Securing future food:
towards ecological food provision

UK Food Group Briefing

UK FOOD GROUP

Nyéléni 2007: Forum for Food Sovereignty

DEFINITION OF FOOD SOVEREIGNTY (from the Declaration of Nyéléni)

Food sovereignty is the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems. It puts the aspirations and needs of those who produce, distribute and consume food at the heart of food systems and policies rather than the demands of markets and corporations. It defends the interests and inclusion of the next generation. It offers a strategy to resist and dismantle the current corporate trade and food regime, and directions for food, farming, pastoral and fisheries systems determined by local producers and users. Food sovereignty prioritises local and national economies and markets and empowers peasant and family farmer-driven agriculture, artisanal - fishing, pastoralist-led grazing, and food production, distribution and consumption based on environmental, social and economic sustainability. Food sovereignty promotes transparent trade that guarantees just incomes to all peoples as well as the rights of consumers to control their food and nutrition. It ensures that the rights to use and manage lands, territories, waters, seeds, livestock and biodiversity are in the hands of those of us who produce food. Food sovereignty implies new social relations free of oppression and inequality between men and women, peoples, racial groups, social and economic classes and generations.

SIX PRINCIPLES OF FOOD SOVEREIGNTY (from Nyéléni Synthesis Report)

1.Focuses on Food for People:

Food sovereignty puts the right to sufficient, healthy and culturally appropriate food for all individuals, peoples and communities, including those who are hungry, under occupation, in conflict zones and marginalised, at the centre of food, agriculture, livestock and fisheries policies;

and **rejects** the proposition that food is just another commodity or component for international agri-business

2. Values Food Providers:

Food sovereignty values and supports the contributions, and respects the rights, of women and men, peasants and small scale family farmers, pastoralists, artisanal fisherfolk, forest dwellers, indigenous peoples and agricultural and fisheries workers, including migrants, who cultivate, grow, harvest and process food;

and **rejects** those policies, actions and programmes that undervalue them, threaten their livelihoods and eliminate them.

3. Localises Food Systems:

Food sovereignty brings food providers and consumers closer together; puts providers and consumers at the centre of decision-making on food issues; protects food providers from the dumping of food and food aid in local markets; protects consumers from poor quality and unhealthy food, inappropriate food aid and food tainted with genetically modified organisms;

and **rejects** governance structures, agreements and practices that depend on and promote unsustainable and inequitable international trade and give power to remote and unaccountable corporations.

4. Puts Control Locally:

Food sovereignty places control over territory, land, grazing, water, seeds, livestock and fish populations on local food providers and respects their rights. They can use and share them in socially and environmentally sustainable ways which conserve diversity; it recognizes that local territories often cross geopolitical borders and ensures the right of local communities to inhabit and use their territories; it promotes positive interaction between food providers in different regions and territories and from different sectors that helps resolve internal conflicts or conflicts with local and national authorities;

and **rejects** the privatisation of natural resources through laws, commercial contracts and intellectual property rights regimes.

5. Builds Knowledge and Skills:

Food sovereignty builds on the skills and local knowledge of food providers and their local organisations that conserve, develop and manage localised food production and harvesting systems, developing appropriate research systems to support this and passing on this wisdom to future generations;

and **rejects** technologies that undermine, threaten or contaminate these, e.g. genetic engineering.

6. Works with Nature:

Food sovereignty uses the contributions of nature in diverse, low external input agroecological production and harvesting methods that maximise the contribution of ecosystems and improve resilience and adaptation, especially in the face of climate change; it seeks to *"heal the planet so that the planet may heal us"*;

and **rejects** methods that harm beneficial ecosystem functions, that depend on energy intensive monocultures and livestock factories, destructive fishing practices and other industrialised production methods, which damage the environment and contribute to global warming.

These six principles are interlinked and inseparable: in implementing the food sovereignty policy framework all should be applied. For more, see **www.nyeleni.org**

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Available online at: www.ukfg.org.uk/ecological_food_provision.php

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"Preparing compost from household and farm waste and using it to raise soil fertility has been found to be as effective as, and in the case of crops bred by smallholder farmers to be more effective than, using chemical fertilizers to raise agricultural productivity."

Tewolde Berhan Gebre Egziabher
General Manager, Environmental Protection Authority of Ethiopia.
Potential of the African Environment for the Intensification of Agricultural Production.
In "Africa Can Feed Itself". Conference proceedings, Oslo, Norway 6-8 June 2007,
ed. Aksel Naersted. Development Fund, Norway.

UK FOOD GROUP

Foreword

This timely Briefing shows why it is necessary to make the radical shift towards ecological food provision in order to secure future food for the world's predicted 9 billion people. The systems that currently feed most people in the world are smaller-scale and locally-sourced. They can be enhanced through practices based on agroecology to meet current and future global demands for food. Research and trade policies and agricultural support measures urgently need to be reoriented in this direction.

The Briefing is the result of a process organised by the UK Food Group, as part of the EC public advocacy project, to gather information about the current challenges resulting from the industrial agriculture model of production and the opportunities resulting from more ecological approaches. In addition to the material summarised from a fully referenced, longer online document, boxed quotes from other processes are included, notably the outcome of the Forum for People's Food Sovereignty now! and its preparatory process, which published the working document 'Policies and Actions to Eradicate Hunger and Malnutrition', and Nyéléni 2007: Forum for Food Sovereignty. The selection of these quotes and other materials and all final edits of this Briefing were made by me, for which I take responsibility for any errors or misinterpretations.

This Briefing, further references, the longer online document and links to other processes are available at: *www.ukfg.org.uk/ecological_food_provision.php*

The UK Food Group is taking forward discussions, debates and actions to further understanding and uptake of this approach towards ecological food provision.

