact of biofuel production and policies on food security. It determines the form of competition for food, feed and land, with diverse land needs depending on the feedstock.
13. While the timeline for the deployment of 2nd generation biofuels has proved overly optimistic, as reflected in particular in the Renewable Fuels Standard of the US, the first commercial-scale plants to produce cellulosic biofuels are now coming online. Multiple pathways for the conversion of different biofuel feedstocks are being developed and deployed. In the next couple of years, we can expect to see long-awaited data on the costs of these technologies operating at commercial scale and their relative performance. Based on that information and relative performance, the number of pathways can be expected to narrow. Learning-by-doing can lower the costs of the industrial process, which is a major component of the costs of producing advanced biofuels, and these industrial advances can occur more quickly than the agronomic advances needed to lower feedstock costs of both conventional and advanced biofuels.
14. The experiences with jatropha have shown that any new biomass production for biofuels will induce some form of competition for land and water, which could have an impact on food security.

Biofuels, food prices, hunger and poverty

15. In less than one decade, world biofuel production has increased five times, from less than 20 billion litres/year in 2001 to over 100 billion litres/year in 2011. The steepest rise in biofuel production occurred in 2007/2008, concomitantly with a sharp rise in food commodity prices (HLPE, 2011a), quickly accompanied by food riots in the cities of many developing countries. In comparison with average food prices between 2002 and 2004, globally traded prices of cereals, oils and fats have been on average from 2 to 2.5 times higher in 2008 and 2011–12, and sugar prices have had annual averages of from 80 percent to 340 percent above their 2000–04 prices. These price increases were accompanied by price volatility and price spikes to an extent unprecedented since the 1970s.
16. Though a range of other factors have been adduced in the enormous amount of studies that have since been dedicated to the issue of rising food prices (HLPE, 2011a), the steeply rising demand for the production of biofuels was identified as an important factor by many observers and a wide range of organizations, from civil society organizations (CSOs) to the World Bank.
17. The biofuel and food price debate is a long-standing, controversial one in the literature, with wide-ranging views. This is due to the number of impacts and feedback loops involved that can positively or negatively affect the price system. The relative strengths of these positive and negative impacts are furthermore different in the short and long terms, involving delayed effects that substantially increase the complexity of the analysis. The expert debates are also blurred by the use of different economic models and competing forms of statistical analysis, and to draw robust conclusions it is impossible to avoid at least some of their complexities.
18. Many factors do influence, concomitantly with biofuels, the world supply and demand for food. What matters most for the present report and analysis is not the net overall effect of all factors on the net food price — this has been dealt with, for example, in HLPE (2011a) — but the isolated effect of biofuels on food prices, *everything else being equal*. A central challenge here is to

disentangle and separate the impact of biofuels from all the other factors so that it can be analysed from the standpoint of its *additional* impact, which leads to *additional* price effects.

19. When crops are used for biofuels, the first direct impact is to reduce food and feed availability. This induces an increase in prices and a reduction of food demand by the poor. It also encourages farmers to produce more. There is also a substitution effect, at consumption level and at production level, which is one of the reasons price increases spread to other crops.
20. The following robust pattern emerges from the observations and analysis and the results of the different bodies of literature:
 - (i) Everything else being equal, the introduction of a rigid biofuel demand does affect food commodity prices. This observation holds in each context, even in the context of prices going down for other reasons than biofuels.
 - (ii) In the last few years (since 2004) of short-term commodity food price increase, biofuels did play an important role. The fact that biofuels have been the most important contributor is still disputed. The important role of biofuels is mainly due to:
 - the difficulty of the recent growth in total supply in keeping up with the growth in total demand, including the biofuel component (MTBE ban, other mandatory biofuels policies);
 - the rise in oil prices being transmitted to food prices via biofuel production capacities, as biofuels created an opportunity gain for key foodcrops (corn, oilseeds, sugar).
 - (iii) Different biofuels have different impacts, although impacts can translate from one crop to another as far as substitutions between those crops can be made in the field or at demand level. Situations in different markets can vary. Ethanol markets and biodiesel markets do not evolve in the same way. Within the ethanol market, an increase in demand has different effects if met by an increase in corn-based ethanol production or by an increase in sugar-cane ethanol production.
 - (iv) Biofuels provide a link between the food and energy markets. The existence of such linkages, as well as the induced correlation between prices, is widely recognized. However, the strength of the correlation is disputed. In addition, short-term (effects on volatility) and long-term correlations are shown to be quite different, as well as very dependent on the different biofuel feedstocks and pathways.

These findings substantially confirm the results of HLPE (2011a), while refining them in important ways.

21. In the present context, oil prices can play a central role. With a continued trend of rising oil prices, corn- and sugar-cane ethanol will be increasingly competitive with respect to fossil gasoline, even without incentives or tariff protection (for example, the US eliminated the tax credit for first-generation (corn), ethanol at the end of 2011). In theory, this could open up an almost infinite market worldwide for corn- and sugar-cane ethanol (HLPE, 2011a). In practice, given the current regulatory frameworks in the US and the EU and level of development of biofuel markets, mandates and targets can become transformed into technical or political ceilings, as in the case of the blending wall in the US or the global limits established by both the US and the EU, which constitute substantial barriers to the expansion of US ethanol. As biodiesel competes economically only in situations of very high oil prices, it will remain driven by government policies, in the absence of major technological advances, and any change in such policies could eliminate its growth.
22. If foreign markets are willing to absorb excess biofuel production, and so long as other obstacles, such as blending requirements or target ceilings do not limit the domestic uses of biofuels, the growth in biofuel demand could continue *so long as oil prices remain higher than the cost of biofuel production*. This leads to oil prices ultimately defining an “opportunity floor” on crop prices, and opens a space for transmission of volatility and speculative behaviour from the petroleum market to food markets.

Biofuels and land

23. Except when relying on crop residues and waste, biofuel production requires land. It thus competes for land with other agricultural activities, including production of other forms of bioenergy, other economic activities, urbanization and, increasingly, with land protection for environmental objectives, especially biodiversity and carbon sequestration. This last point is of particular relevance concerning biofuel production as one of its aims is to mitigate climate change; which implies that, when entering into competition with carbon sequestration, both activities should be assessed with regard to their comparative mitigation potential. To what extent is land availability a constraint to biofuel development and to ensuring world food security?
24. The debate is very much oriented by prospective considerations on what is/would be the land needed to produce a certain quantity of biofuels versus what is/would be the land “available” globally, given the need to increase food production to satisfy a growing demand. Answers to these questions are driven by the assumptions made in terms of yield (crop yield, biofuel yield) and by the information on land availability (including quantities and definition).
25. Much of the literature on land availability is devoted to calculations on the amount of agronomically “suitable” and available land, with high and low suitability parameters. Major assessments suggest that ample amounts of land can be mobilized to confront future food demand on the condition that good management practices are adopted, and the same arguments are developed when discussing biofuels. The argument has also been advanced that some biofuel feedstocks would not compete with food even via land use as they could be grown on areas not suitable for foodcrops.
26. The debate on the global amounts of land available from an agronomic point of view often hides other dimensions of “land availability”. Many authors point to the need for a clearer picture of what “available land” means, some preferring to use “underutilized” land, while others contest the very notion, arguing that most, if not all, land is already used, in various ways (HLPE, 2011b). Some critical analyses on land availability argue that land that is apparently idle or underutilized is in fact generally integrated into traditional forms of land use, ranging from itinerant pasturing, to fallow lands, to land used for energy, complementary foods and raw material for a variety of non-food activities.
27. In particular many have questioned the role of biofuels as a driver of domestic and foreign large-scale investments in land, often called “land grabbing”. In the initial accounts, and in the literature that has emerged as from 2008 focusing particularly on sub-Saharan Africa (SSA) countries, biofuels were identified as a central, if not the leading, motive behind these investments. Subsequent analysis has reduced the weight originally attributed to biofuels, identifying a wider concern with: (i) food security by capital-rich and resource-poor emerging countries; (ii) speculative interests in securing scarce resources in the wake of the financial meltdown of 2008; and (iii) an increasing convergence of food and bioenergy markets through the use of common feedstocks (sometimes called “flex crops”), which can be directed equally at fuel or food markets depending on price advantages. Nevertheless, there is ample documentation that large-scale biofuel investments are playing an important role in transforming land use in many developing countries.

Biofuels and bioenergy: socio-economic impacts and development perspectives

28. For many, biofuels provide important new opportunities for income and employment generation, in addition to bringing much needed capital, technology and knowledge to developing country agriculture. Other analyses have identified negative impacts of biofuels on poor farmers and their communities, either directly in the form of land expropriations or indirectly through the concentration of resources on large-scale farming operations.
29. Developing countries are still in the process of putting policies together on biofuels, with many investments and initiatives still in various stages of implementation. An appreciation of impacts over time and on a macro or regional scale is, therefore, still largely speculative.
30. An exception here is the Brazilian case, which in terms of sugar-cane ethanol has now a 40-year history, and a decade if we consider its ambitious biodiesel programme. Although the evidence is mixed, in the case of ethanol in the State of São Paulo, a number of studies point to the relatively favourable effects of ethanol investments at municipal level when compared with the other municipalities, particularly those dominated by cattle ranching. The Brazilian biodiesel programme was designed with the objective of rural development based on the family-farming sector and its typical regional oil crops. Huge resources and ingenuity have been invested, but after ten years it is soybeans and the already best-organized sections of family farmers who have benefitted most. On the other hand, the programme confirms that if small farmers have inadequate access to basic resources of land and water, little can be done to consolidate their income on a productive basis.
31. Sub-Saharan Africa has been a specific focus of impact analysis with the use of computable general equilibrium (CGE) models in Mozambique and the United Republic of Tanzania (this latter as part of the bioenergy and food security [BEFS] studies). The countries are equally poor but quite different in energy and food dependences. Transmission of high food and fuel prices was direct in Mozambique leading to a sharp decline in the welfare index (5 percent) and even more in household consumption (7 percent). On the other hand, simulation showed that implanting large-scale biofuels for export would produce positive results with an overall increase of 0.65 percent in overall GDP, rising to 2.4 percent in the case of agriculture and 1.5 percent for industry. The Tanzanian study, conducted in partnership with the FAO BEFS programme, also shows positive welfare results with the expansion of ethanol replacing other export crops rather than foodstuffs.
32. The BEFS project has developed a detailed toolkit for country analysis that includes a long-term analysis of agriculture within an international perspective, a survey of natural resources, detailed feasibility studies of individual projects and a socio-economic analysis of likely impacts. Peru, the United Republic of Tanzania and Thailand have been analysed, covering each of the developing world continents.
33. A growing number of studies have tried to bring to the attention of policy-makers the importance of taking gender into account in biofuels development. These studies highlight the issues of the security of access to and ownership of land as key factors determining whether the expansion of biofuel feedstocks could potentially benefit the rural poor, women in particular.
34. The most positive use of biofuels in highly rural developing countries where transport fuels are less important and where the majority of the rural poor live without access to energy is in the development of bioenergy initiatives for cooking, heating and local power generation. Hundreds of initiatives in this direction are currently being supported in developing countries and there is an urgent need to benchmark the most successful of these experiences for funding and diffusion.
35. A number of scholars have produced typologies to identify both the conditions under which biofuel/bioenergy policies should be adopted in developing countries and the specific focus that these policies should have in each country, given an appreciation of key variables in terms of country endowments and levels of economic development and urbanization. Similarly, farm-level typologies are being adopted to assess relative income and employment implications. Such typologies can be important instruments in guiding the formulation of country and local biofuel policies.

Recommendations

Food security policies and biofuel policies cannot be separated because they mutually interact. Food security and the right to food should be priority concerns in the design of any biofuel policy.

Governments should adopt the principle: biofuels shall not compromise food security and therefore should be managed so that food access or the resources necessary for the production of food, principally land, biodiversity, water and labour are not put at risk. The CFS should undertake action to ensure that this principle is operable in the very varied contexts in which all countries find themselves.

Given the trend to the emergence of a global biofuels market, and a context moving from policy-driven to market-driven biofuels, there is an urgent need for close and pro-active coordination of food security, biofuel/bioenergy policies and energy policies, at national and international levels, as well as rapid response mechanisms in case of crisis.

There is also an urgent need to create an enabling, responsible climate for food and non-food investments compatible with food security.

The HLPE recommends that governments adopt a coordinated food security and energy security strategy, which would require articulation around the following five axes/dimensions.

a. Adapt to the change to global, market-driven dynamics

- a. Governments must adjust biofuel policies and devise mechanisms to prevent (market-driven) biofuel demands posing a threat to food security from price rises and diminishing access to land and associated resources for food.
- b. Governments and concerned stakeholders should promote the international coordination of such policies and mechanisms in an appropriate forum, which could address also short-term, coordinated responses in times of crisis.
- c. The CFS could invite the Global Bioenergy Partnership (GBEP), the Committee on Commodity Problems and its Intergovernmental Group on Grains to make a proposal on possible response mechanisms, based on a state-of-the-art review and evaluation of options.
- d. The CFS may recommend/request that governments regularly communicate their biofuels policies and targets to the Agricultural Market Information System (AMIS), with the aim of setting up a comprehensive database.

2. Address the land, water and resource implications of biofuel policies

- a. Governments should ensure that the principles for responsible investment in agriculture, currently being elaborated by the CFS, will be effectively implemented and monitored, especially in the case of investments for biofuel production.
- b. The principles of free, prior and informed consent and full participation of all concerned in land-use investment should be used, as preconditions for any land investments.
- c. Measures taken to implement the *Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security* should ensure that biofuel investments should not undermine tenure rights, and ensure that women participate fully in land negotiations and that their land tenure rights are recognized.
- d. Policies must integrate land and water impact assessment so that land concessions cannot be made without an evaluation of the impacts of land use on water resources.
- e. All crops compete for the same land or water, labour, capital, inputs and investment and there are no current magic non-food crops that can ensure more harmonious biofuel production on marginal lands. Therefore, non-food/feedcrops should be assessed with the same rigour as food/feedcrops for their direct and indirect food security impacts.

3. Foster the transition from biofuels to comprehensive food-energy policies

- a. Governments should adopt a comprehensive bioenergy policy approach, wider than simply biofuels, promoting the development of a modern biomass-based sector, which, in many developing countries, can be an effective development strategy to provide high-value products, electricity and alternative power for cooking, power for water management and local productive facilities, in addition to transport fuel.
- b. Governments should support smallholder participation in biofuels and bioenergy value chains on the basis of fair and equitable conditions of market access and contractual arrangements.
- c. As a key part of a coordinated food security and energy security strategy, governments need to explore alternative policy measures (such as improvements in fuel efficiency and a transition to collective transport, and the development of alternative renewable fuels) in order to reduce fossil-energy-based transport and associated GHG emissions according to the specificities of both developing and developed countries.

4. Promote Research and Development

- a. Research and development (R&D) have an important role to play in improving the efficiency of the technologies used for biofuels both as regards resources and processes. Research partners should devise solutions adapted to the needs of the least developed countries and of smallholders who are most in need of access to energy. The public sector has here an important role to play, in partnership with the private sector, to upgrade and finance related R&D systems.
- b. Research should examine if and how both first- and second-generation biofuels could contribute to restoring degraded land and to the better management of watersheds. Such research could be developed in collaboration with the Global Soil and the Global Water Partnerships.
- c. Given the relative energy inefficiencies of current biofuel technologies and those in the pipeline, R&D resources should be dedicated to accelerating the commercial feasibility of more advanced renewable energy pathways.
- d. In order to better inform decision-making, governments, FAO, research and associated institutions should promote and facilitate exchange of information and cooperation for food security and biofuels assessments and projections, including by providing transparent information on assumptions, methods, tools and data used.

5. Develop methods and guidelines for coordinated food, biofuels, bio-energy policies at national and international levels

- a. The CFS could encourage FAO and relevant stakeholders to elaborate methodologies, including typologies, for assessing national biofuel potential based on land and water availability, population density, food and energy needs, agricultural production, per capita income and other relevant variables to provide a preliminary orientation on the incorporation of biofuel/bioenergy policies within a national food security and energy security plan.
- b. The CFS could invite GBEP to launch an inclusive process to ensure that only certification schemes that are multistakeholder, fully participative and transparent be recognized for access to the biofuels market. These schemes should also limit transaction costs to avoid excluding smallholders.
- c. While it might be difficult to request all agricultural production to be subject to sustainability criteria ratified by recognized certification schemes, the question should be raised of how to improve the overall sustainability of agriculture at the macro-aggregate level. The CFS could invite the Committee on Agriculture (COAG) to prepare proposals for the development of sustainability criteria, testified by certification schemes, for farming activities and products.
- d. The CFS could launch, with support of FAO and GBEP, the development of guidelines to be adopted by countries and used to evaluate the impact and viability of biofuels policies. These guidelines should include:
 - i. the prior existence of technical, social and environmental zoning to delimit “available land” and accompanying resources;
 - ii. the prior existence of “responsible land investment” practices;

- iii. the prior existence of mechanisms to ensure the capacity to react quickly to food price spikes and problems of food availability (price triggers, waivers, “minimum” levels of food stocks);
- iv. the prior evaluation of the implications for the origin of feedstock provision (domestic/imported); and for trade;
- v. a prior evaluation of the implications of the policy for domestic and international food security.

HLPE #6 INVESTING IN SMALLHOLDER AGRICULTURE FOR FOOD SECURITY

[Download the HLPE Report #6 here](#)

Summary and Recommendations

In October 2011, the Committee on World Food Security (CFS) requested the High Level Panel of Experts (HLPE) to prepare "a comparative study of constraints to smallholder investment in agriculture in different contexts with policy options for addressing these constraints, taking into consideration the work done on this topic by IFAD, and by FAO in the context of COAG, and the work of other key partners. This should include a comparative assessment of strategies for linking smallholders to food value chains in national and regional markets and what can be learned from different experiences, as well as an assessment of the impacts on smallholders of public-private as well as farmer cooperative-private and private-private partnerships" (CFS, 2011 – Final report of the 37th session).

Addressing this request requires defining smallholder agriculture, understanding what it covers, the scope and purpose of investments, and framing the question in a broader perspective on smallholder agriculture, including its contribution to food security and its future trajectories, taking into account diverse regional and national situations.

Of the 1.4 billion extremely poor people in the world (living on less than USD1.25/day), 70 percent are estimated to live in rural areas and most of them depend partly (or completely) on agriculture. For this reason, the urgent and undeniable need to reduce poverty puts smallholder agriculture at centre stage.

Main observations

1. What is smallholder agriculture?

1. There are a number of different definitions of "smallholder agriculture"² and each definition carries implications for the measurement of the number of smallholders. Definitions also guide our understanding of the investment needs of smallholders. A discussion on definitions is therefore neither trivial nor academic, but has real implications for policies and impacts on livelihoods.
2. Smallholder agriculture is practised by families (including one or more households) using only or mostly family labour and deriving from that work a large but variable share of their income, in kind or in cash. Agriculture includes crop raising, animal husbandry, forestry and artisanal fisheries. The holdings are run by family groups, a large proportion of which are headed by women, and women play important roles in production, processing and marketing activities.
3. The definition of "smallholder agriculture" cannot be rigid or "one size fits all": there are many variations in each specific context at the regional, national and local levels, and also over time as economies transform. Classifications of smallholder agriculture based only on farm size can be misleading. A smallholding is "small" because resources are scarce, especially land, and using it to generate a level of income that helps fulfil basic needs and achieve a sustainable livelihood consequently require a high level of total factor productivity, requiring in turn a significant level of investment.
4. Smallholder agriculture is also defined in relation to, and in contrast with, two opposites – larger

² This report deals mainly with crop and livestock systems from a smallholder perspective. Some of the analysis and recommendations can also apply to other systems. Specific issues related to fisheries and aquaculture will be dealt with in the upcoming report of the HLPE on the role of sustainable fisheries and aquaculture for food security and nutrition (forthcoming, 2014).

commercial holdings with hired labour on the one hand, and landless workers on the other.

5. Off-farm activities play an important role in providing smallholders with additional income and as a way of diversifying risk, thus improving their resilience to the shocks that impact on agriculture. Off-farm activities are a common feature of rural economies, both in developed and developing countries, and offer opportunities for investments in support of smallholders.
6. The family is at the same time a social unit of production and consumption and the source of labour for agriculture. The productive and the domestic sides of smallholder farmers are closely linked. These linkages explain some of the constraints faced by smallholders regarding investments, as shocks and risks can spread between the production side and the family side; they also explain the resilience of rural societies because of reciprocal ties relying on kinship and social proximity.
7. Today, smallholder farmers detached from any type of market exchange are no longer significant in social or economic terms, but smallholders producing only or mainly for subsistence are not uncommon – in all regions. These farms rely on their own production for food consumption, as a complement to low monetary incomes. These smallholders are part of the market economy through their provision of labour, and their food security depends on their production, which does not necessarily enter the market.
8. At the collective level, smallholders' families are part of social networks within which mutual assistance and reciprocity translate into collective investments (mainly through work exchanges) and into solidarity systems. They also participate – when political freedom allows it – in rural producers' organizations and local development associations in order to improve service provisions, including market access and market power, access to productive assets and to have a voice in public policy debates.
9. To appraise the magnitude and diversity of smallholder agriculture and to inform sound policy-making, more accurate and extensive data are needed: not only on land size, but also on assets' composition (resulting from past investments), production and sources of income. Such data are currently not available at the global level, and at the national level for some countries only. The FAO's World Census of Agriculture (WCA) frames and organizes the way censuses have to be implemented in all countries. However, there are three difficulties that need to be overcome: (i) not all the countries have the means, the interest and the capacities to carry them out: the last completed WCA round covered 114 countries; (ii) data are not always homogeneous and comparable; they can vary according to the specific focus of each country; and (iii) they are not linked to production statistics, making it difficult to make the link to national and global production according to the type of holding.

2. Why invest in smallholder agriculture?

10. Smallholder agriculture is the foundation of food security in many countries and an important part of the socio/economic/ecological landscape in all countries. With urbanization, integration and globalization of markets, the sector is undergoing great transformations that are of vital national interest, that are often against the interests of smallholders, and that are neither inevitable nor a matter of chance, but of social choice. Depending on regional, national and subnational contexts, these transformations can lead to various patterns, which all entail a certain proportion of smallholders and larger farms, with impacts on the diversification of the rural economies.
11. The structural transformation that occurred in the Western countries and in some of the Asian and Latin American countries has been grounded on intensive use of resources, and on the capacity of these economies to create jobs in other sectors, or on the possibility of massive domestic or international migrations. The situation is quite different today owing to regionally contrasted demographic and economic patterns with implications for job creation in non-agricultural sectors to absorb new entrants into the labour market.
12. Smallholders contribute to world food security and nutrition while performing other related roles

in their territories. Historical evidence shows that smallholder agriculture, adequately supported by policy and public investments, has the capacity to contribute effectively to food security, food sovereignty, and substantially and significantly to economic growth, the generation of employment, poverty reduction, the emancipation of neglected and marginalized groups, and the reduction of spatial and socio-economic inequalities. Within an enabling political and institutional environment, it can contribute to sustainable management of biodiversity and other natural resources while preserving cultural heritage.

13. The contribution that smallholder agriculture makes to world food security and nutrition is both direct, in as far as it links production and consumption for many rural households, and indirect because (a) it is provisioning domestic markets with the main food products, (b) it does so in a potentially resilient way, and (c) because in many countries smallholder agriculture functions as an important social safety net.
14. The potential efficiency of smallholder farming relative to larger farms has been widely documented, focusing on the capacity of smallholders to achieve high production levels per unit of land through the use of family labour in diversified production systems.
15. Predicted challenges in feeding humanity point to the need to pay greater attention to the sustainable use of natural resources and to limit damage to the environment. At a global scale, attention must be given to the increasing scarcity of fossil fuels, water, soil fertility and biomass. Many examples of efficient and sustainable smallholder farming exist (from China and Viet Nam, to Costa Rica and Guatemala) that demonstrate that it can be an economically, socially and environmentally effective way of organizing agricultural production.
16. Despite the limitations of defining smallholders by the size of their holdings, comparable data compiled for 81 countries offer a telling global picture: worldwide, 73 percent of the total number of holdings dispose of less than 1 ha of land and 85 percent dispose of less than 2 ha. The majority of holdings below 2 ha are found in Asia. In Africa, 80 percent of the holdings are below 2 ha. In developing countries, the total number of smallholdings tends to reach 500 millions unit. According to the WCA, has close to 200 million smallholdings; they cover only 10 percent of the agricultural land that is globally available, and they produce 20 percent of all food in the world. This is an important indication of the productivity that can be achieved in smallholder agriculture relative to larger farms.
17. Even in developed countries, smallholders have changed but have not disappeared. Though they have been neglected by policies often favouring larger farmers, they remain numerically important depending on the prevailing national context, often combining farming with other activities in the rural non-farm economy.

3. Who invests in smallholder agriculture?

18. Most investments in smallholder agriculture are realized by smallholders themselves. This occurs through different modalities but mostly through labour investments to enlarge and improve the resource base, and to a lesser extent through personal savings and remittances from family members that are used for the acquisition of new, additional resources. However, these investments are limited since domestic needs receive priority when food, health or education expenditures are at risk.
19. Public investments in and for agriculture have fallen considerably since the 1980s. It is now widely recognized that agriculture has been neglected at both the national and international levels. Many agricultural banks (mostly linked to, and supported by, the state) have disappeared, and extension services, applied research and investment in infrastructure projects have declined since the mid-1980s.
20. Meanwhile, larger enterprises mostly oriented at agro-exports have been favoured, while the smallholder sector, mainly (although far from exclusively) producing for the domestic market, has been neglected. Major corporations and other private sector companies were expected to provide the appropriate market services as well as the technical knowledge to help producers

upgrade their standards in order to meet market requirements. This has occurred in some places, but not in most, and often not in ways that have benefited smallholders. When related to the total number of smallholders, only a minority has actually been able to participate in such schemes.

21. There is growing interest in making more effective use of public–private partnerships (PPPs) in order to better mobilize and orient private investments towards collective goals. This generic term covers various types of partnerships between public and private actors, used initially for large investments projects, research and technology, and now increasingly putting emphasis on agriculture. Many governments are in the process of designing legal frameworks for PPPs, including in the agriculture sector. One difficulty here is how to make them work for smallholders and how to involve them in their design.

4. What are the constraints to investing in smallholder agriculture?

22. When confronted with the need to invest, smallholders face a diversity of often interrelated constraints: poverty, high levels of risk (personal, natural and technical, and economic and financial), declining size of land holdings, lack of incentives in their economic and institutional environments, difficulties in accessing appropriate markets, and the weak voice of smallholders' organizations in policy debates.
23. The diversity of such constraints to investment can be organized along three dimensions related to (i) assets, (ii) markets and (iii) institutions. These dimensions not only present a basis for understanding the variety of constraints to investments, they also hold clues to overcoming them.
 - a) The first dimension addresses natural and productive assets, including physical, financial, social and human assets. Investment decisions need to address the totality of the asset base of the smallholding. Among the assets, the natural resource endowment of the holding is a key factor, and it is important to note that, even when limited in size, it can be improved through investments. Limited access to land and other natural assets (especially water) is one of the most binding constraints on smallholder farming investment, especially for women. Highly skewed distribution in the access to land and water critically hinders the productive potential of smallholder farmers.
 - b) The second dimension addresses markets and market agents. Unfavourable conditions such as price volatility, lack of access to appropriate markets, including to financial markets, lack of collective bargaining power and high transaction costs discourage investments or even make them impossible.
 - c) The third dimension addresses institutions and policy design. Good policy design is essential, as well as innovative and enabling institutional environments. Smallholder organizations and collective action are crucial, yet there are many impediments to their effective participation, including, in some cases, a lack of recognition of their basic rights.

5. What strategies have been shown to work in overcoming these constraints and enhancing investment in smallholder agriculture?

24. To realize the full potential of smallholder agriculture, there is a need to reduce or eliminate the constraints that limit its investment capacity. The first objective is to support investments by smallholders themselves, but their capacity to do so depends on other related investments in collective action, private initiatives and in public goods.
25. To be more effective, policies need to be integrated in the sense that each policy should support (rather than hinder) the other. For example, investments in appropriate research and extension will not necessarily lead to improvements unless investments are also made in accessing and creating new appropriate markets. Similarly, investments in infrastructure work better if they support the models of production and markets that are appropriate to smallholders and, further, these investments would not reach their aim unless investments are also made in securing tenure rights.

26. Governance for agriculture and rural development needs to be designed to support the multifunctional roles of smallholder farming in development. Traditional ministries of agriculture are typically insufficient in fulfilling this function. Experience shows that the efficiency of specific sectoral or ministerial policies is mutually enhanced by their coordination. This often calls for specific national level governance and coordination mechanisms between different ministries, public administration and concerned stakeholders.
27. Smallholder agriculture in particular and agriculture as a whole are often left to undergo great transformations that are sometimes positive but sometimes adverse for smallholders and their food security. These transformations are not inevitable but are the result of explicit or implicit political choices, very often of vital national relevance. Within such political choices, depending on national specificities, it is paramount to recognize and support the important socio/economic/ecological functions of smallholder farming. Appropriate choices and policies result from transparently determined political processes that involve smallholder organizations.
28. Coordinated actions to enhance smallholder investments and capacities to invest can be described along three lines of actions: improving assets, improving markets and improving institutions for smallholders. These actions are not limited to agriculture, but may concern off-farm activities.

a) *Increasing smallholders' access to natural and productive assets.* Increased access to land, tenure security and the right to use common property resources are essential to the livelihoods of many smallholder communities. With secure access to resources (and adequate incentives and institutional settings that allow increasing the productivity of smallholder family labour), the smallholder family may realize a level of income that enables further investments. This implies that investing in smallholder agriculture to improve efficiency and outcomes for smallholders can be done even without increasing holding size.

b) *Improving smallholders' access to markets.* Smallholder agriculture needs to be better linked to markets by reducing transaction costs, with better infrastructure and key public investment. An additional issue is how to invest and with which stakeholders to increase and keep more value-added at the holding and territorial level. In order to create favourable conditions, it might be necessary to develop new markets (such as "short circuits" that reduce the distance between consumers and producers, and public procurement schemes) and to regulate existing markets differently. In particular, the efficiency of the domestic market can be improved, benefiting both producers and consumers through adequate strategies combining public and private investments.

The advantages and disadvantages of contract farming for smallholders have been a subject of controversy. Contract farming cannot be a miracle solution to problems smallholders are facing, or applicable to all smallholders in the world. However, given its potential, this report suggests investigating the economic and institutional conditions for making contract farming an inclusive, fair and transparent process for smallholders. This includes monitoring accountability mechanisms on impacts on their food security at the household level and beyond, and on the distribution of value-added among stakeholders. Improving access to innovative credit schemes, collective investments in physical and social capital, and in collective assets to improve market access, are important to enhance the competitiveness of smallholder farming.

c) *Making institutions work for smallholders.* The state has a key role to play in regulating market relations. It is therefore important to invest in re-establishing (whenever needed) the authority and capacity of the state through rebuilding and strengthening the ability of the public sector to act efficiently in support of smallholder development, including achieving accountability of the resources allocated. The state and local authorities also have a key responsibility in recognizing and enforcing the rights of smallholders, for instance to access land and water, and above all to ensure security of tenure and access to common property resources.

Most agricultural development programmes have been designed to increase productivity through technology-driven intensification, yet, while productivity is important, other related objectives must also be considered, especially increasing resilience. Research and extension systems are crucial to enhanced investment in smallholder farming by designing and promoting appropriate systems and practices adapted to the needs of smallholders, such as agro-ecological approaches and other sustainable intensification practices aiming at a more efficient use of inputs and decreasing the drudgery of agricultural labour.

29. Investing in public goods is essential for poverty reduction in the rural population as well as to reduce regional disparities. This includes specific attention to agriculture, through research and extension, for example, but also basic public goods for the rural population such as roads and communications, electricity, irrigation, education, health, water and sanitation. The family labour force is smallholders' first and foremost asset. Undernutrition, lack of safe and accessible drinking water, diseases, lack of education, highly unequal gender relations, etc., all degrade the quality and quantity of the family labour force. Consequently, safeguarding basic needs is absolutely essential. Providing better services for smallholders would enable them to better invest – not only in farming, but also in non-farm activities that could provide a source of monetary incomes and remittances to invest in agriculture.
30. Strengthening the collective voice of smallholders at various levels remains high on the agenda to improve investment capacities; the organizations themselves have to consider investments to serve their members within a market-led economy. They will need public support to be more effective in servicing their members and voicing their interests.
31. To be effective, policies that address poverty and malnutrition and hunger must be based on respect for the right to food. The right to food differs from food security in providing entitlements to individuals – and placing legal obligations on states – to access adequate food and the resources that are necessary for the sustainable enjoyment of food security. Achieving the right to food for smallholders requires improved investments in their capacity to produce and earn incomes.

Recommendations

Smallholder farmers are the main investors in their own farming as they seek to increase productivity, improve their well-being, including food security and nutrition, and reduce environmental degradation. However, governments and donors have a fundamental role to play in providing the policies and public goods necessary to make smallholder farmers' investments possible. In what follows, we make recommendations to governments, donors and the CFS for policies and public investments in support of smallholder farmers' own investments. The recommendations are also offered as input to the ongoing CFS consultations on the principles for responsible agricultural investments.

b. Developing a national strategy and mobilizing political will

- a. National Smallholder Investment Strategies:** Governments should design and implement medium- and long-term strategies, with the accompanying set of policies and budgets, to increase the capacity of the smallholder sector to fulfil its multifunctional roles in national development. These roles include contributing to growth, maintaining employment, reducing poverty, enhancing the sustainable management of natural resources and achieving food security. These National Smallholder Investment Strategies should be solidly grounded in participatory processes involving first and foremost the smallholder organizations and all concerned stakeholders.
- b. Citizenship and rights:** When it is not already the case, governments should recognize in law the individual and collective rights of smallholders, including their right to organize democratically, to have voice in policy debates and to defend their interests, with gender- and age-balanced representation. Securing such rights is important not only intrinsically for them but also in contributing to building the political will necessary to implement the proposed National Smallholder Investment Strategies.
- c. Achieving the right to food for smallholder farmers:** This population is more exposed to malnutrition and hunger. It derives its access to food through self-provisioning, the exchange of products and market purchases based on monetary income. Attention thus needs to be given not only to increasing purchasing power, but also to accessing productive assets and increasing the productivity of land and labour in smallholder farming through appropriate training, technology and support services to achieve food and nutrition security with a rights-based approach.

c. Gaining access to natural assets

Governments must guarantee tenure security for smallholder farmers over land and natural resources, by implementing the *Voluntary guidelines on responsible governance of tenure of land, fisheries, and forests*. They must also take relevant measures to improve cooperation and governance in the management of common property resources, including open-range pastoral resources, biodiversity, water, forestry and fisheries. Women's rights to land and natural resources use must be developed and strengthened. Governments should improve access to land by various means including land reform processes, making use of the lessons learned from other countries' experiences.

d. Providing a favourable investment climate

- a. Access to public goods:** To support their investment efforts, smallholder farmers need adequate access to public goods on both the production and consumption sides of the household, with benefits reinforcing each other. On the production side, public investments are needed, for example, in water management facilities and soil conservation. On the consumption side, public investments are needed in health services, education, water and sanitation, and social protection. By increasing the productivity of labour, these consumption goods reinforce the production side of the smallholder operations. Gender-specific support services are needed to recognize the differential roles of household members in production, consumption and the reproduction of the family unit over time. Achieving level playing fields for smallholder farmers in accessing public goods and services is the responsibility of governments and is essential to securing their well-being and competitiveness.
- b. Access to markets:** Governments should give priority to linking smallholder farmers to domestic, national and regional markets, as well as to new markets that create direct links between producers and consumers, and to schemes that rely on smallholders for the procurement of food for school and institutional feeding programmes. Developing these market linkages also requires investment in small- and medium-size food processors, and small-scale traders at the retail and wholesale levels. Market failures and price volatility are major disincentives for smallholder investment. Government intervention is important to reduce transaction costs on markets and to stabilize prices and smallholders' incomes. Regarding contracting opportunities in value chains, governments should strive to establish the necessary regulatory instruments to bridge the

significant gap in economic and political power that exists between smallholders and their organizations on the one side, and the other contracting organizations on the other side.

- c. **Access to financial services:** There is an urgent need to improve smallholder access to financial services adapted to their needs. This includes facilitating monetary transactions (such as mobile-phone based money transfers), safe savings deposits (with incentives to save), low-priced credit (such as through joint-liability group lending), and insurance (such as index-based weather insurance). Novel solutions are needed that reduce financial risks, lower transaction costs and facilitate long-term investments, for instance in technological innovations and soil fertility improvements in sub-Saharan Africa. Liquidity constraints must be relaxed not only on working capital expenditures (fertilizers, seeds), but also on medium- and long-term investments, supported by fair subsidy mechanisms.

e. **Improving productivity through research and extension.**

There is an urgent need to upgrade and finance national research and extension systems targeted specifically to the needs of smallholders, with supporting financial mechanisms. The main objective would be to increase productivity and resilience through diversification of the production system with a high concern for the self-provision of diverse foods with a high nutritional value. Combining increased productivity and resilience will require a high level of investment in research to develop productive land-use systems with minimal ecological risk such that biodiversity may be used productively and conserved. Agricultural research and extension should support the *in-situ* and *ex-situ* conservation of agricultural biodiversity in the context of climate change. Agro-ecological approaches and production ecological principles may be instrumental. Smallholder farmers need appropriate seeds as well as machinery for field operation, food processing and other value-adding transformations. International collaboration and the sharing of experiences in technology development for smallholder farmers in different regions of the world should be promoted with a strong engagement, if not leadership, of smallholder organizations.

f. **Investing beyond the farm: rural non-farm economy and territorial development**

- a. **Diversification of sources of income.** When confronted with the need to escape poverty and malnutrition, smallholder households often need access to complementary sources of income in the rural non-farm economy. Successful rural non-farm employment in turn consolidates the farm economy, providing it with liquidity and risk-reduction that support on-farm investments. For this, investment must be made in support of the rural non-farm economy and the decentralization of economic activity towards rural areas. Investment must correspondingly be made in the qualifications of young people so that they can find employment either in modernized agriculture or in other related activities and labour markets. Territorial development can offer an effective platform to coordinate public and private investments in agriculture and in the regional non-farm economy.
- b. **Governance for agriculture and rural development.** Extensive market failures for agriculture and smallholders, and the need to coordinate public and private investments and programmes in a territorial perspective, require appropriate governance. Governance for agriculture and territorial development requires going beyond the traditional ministries of agriculture. Different solutions must be tailored to national political and institutional contexts. Early lessons from implementation of the Comprehensive African Agricultural Development Programme (CAADP) and the Global Agriculture and Food Security Programme (GAFSP) offer an opportunity to reflect on best practices across countries and regions for investments in support of smallholder farmers.
- c. **Up-to-date information on the smallholder sector.** In order to better inform National Smallholder Investments Strategies, international agencies and especially FAO, in cooperation with national governments, need to better document the evolution of smallholder agriculture and its contributions to various outcomes. These outcomes include measurement of non-market food production and of the diversity of diets. The World Census of Agriculture [WCA] and other data collection efforts should be harmonized to strengthen the evidence-base for investment decisions. International funding should support countries in implementing censuses and related surveys.

Recommendations to the CFS

1. Given the critical role for smallholder farmers to attain food security through the combination of self-provision, exchange of products and market transactions, and the fact that a large portion of them are suffering from food insecurity, the CFS could promote awareness on the specific instruments, programmes and policies needed to realize the right to food for smallholders by creating a specific platform for the sharing of lessons learned and best practices among countries.
2. To support the National Smallholder Investment Strategies, CFS could request IFAD, the World Bank, bilateral funding agencies and regional development banks to finance pilots of the design, implementation and monitoring of such strategies in a small number of countries. These efforts should build on the findings of the present report. The results of these experiences should be fed back to the CFS as a means of assessing and improving the design of multisectoral policies on this complex issue.
3. Contract farming and public–private partnerships (PPPs) may offer opportunities to improve smallholders' food security. To maximize benefits, improve fairness and the food security impacts of these arrangements, there is a need for implementable and monitorable frameworks agreed by all countries and crafted with the involvement of smallholders themselves. The CFS could take up the challenge of leading inclusive processes to develop (i) guidelines on contract farming and (ii) guidelines on PPPs that relate to investment in smallholder farming.

HLPE #7 SUSTAINABLE FISHERIES AND AQUACULTURE FOR FOOD SECURITY AND NUTRITION

[Download the HLPE Report #7 here](#)

Summary and Recommendations

Fish,³ either produced through fish farming/aquaculture⁴ activity or caught from wild marine or freshwater stocks, is a primary source of protein and essential nutrients, and there is a growing recognition of its nutritional and health-promoting qualities. Fish is one of the most efficient converters of feed into high quality food. Fish and fish-related products provide income and livelihoods for numerous communities across the world.

The contribution of fisheries and aquaculture to food security and nutrition now and in the future is driven by many interactions between several environmental, development, policy and governance issues.

The need to feed a growing global population, and to address a growing demand for fish, puts pressure on natural resources and challenges the sustainability of marine and inland fisheries and of aquaculture development. It also raises several issues relating to the management of fish value chains to realise the right to food of fishing communities and to make fish available for all. It also questions the roles and contributions of the various actors (fishing communities, smallholders and international fishing companies, etc.) in a very diverse and heterogeneous sector, prone to significant inequalities.

In this context, in October 2012, the UN Committee on World Food Security (CFS) requested the High Level Panel of Experts on Food Security and Nutrition (HLPE) to conduct a policy oriented, practical and operational study on the role of sustainable fisheries and aquaculture for food security and nutrition, considering the environmental, social and economic aspects of fisheries including artisanal fisheries, as well as a review of aquaculture development.

Recognizing the importance of fish for food security and nutrition, what should be done to maintain or even enhance this contribution now and in the long term, given the challenges that both the fisheries and aquaculture sectors are facing in terms of sustainability and governance, and given the economic constraints and demographic conditions that they have to respond to? This report seeks to address this question.

Main findings

Fish as a critical food source

1. Today capture fisheries and aquaculture provide 3.0 billion people with almost 20 percent of their average per capita intake of animal protein, and a further 1.3 billion people with about 15 percent of their per capita intake. This share can exceed 50 percent in some countries. In West African coastal countries, where fisheries have historically been a central element in local economies, the proportion of total dietary protein from fish is remarkably high: e.g. more than 60 percent in the Gambia, Sierra Leone and Ghana. Likewise, in Asia, where fisheries are extremely important and fish farming has developed rapidly over the last 30 years: total dietary protein from fish is between 50 and 60 percent in Cambodia, Bangladesh, Indonesia and Sri Lanka. Fish provides a similarly significant proportion of protein in the human diets in most small island states (e.g. almost 60 percent in Maldives).
2. Overall, 158 million tonnes of fish were produced in 2012 (91.3 million tonnes from inland and marine capture fisheries and 66.6 million tonnes from inland and marine aquaculture), of which 136 million tonnes were used for human consumption. The continual growth in fish production – mostly from aquaculture since the 1990s – and improved production efficiency and distribution

³ “Fish” in this report includes finfish, crustaceans, molluscs, miscellaneous aquatic animals, but excludes aquatic plants and algae.

⁴ In this report fish farming and aquaculture will be used interchangeably.

channels enabled the supply of fish for food per-capita to more than triple at world level since 1950, from 6 kg/cap/yr in 1950 to 19.2 kg/cap/yr in 2012. However, this global figure masks some important regional distinctions. Asia accounts for almost two-thirds of global fish consumption and 21.4 kg per capita⁵ in 2011 – a level similar to Europe (22.0 kg/cap/yr) and North America (21.7 kg/cap/yr). Africa, Latin America and Near-East have lowest per-capita consumption (10.4, 9.9 and 9.3 kg/cap/yr in 2011, respectively). Oceania has highest levels per capita at 25.1 kg/cap/yr.

3. World population growth, but more importantly the combination of urbanization, increased levels of development, living standards and income are key drivers of the increase of fish and seafood demand and of fisheries development. Demand has been rising in both the developed and developing world at more than 2.5 percent per year since 1950 and, as wealth increases in highly populated countries such as China and India, demand is likely to continue its rise.

Fish has received little attention in food security and nutrition strategies

4. Limited attention has been given so far to fish as a key element in food security and nutrition strategies at national level and in wider development discussions and interventions. Specialist fisheries debates have concentrated predominantly on questions of biological sustainability and on the economic efficiency of fisheries, neglecting issues linked to their contribution to reducing hunger and malnutrition and to supporting livelihoods. Yet increased consumption of fish, and its addition to the diets of low income populations (including pregnant and breastfeeding mothers and young children), offers important means for improving food security and nutrition for several reasons. First, the bioavailability of fish protein is approximately 5–15 percent higher than that from plant sources. Fish also contains several amino acids essential for human health; especially lysine and methionine. Second, the lipid composition of fish is unique, having long-chain, poly-unsaturated fatty acids (LC-PUFAs) with many potential beneficial effects for adult health and child development. Many low-cost, small pelagic fish such as anchovy and sardine are some of the richest sources of LC-PUFAs. Third, fish is an important source of essential micronutrients – vitamins D, A and B, minerals (calcium, phosphorus, iodine, zinc, iron and selenium) – especially so for many small fish species that are consumed whole (with bones, heads, and viscera).

Risks and pressures affecting the world fisheries

5. Since the early 1990s, numerous media headlines, scientific papers and environmental campaigns have been framed around the idea that all world fisheries resources are in crisis as a result of overfishing. This crisis narrative has some substance. FAO categorizes fish stocks either as underexploited, moderately exploited, fully exploited, overexploited, depleted or recovering. Analyses of world marine stocks show an increase in the percentage of overexploited and depleted stocks over time, while the number of underexploited or moderately exploited stocks decreases. Overall, world capture fisheries production has plateaued since the mid-1990s around 90 million tonnes per year.
6. Fish caught can end-up being dumped overboard (discarded) – either due to accidental by-catch of non-targeted species or legally undersized fish, or due to low quality, partial damage or spoilage – making them not being commercially worth landing. The volume of fish discards varies greatly between fisheries and within fisheries, with discard rates ranging from negligible in some small-scale coastal fisheries or in Atlantic herring fisheries, to 70-90 percent for some demersal trawl fisheries. Global discard volumes are particularly challenging to estimate, and any global figure is prone to significant uncertainty. The latest report published by FAO in 2005 on the issue has given an estimate of an 8 percent global discard rate of the world total capture fisheries, with a lower rate of 3.7 percent for small-scale fisheries.
7. Recent data confirm that the period of high investment in large-size vessels, which peaked around the mid-1980s, is largely over. However, in Exclusive Economic Zones (EEZs, 200 nautical miles from the coast), where both large and smaller operators are present, the total number and power of smaller boats have increased substantially over the same period. As a consequence, global fishing capacity is still very high and, with some notable exceptions, the required adjustments in fishing capacities have not yet happened. Many fishery resources are

⁵ These figures designate “apparent” fish consumption, in live weight equivalent, including non-edible parts, and without accounting for post-harvest losses.

severely depleted and subsidies (often in the form of subsidised fuel) continue. Detailed attributed amounts of these subsidies are not systematically made public everywhere.

8. When the environment, production ecosystems and/or the resources bases (fish stocks) are degraded or overexploited, the capacities of the sector to deliver its food security and nutrition functions are limited or reduced. The sustainability of fisheries in their environmental and natural resource dimensions is therefore recognized to be a *sine qua non* condition for food security and nutrition. In practice, however, the links between the two are complex and remain not sufficiently documented. In addition, food security and nutrition outcomes of fisheries would not depend only on stock recovery but also on access to, and distribution, of the harvest.
9. The impacts of activities such as oil drilling, energy installations, coastal development and construction of ports and other coastal infrastructures, dams and water flow management (especially for inland fisheries), etc. have tremendous impacts on aquatic productivity, on habitats that sustain resources (e.g. erosion and pollution), or on the livelihoods of fishing communities (e.g. through denial of access to fishing grounds or displacement from coastal settlements). Conservation activities and the establishment of Marine Protected Areas can also impact on the livelihoods of local fishing communities.
10. Climate change impacts are already visible, with modifications of the geographic distribution of species and warmer water species moving towards the poles, ocean acidification and changes in coastal conditions that affect habitat. This has various impacts on production. Inland fisheries and aquaculture may face higher mortality due to heat waves, water scarcity and competition for water. Climate change impacts on fish-dependent populations will depend on the evolution of fishing opportunities (evolution of resources available, entitlements and capacities to fish, evolution of operational costs in production and marketing) and the evolution of prices. Impacts of extreme events are increasing, with more risks of damage or loss of infrastructure and housing. Sea level rise might lead to the relocation of communities.

Opportunities and challenges in aquaculture

11. In the last three decades, farmed fish production has increased 12 times at an average annual growth of over 8 percent, making it the fastest growing food production sector. It is now widely agreed that the foreseen future increase in demand for fish will have to be satisfied through aquaculture production.
12. Aquaculture fish convert more of their feed into body mass than terrestrial animals. For instance, the production of 1 kg of beef (resp. pork and fish) protein requires 61 kg (resp. 38 kg and 13 kg) of grain. Moreover, aquatic animal production systems also have a lower carbon footprint per kilogram of output compared with other terrestrial animal production systems. Nitrogen and phosphorous emissions from aquaculture production systems are much lower compared to beef and pork production systems though they are slightly higher than those of poultry.
13. Aquaculture is expected to continue growing – although at a slightly lower rate than until recently – and there is a strong interest amongst different actors (public, private) in many countries to engage in this activity.
14. Aquaculture development came also with a range of challenges and externalities - including some affecting food security, but aquaculture experts are now more confident that the era of severe environmental problems has passed and that aquaculture is on the road of being more environmentally sustainable.
15. Often, previously existing land and water uses have been disturbed by the development of aquaculture, affecting the livelihoods of many – including a large number of fisherfolks. As more space is progressively allocated to aquaculture operations on lakes, water-bodies or along the coast, smaller wild stocks and more congestion are likely to affect the fishing activities in the areas remaining open for wild harvest. Conflicts are common when aquaculture is introduced into a region where fishery activities are already established, particularly at subsistence level.
16. As for livestock production, fish diseases (e.g. the early mortality syndrome), are a constant threat to production and therefore to local livelihoods. The use of antibiotics and chemicals in intensive systems are also sources of concern and many countries have put in place regulations on the use of antibiotics, drugs and chemicals in aquaculture production.

17. The potential release of aquaculture stock in the environment can constitute a risk for wild populations (e.g. risk of invasive species, or of genetically modified fish becoming invasive or crossing with wild varieties) and ecosystems.
18. Fish is also used as fishmeal and fish oil to feed carnivorous and omnivorous farmed fish and crustacean species (such as salmon, trout, tuna, shrimp and tilapia), poultry and other livestock. This use of fish “to feed the fish”, called *reduction*, has been highly controversial although the proportion of global fish production used as fishmeal has decreased from an average of 23 percent (26 million tonnes/yr) in the 1990s to 10 percent in 2012 (16 million tonnes), thanks to development and use of fishmeal replacers, including plant proteins, waste products from fish and terrestrial animals and use of improved breeds of aquatic animals with better feed conversion. Yet from a food security and nutrition perspective, debate continues on whether it would not be preferable to use such fish directly for human consumption instead as for fishmeal, especially as ‘lower grade’ but nutritious fish could be consumed by food insecure people, instead of being used to feed fish consumed by wealthier consumers.

Small vs large scale fishing operations

19. It is estimated that more than 120 million people in the world depend directly on fisheries-related activities (fishing, processing, trading), a vast majority of them living in developing and emergent countries. Small-scale fisheries account for 90% of fisher folk. Small-scale fisheries, as compared to larger scale fisheries, generally make broader direct and indirect contributions to food security: they make affordable fish available and accessible to poor populations and are a key mean to sustain livelihoods of marginalized and vulnerable populations in developing countries. The importance of small-scale fisheries (including inland fisheries) in terms of overall production and contribution to food security and nutrition is often underestimated or ignored. Catches from subsistence fishing are rarely included in national catch statistics. There is, however, sufficient evidence to support a focus on small-scale fisheries for food security and nutrition interventions in developing countries.
20. Larger-scale industrial fisheries can also contribute to the food security and nutrition of the poor in developing countries, especially when they favour the wide commercialization of cheap, easily stored and transported (e.g. canned) nutritious pelagic fish such as sardine, pilchard, herring, anchovy or even tuna. As noted in relation to international fish trade, revenues generated by large-scale operations can also contribute indirectly to food security through employment creation where legislation to protect decent working conditions is in place.
21. However, small- and large-scale fleets (e.g. trawlers) can compete for resources, fishing zones and gear, leading to conflicts in zones where they jointly operate, which in most cases increases small-scale operators’ vulnerability, threatens their well-being, incomes and food security. Such competition can also negatively impact on coastal habitats.
22. For aquaculture, whether scale of operation is neutral or not with respect to food security and nutrition outcomes is less clear. In Africa, small-scale, subsistence aquaculture has failed to deliver the anticipated reduction of poverty and food insecurity, and interest has now shifted towards slightly larger (i.e. medium-scale), more commercial-oriented enterprises, with the hope that this new model will be more successful at delivering food security outcomes. In Asia, however, the debate is still open. While some scholars claim that medium-scale enterprises are more effective at addressing poverty reduction and food security, the fact remains that 70–80 percent of aquaculture production has come so far from small-scale farming.

Unsettled debates on fish trade

23. Fish is one of the most internationally traded foods. In 2012, international trade represented 37% of the total fish production, with a total export value of 129 billion USD, of which 70 billion USD of developing countries’ exports. Evidence suggests that international fish trade can have mixed impacts on the well-being and food security and nutrition of local fishing populations. On one hand, some analysts point to the contribution that export revenues from fisheries make to local economies and extra government revenues, with opportunities to redeploy those for pro-poor interventions, including support for food security and nutrition. Additionally the growth and employment effects of fisheries development can have positive indirect consequences on the food security and nutrition of the poor. Other studies, on the other hand, have shown that in many

cases very remunerative international fish trade generating millions of dollars of revenues co-exist with miserable living conditions for the local communities who have been displaced by industrial scale operators, or excluded from the trade by stringent commercial regulations, losing access to employment and to a rich food source. Existing evidence also suggests that developing nation governments have not always negotiated good agreements with foreign fishing operators for the resources extracted from their fisheries.

24. As countries compete in the global economy, national and international policies and interventions have so far provided strong support to international fish trade, often giving little attention and support to regional and domestic fisheries trade, despite its potential to improve food security and nutrition, especially for vulnerable groups. The large number of small-scale, informal producers and traders (mainly women) – who are usually marginalized by the globalization of fish trade oriented to a small number of globally traded species – would be able to better engage with the market opportunities created by domestic or regional trade, where demand exists for a diverse set of local species and products that small-scale fisheries can produce, and that are easier to commercialize at these levels. Focusing more policy attention, carefully devised interventions (such as development and market infrastructure) and research, on regional/domestic trade in developing countries would therefore help make more fish available locally, contributing to reduce a growing tension -which fish imports cannot alone alleviate- between the demand and supply of fish. In Africa, renewed focus on local trade of products could also provide a further stimulus for aquaculture, which has been contending with production challenges. Increased demand for fish by the growing urban (and rural) population could also boost investments in, for example, peri-urban aquaculture.
25. The main focus of fish certification schemes to date has been on ecolabelling to address environmental sustainability issues. These schemes are also progressively moving to include social responsibility and labour considerations, but have failed so far to include food security and nutrition considerations. With limited exceptions, certification concerns predominantly developed countries and large-scale fisheries. More work is needed on appropriate indicators of the food security and nutrition outcomes of fisheries operations so that improvements can be better targeted and monitored. As certification schemes currently operate, their effect on food security and nutrition is unclear.

Social protection and labour rights

26. Most of these fishers or farming/fish processing and/or trading people live in developing countries, earn low income, often depend on informal work. They are exposed to three levels of exclusion: the existence or not of regulations of work and social protection in a country; the fact that these apply or not to fisheries; the importance of informal work, without access to social protection schemes (unemployment or pension schemes, health insurance, etc.). Although the International Labour Organisation adopted the Work in Fishing Convention No 188 in 2007, progress towards ratification of the Covenant 188 concerning working conditions in the fishing sector has been slow especially in the developing world.

Gender equity

27. The first comprehensive attempt to estimate the number of fish workers found that 56 million, near half of the 120 million people who work in the capture fisheries sector and its supply chains, are women. This is essentially due to the very high number of female workers engaged in fish processing (including in processing factories) and in (informal) small-scale fish trading operations. However, small-scale fisheries and supply-chain jobs outside production are not well recorded, so the actual number of women may be higher. Comparable estimates are not yet available for the 38 million aquaculture sector workers.
28. Gender, along with intersectional factors (such as economic class, ethnic group, age or religion), is a key determinant of the many different ways by which fisheries and aquaculture affect food security and nutrition outcomes, availability, access, stability and diet adequacy, for the population groups directly involved in fish production and supply chains, but also beyond.
29. Men are dominant in direct production work in fisheries and aquaculture. Much of women's work, such as gleaning, diving, post-harvest processing and vending, is not recognized or not well recorded, despite its economic and other contributions. Gender disaggregated data are not

routinely collected and, partly as a result of this, little policy attention is given to women and to the gender dimension of the sector.

Governance

30. Governance is particularly important to determine access to fisheries resources, integrity of fisheries resources and distribution of fish benefits. In most countries, too little attention has been given to the ways different individuals and groups (including poorer and marginalized people in the fisheries and aquaculture supply chains, but also poor consumers more generally) will gain, lose, or be excluded from access to fish resources, to other productive supply chain assets, or to fish as a food commodity. In this regard, evidence suggest that human rights instruments are important effective tools to help ensure that states fulfil their obligations, including those pertaining to the right to food.
31. In the face of increasing and competitive economic exploitation of the oceans and freshwater, fish and food security and nutrition interests are usually acknowledged at the international level, but only in general and rhetorical terms. Analysis of existing international partnerships and initiatives reveals that detailed strategies linking production growth and sustainability to food security and nutrition are lacking.
32. With the notable exception of the UN-driven initiatives for which a very inclusive consultative process has been followed, most of the other recent ocean-related governance initiatives are deficient by their lack of representation of the small-scale operators from developing countries.
33. At the national level, the limited number of recent meta-analyses that are available show that both in terms of direct effects through access to and improved status of the resource base, and indirect pathways through income derived from fishing-related activities, co-management of fisheries' resources has not yet delivered the expected improvements in food security and nutrition.

Recommendations

1. Fish deserves a central position in food security and nutrition strategies

States should

- 1a) Make fish an integral element in inter-sectoral national food security and nutrition policies and programmes with special regard to promoting small-scale production and local arrangements (such as procurement through local markets, e.g. for school meals) and other policy tools, including nutrition education.
- 1b) Include fish in their nutritional programmes and interventions aiming at tackling micronutrient deficiencies especially among children and women, in the respect of cultural specificities, promoting local procurement, and taking into account costs and benefits.
- 1c) Strengthen international assistance and cooperation to build the capacity of developing countries to negotiate better terms in fishing agreements to protect the food security and nutrition of their populations.
- 1d) Eliminate harmful subsidies that encourage over-fishing, to make progress toward halting the current decline in global fish stocks. Revenues available to states from foregone subsidies could be redirected towards public good investments that support food security and nutrition in relation to sustainable fisheries (such as infrastructure and capacity development), or to improve the livelihoods and economic possibilities of fishing community residents.

States, national and international research institutes and development agencies should

- 1e) Conduct regular intra-household studies to better understand the pathways between fish, gender and the nutritional status of individuals and households, including on the impact of over-fishing. These studies need to be conducted based on gender-disaggregated data.

1f) Review fisheries' discarding practices and options through a food security and nutrition lens as well as with regard to resources and ecosystem sustainability.

2. Threats and risks for world fisheries, including effects of climate change

States should

2a) Mainstream climate change adaptation strategies relevant to fish and food security and nutrition into all aquaculture and fisheries policies and actions at national and subnational levels, including by linking them to climate and weather research and prediction agencies, developing specific studies and introducing, where needed, flexibility in management and governance mechanisms.

2b) Engage in inclusive dialogue and analysis to build scenarios to understand the possible impact of climate change on the food security and nutrition of most vulnerable zones (for example coastal and small island states) that could be affected and develop and implement the necessary actions through inclusive processes.

FAO should

2c) Take the lead in a global effort to redevelop resource assessment tools and governance concepts suitable for use in improving the contribution of fish to food security and nutrition, including by developing new approaches for use in the multispecies, multigear fisheries and more adapted to the specific characteristics of small-scale fisheries.

3. Opportunities and challenges in aquaculture

National and international research organizations (such as the CGIAR Centers), funded by the governments and other agencies, should

3a) Lead research and development initiatives that aim at enhancing sustainability and productivity of aquaculture, both in small and large scale systems. Research should focus on health control and food safety, improved feed stocks that do not directly compete with human foods, domestication and genetic improvement of key traits contributing to the various dimensions of food security and nutrition, integration of aquaculture in agroecological models of production at the farm and landscape levels, and improved linkages with food chain, with due consideration to ecosystems' integrity.

States and other private and public stakeholders and international actors should

3b) Put in place appropriate actions to reduce further the use of fish meal and fish oil as feed in aquaculture and livestock production, and should encourage their elimination by the use of alternate sources as well as by the promotion of low trophic level fish (herbivores and omnivores).

3c) Put in place the conditions to develop and implement South-South collaborations to encourage sharing and learning experience in aquaculture.

4. Small-scale versus large scale fishing operations

Governments and other private and public stakeholders should

4a) Recognize the contribution of small-scale fisheries to food security and nutrition, and take into account their characteristics in the design and implementation of all national and international policies and programs related to fisheries, including through appropriate and inclusive representation.

4b) Support self-organized, local professional organizations and cooperatives, as these arrangements strongly contribute to foster the integration of small-scale operators into markets.

National and regional agencies responsible for fisheries should

4c) Give high priority to the support of small-scale fisheries through adequate planning, legislation and the recognition or allocation of rights and resources. Where small-scale fisheries are in competition

with larger-scale operations, governments should promote the former's contribution to food security and nutrition and, in particular, develop national policy regulations that protect small-scale fisheries.

5. Trade and markets

States should

5a) Ensure that food security and nutrition are better taken into account in the objectives of policies and mechanisms related to international, regional and local fish trade, including by the inclusive development of guidelines, procedures and regulations to protect the food security and nutrition of local populations.

International agencies, regional economic and fisheries bodies and national ministries should

5b) Allocate more policy attention and resources to develop, promote and support domestic and regional fish trade. Investment should take account of the voluntary guidelines for land, fisheries and forests and respect the Principles for Responsible Investment in Agriculture. They should redirect resources to and support capacity building for the different actors involved in local, national or regional fish trade activities, especially through the value chains involving small-scale fisheries, aquaculture and marketing.

Governments, international organizations, private sector and civil society should

5c) Support the development and use of existing or new sustainability certification standards which include food security and nutrition criteria and facilitate the engagement of small-scale operators by adequate support and capacity building.

6. Social Protection and labour rights

States should

6a) Ratify the ILO No. 188 Work in Fishing Convention to ensure improved working conditions and social security of those working in the fishing sector.

States, in particular national government labour agencies, in collaboration with fisheries agencies, should

6b) Improve national level regulations for fishworkers, including women workers in processing factories and markets, migrant and local crew on fishing vessels. Owners should guarantee that their vessels are sea-worthy and that at-sea working conditions are safe.

6c) Take measures to put in place social protection systems in the form of minimum wages and social security schemes for both fishers and fishworkers, including self-employed workers, women and migrant workers.

7. Gender equity

States should

7a) Ensure that their aquaculture and fisheries policies and interventions do not create negative impacts on women and encourage gender equality.

7b) Enshrine gender equity in all fisheries rights systems, including licensing and access rights. The definitions of fishing must cover all forms of harvest including the forms typically practised by women and small-scale operators, such as inshore and inland harvesting of invertebrates by hand and the use of very small-scale gear.

The FAO Committee on Fisheries (COFI) should

7c) Develop policy guidance on gender equality and economic contributions, e.g. technical guidelines on gender in aquaculture and fisheries within the Code of Conduct on Responsible Fisheries.

The CFS should

7d) Urge international and national fish sector organizations to fully address the gender dimension of the fishery and aquaculture sectors in their policies and actions to overcome the unintended gender-blindness of present approaches.

Development assistance programmes should

7e) Be gender-aware and give priority to gendered projects.

8. Governance

States must

8a) Comply with their obligations under international human rights treaties, including the International Covenant on Civil and Political Rights and the International Covenant on Economic, Social and Cultural Rights.

States should

8b) Assess policies, interventions and investments with direct and indirect links to fisheries and fishing communities in terms of their impacts on the right to food of the affected communities.

8c) Use the Voluntary Guidelines on the Good Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security, recognising the particular relevance of article 8.3 on collective rights and common resources, to design and assess policies and programmes especially these which affect the access of fishing communities to natural resources.

8d) Ensure that fishing communities and fish workers actively and meaningfully participate in all decisions that impact their enjoyment of the right to food.

8e) Ensure that food security and nutrition, that are gender-sensitive, are an integral element of fish-value-chain governance mechanisms, including national government policies, certification standards and corporate social responsibility policies.

8f) Formally protect the rights and ongoing tenure over sites for food-insecure people, fishing communities and indigenous and tribal peoples,

8g) Support the development of small and medium enterprises, by e.g. helping them access best management practices and credit schemes to stay profitable.

FAO should

8h) Lead reform of international fisheries and ocean governance with the objective of improving the transparency and representativeness of all the major international programmes and initiatives to guarantee that the small-scale fishers are fully included in these programmes. These programmes should go beyond their early focus on economic growth with ecological sustainability and aim to prioritize food security and nutrition and poverty alleviation.

The CFS and COFI should

8i) Convene a special joint session involving international fisheries and aquaculture bodies and related actors to share views on how to coordinate their policies and programmes towards progress in the food security and nutrition outcomes of their activities.

HLPE #8 FOOD LOSSES AND WASTE IN THE CONTEXT OF SUSTAINABLE FOOD SYSTEMS

[Download the HLPE Report #8 here](#)

Summary and Recommendations

The issue of global food losses and waste has recently received much attention and has been given high visibility. According to FAO, almost one-third of food produced for human consumption – approximately 1.3 billion tonnes per year – is either lost or wasted globally: their reduction is now presented as essential to improve food security and to reduce the environmental footprint of food systems.

In this context, the Committee on World Food Security (CFS), in its Thirty-ninth Session (October 2012) requested the High Level Panel of Experts on Food Security and Nutrition (HLPE) to undertake a study on “Food losses and waste in the context of sustainable food systems” to be presented to the CFS Plenary in 2014.

The very extent of food losses and waste invites to consider them not as an accident but as an integral part of food systems. Food losses and waste are consequences of the way food systems function, technically, culturally and economically. This report analyses food losses and waste in a triple perspective: a systemic perspective, a sustainability perspective, including the environmental, social and economic dimensions of sustainability, and a food security and nutrition perspective, looking at how food losses and waste relate to the various dimensions of food security and nutrition.

Main findings

Scope and extent of food losses and waste

1. Food losses and waste have been approached by two different angles: either from a waste perspective, with the associated environmental concerns, or from a food perspective, with the associated food security concerns. This duality of approaches has often led to confusions on the definition and scope of food losses and waste, contributing to unreliability and lack of clarity of data.
2. This report adopts a food security and nutrition lens and defines *food losses and waste* (FLW) as “a decrease, at all stages of the food chain from harvest to consumption, in mass, of food that was originally intended for human consumption, regardless of the cause”. For the purpose of terminology, the report makes the distinction between *food losses*, occurring before consumption level regardless of the cause, and *food waste*, occurring at consumption level regardless of the cause. It further proposes to define *food quality loss or waste* (FQLW) which refers to the decrease of a quality attribute of food (nutrition, aspect, etc.), linked to the degradation of the product, at all stages of the food chain from harvest to consumption.
3. There are numerous studies on FLW with diverse scopes and methodologies, making them difficult to compare. At the global level, recent studies use the data compiled for the FAO report published in 2011, which estimated global FLW at one third of food produced for human consumption in mass (equivalent to 1.3 billion tonnes per year), or one quarter as measured in calories.
4. The distribution of FLW along the food chain varies greatly by region and product. In middle and high-income countries, most of the FLW occur at distribution and consumption; in low income countries, FLW are concentrated at production and post-harvest. Per-capita FLW peaks at 280–300 kg/cap/year in Europe and North America and amounts to 120–170 kg/cap/year in sub-Saharan Africa and South/Southeast Asia.
5. Different definitions, different metrics, different measurement protocols and the lack of standards for data collection adapted to different countries and products, makes it difficult – and sometimes impossible – to compare studies, systems and countries. There is also no agreed method to

evaluate the quality of data, method and numbers produced. This situation is a huge barrier to understanding and identifying the causes and extent of FLW, the potential for solutions, the priorities for action and the monitoring of progress in reducing FLW. This is why there are currently strong calls for the development of global protocols to measure FLW, taking into account the large number of variables and country specificities, towards a harmonization of definitions and measurement methods, with a view to improve the reliability, comparability and transparency of data.

Impacts of FLW on food security and nutrition and on the sustainability of food systems

6. FLW impact both food security and nutrition and the sustainability of food systems. This report looks at FLW in the context of sustainable food systems, and adopts the following definitions, as adapted from a range of other definitions.
7. A *food system* gathers all the elements (environment, people, inputs, processes, infrastructures, institutions, etc.) and activities that relate to the production, processing, distribution, preparation and consumption of food, and the outputs of these activities, including socio-economic and environmental outcomes.
8. A *sustainable food system (SFS)* is a food system that delivers food security and nutrition for all in such a way that the economic, social and environmental bases to generate food security and nutrition for future generations are not compromised.
9. FLW impact food security and nutrition by three main ways. First, a reduction of global and local availability of food. Second, a negative impact on food access, for those involved in harvest and post-harvest operations and who face FLW-related economic and income losses, and for consumers due to the contribution of FLW to tightening the food market and raising prices of food. Third, a longer-term effect on food security results from the unsustainable use of natural resources on which the future production of food depends.
10. Two additional relationships between FLW and food security and nutrition are less explored in the literature. One relates to quality and nutrient losses all along food chains, including at consumer level, which negatively impact nutrition. The second relates to the characteristics a food system should have to assure the “stability” dimension of food security, especially given the “variable” nature of food production and consumption. FLW may be indissociable from the need for appropriate “buffering” mechanisms – and some degree of redundancies – to handle the sometimes very high variability of production and consumption in time and in space.
11. FLW also impact the sustainability of food systems in all the three dimensions: economic, social and environmental. They induce economic losses and reduce return on investments. They impede development and hinder social progress. They have an important impact on the environment both from the superfluous use of resources used to produce the food lost and wasted, and from the local and global environmental impacts of putting food waste at disposal in landfills, including the emissions of methane, a potent greenhouse gas.

Organizing the description of causes of food losses and waste: micro, meso and macro causes

12. Identification of causes of FLW is primordial to identification of solutions to reduce FLW, and priorities for action. FLW can result from a very wide range of antecedents, ranging from biological, microbial, chemical, biochemical, mechanical, physical, physiological, technological, logistical, organizational, to psychological and behavioural causes – including those induced by marketing, etc. The importance of these antecedents vary greatly according to the produce and the context, and the stage of the food chain considered. Some studies have identified as much as several hundreds of different individual causes of FLW.
13. Identifying the causes of FLW requires an integrated perspective along the food chain, and to consider any action at one specific stage not in isolation but as part of a whole. Just as in a conveyor belt, actions at one stage of the food chain can affect the whole chain. It is important not to confuse “where” a specific loss or waste is occurring, with its “cause”. FLW happening at one stage of the food chain can have their cause at another stage. For instance, some part of FLW happening at retail and consumption stages can be traced back to causes at harvest or even pre-harvest stages. Lack of care in the manipulation of fruits during harvest and packaging, which in

turn can be related to poor work conditions, can reduce their shelf-life and cause retail-level loss or consumer waste. Conversely, fruits can be left to rot in the field because of a retailer's decision to lower its buying price or interrupt a contract.

14. Causes are often interrelated: rarely a loss or a waste appearing at one stage of the chain, for a particular reason, is solely dependent on one specific cause.
15. This report proposes to disentangle the complexity and diversity of causes in organizing their description amongst three different levels
 - i. First, "micro-level" causes of FLW. These are the causes of FLW, at each particular stage of the food chain where FLW occurs, from production to consumption, that result from actions or non-actions of individual actors *of the same stage*, in response (or not) to external factors.
 - ii. Second, "meso-level" causes of FLW. These include secondary causes or structural causes of FLW. A meso-level cause can be found at another stage of the chain as to where FLW happen, or result from how different actors are organized together, of relationships along the food chain, of the state of infrastructures, etc. Meso-level causes can contribute to the existence of micro-level causes.
 - iii. Third, "macro-level" causes of FLW. This higher level accounts for how food losses and waste can be explained by more systemic issues, such as a malfunctioning food system, the lack of institutional or policy conditions to facilitate the coordination of actors (including securing contractual relations), to enable investments and the adoption of good practices. Systemic causes are those that favour the emergence of all the other causes of FLW, including meso and micro causes. In the end, they are a major reason for the global extent of FLW.

Micro level causes of food losses and waste along food chains

16. Micro-level causes can be found all along the food chain, and are the direct, immediate reasons for FLW taking place at a certain point of the chain, resulting from actions (or non-action) at the same point of the chain, on how individual actors deal with various factors potentially leading to FLW.
17. Poor harvest scheduling and timing, and rough, careless handling of the produce, are both major contributors to FLW.
18. All along the food chain, inadequate or lack of storage conditions and, for perishable products, poor temperature management are key factors leading to FLW.
19. Transport can be a major cause of FLW: by introducing a time span between production and consumption, of particular importance for fresh products and by bringing additional risks of mechanical and heat injury. Time spent because of transport can also lead to decrease of nutritional contents.
20. Conditions within the retail outlet (temperature, relative humidity, lighting, gas composition, etc.) and handling practices have an effect on quality, shelf-life and acceptability of the product.
21. FLW at consumer stage, at household level but also in catering and other food services, are particularly important in developed countries. They are mainly driven by behavioural causes, including habits of food buying, preparation and consumption, as well as time planning and coordination. They are influenced by marketing techniques which encourage consumers to buy more than they need.

Meso and macro-level causes of FLW

22. Very often causes of FLW are found at "higher" meso- and macro-levels, which lead to FLW (and their micro-causes) happening at various stage of the chain.
23. At meso-level, the lack of equipment and/or of good practices, inadequate organization, coordination and communication between food chain actors (e.g. transformation that renders the product useless at a later stage of the chain, etc.), inadequate infrastructure, maladapted economic conditions along the food chain (product unmarketable, etc.) are major causes of FLW at various parts of the food chain. More macro-level, systemic causes include the absence of a

good, enabling environment to support coordination between actors, investment and improvement of practices.

24. Pre-harvest conditions and actions in the field can indirectly lead to losses at later stages in the chain, as production and agronomic practices influence quality at harvest, suitability for transport and shipping, storage stability and shelf-life after harvest.
25. The retailers influence the activities of supply chains by dictating the quality of the produce to be supplied and displayed in their outlets. Quality standards (as to shape, size, weight) imposed by the processors, retailers or target markets can lead to produce not meeting them remaining un-harvested.
26. Inadequate information and bad anticipation of market conditions (level of demand, prices) can also lead to produce remaining un-harvested.
27. In many low-income countries, there is considerable food loss due to lack of storage capacity and poor storage conditions as well as lack of capacity to transport the produce to processing plants or markets immediately after harvesting. There are also too few wholesale, supermarket and retail facilities providing suitable storage and sales conditions for food products. Wholesale and retail markets in developing countries are often small, overcrowded, unsanitary and lack cooling equipment.
28. Poor transportation infrastructure is another important meso-cause of FLW.
29. Even with adequate equipment, lack of implementation of good practices all along the food chain is a major cause of food losses and waste.
30. Confusion arising from the existence and poor understanding of different food date labels are a major, indirect cause of FLW at the retail and consumer levels. Consumers tend to assume that these dates are linked to food safety when in reality they are more often based on food quality (which will deteriorate over time without necessarily becoming a health hazard). Many kinds of date labels coexist, some of them not intended to inform consumers but rather to help retailers manage their stock. Other date labels are directed to consumers, but their purpose can be very different whether the indicated date is related to food safety rules, or related to marketing strategies to protect consumers' experience of a product in the view to safeguard its reputation, often with a huge food safety margin. Consumers get lost in this multitude of date labels. Furthermore, date labeling is a major cause of FLW and economic loss at the retail level as retailers often anticipate dates to preserve their good image.
31. At macro-level, the ability of the actors of the food chain to reduce FLW depend on the surrounding policies and regulatory frameworks. Many regulations affect FLW, including policies that control the use of surplus food for humans or for animal feed; policies or bans on fish discards; food hygiene regulations; food labelling and packaging regulations; waste regulations and policies. Other regulations might not have a direct impact on FLW, but on the potential to use them as feed or energy.

Micro solutions to reduce food losses and waste

32. The identification of broad categories and levels of causes enables to design pathways for all stakeholders to identify and implement solutions to reduce FLW.
33. The review of "micro" causes of FLW at each stage of food chains leads to the identification of potential solutions and of actors to implement them. At each stage of the food chain, some solutions can be implemented by single actors to address specific causes of losses and waste.
34. Micro-level solutions at harvest and post-harvest stages involve improved practices, adoption of technical innovations, investments, or a combination of these. When appropriately applied, good agricultural practices and good veterinary practices at the primary stage of production as well as good manufacturing practices and good hygienic practices during food processing can protect food from contamination or damage. A key intervention all along food chains is to improve storage conditions. Various solutions have been already successfully implemented in many places.
35. Modifying consumers' behaviour is also important. It involves direct communication and awareness raising on the importance of reducing food waste. Stressing the civic responsibility for reducing FLW is important. Consumers may also need technical options, such as better, smart

packaging adapted to different conditions of use, or the promotion of the “doggy bag” practice in restaurants. It also requires the support and cooperation of the food industry and retailing, for instance to improve the clarity of food date labelling and to provide advice on food storage, or to ensure that an appropriate range of pack or portion sizes is available to meet the needs of different households

Meso-level solutions

36. Micro-level solutions can be supported and enhanced by actions at meso-level, often involving several actors altogether, public and private.
37. They often require investments, both public and private. This is particularly the case when the main solutions reside in improvement of logistics. For perishable products, management of temperature and absence of delays are two vital issues that require investments in infrastructures (energy for cold chains, roads for transportation). Innovation and adaptation of technical solutions to local conditions are essential for success. Cold chain management in perishable foods supply chains offers a very good example of potential solutions and what is needed to implement them in locally adapted ways.
38. For many products, particularly for perishable ones, transformation can be a way to reduce FLW and improve resistance to transport and storage, and increase shelf life. Investment in food processing infrastructure, including packaging, can be seen as a huge opportunity to contribute to improved situations of food security, especially in sustainable ways to fulfil the growing demands of metropolitan areas.
39. Capacity development in the form of education, training and extension services for farmers and all actors across the food chain is a key tool for reducing food losses and waste.
40. There are initiatives from government and development partners in developing countries to improve the livelihoods of women farmers through value addition and marketing of perishables food crops such as fruits and vegetables. These initiatives have two-pronged benefits – economic empowerment of rural women and reduction of post-harvest losses in the perishable commodities.
41. The increasing inclusion in annual corporate businesses reports of a section detailing the environmental and social impacts of their activities could lead to more sustainable food systems and less FLW. Businesses can commit and report (i) on monitoring of food losses and waste in their activities, (ii) on reducing food losses and waste in their activities, (iii) support activities which lead to reduction of FLW, with their suppliers, at consumer level or elsewhere.
42. The standardization of the products offered to consumers is a major cause of FLW in modern retailing systems. In traditional systems products gradually lose their economic and exchange value along with their quality, as defined by the FLWQ concept. They are generally still sold or exchanged, but at gradually lower prices. In modern, standardized systems, products are rather defined as marketable or not. They “suddenly” lose all their economic value when they are no more of the minimum quality considered as marketable – which is often not linked to their edibility – as illustrated by the confusion on date labelling. Alternative distribution systems such as food banks preserve them an edible value.

Macro-level (systemic) solutions

43. Solutions at micro- or meso-level can be enabled, supported and enhanced by action at macro-level. Some solutions can only be implemented if they are accompanied by action at “macro” level. This includes specific policies against FLW or considering FLW in other sets of policies. As mentioned above, reducing FLW often involves improving infrastructures, particularly transport, energy and market facilities. This requires government action, with often involvement of local authorities and also of the private sector. Decisions and policies would deserve to be based on sound cost-benefit analysis, so as for example to ensure that the right incentives or corrective measures are put in place.
44. Many of the causes of FLW – and therefore the appropriate solutions – are due to behavioural or economic choices, which seem rational at one stage of the chain, but may lead to FLW when the rest of the food chain is considered. For example, the decision of a farmer to plant a larger field at

the expense of not necessarily harvesting the whole of it depending on market conditions; the decision of food chain agents to overbuy food with respect to potential sales and their variability; supermarkets needing to show a situation of abundance of products to attract clients, etc. Tackling these causes of food losses and waste will imply addressing their underlying economic and behavioural drivers, understanding their reasons, and finding a “substitution” to the different “functions” that these actions (which may end up in creating FLW) “ensure” for the different actors.

45. Solutions to be implemented at meso and macro level generally require concerted and collective action and measures. Prior identification of potential winners and losers across the whole food system, and the design of appropriate incentive or compensation mechanisms, is key to the success of implementation. This includes in particular assessing whether the poor producers and consumers gain from FLW reduction. It should also consider how the “FLW-to-be-reduced” was originally used (e.g. was it used as feed for animals or thrown away?). To avoid unintended consequences of FLW reduction strategies, policymakers and stakeholders should consider all the impacts of the proposed changes.

A growing set of initiatives towards coordinated actions to tackle FLW

46. There are a growing number of initiatives around the world that focus on reducing FLW, at national, regional and local levels. They have all as common denominator the perspective of gathering public and private actors, in a multi-stakeholder setting, often with a significant engagement of the private sector.
47. Some governments have started to define specific targets for FLW reduction. However few governments have put in place specific policies to reduce FLW, less even with a systemic approach and integrated programmes. To date, main drivers for FLW targets are generally found outside the perimeter of food policies, such as in waste management policies leading to reducing the volume of waste, including packaging waste, and in resource use efficiency policies leading to optimize, in analogy to the energy sector, the amount of inputs and resources (including raw food products) in production and consumption.
48. Reducing food losses and waste requires identifying causes and selecting potential solutions adapted to local and product specificities. It includes evaluating potential costs and benefits of various options for different actors along the chains. The implementation of the selected solutions generally requires the support or involvement of other actors, inside the food chain or at broader levels. This often calls for coordinated action of multiple stakeholders. It also calls for actions at policy level, to improve policies having an impact on FLW, or to build specific FLW reduction policies.

Recommendations

Food losses and waste (FLW) impact both food security and nutrition and the sustainability of food systems, in their capacity to ensure good quality and adequate food for this generation and future generations. It calls for all stakeholders – States, international organizations, private sector and civil society – to recognize food security and nutrition as a central dimension of sustainable food systems and to address collectively FLW to improve the sustainability of food systems and to contribute to food security and nutrition.

According to FAO, nearly one-third of food produced for human consumption – approximately 1.3 billion tonnes per year – is either lost or wasted globally. The HLPE makes the following recommendations as a way of making serious progress to reduce this figure.

The HLPE recommends that States and international organizations better integrate food chains and food systems perspectives in any food security and nutrition strategy or action. Reduction of FLW should be systematically considered and assessed as a potential means to improve agricultural and food systems efficiency and sustainability towards improved food security and nutrition. Direct and indirect causes of FLW in a given system should be analysed to identify hotspots where it would be most efficient to act.

The HLPE recommends undertaking four parallel mutually supportive tracks, in an inclusive and participatory manner:

1. Improve data collection and knowledge sharing on FLW.
2. Develop effective strategies to reduce FLW, at the appropriate levels.
3. Take effective steps to reduce FLW.
4. Improve coordination of policies and strategies in order to reduce FLW.

1) Improve data collection and knowledge sharing on FLW

All Stakeholders should

- 1a) Agree on a shared understanding, definition and scope for FLW.
- 1b) Improve the collection, transparency and sharing of data, experiences and good practices on FLW at all stages of food chains.

FAO should

- 1c) Consider developing common protocols and methodologies to measure FLW and analyze their causes. This should be done through an inclusive and participatory process, taking into account product, country and all stakeholders' specificities and building upon FAO's experience.
- 1d) Invite all stakeholders, international organizations, governments, private sector and civil society to collect and share data on FLW in a coherent and transparent manner at all stages of food chains.

2) Develop effective strategies to reduce FLW, at the appropriate levels

States should

- 2a) Convene an inclusive process to identify hotspots, causes of losses and waste at different levels (see Appendix 1), potential solutions (see Appendix 2) and levels of intervention. This requires identifying the actors who will directly implement solutions, individually or collectively, identify the costs they will bear, as well as potential benefits and beneficiaries. It also requires identifying constraints (including systemic constraints) and how they would be addressed (infrastructure, technologies, changes of organization in the food chain/system, capacity building, policies and institutions).
- 2b) Determine a plan of action in a manner that includes all stakeholders.

FAO should

- 2c) Support these national processes in collaboration with partners to devise methodological guidance adapted to countries' specificities, and needs and priorities of various actors.

3) Take effective steps to reduce FLW

States should

- 3a) Invest in infrastructure and public goods to reduce FLW and to ensure sustainable food systems such as storage and processing facilities, reliable energy supply, transport, appropriate technologies, improved access and connection of food producers and consumers to markets.
- 3b) Implement an adequate framework including regulation, incentives and facilitation so that the private sector (e.g. wholesaler, retailer, catering and other food services) and consumers take robust measures to tackle unsustainable consumption patterns. This framework should also ensure that the private sector better incorporates negative externalities of their activities such as damage to natural resources.

3c) Take measures to support smallholders to reduce the FLW by organizing themselves in ways that yield economies of scale and allow them to move towards high value activities in the food supply chain.

3d) Create an enabling environment for the reduction of FLW including by encouraging sustainable patterns of consumption among the population, as well as food and non-food investments promoting food security.

3e) Encourage sector-based audits of FLW.

3f) Reform public food procurement policies to reduce and minimize FLW while ensuring food safety.

3g) Design and introduce procedures to ensure higher corporate accountability standards for FLW, and monitor reductions in FLW in the food processing and retailing sectors.

States and other stakeholders, including international organizations, private sector and civil society should

3h) Carry out training and capacity building to strengthen the coordinated use of appropriate technologies.

3i) Promote experimentation and the exchange of good practices regarding FLW.

3j) Recognize the plurality of food systems in their diverse contributions to FLW and various potentials to reduce them.

3k) Enable and support multi-stakeholder initiatives to improve governance along food chains and organize collective understanding and action to reduce FLW.

3l) Invest in research and development to minimize FLW.

3m) Improve the dissemination of accurate information and advice to consumers to minimize FLW.

3n) Encourage civic engagement of all actors, including consumers, to act concretely to reduce FLW in particular through public campaigns, education of youth and children.

Private sector should

3o) Develop and implement corporate responsibility policies to diminish FLW including by collecting and sharing data on FLW and ensuring that the costs and benefits of FLW reduction are appropriately shared.

3p) Get involved with collective actions and initiatives for reducing FLW, including by mobilizing companies to change their practices in order to reduce FLW in households.

3q) Reform supermarket and food retailer practices such as product standards used to accept or reject farmers produce (e.g. size and shape of foods as well as cosmetic standards for fruit, vegetables, livestock products). This can be done for example by introducing differentiated pricing to prevent economic and nutrition value losses.

National and International research and development organizations should

3r) Increase investment in technological innovations at post-harvest and consumption stages for effective reduction of FLW as well as for adding value to agricultural products in the whole food value chain, for example through the extension of shelf life while protecting nutritional value.

4) Improve coordination of policies and strategies in order to reduce FLW

States should

4a) Integrate FLW concerns and solutions, and a food chain approach, in agricultural and food policies and development programs, as well as in other policies which could impact FLW.

4b) Strengthen the coherence of policies across sectors and objectives (e.g. sustainable food consumption, dietary guidelines, food safety, energy, and waste).

4c) Set targets and introduce enabling economic policies and incentives to reduce FLW, through a “food use-not-waste” hierarchy (i.e. prevention, reallocation of food for feed, recycle for energy through anaerobic digestion, recover for compost, disposal, and ultimately, if no other solution is available, in landfills).

4d) Support efforts for coherence, clarification and harmonization of the meaning and use of food dates labelling, at national as well as international level taking into account the principles of the *Codex Alimentarius*.

4e) Ensure a holistic food chain approach, with adequate research and extension services, including towards small transport, transformation and distribution enterprises.

4f) Support coordination of efforts through multi-stakeholder initiatives, such as the global “Save Food” initiative.

All Stakeholders should

4g) Improve communication, coordination, recognition of efforts needed/made at one stage to reduce FLW at another stage (downstream or upstream).

CFS should

4h) Consider convening an inclusive meeting to share successful experiences, challenges faced and lessons learned from FLW initiatives.

4i) Develop guidelines to assist governments in an assessment of their food systems with a view to reduce FLW.

4j) Raise awareness of the importance of reducing FLW and disseminate this HLPE report to international organizations and bodies.

HLPE #9 WATER FOR FOOD SECURITY AND NUTRITION

[Download the HLPE Report #9 here](#)

Summary and Recommendations

Water is key to food security and nutrition. However there are many challenges for water, food security and nutrition, now and in the future, in the wider context of the nexus between water, land, soils, energy and food, given the objectives of inclusive growth and sustainable development.

In this context, in October 2013, the Committee on World Food Security (CFS) requested the High Level Panel of Experts on Food Security and Nutrition (HLPE) to prepare a report on Water and Food Security, to feed into CFS's 42nd Plenary session in 2015.

This report explores the relations between water and food security and nutrition, from household level to global level. It investigates these multiple linkages, in a context of competing demands, rising scarcities, and climate change. It explores ways for improved water management in agriculture and food systems, as well as ways for improved governance of water, for better food security and nutrition for all, now and in the future. The report is deliberately oriented towards action. It provides examples and options to be implemented by the many stakeholders and sectors involved, given regional and local specificities.

Main findings

What follows is a summary of the main observations and findings of the report:

Water is central to Food Security and Nutrition (FSN)

1. Water is life. Water is essential to food security and nutrition. It is the lifeblood of ecosystems, including forests, lakes and wetlands, on which depend the food security and nutrition of present and future generations. Water of appropriate quality and quantity is essential for drinking and sanitation, for food production (fisheries, crops and livestock), food processing, transformation and preparation. Water is also important for the energy, industry and other economic sectors. Water streams and bodies are often key ways for transport (including inputs, food and feed). All in all, water supports economic growth, and income generation, and thus economic access to food.
2. Safe drinking water and sanitation are fundamental to the nutrition, health and dignity of all. Lack of access to safe drinking water, sanitation facilities and hygiene practices undermines the nutritional status of people through water-borne diseases and chronic intestinal infections. Despite significant advances in access to drinking water and sanitation, in 2012, according to WHO and UNICEF, globally 4 percent of the urban population and 18 percent of the rural population (but 47 percent of the rural population in Sub Saharan Africa) still lacked access to an improved drinking water source⁶ and 25 percent of the population lacked access to improved or shared sanitation.⁷
3. According to FAO, in 2009, 311 million hectares were equipped with irrigation, 84 percent of those actually being irrigated, corresponding to 16 percent of all cultivated land and contributing to 44 percent of total crop production. Reliable irrigation is also essential to increasing and stabilizing incomes and provides livelihood resilience for a vast number of smallholder farmers. Irrigated agriculture is by far the largest water user globally, totalling 252 billion cubic meters of

⁶ Sources protected from outside contamination, particularly faecal matter, by construction or through active intervention.

⁷ Facilities ensuring hygienic separation of human excreta from human contact.

surface and groundwater withdrawals⁸ in 2013[†], equivalent to 6.5 percent of the global renewable freshwater resources flows, and 70 percent of anthropic withdrawals globally, with significant differences between countries: 90 percent in low income countries, 43 percent in high income countries.

Water availability and stability for FSN

4. Availability of water is very different across geographical regions, both in terms of rainwater, and of surface and ground water. Therefore, water availability needs to be considered at regional, national and local levels.
5. Ground water is a particularly stable source of water. 40 percent of irrigation uses groundwater sources. It offers considerable opportunities especially for regions that have no other sources. However it is also a major challenge for the future as much groundwater is not renewable, and slowly replenishing reservoirs can get quickly depleted. Some “fossil” ground water reservoirs are replenished only on a geological timescale, thousands or even millions of years.
6. Ecosystems and landscapes sustain water resources. Forests play a major role in the watercycle, ensuring quantity, quality and stability of water for human use.
7. Climate change adds significant uncertainty to the availability of water in many regions. It affects precipitation, runoff, hydrological flows, water quality, water temperature and groundwater recharge. It will impact both rainfed systems, through precipitation patterns, and irrigated systems, through availability of water at basin level. Climate change will modify crop and livestock water requirements, and impact water flows and water temperatures in water bodies which will impact fisheries. Droughts may intensify in some seasons and areas, due to reduced precipitation and/or increased evapotranspiration. Climate change will also significantly impact sea level, with impacts on freshwater resources in coastal areas.

Competing uses of water

8. In most parts of the world water resources are under increasing stress. Population growth, rising incomes, changing lifestyles and diets, and growing demands for different uses of water, are all increasing pressure on limited freshwater resources. Total water withdrawals for agriculture, energy, industry, and municipalities accounted in 2013[†] for globally 9 percent of internal renewable resources, a number ranging from 2.2 percent for Latin America and Caribbean, to 122 percent in the Middle East and North Africa.
9. Water and energy are closely linked: water use for energy generation represented 15 percent of world water withdrawals in 2010, and can compete with food production. At the same time energy is essential in making water available for irrigation, food processing and preparation and for water and wastewater treatment.
10. According to OECD’s business as usual scenario global water demand is projected to increase by some 55 percent by 2050, with over 40 percent of the global population living in river basins experiencing severe water stress (where water withdrawals exceed 40 percent of recharge), especially in North and Southern Africa, and South and Central Asia. Manufacturing (+400 percent), thermal electricity (+140 percent) and domestic use (+130 percent) are responsible for the projected demand growth until 2050, with little scope to increase irrigation water use.

⁸ A withdrawal of water (or “water use”) does not necessarily translate in net water consumption, which is the portion of water withdrawn that is not returned to the original water source after being withdrawn (11 percent of the withdrawals by the energy sector are consumed, and 50% of the withdrawals for irrigated agriculture are consumed, i.e. evaporated into the atmosphere or transpired through plant leaves). Water withdrawn and returned to the original source is often accompanied by an alteration of its quality.

[†] World Development Indicators (World Bank database) estimates for 2013 as per available figures.

Water scarcity and access to water

11. Water scarcity is generally defined⁹ by the difference between water availability - the level of renewable water resources (rain water, surface and ground water) available within a certain area - and a certain demand for water, including basic needs. There are however as many perspectives to “water scarcity” as there are perspectives to water availability and to water demand. Water scarcity can also be encountered in water rich regions, if there is an excess of water demand, with often increasing and badly managed competition for water use between sectors (agriculture, energy, industry, tourism, and household use).
12. Access to, and use of, water for FSN is informed by social, political and economic power relations within countries, in water basins, and at the local level, as much as by infrastructure and rainfall. Securing access to water can be particularly challenging for small holders, vulnerable and marginalized populations and women.
13. Access to water, or the lack of it, is of particular importance for women as cultural norms in much of the developing world dictate that women and girls are responsible for water collection, and they may spend several hours per day collecting water, with impacts on their health and nutritional status as well as on time available for other activities, child-care, productive and educational activities. Moreover, women are often excluded from decision-making processes regarding water management or access to water technologies, and are often discriminated against by formal water allocation systems.

Water quality

14. The many potential uses of water, from drinking and sanitation, to growing food, energy, mining, manufacturing, etc. typically require different quantities and qualities of water, and therefore often specific treatment, which can be done at the source, or closer to the user, or even by the end-user itself (household or industry). Also, irrigation water quality needs vary by crop. This leads to trade-offs for the provision of water services, between their specialization versus a “multiple use approach” to serve different purposes or uses.
15. Poor water quality affects human health and ecosystems’ functioning. High water quality standards are needed for drinking water and important for other WASH components, and are important for food processing and preparation. Drinking water quality has improved in many developed countries over the last several decades and is supported by regulations and monitoring. In most parts of the global South, water quality and associated food safety risks still have adverse impacts on both human and ecosystem health.
16. Environmental impacts of uses and return flows vary between uses, as well as depollution needs, and all require specific attention. Pollution renders water unfit for use and undermines ecosystems’ health in many areas. Unsustainable water use and management reduce the ecosystems’ functions of land, fisheries, forests and water bodies, including their ability to provide food and nutrition.
17. Waste water is also a resource, and water-scarce countries often resort to wastewater reuse, which also provides for closing the nutrient cycle but poses risks to human health if not regulated effectively. Waste water, currently undervalued and underused, can be a resource for the future, with adequate safeguards. Desalination of sea water is a potential source of freshwater in coastal areas, particularly for drinking.

⁹ Some authors have come to define “water scarcity” by pre-determined thresholds, such as 1700 m³ and 1000 m³ of available water per person per annum, which were determined to cover all uses including agriculture (irrigation) and other economic sectors. Other authors have defined “economic water scarcity” to define situations where water is physically available in the environment to, in theory, meet the demand, but not provided where it is needed and at the quality needed, due to economic factors, such as a lack of infrastructure, storage, distribution systems, etc. One could define “social water scarcity” for situations where part of the population does not have access to water in sufficient quantity and quality, for drinking and sanitation, as well as to sustain their livelihoods.

Managing water scarcities in agriculture and food systems

18. Improving water management in agriculture and food systems aims at improving the productivity of agriculture and food systems for FSN (availability, access, stability, nutrition), given water constraints. This can be achieved by improving water efficiency at all levels (how water is used, from ecosystems to plants) and by improving the agricultural water productivity (the ratio of output to the water input), in rainfed and irrigated systems.
19. Improving water management for FSN mobilises actions ranging from appropriate planning and optimization of resources, inputs and means of production, in both rainfed and irrigated systems, as well as along food chains, to sustainable management of ecosystems and landscapes which enhance, regulate and stabilize water provision. Water management will be key to the adaptation to climate change of agricultural systems both rainfed and irrigated.
20. For future food security, land and water management needs to preserve ecosystem functions and ensure the future of the resource. Sustainable management of ecosystems, and an ecosystem's approach to water management from local to continental levels is key to ensuring quantity and quality of water for food security and nutrition in the future.

Management for improved water and agriculture productivity in both rainfed and irrigated systems

21. Broader agro-ecosystem approaches consider rainfed and irrigated agriculture as part of a whole, with upstream-downstream interactions, aiming to optimize water allocation and ensuring attention to ecosystem's health.
22. Globally, rainfed agriculture is the primary source of food production. In many regions, there is still an important yield gap, and potential to improve yields and water productivities without irrigation. Rainwater harvesting, as well as supplemental irrigation, can also substantially improve rainfed agriculture. Livestock water productivity can be improved, inter alia, through better management of grasslands and rangelands and through livestock systems resilient to water stresses. In pastoral systems, drinking water constraints for livestock often limit the use of pastures and rangelands, and making water available could increase the sustainable use of available biomass.
23. A range of means such as plant and livestock breeding, agro-ecology and conservation agriculture can also improve water productivity in both rainfed and irrigated systems. Better integration of plant and livestock production can improve nutrient management and water use efficiency. The water productivity of aquaculture, including in integrated systems, is high compared to other sources of protein and nutrients, which gives it an important role for FSN.
24. High variability of expected income, linked to dependence on variable rainfalls often constrain investment in rainfed agriculture, thus limiting potential improvements. Risk management strategies and tools can thus facilitate investments and productivity enhancements.
25. Groundwater is increasingly being used for irrigation and being overexploited in many regions. In other areas it is still underutilized and can be further exploited for food production. A constraint to the sustainable use of ground water is the difficulty to monitor individual withdrawals and the impact on the resource.

Optimise uses and re-uses for FSN at all levels

26. In the irrigation sector, there are margins of improvement and revitalization of existing systems to improve productivity and sustainability. It requires appropriate maintenance, which necessitates institutions, technical competencies, and sustainable financing. In addition, cropping systems, patterns and practices can be adapted to reduce the need for irrigation water. Finally, there is scope for new systems and practices in some areas.

27. Currently, about 0.25 to 1.5 million hectares of irrigated land are estimated to be lost annually because of salinization due to bad irrigation practises.¹⁰ Globally 34 million hectares are now impacted by salinity representing 11 percent of the total irrigation equipped area. Addressing secondary salinization and drainage issues is essential to keep the potential and valorize the investment of irrigation-equipped land.
28. Appropriate water pricing can be a tool to improve cost recovery in irrigation schemes. In addition, water and energy pricing can be used to increase efficiency. High levels of energy subsidies can also result in the overuse of water.
29. In some areas, more water can be made available through the development of new infrastructure. Marginal quality water including brackish, sewage and drainage water can also be used, although environmental, health and cost concerns must be managed.
30. In food processing, water management issues mainly regard the quality of the water needed, and the impact of activities on water quality through discharged water.

Trade can compensate water scarcities for FSN

31. The importation of food is a coping mechanism used by water scarce countries. Approximately 14% of world cereals are traded internationally, with a greater share of net imports by countries facing physical or economic water scarcity. Water scarce countries are thus particularly dependent on international trade and particularly affected by food price volatility as well as by export restrictions in times of crisis.
32. Trade has a key role to play for FSN, to cope with water scarcity and also to maximize FSN outcomes of water abundance. The food and nutrition security of water scarce countries depends on a reliable international trade. Measures to improve the reliability of international trade, such as the creation of AMIS can thus be also seen as measures to cope with water scarcity. Water used for agriculture in water rich countries contributes to ensure global availability of food.

Data and monitoring

33. Effective water management is grounded on appropriate tools to monitor and assess climate risks (floods and droughts), and can mobilize landscape approaches, such as land restoration, forest and watershed management, appropriate use of floodplains, as well as infrastructure for water storage.
34. Improvement in water management relies on appropriate data and tools, such as metrics of water use, water efficiency and water productivity. To improve water management, each stakeholder needs different tools, which to be mobilized will require appropriate data. In many countries, there is still a lack of basic data, particularly in relation to groundwater and water quality. There is also value to collect more data on informal uses as well as more gender disaggregated data. Another challenge is the rapidly changing situation of the resources, both in quality and quantity, as well as of the uses, and the need for up-to-date data systems at the appropriate level/scale.
35. Different water accounting schemes have been proposed (e.g. life cycle analysis, water footprinting etc.), with the aim to help orient production choices for producers to optimize water use, and to help raise awareness of consumers and contribute to orient their choices. It is however important to use such tools with caution as they often cannot capture all context specificities, particularly local scarcities and impacts on ecosystems.

Challenges of water governance for food security and nutrition

36. Water governance¹¹ has to deal with competing policies, interests and actors coming from numerous sectors, with different degrees of political or economic power. Access to water, control

¹⁰ Data on additional salinized areas per year are variable and challenging to compile at global level. The problem is mainly concentrated in irrigated land located in semi-arid and arid zones.

¹¹ In this report, the following definition of water governance is used: "Water governance is the set of political, social, economic and administrative systems, rules and processes (i) which determine the way decisions regarding the

over water resources or water pollution can cause disputes and conflicts at various levels. Increasing scarcities and growing and competing demands on water by a multiplicity of users and sectors make water governance for food security and nutrition particularly challenging, from local to broader levels.

37. Water governance covers both water resources and water services. Depending on the situations, the governance of these two issues have been either linked or separated. The modernization of water provision, when it happened, often led to differentiated governance schemes for water services. Governance issues are different for resources and for services. For resources, the dominant challenges are competition between uses and users of different economic and political power, the rules of this competition and how FSN is taken into account, as well as the links with land. For services, the dominant challenge is the regulation, control and monitoring of the service provider, public or private, including how physical and economic access to water for different users, especially marginalized populations, is enabled, conditioned and performed.

The challenge of integration and prioritization

38. Numerous policies have an impact on water resources: environment, energy, trade, food and agriculture, including fisheries and forests, industry, etc. Policy coordination is managed differently according to countries' institutional settings. At national level, when it exists, the coordination is assumed either by a lead ministry, or an interministerial coordination mechanism, or a dedicated body. In some cases, this leads to an integrated water policy.
39. In many cases national water policies do not prioritise water for food security. While some do outline the order of priorities for water allocation with a focus on FSN, fully implementing it remains a challenge, not least due to the lack of integration in decision-making, with decisions on irrigation, industrial or power generation development being taken in different departments with little consideration for the cumulative impacts on water. Some countries however have put in place improved intersectoral decision making, a critical process in ensuring sufficient water for FSN.
40. Sustainable management of water resources for FSN often depends on the protection and conservation of specific ecosystems, particularly wetlands and forests, which themselves also contribute to the FSN of local populations. Similarly, quality water streams and bodies are important for inland fisheries and aquaculture. The ecosystem approach as defined by the Convention of Biological Diversity provides a good model. It requires specific integrated governance mechanisms.
41. The concept of Integrated water resources management (IWRM), following the Dublin principles (1992), was invented to bring together social, environmental and economic objectives, in a cross-sectoral approach of water management, combining users, planners, scientists and policy-makers. It has been widely used and promoted,¹² but also the object of numerous criticisms. Whilst the critics of IWRM recognize its value as a comprehensive framework, they argue that it is too abstract when addressing implementation challenges. This makes it less operational and practical especially in developing countries' contexts. Critics also point to IWRM's difficulty to recognize conflicts and to enable proper prioritisation of issues, especially those most important for people locally, including water for FSN.

Actors

42. Many different actors, public and private, operate in water use and management. There is often confusion, and a need for clear rules and common understanding, on their roles and functions, the way they interrelate, their different responsibilities and how they can be made accountable. In many cases, inclusiveness of governance schemes, accountability and control mechanisms do not function in such a way that the efficiency and fairness of the system can be fully guaranteed.

management and use of water resources, and the delivery of water services, are taken and implemented by the various actors; and (ii) through which decision-makers are held accountable".

¹² IWRM has been defined, in 2000, by the Global Water Partnership as "a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems".

43. Corporate actors such as from energy and industrial sectors, cities, food transformation and beverage industry, or large-scale agriculture/plantations, have an increasing influence in water governance and management. First, some of them, like the big providers of services for large irrigation schemes or for drinking water, act as water managers. Second, large enterprises enter in competition for the allocation of the resource with agriculture and small users. Third, in some cases, the scale of the intervention or investment, or the economic and political influence, is such that the resource itself is controlled.
44. While there is also clearly a role for the private sector in the provision of water, in many countries there is insufficient regulatory oversight. Experiences with privatization of water services have not always been poor-friendly, affecting the ability of poor households to access sufficient water of an appropriate quality for food preparation, health and hygiene requirements.
45. In many countries, water users associations can play an important role in the management of water resources and water services, especially at local and community level, including in irrigation schemes. There is however often a divide between different categories of users, having different objectives: farmers, fisherfolks, urban users, environmentalists and recreational users, etc. Governance has to provide for mechanisms to arbitrate between diverging interests and to solve conflicts in a fair way.

Institutions

46. Institutions dealing with water resources are extremely diverse, depending on countries and situations. They can be formal or informal/customary, part of the local, sub-national or national administration, they can be specific water institutions, eventually linked to a water body (or not), they can be linked to an investment, they can be public or private, they can associate to various degrees the different users in the management of the resource.
47. Decentralized governance allows to take better into account the need of users and the state of the resource, and to better responsabilize users especially with secure rights and when they are associated to the resource management decisions. Decentralized governance often involves strengthening local organizations and/or the setting up of specific institutions, such as water user associations, or river basin organisations. However even at such levels, principles of good governance need to be put in place to ensure equitable access, and not exclude less powerful actors, including informal water users.

Mechanisms to manage competing demands

48. Many mechanisms and tools can be used to manage water scarcities and competing demands, such as: mechanisms to set maximum withdrawals; allocation tools, including access rights; permits and tradable permits; licensing systems; pricing schemes; other tools to protect the resource and its quality, such as to regulate water abstraction and discharge, protected areas, catchment protection, water quality and resource protection regulations. The choice of the tools and the way they are implemented can have diverse effects on FSN through the impacts on water available for agricultural uses, and on access to water for poor, vulnerable and marginalized populations. In particular, the impacts of tools on FSN and on populations depend on the social and legal systems in which they are implemented (formal and informal). Badly adapted tools can disrupt existing community-based systems. Market based tools often tend to give priority to the sectors which offer the highest economic value for water use, at the expense of food security.
49. Governance of water resources, especially in water scarcity contexts, goes with the establishment of an allocation scheme, including allocation tools and rules. In the context of FSN, the challenge is to ensure that allocation systems give adequate priority to water for food production as well as for the basic needs of poor and marginalized populations.
50. Allocation mechanisms, ideally, operate at a pertinent hydrological level where the resource is contained and shared. This can be particularly challenging because the institutional arrangements are not often aligned on hydrological bodies. A water resource can spread on different administrative entities including on different countries. Also, institutional arrangements

do not always take into account interconnections between various water resources, such as between surface and ground water.

51. Allocation of, and access to water are determined not only by formal institutions (supported by laws) but also by informal arrangements such as customary law. In a context of increasing formalization of access rights, the rights of poor and marginalized women and men, often of a customary nature, are often overlooked and threatened, with impacts on FSN.

Land and water linkages

52. When land and water governance are not adequately linked, changes in land ownership and tenure at one location can have impacts on water access rights elsewhere, with impacts on agriculture and FSN. Conversely, loss of access to water can impede the proper use of land. In particular, large land acquisitions can lead to the re-allocation of water locally or downstream and can negatively affect the FSN of communities, local or remote.
53. The Voluntary Guidelines on the responsible governance of tenure of land, fisheries and forests in the context of national food security (VGGT), and the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (VGSSF) have not paid much attention to the topic of water resources, despite it having important linkages with land issues, and it being a determinant of fisheries resources.

Investments

54. Investments in various economic activities, and in particular in energy, industry and large scale plantations, by corporate actors, often have an important impact on water. Mobilizing the investment potential of businesses can benefit FSN by providing development opportunities. They can also, when directed to water supply and water services, increase the provision of water. However, in both cases they can often bear a very important negative impact on local population, especially on the most vulnerable, marginalized, indigenous peoples and women. There is a need to ex-ante assess impacts on the FSN of all, including vulnerable populations, and to create mediation and dispute settlement mechanisms in case of negative impacts. Tools recently developed such as the CFS principles for responsible investments in agriculture and food systems can serve as a guide to maximize FSN outcomes of investments in the water sector and of investments in activities having an impact on water.

International agreements and initiatives

55. The 263 transboundary lakes and river basins account for an estimated 60 percent of freshwater flows. In addition approximately 300 groundwater aquifers are transboundary. Close to 700 bilateral, regional or multilateral water agreements in more than 110 basins cover different types of activities and objectives, from regulation and development of water resources to the setting of management frameworks.
56. The 1997 United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses is the only treaty governing shared freshwater resources that is of universal applicability. It introduced the principles of equitable and reasonable utilization and participation, in the use, development and protection of the international resource, the obligation not to cause significant harm to other states, principles of prior notification of planned measures, and provisions concerning management and settlement of disputes.
57. At the global level, several international initiatives have emerged, particularly in the aftermath of the Dublin conference in 1992. The Global Water Partnership aims at promoting integrated water resource management, and providing advice, helping with R&D and training. The World Water Council – a multistakeholder association, best known for its flagship conference, the World Water Forum, aims to promote awareness, build political commitment and trigger action on water issues. In addition, UN-Water has been created to strengthen coordination and coherence amongst the UN agencies, programmes and funds that have a significant role in tackling global water concerns.

The right to safe drinking water and sanitation, and the right to food

58. The human right to safe and clean drinking water and sanitation were recognized in 2010 by the United Nations General Assembly. It entitles everyone, without discrimination, to access to sufficient, safe, acceptable, physically accessible and affordable drinking water and to physical and affordable access to sanitation for personal and domestic use. It was incorporated in several constitutions and national legal orders.
59. The right to adequate food has been recognized in the International Covenant on Economic, Social and Cultural Rights (ICESCR), a multilateral treaty adopted by the United Nations General Assembly in 1966. The 2004 Voluntary Guidelines to support the progressive realization of the right to adequate food in the context of national food security (VGRtF) contain dispositions about access to and sustainable use of water.¹³
60. The human right to safe drinking water and sanitation and the human right to food have close ties because safe drinking water and sanitation are crucial for health and good nutrition, and because access to water is indispensable for food producers, and the right to food of producers. There are ongoing reflexions, warranting further exploration and research, on the consequences of these two rights for water governance, and how they can promote a human rights based approach to water governance for FSN. These reflexions also lead to considerations about the extra-territorial obligations of States to regulate the activities of third parties under their jurisdiction to ensure that they do not violate the human rights of people living in other countries.

¹³ The VGRtF underline that the realization of the right to food necessitate State action to *“improve access to, and promote sustainable use of, water resources and their allocation among users giving due regard to efficiency and the satisfaction of basic human needs in an equitable manner and that balances the requirement of preserving or restoring the functioning of ecosystems with domestic, industrial and agricultural needs, including safeguarding drinking-water quality”*.

Recommendations

The concept of “water for FSN” designates water’s direct and indirect contributions to food security and nutrition in its four dimensions. It covers safe drinking water and sanitation, water used to produce, transform, and prepare food, as well as the contribution of water uses in all sectors to livelihoods and income and as such to food accessibility. It covers also the objective of sustainable management and conservation of water resources and of the ecosystems that sustain them, and that are necessary to ensure FSN for present and future generations.

1. Ensure sustainable management and conservation of ecosystems for the continued availability, quality and stability of water for FSN

States should:

- g. Ensure continued availability, quality and stability of water for FSN through the conservation and sustainable management of landscapes and ecosystems, across biomes, including by using the ecosystem approach of the Convention on Biological Diversity.
- h. Ensure that the quality of water resources is preserved, especially for the provision of drinking water, for food processing, for sanitation, as well as for irrigation water. This should be done through the introduction of regulatory systems as well as targeted incentives and disincentives, such as the polluter-pays principle and other measures commensurate with harm done. All actors should be held accountable for the impact of their activities on water quality.

States and other relevant stakeholders should:

- i. Promote participatory mechanisms for sustainable management of ecosystems and landscapes that are key to ensure the availability, quality and stability of water for FSN. These include collective and coordinated action within and across watersheds and ecosystems, innovative capacity building and frameworks for accountability of governance and management, including of decentralized governance and local adaptive management.
- j. Consider co-management of water resources whereby the design, implementation and monitoring of management measures are shared or developed with a range of different stakeholders closer to the resource such as local governments, basin organizational structures, associations of food producers and of other users.

2. Ensure an integrated approach to water and FSN related policies

States should:

- a) Develop, through inclusive participation of all stakeholders, a national integrated water resource management strategy, and make sure that it incorporates FSN concerns related to water availability, quality and access to water for food production, food processing, drinking and sanitation. The strategy must be comprehensive across sectors. Such a strategy needs to ensure equitable access for all to safe drinking water and sanitation. It should also take into account the specific FSN needs and uses of water by urban and rural populations, and the contribution of food producers (subsistence, smallholders and large scale) and processors (small and large scale) to FSN.
- b) Integrate water into comprehensive national FSN strategies, review national policies related to trade, rural development, and industrialization to ensure that they promote water for FSN and eliminate practices that disadvantage the vulnerable and marginalized.
- c) Ensure coordinated policy development and implementation of water and FSN strategies across sectors and hold all sectors accountable for their impact on water for FSN.

- d) Undertake evidence-based assessments of actual and future water demand in all sectors and plan investments, policies and allocation for the pro-active management of long-term water resources and uses accordingly, prioritizing water for FSN amongst uses.
- e) Include sex-disaggregated indicators for water availability, access, quality and stability of supply of water for FSN in national food security information systems. This shall contribute to the implementation of the sustainable development goals, according to national priorities.

States and Civil Society Organizations and other relevant stakeholders should:

- f) Strengthen the capacity of households and local organizations to adopt water-saving practices and technologies for innovative water storage and distribution, efficiency in multiple water uses and disposal of wastewater that is appropriate for the environmental, social and cultural contexts.

3. Prioritise the most vulnerable and marginalised, including mainstreaming gender and addressing the specific needs of women

States and, where relevant, other stakeholders should:

- a) Ensure that policy and legislation give women and men equal access to water. Particular attention should be given to indigenous peoples, smallholders and marginalized communities.
- b) Avoid negative effects on the FSN of the urban and rural poor and marginalized in any reform in water management.
- c) Take proactive measures to ensure that women and men food producers are accorded equitable access to land, inputs, markets, finance, training, technologies, services, including climate information, that will allow them to use water effectively to meet their FSN requirements.
- d) Design and implement appropriate infrastructure and technologies to improve water availability and access at household level that deliberately address the drudgery and burden of water collection and disposal and related health risks, and directly improve conditions for clean drinking water, hygiene and food safety to reduce the incidence of food-borne diseases.
- e) Address the specific needs of women and girls in relation to water for FSN through their empowerment as well as through targeted interventions. These should take into account women's productive and reproductive roles.
- f) Strengthen rural women's participation and representation at all levels of water governance (water users associations, ministries and other national institutions, regional platforms, etc.) to ensure that their perspectives and productive roles in all key sectors are taken into account in policy-making and reform processes.

Private, public, and public-private initiatives should:

- g) Ensure that no action related to water have negative impacts on the availability and access to water for FSN of vulnerable and marginalized peoples.

4. Improve water management in agriculture and adapt agricultural systems to improve their overall water efficiency and water productivity, and their resilience to water stresses

States and, where relevant, other stakeholders should:

- a) Develop and implement adaptive water and agricultural strategies and action plans based on a comprehensive approach to long-term availability and variability of all water sources (rain-water, surface water and ground water), considering also the impacts of climate change and

the capacity of agro-ecological systems to retain moisture.

- b) Reduce water scarcity risks through water management options such as water harvesting and supplementary irrigation, water storage infrastructure, including improving soil moisture retention capacity.
- c) Design and implement agricultural practices (agronomic practices, agro-ecological innovations, seeds, livestock breeds, diversification) and landscape management which increase resilience of agricultural systems to water stress.
- d) Make rain-fed agriculture systems a more reliable option for farmers and pastoralists, by reducing risk, and adapting formal and informal enabling mechanisms (e.g. credit, community solidarity) to enhance rain-fed systems' resilience to water stress.
- e) Invest in an enabling environment, mobilizing the full set of tools (from meteorological predictions and credit provision, to social protection) in order to devise a risk management strategy that reduces water-related risks on agricultural production, communities and households.
- f) Take into account the long-term availability of water in planning and investing in irrigation, to maximise long-term FSN objectives.
- g) Investments in, and management of, irrigation systems should aim for water efficiency at catchment level and minimise adverse effects on land and water quality (e.g. salinisation and contamination of water tables), and on downstream water quantity (e.g. for the FSN of fishing and pastoralist communities).
- h) Ensure, through appropriate governance mechanisms, sustainable management of groundwater taking into account renewal rates and future needs, and considering, when necessary, fixing maximum withdrawals levels and setting up systems to monitor and control individual water withdrawals.

5. Improve the contribution of trade to “water for FSN”

States should, when negotiating and implementing trade rules and agreements:

- a) Take action to restore confidence in a rules-based, transparent and accountable multilateral trading system, taking into account the concerns and vulnerabilities of water-scarce countries that rely on international markets to meet their FSN needs through food imports.
- b) Protect the interests of low-income, water stressed, net food-importing countries by strengthening trade rules on food exports, including rules that limit the use of export constraints.

States should:

- c) Strengthen the capacity of AMIS (Agricultural Market Information System) to provide transparency about prices, production, stocks and trade in staple foods. This includes encouraging States to join AMIS and to ensure that all AMIS members provide up-to-date and comprehensive data.
- d) Consider measures to ensure that commercial actors respect their contractual obligations to deliver food imports. For example, encourage contracted parties to use third party commercial conciliation for contract enforcement.
- e) Incorporate trade and investment policies into their comprehensive national FSN plans, taking account of water-related risks and vulnerabilities for FSN, in particular at times of crisis. Policy instruments might include food reserves, risk insurance, social protection, and investment in the development of agri-food industries.

6. Devise and share enhanced knowledge, technologies and management tools related to water for FSN

States, research actors, and, where relevant, other stakeholders should:

- a) Support the definition of global, national and local strategic research agendas through inclusive participatory processes by relevant actors including local communities and researchers engaged in water for FSN. They should also ensure that all research on water and FSN is gender-sensitive.
- b) Enable methodological and institutional innovations for the participatory co-construction, co-validation and dissemination of knowledge appropriate for risk prone, diverse and complex environments, such as arid and semi-arid regions, wetlands, deltas, and mountains.
- c) Increase investments in research and innovation for water and FSN, with due attention to neglected areas. Research is needed in the following key areas:
 - Impacts of climate change on run off, aquifer recharge, water quality and plant water use, and means to address them.
 - Incentive instruments and pricing structures for energy and water to reduce water waste or over-utilisation.
 - Monitoring and evaluation of the water-related impacts, at different geo-spatial and temporal scales, of large-scale land acquisitions and foreign direct investments impacting water availability, access, quality and stability of supply, as well as on policies, interventions and institutional innovation to regulate their negative effects on FSN.
- d) Build the necessary capacities, professional re-training, and organizational change to develop systems approaches within the research and local communities, for the production of knowledge on water for FSN, including capacity building on community-established research protocols.
- e) Intensify national and international efforts to collect sex-disaggregated data on water for FSN to monitor progress and improve gender-sensitive policies and practices.
- f) Improve the local level relevance of climate models particularly for countries that are vulnerable to climate change impacts; and develop climate-resilience tools for decision making that combine information from improved localized climate and hydrological modelling.
- g) Establish and manage open data systems to provide evidence for decision making and monitoring.
- h) Facilitate knowledge exchange on best practices for the management and governance of water systems for FSN.

International research organisations (such as the CGIAR) should:

- i) Take a lead role in research and development initiatives that seek to investigate the global issues related to water for FSN.

7. Foster an inclusive and effective governance of water for FSN

States should:

- a) Establish effective governance mechanisms to strengthen policy coherence across sectors to ensure comprehensive water and FSN strategies.
- b) Coordinate agriculture, land and water governance processes to ensure the full and effective participation and promote the interests of marginalized and poor disadvantaged users of common lands and pastures, water, and fisheries, particularly indigenous peoples and those whose rights are enshrined in customary arrangements.

- c) Ensure the full and effective participation of all actors, including the vulnerable and marginalized, with special attention to gender inclusive processes, in the development of policies and practices for the conservation and sustainable use of water for FSN.
- d) In the context of increasing uncertainty and rapid change, ensure the participation of all actors, including the vulnerable and marginalized, in the local adaptive management of landscapes and diverse ecosystems that sustain water for FSN.
- e) Ensure that all investments respect the Right to safe drinking water and sanitation and the Right to adequate food, and are guided by the Voluntary Guidelines to support the progressive realization of the right to adequate food in the context of national food security (VGRtF), by the Voluntary Guidelines on the responsible governance of tenure of land, fisheries and forests in the context of national food security (VGGT), and by the CFS principles for responsible investments in agriculture and food systems, in particular in relation to large-scale land acquisitions.
- f) Ensure that all parties to contracts involving large-scale investments in land (with its associated water) are held accountable for the impacts on the sustainable use of natural resources and the consequences on the livelihood and FSN of the affected communities.
- g) Protect the access, use and tenure rights of the vulnerable and marginalized to land, fisheries and water in particular, especially in the face of large-scale infrastructure development.

States, Intergovernmental Organizations, as well as Civil Society Organizations and other relevant stakeholders should:

- h) Support communities to take ownership of water planning and management at relevant levels.
- i) Comply with principles of good governance such as Free Prior and Informed Consent (FPIC) and build capacities about them.

States should

- j) Recognize community-based actors and empower them with regard to water conservation and sustainable use of water for FSN in order to have a greater impact on outcomes.
- k) Use the VGGT in the context of water for FSN, recognizing the particular relevance of article 8.3 on collective rights and common resources, and Section 9 on Indigenous Peoples, to develop, implement and assess policies and programmes, particularly those that affect access to water for FSN.

The CFS and relevant international water platforms should:

- l) Jointly organize a special meeting inviting all food security, nutrition and water-related actors to discuss how to coordinate policies and programmes toward progress in the FSN outcomes of their activities.

8. Promote a rights-based approach to governance of water for FSN

States must:

- a) Comply with their obligations under international human rights treaties and similar agreements, including but not limited to the International Covenant on Civil and Political Rights, and the International Covenant on Economic, Social and Cultural Rights.

States should:

- b) Ensure the full and meaningful implementation of the existing Right to safe drinking water and sanitation.

- c) Ensure the full and meaningful realization of the Right to adequate food, and the full and meaningful implementation of the VGRtF, fully taking into account the contribution of water to FSN.
- d) Ensure the full and meaningful implementation of the VGGT in such a way that it takes into account the inextricable relationship between land (fisheries and forests) and water, and the associated tenure rights.
- e) Fully take into account, in the governance of water, the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (VGSSF) and the importance of quality water streams and bodies for inland fisheries and aquaculture.
- f) Assess the direct and indirect effects, of the development and implementation of water and/or land related policies, interventions and investments, on the realization of Right to safe drinking water and sanitation, and of the Right to adequate food.
- g) Implement the UN Declaration on the Rights of Indigenous Peoples, particularly in the context of laws and policies that affect water for FSN.

The CFS should:

- h) Provide guidance on how to ensure access to water for FSN when implementing the VGGT and the VGRtF, based on experiences of members and participants of the CFS, as well as on technical work by FAO.

The United Nations Human Rights Council and its Special Procedures (especially the Special Rapporteurs on the Human Right to Safe Drinking Water and Sanitation, the Right to Food, the Right to Health, the Rights of Indigenous Peoples and the Independent Expert on Human Rights and the Environment) should:

- i) Address in their work means to strengthen the realization of the Right to drinking water and sanitation and to explore the implications of the linkages between water and FSN on the realization of human rights.
- j) Provide guidance on the relevance and possible use of the Maastricht Principles on Extraterritorial Obligations of States in the Area of Economic, Social and Cultural Rights, as related to water for FSN.

HLPE #10 SUSTAINABLE AGRICULTURAL DEVELOPMENT FOR FOOD SECURITY AND NUTRITION: WHAT ROLES FOR LIVESTOCK?

[Download the HLPE Report #10 here](#)

Summary and Recommendations

In October 2014, the Committee on World Food Security (CFS) requested its High Level Panel of Experts for Food Security and Nutrition (HLPE) to prepare a report on sustainable agricultural development for food security and nutrition, including the role of livestock, to be presented in its 43rd Plenary Session in October 2016. This topic is highly relevant to the Sustainable Development Goals (SDGs) as well as to the implementation of the 2014 Rome Declaration on Nutrition and to the fulfilment of the universal Human Right to Food.

Agricultural¹⁴ development is critically important to improving food security and nutrition. Its roles include: increasing the quantity and diversity of food; driving economic transformation; and providing the primary source of income for many of the world's poorest people. Numerous empirical studies across many countries over many years show that both agricultural development and economy-wide growth are needed to improve food security and nutrition, and that the former can reinforce the latter.

The livestock¹⁵ sector is a powerful engine for the development of agriculture and food systems. It drives major economic, social and environmental changes in food systems worldwide, and provides an entry point for understanding the issues around sustainable agricultural development as a whole. As reflected in its title, this report is focused on livestock because of the importance and complexity of its roles and contribution to sustainable agricultural development for food security and nutrition.

The report is structured as follows. Chapter 1 elaborates a *conceptual framework* and a typology of livestock farming systems, which are used to structure the report. Chapter 2 describes the main *drivers and trends of agricultural development*. Chapter 3 identifies the main *sustainability challenges for agricultural development, with a focus on livestock*. Chapter 4 proposes *pathways and responses* to address those challenges, both globally and in specific farming systems. The report concludes by providing a set of action-oriented *recommendations* addressed to states and other stakeholders.

Summary

Sustainable agricultural development for food security and nutrition: approach and conceptual framework

1. The report defines sustainable agricultural development (SAD) for food security and nutrition (FSN) as follows: "Sustainable agricultural development is agricultural development that contributes to improving resource efficiency, strengthening resilience and securing social equity/responsibility of agriculture and food systems in order to ensure food security and nutrition for all, now and in the future."
2. Importantly, FSN and the progressive realization of the right to adequate food do not depend only on global *availability* of food but also on *access, utilization* and *stability*. Indeed, *access* to food, but also to productive assets, markets and services are all critical for FSN. *Utilization* of food, and particularly of animal-sourced foods (ASF), from evolving and increasingly complex food supply chains, is having profound effects on human health and well-being, in some cases supplying much needed nutrients but in others giving rise to dietary concerns, for example over excessive

¹⁴ Agriculture is interpreted in this report in the narrower sense of crops and livestock. Fisheries and aquaculture were treated in a dedicated HLPE report in 2014, while forestry will be covered in a report to be released in 2017.

¹⁵ In this report, livestock is used to designate domesticated terrestrial animals raised for food production. Bees, insects and wild foods are not covered.

meat intake. Finally, conflicts and extreme climate events increasingly threaten the *stability* of FSN for all now and in the future.

3. The report acknowledges the wide diversity of farming and food systems, each of which can and should improve its contribution to SAD for FSN. To sustainably supply nutritious food to a world population that is expected to reach 9.7 billion people by 2050, the report proposes the adoption of context-specific pathways to enable the transition towards more sustainable agricultural and food systems for FSN. Despite wide acceptance of the imperative of achieving food security and better nutrition for all, the multiplicity of possible entry points, perspectives and objectives has led to a coexistence of many narratives and conflicting evaluations about the state of agricultural development and, most importantly, on the directions and policy instruments required to improve sustainability.
4. The livestock sector is central to food systems' development. It is a particularly dynamic and complex agriculture sector, accounting for around one-third of global agricultural GDP, with implications for animal-feed demand, for market concentration in agricultural supply chains, for the intensification of production at the farm level, for farm income, for land use and for human and animal nutrition and health. Livestock has often set the speed of change in agriculture in recent decades. Livestock is the largest user of land resources; permanent meadows and pastures represent 26 percent of global land area and feed crops account for one-third of global arable land. Livestock is strongly linked to the feed crop sector, generates co-products including manure and draught power, and in many economies acts as a store of wealth and a safety net. It is integral to the cultural identity, traditional practices, values and landscapes of many communities across the world. Livestock has profound effects on the environment, particularly when indirect land-use changes and feed crop production effects are taken into account.
5. Livestock production takes place in a wide range of farming systems: extensive (e.g. grazing in the case of ruminant livestock or foraging in the case of poultry and pigs); intensive (in which thousands of animals are fed with concentrated feed rations in confined facilities); and in the many intermediate systems that exist between the two.
6. Critical issues to be addressed by SAD for FSN are global in nature but the ways by which they manifest themselves or can be dealt with are very diverse in different livestock systems and across countries. In order to value and address this diversity of farming systems and their distinct challenges, the report considers four broad classes of livestock rearing: smallholder mixed farming; pastoral; commercial grazing; and intensive livestock systems.

Trends and drivers of agricultural development

7. According to FAO (2012a) projections, growth trends in global population and incomes will require global agricultural production in 2050 to be 60 percent higher in volume than in 2005–2007. This increase would come mainly from an increase in crop yield (80 percent of the world production increase), in cropping intensity (10 percent) and the rest from a limited expansion of land use. Consumption of ASF is expected to rise till 2050, faster in developing countries.
8. Yet, such a need for increase will be subject to variation. Over the next several decades, population increase and income growth (both of which trends are more pronounced in emerging and developing countries) are expected to drive increased demand for ASF. Population growth has been the main demand driver in agriculture and food systems in the past but its weight is declining relative to other drivers such as increasing per capita incomes, urbanization and changing dietary preferences and patterns. Much of the increased crop demand in the period to 2050 will be for feedstuffs for livestock.
9. The increasing consumption of ASF in emerging and developing countries has the potential to significantly improve FSN in many cases. However, the consensus of expert medical advice is that, in developed and some emerging countries, people should reduce their consumption of a number of ASF, in particular of red and processed meats. If there were to be a significant reduction in overall consumption of ASF in richer areas, it would have important implications on production levels and practices, on land use, and on the geographical distribution of livestock production. In general, consumption levels of some ASF needs to contract in some places and/or among some populations, while increasing in others. Such a shift would allow greater convergence of consumption at the global level.

10. International trade volumes of most agricultural commodities are projected to expand over the next several decades. While a very high proportion of ASF is produced and consumed locally, the importance of international trade in the distribution of ASF is increasing. Staple dairy products (in particular milk powder) are the most traded livestock products; more than 50 percent of total production is exported. According to OECD–FAO projections, beef will continue to be the most traded meat in the next decade. At the same time, dairy and beef products are among the commodities most affected by government policies across the world – the volume and direction of trade flows, as well as the products traded. Sanitary standards, environmental regulations, animal welfare rules and certification measures, as well as geographical indications, are all increasingly important in influencing international trade of agricultural products.
11. The food supply chain has experienced fundamental changes during the last two decades. It has become more globalized, and the scale of production and economic concentration have both increased. A shrinking number of firms dominate both the distribution and the input side of the agri-food chain. For example, four agri-business firms are estimated to control 75–90 percent of the global grain trade, raising concerns about barriers to entry, information flows and the potential for oligopolistic companies to abuse their dominant market position. Concentration among multinational companies is increasingly evident in a number of agriculture sectors, including inputs (e.g. seeds, plant and animal protection products), marketing, food processing and food retail.
12. According to OECD–FAO Outlook, real world prices of agricultural commodities and food have followed a long-term declining trend, albeit coupled with significant levels of short-term price volatility. The latter has been especially marked since the 2007–2008 food price spikes when compared with the previous two decades. Nonetheless, the underlying downward price trend is widely projected to continue for the short and medium terms.

Sustainability challenges for livestock in agricultural development

13. Some of the challenges impeding the realization of SAD for FSN for all now and in the future concern all livestock systems. Others are specific to one or more of the four broad categories of livestock systems described in the report.
14. The overarching goal for sustainable agricultural development is to ensure FSN for all now and in the future, in the context of climate change and increasing scarcity of natural resources, given the rapidly evolving and changing food demand, the growing and more urbanized human population and the need to “leave no one behind”.

Food security and nutrition

15. While food security concerns historically focused on total calorie intake, today they encompass the so-called “triple burden” of malnutrition: hunger (deficiencies in dietary energy intake), estimated by FAO to affect some 792 million people worldwide; micronutrient deficiencies (such as iron, vitamin A, iodine and zinc), which, according to WHO, affect some two billion people; and increasing overnutrition that now affects more people than hunger does. In 2014, WHO estimated more than 1.9 billion (39 percent) adults, aged 18 years and over, were overweight, of which over 600 million (13 percent) were obese. The relationships between food systems and nutrition will be explored in depth in a forthcoming HLPE report (2017).

Environment

16. In a context of increasing resource scarcity, and with the urgent need to reduce greenhouse gas (GHG) emissions and adapt to climate change, numerous studies have identified livestock as a key area for action.
17. Resource efficiency in livestock production will have to be improved in order to: maintain production systems within critical planetary limits; preserve the ecosystem services on which agricultural production relies; and reduce land degradation, biodiversity loss and pressure on water use and quality. As a driver of deforestation, demand for feed, and transportation and processing infrastructure, the livestock sector is directly and indirectly responsible for 14.5 percent of GHG emissions. At the same time, some livestock systems are among the most vulnerable to climate change (particularly those in dry areas) and to new environment-related emerging diseases. These challenges are huge but the livestock sector also has huge potential for

improvement, if the best existing practices in a given system and region can be shared and learned from more widely.

Economic

18. Livestock plays a crucial economic role in many food systems: providing income, wealth and employment; buffering price shocks; adding value to feedstuffs; providing a source of fertilizer and draught power. Agricultural markets face three challenges: (i) imperfect competition, due to lack of information, barriers to market entry, infrastructure constraints; (ii) externalities that create significant costs not borne by producers; and (iii) market distortions arising from poor public policies, including subsidies and taxes that reward unsustainable practices. More specifically, agricultural markets are subject to unpredictable forces, such as the weather, and to time lags between investments in production and readiness to sell that encourage producers to be risk averse unless they are supported by safety nets. International trade has introduced opportunities but also new challenges, including an increased potential for diseases to spread. International trade has also been accompanied by a growing role for multinational private actors in making investment decisions in agricultural systems. Concentrated corporate control of agriculture has also increased in the face of uneven access to market information and technologies, undermining competition.
19. Different livestock systems face different economic risks and opportunities in this more general context. Determining factors include: the degree of integration into international markets and urban distribution systems; the level of dependence on external inputs (such as feed); and the degree of concentration in the markets upstream and downstream from livestock producers.

Social

20. According to the *World Development Report* (IBRD/World Bank, 2007), agriculture provides employment to 1.3 billion people worldwide, 97 percent of them in developing countries. Agriculture and food systems are among the sectors where informal jobs are the most common, without adequate work safety, in unhealthy working conditions and for low wages. Children are also disproportionately employed in agriculture, including in ways that violate their rights. Many agricultural systems face a serious demographic challenge in failing to attract and maintain the interest of young people. Conflicts and protracted crises, such as droughts and epidemic outbreaks, strongly impinge on agriculture and livestock production, affecting feed crop production, the productivity of rangelands and access to pastures, rangelands, feed and forage.

Gender

21. Women play a vital role in the management of many livestock systems, especially poultry and pigs. Women's roles within livestock production systems differ from region to region, and the distribution of ownership of livestock between men and women is strongly related to social, cultural and economic norms. Too often, however, women face multiple forms of discrimination, from lack of access to education and productive resources to discriminatory political and legal systems that together limit their ability to benefit from the livestock sector. Not enough gender-disaggregated data are available to fully understand the specific challenges faced by women in this sector.

Animal health and welfare

22. Animal diseases are a major cause of productivity and economic losses in developing countries. The rapid expansion of the sector as well as increased movements of animals and products within countries and across borders make it all the more urgent to address infectious diseases. Even more since the majority of emerging and re-emerging human diseases are zoonotic – they come from animals and are transmitted to humans. The critical linkages between human health, animal health and ecosystems are encompassed in the concept of *One Health*, which highlights the need for collaboration across sectors.
23. Animal welfare is an increasing public concern, raised by consumers and often by retailers who are responding to consumer demand. In many countries, legislation provides for a minimum standard of animal welfare. Where this legislation does not yet exist, the World Organisation for Animal Health (OIE) provides guidelines.

System specific challenges

24. These global challenges concern the different livestock systems to various degrees. Each system is also confronted with specific challenges.
- a. *Smallholder mixed farming systems* face limited access to resources, markets and services, variable resource efficiency and big yield gaps, and have little capacity to adapt to deep and rapid structural transformation in the agriculture sector and in the wider economy.
 - b. *Pastoral systems*: in addition to the challenges they share with smallholders, pastoral systems must cope with conflicts for land and water, economic and political exclusion, social (including gender) inequity, poor animal health and high risks of zoonotic diseases.
 - c. *Commercial grazing systems* face the degradation of the natural grasslands they depend upon, conflicts with other sectors over land and resource use, poor conditions for workers and, in some cases, technical inefficiencies.
 - d. *Intensive livestock systems* face environmental challenges resulting from intensification (land and water use; water, soil and air pollution); the harm to human and animal health created by antimicrobial resistance, the emergence of new diseases; the social consequences of intensification (rural abandonment, poor working conditions, low wages, vulnerability of migrant labour, occupational hazards); and economic risks in the form of dependence on external inputs, including feed and energy, market concentration, price volatility, inequitable distribution of value added, as well as the difficulty of internalizing externalities in price signals.

Pathways towards sustainable livestock development

25. The report proposes a common approach to elaborate pathways for SAD comprised of eight steps. These steps *de facto* outline a process around which to design national SAD strategies:
- i. Describe the current situation in a specific context.
 - ii. Agree on the long-term FSN goals and targets at the national level, in line with the SDGs.
 - iii. Identify the challenges to be addressed to move towards SAD for FSN.
 - iv. Define a set of operational priorities among these challenges.
 - v. Identify available solutions that can be mobilized by stakeholders at different levels.
 - vi. Define the context specific responses and technical solutions.
 - vii. Set in place an appropriate political and institutional environment at the national level to enable the choice of priority actions at the farm level and along the food chain.
 - viii. Set in place methods to monitor and evaluate progress, to continue to identify constraints, and to allow for a dynamic and iterative process of learning by doing.
26. Pathways combine technical interventions, investments, and enabling policies and instruments. They involve a variety of actors, operating at different scales, all working towards SAD for FSN. The pathways need to be specific to national and local contexts, and to particular scales and time periods. They can be grounded on very different narratives, each of which drives a selection of options. Amid this specificity, three interlinked principles help shape those pathways towards SAD for FSN:
- *Improve resource efficiency*. Considerable potential exists to improve resource efficiency through the transfer and adoption of best available practices and technologies in a given context and through the adoption of diverse approaches (including “sustainable intensification”, “save and grow”, “ecological intensification”, and “agro-ecology”), all with a growing emphasis on ecosystem services. This would make it possible to simultaneously increase productivity, to preserve and make better use of limited resources, and to reduce GHG emissions. Resource efficiency can be improved through different technical means including: improving livestock management, careful breeding, health and feed efficiency; closing the nutrient cycle; and reducing food losses and waste.

- *Strengthen resilience*. To address changing risks and shocks, whether environmental, economic, financial, or related to human and animal health, requires building resilience in livestock systems. The diversification of production and integration of crops and livestock at all levels – from farm to landscape, community, territory and region – will contribute to strengthen resilience and improve resource efficiency.
 - *Improve social equity/responsibility outcomes*. The failure to protect social equity and cultural integrity raises some of the most wide-ranging and politically sensitive challenges for sustainability. The norms, practices and priorities of social equity/responsibility, the property rights and land tenure laws and customs, all differ across countries and communities and change over time. Working conditions need to be improved at all levels of food value chains. In line with the SDGs, national SAD strategies will have to prioritize the needs and interests of the most vulnerable populations (which typically include women, children, migrants, and indigenous peoples).
27. The report notes the need for appropriate, and where relevant gender disaggregated, data to enable stakeholders to identify priorities and monitor progress.
 28. The report highlights the need for coherence and integration among agriculture, economic, nutrition, education and health policies at the national level, and to improve the international coordination across these sectors as well, so as to address sustainability and FSN challenges.
 29. The twin problems of under- and overnutrition require local and national governments to coordinate policies pertaining to nutrition, health and SAD goals, taking into account the level of socio-economic development and their cultural and religious contexts. The regulation of agrifood industries and their cooperation are also necessary.
 30. While recognizing that farm level is at the heart of decision-making processes, enabling environments, including good governance and effective institutions, will be critical for an effective implementation of pathways and for the success of SAD strategies. The framework for developing strategies needs to ensure that actions taken at a particular level of organization (local government, territory, value chain, country, region, international) are consistent with actions taken at other levels and with other non-agriculture sectors, in order to allocate needed resources for facilitating pathways, to strengthen synergies and to address trade-offs to best achieve SAD for FSN. In addition, pathways are needed for all farming systems and one of the critical challenges is to consistently manage the co-existence of systems and their pathways at supra levels.
 31. Agriculture merits increased public and private investment and R&D for SAD: this should be a political and economic priority. This had also been shown by the World Development Report, which emphasized the specific role of agriculture as a powerful driver of growth and poverty reduction. SAD strategies must take into consideration: the role and limits of markets; the universal human right to food; and the challenge presented by the principle of “food sovereignty”, which emphasizes the importance of subsidiarity and democratic voice in making decisions that affect food systems.
 32. Appropriate technologies for sustainable agriculture need to be made available for all farming systems and be tailored to particular circumstances and contexts. In all cases, technological choices must be informed by solid risk assessment and impact evaluations. The application of information and communications technology (ICT) in agriculture is increasingly important, especially in the development of new innovations that can empower farmers – including smallholders – and the value chains that support them. The rapidly declining costs of ICT can make it an attractive tool for poorer farmers, extending its reach.
 33. Genetic resources are a key asset for SAD. They need to be sustainably managed and appropriately conserved, in situ and ex situ, together with the knowledge associated with them, including traditional and indigenous knowledge. The means and mechanisms to facilitate access of smallholders to genetic resources as well as benefit sharing are particularly important. Such mechanisms are much more developed for plants than for animals.

Operational priorities for action

In addition to these more general principles, orientations and actions, each category of livestock system has some priority areas of intervention that better take into account its specificities.

34. *For smallholder mixed farming systems, the priorities include:* ensure better access to markets and more choice of markets; secure tenure rights and equitable access to land; design feasible growth pathways taking into consideration available resources; recognize, empower and enable the role of women; improve animal health management; encourage the use of local, more resistant, breeds; implement appropriate, tailored and participatory programmes that respond to farmers' needs; facilitate smallholders' participation in political processes; provide good quality training programmes and information; and redirect development policies and tax incentives towards the design of diversified and resilient farming and food systems.
35. *For pastoral systems, the priorities include:* improve governance and security by involving pastoral societies in participatory governance mechanisms; improve connections to markets and market choices; provide and protect access to public services, including for animal and human health, and access to pastoral resources (water and land); implement a fairer taxation system to enhance value-added activities through the processing and marketing of pastoral products; better target emergency assistance; and devise development strategies that take into account the specific needs of pastoral systems, including mobility.
36. *For commercial grazing systems, the priorities include:* the maintenance and improvement of grassland management practices to improve resource efficiency and contribute to climate change mitigation and adaptation; the development of integrated crop–livestock–forestry systems that enable several kinds of production on the same land and allow synergies between those productions; and the protection of native forests from deforestation.
37. *For intensive livestock systems, the priorities include:* investment in R&D along the complete food chain to strike a balance between increasing production and reducing environmental harm, including food losses and waste; the expansion of precision livestock farming; action to reduce the prophylactic use of antibiotics in animal care and to improve animal welfare; policies to reduce the environmental impact of intensive systems including systems that promote more recycling of animal waste to promote efficiency and reduce the harm caused by unbalanced nutrient cycles (too much depletion where the feed crops are grown and too much addition where livestock are raised and fed); and increase the sustainable production of feed while improving the ratio of feed to animal conversion.

These means can be mobilized, as appropriate, to answer the priorities determined according to each specific situation, in the pursuit of a common objective of SAD.

Recommendations

The following recommendations have been elaborated building upon the main findings of the report on *Sustainable agricultural development for food security and nutrition: what roles for livestock?* They aim to strengthen the contributions of the livestock sector to sustainable agricultural development (SAD) for food security and nutrition (FSN). They are directed at different categories of stakeholders as appropriate: states, intergovernmental organizations (IGOs), the private sector and civil society organizations, and other stakeholders. They should:

1. ELABORATE CONTEXT-SPECIFIC PATHWAYS TO SAD FOR FSN

States and other stakeholders should:

- a. use the common approach presented in this report to elaborate, at all appropriate levels, context-specific pathways towards SAD. Such pathways should aim to strengthen synergies and limit trade-offs between the different dimensions of sustainability through improving resource efficiency, strengthening resilience and securing social equity/responsibility. They could draw on initiatives such as the Global Agenda for Sustainable Livestock and the Global Research Alliance on agricultural greenhouse gases. In that respect, in line with SDGs, all stakeholders should support initiatives that involve multi-stakeholders dialogue, consultation and collaboration.

2. STRENGTHEN INTEGRATION OF LIVESTOCK IN NATIONAL SAD STRATEGIES

States should:

- a. ensure that their SAD strategies and plans incorporate the integrated approach to FSN advocated by the CFS and are in line with the SDGs. States should better integrate into their SAD strategies the contributions that livestock systems make to the achievement of FSN. Policies, strategies and programmes need to take into account the interlinkages between different farming systems and their dynamic nature. They should in particular promote crop–livestock integration at a scale and through means that are adapted to the diversity of systems.

3. FOSTER COHERENCE BETWEEN SECTORAL POLICIES AND PROGRAMMES

States and IGOs should:

- a. foster greater coherence between sustainable agricultural development, food systems, health, social protection, education and nutrition policies and programmes, as well as between their respective institutions, agencies and ministries.

4. DEVELOP GENDER-SENSITIVE LIVESTOCK POLICIES AND INTERVENTIONS

States, IGOs and other stakeholders should:

- a. collect gender-disaggregated data on women's roles in livestock production to understand where gender asymmetries persist in the livestock sector;
- b. adopt and ensure implementation of legislation to provide women equal access to and control of land and resources at the community and household levels;
- c. ensure that women, in particular smallholders, have access to credit and develop specific financial products for women, in order to facilitate the diversification of their economic activities;
- d. improve women's labour conditions in the livestock sector, including at the processing stage;
- e. take measures at the local level to ensure the inclusion of women at every stage of the livestock value chain, taking account of their productive and reproductive roles;
- f. take measures to enhance women's skill and knowledge by providing inclusive training and capacity building activities including when introducing new technologies.

5. BETTER INTEGRATE SAD ISSUES FOR FSN IN TRADE POLICIES

States and IGOs in relation to stakeholders should:

- a. better integrate agriculture, including livestock, feed and related technical issues, into national, regional and multilateral trade rules and policies in order to improve SAD for FSN;
- b. establish appropriate national and international food safety and quality standards and ensure their implementation through capacity building and appropriate resources for compliance.

Governments, producer organizations, the private sector and civil society should:

- a. consider all dimensions of SAD in the development and implementation of standards for animal-sourced foods and livestock feed.

6. LIMIT AND MANAGE EXCESSIVE PRICE VOLATILITY

States, producer organizations and other stakeholders should:

- a. develop tools to limit and manage excessive price volatility, including through the use of grain storage facilities, insurance programmes and other public policy instruments and private

initiatives. In particular, these tools should address the risks posed by import surges and volatility in feed markets, and the specific vulnerabilities of smallholders.

7. PROTECT, PRESERVE AND FACILITATE THE SHARING OF LIVESTOCK GENETIC RESOURCES

States, IGOs, food producers, the private sector and research organizations should:

- a. in order to support SAD, increase cooperation and ensure dissemination, distribution and creation of knowledge and transfer of appropriate technologies to characterize, conserve and manage livestock genetic resources both *in situ* and in germplasm stores and related facilities;
- b. act to minimize genetic erosion of the remaining biodiversity both *in situ* and in gene banks, as well as to recognize and protect traditional and indigenous knowledge linked to livestock genetic resources;
- c. create conditions to facilitate access to livestock genetic resources for food and agriculture and the fair and equitable sharing of the benefits arising from their use;
- d. consider the establishment of dedicated international mechanisms to realize these objectives;
- e. promote the recognition and protection of smallholders and indigenous peoples' livestock genetic resources as well as the associated knowledge of those resources;
- f. recognize and protect the rights of smallholders and indigenous peoples to determine access to their livestock genetic resources including their right to determine who should have access to them and to a fair and equitable share of the benefits that arise from their use.

8. IMPROVE SURVEILLANCE AND CONTROL OF LIVESTOCK DISEASES

States and IGOs should:

- a. implement *One Health* approaches to improve the surveillance and response for diseases emerging from livestock systems;
- b. cooperate to provide transparent reporting for early warnings on transboundary diseases and emerging zoonosis;
- c. provide adequate means to ensure compliance to international and national laws and rules;
- d. provide financial and technical support for improved animal health and welfare in agricultural development, including for capacity building programmes.

9. PROMOTE RESEARCH AND DEVELOPMENT

States and IGOs should:

- a. integrate a participatory approach when designing an agenda and allocating resources for R&D, and focus on technologies, practices, metrics and institutions needed to improve resource efficiency, strengthen resilience and secure social equity/responsibility in diverse livestock farming systems;
- b. enable participatory research in order to promote the integration of diverse knowledge systems about livestock keeping, including animal breeding;
- c. promote the collaboration of researchers in livestock keepers' and other stakeholders' innovation processes and platforms to ensure dissemination of research findings and sharing of good practices.

States, IGOs and the private sector should:

- a. leverage the potential of information and communication technologies (ICT) in order to gather, share and use information in different livestock systems, ensuring broad access, in particular by women, vulnerable and marginalized communities.

10. REVIEW AND IMPROVE INDICATORS AND METHODOLOGY AND IDENTIFY DATA GAPS

FAO, in coordination with relevant international and national agencies and other relevant stakeholders, should:

- a. review the data sets, indicators and methodologies that are needed to monitor and evaluate SAD for FSN, using such tools as the World Agricultural Census and the preparation of indicators for the SDGs, and identify data gaps;
- b. consider ways to improve the monitoring of changes in grasslands and their biodiversity, and to report on their global state;
- c. make available online an inventory of evidence-based policy measures as well as producer organizations, the private sector and other stakeholders actions that contribute to SAD for FSN.

RECOMMENDATIONS RELATED TO SPECIFIC LIVESTOCK SYSTEMS

States, IGOs and other stakeholders should consider the roles of different livestock systems in all agricultural, food security and nutrition policies and promote SAD-oriented efficiency and sustainability pathways that are adapted to the specificity of each of the systems. In particular, they should:

11. RECOGNIZE THE IMPORTANCE OF SMALLHOLDER MIXED FARMING SYSTEMS FOR FSN AND SUPPORT THEM BY:

- a. enhancing economic viability and access to markets; prioritizing fairer markets and measures to overcome obstacles faced especially by women, marginalized and vulnerable groups engaged in managing small-scale livestock operations;
- b. creating an enabling environment for collective organizations and actions of smallholders; investing in market information and infrastructure (including informal markets);
- c. strengthening security, tenure and title of customary lands, property rights and governance of common natural resources building on the CFS Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests, and other relevant instruments in the international legal framework;
- d. leveraging the potential of livestock as a means for sustainable livelihoods in smallholder mixed farming systems.

12. RECOGNIZE AND SUPPORT THE UNIQUE ROLE OF PASTORAL SYSTEMS BY:

- a. strengthening the role of local pastoralist organizations in adaptive land management and governance in order to increase the resilience of pastoral systems and households, in particular with respect to climate change, conflicts and protracted crises, as well as price volatility;

- b. considering the use of innovative financing mechanisms to invest in the provision of basic services adapted to the needs and ways of life of pastoralists, including culturally appropriate education, health, communications, drinking water and sanitation services, and renewable energy systems;
- c. exploring ways to improve the connection of pastoralists to local, national and international markets;
- d. strengthening security, tenure and title of customary lands, property rights and governance of grazing resources building on CFS Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests, and other relevant instruments in the international legal framework;
- e. enabling the mobility of pastoralists, including transboundary passage, through appropriate infrastructures, institutions, agreements and rules.

13. PROMOTE THE SUSTAINABILITY OF COMMERCIAL GRAZING SYSTEMS BY:

- a. supporting sustainable management of livestock, pastures and feed in order to minimize harmful environmental externalities, including by promoting models of production that preserve biodiversity and ecosystem services and reduce GHG emissions;
- b. exploring context specific technical possibilities and policy initiatives for integration of plants and animals at diverse scales, such as, for instance, agro-sylvopastoral systems;
- c. promoting practices that enhance resource efficiency and resilience of commercial grazing systems.

14. ADDRESS THE SPECIFIC CHALLENGES OF INTENSIVE LIVESTOCK SYSTEMS BY:

- a. ensuring that the working and living conditions of workers, especially women and other vulnerable workers, including temporary and migrant workers, at all stages of production, transformation and distribution, meet international standards and are protected by domestic laws;
- b. undertaking lifecycle assessment along the complete food chain to identify options for increasing production while minimizing negative environmental impacts and excessive use of energy, water, nitrogen and other natural resources;
- c. improving technical efficiency by monitoring the individual performance of herds and animals;
- d. supporting and improving animal health and welfare by promoting good practices and by establishing and enforcing robust standards for different species in intensive systems, building upon the World Organisation for Animal Health (OIE) guidelines and private sector initiatives;
- e. exploring and implementing approaches for the reduction of antimicrobial use in livestock production;
- f. developing innovative approaches, with farmers' organizations, at diverse scales, in order to facilitate the use of manure as organic fertilizer – and to promote the use of crop co-products or residues and waste as feed including through technical innovations.