Patrick Mulvany, Co-chair UK Food Group
January 2010

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Front Cover Photo: Fatima Adam selecting Millet seed heads for next season's planting in Darfur, Sudan. Women farmers provide 80 per cent of Africa's food. Photo credit: Elhadi Jumma Gadal/Practical Action.

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Glossary

CBD – Convention on Biological Diversity
CSOs – Civil Society Organisations
DEFRA – (UK) Department for Environment, Food and Rural Affairs
DFID – (UK) Department for International Development
DNA – Deoxy-Ribonucleic Acid
EC – European Commission
EU – European Union
EPAs – Economic Partnership Agreements
FAO – Food and Agriculture Organisation of the United Nations
FTAs – Free Trade Agreements
GM[Os] – Genetically Modified [Organisms]
HYVs – High Yielding Varieties
IAASTD – International Assessment of Agricultural Knowledge, Science and Technology for Development
IIED – International Institute for Environment and Development
IMF – International Monetary Fund
IPC – The NGO/CSO International Planning Committee for Food Sovereignty
IPCC – Intergovernmental Panel on Climate Change
ITDG – Intermediate Technology Development Group, now known as Practical Action
IT PGRFA – International Treaty on Plant Genetic Resources for Food and Agriculture
SARD – Sustainable Agriculture and Rural Development
UNCTAD – United Nations Conference on Trade and Development
UNEP – United Nations Environment Programme
WTO – World Trade Organisation

1. Introduction

The world's food futures are in the balance. Not only in regions such as sub-Saharan Africa where hunger is endemic in many countries, but in all regions, North and South, the sustainability of food supplies is threatened. The livelihoods of the small-scale food providers[1] who produce, harvest and collect most of the food we eat, are being eliminated. And the productive, biodiverse environment and its natural wealth, which are used for food provision, are becoming increasingly degraded. It is generally accepted that the present food system, affected by speculative shortages and price spikes and the energy, climate and financial crises, is not sufficiently resilient to secure the world's food supply for a growing population. Approaches that promote the dichotomous and inequitable strategy of agricultural development, crudely characterised on the one hand, as a focus on industrial production methods in high potential areas and improving links to external markets while, on the other hand, providing social protection for the poorest, will not secure food for all now, nor for the predicted 9 billlion in 2050.

Why change is needed

- A billion people are hungry, many in sub-Saharan Africa, because they do not have the means to produce food for themselves or purchase it. The majority of these hungry people are rural small-scale food providers, workers and their families, who are unable to grow sufficient food or earn enough income from their production and labour to meet their food and health needs.
- Women are especially hard hit. They are the principle providers of food for their families and communities, playing central roles in food production, processing and preparation. Yet they are subject to multiple forms of social, economic and cultural discrimination, which prevent them from having equality in access to food and control over productive resources and natural wealth.
- Hunger and malnutrition are chronic structural problems and worsening in the wake of the food price, financial, energy and climate crises. The food price crisis has hit particularly hard those who depend on markets affected by global prices for their access to food.

Not only have most governments and international institutions failed to reduce hunger and poverty and build on the findings of international processes designed to find ways forward (e.g. the International Assessment of Agricultural Knowledge, Science and Technology for Development - IAASTD), but they have, instead, adopted and implemented policies that have exacerbated the problems.

There is an urgent need to change the power and economic structures and policies that have caused the current crises.

[1]Given the wide range of activities by women and men small-scale peasant and family farmers, pastoralists, fishers, forest dwellers, Indigenous Peoples, workers and others in providing food through production, harvesting, gathering, on-farm processing etc – the terms 'food provision' and consequently the term small-scale 'food providers', are used in this report. These terms were used in the reports of Nyéléni 2007:forum for food sovereignty. See *www.nyeleni.org*.

There is a way forward. This approach is to shift towards a more ecological and equitable system that places food for people at the centre of policy and practice. This system is the one practiced, to a greater or lesser extent, by the majority of food providers and is the system advocated by their social movements across the world. It is an approach that promotes ecological food provision, which underpins agroecology[2] and food sovereignty.

Definitions

ECOLOGICAL FOOD PROVISION can be defined as a system that provides healthy food and other products, whilst ensuring food sovereignty, securing livelihoods and sustaining the biosphere. It involves, especially small-scale, agricultural, livestock, aquatic and fisheries production, harvesting, gathering and local processing that conserves natural assets (air, soils, waters, biodiversity) through their sustainable use. This is achieved in part by rehabilitating and valuing local and traditional knowledge and using socially just and appropriate technologies for food provision with equitable trade at local, national and international levels.

AGROECOLOGY is a specific crop-based form of ecological food provision. It is an approach to agriculture, based on the principles and science of ecology, and to meeting people's need for food which gives equal attention to the goals of sustainability, resilience and equity and not only to production.

FOOD SOVEREIGNTY is the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems. It focuses on food for people rather than internationally tradeable commodities. It values food providers rather than eliminating them. It localises food systems rather than encouraging dependence on inequitable global trade, and it takes control of the food system away from unaccountable corporations. It builds knowledge and skills that conserve and develop local food production, and rejects alien technologies such as GMOs. It works with nature in diverse [agro]ecological systems, rather than energy-intensive production methods which damage the environment and contribute to global warming.

The efficacy of this approach for future food provision is also supported by the comprehensive and balanced global scientific assessment carried out by more than 400 scientists from all relevant disciplines over four years - the 2008 UN/World Bank International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD). It found that "*An increase and strengthening of agricultural knowledge, science and technology (AKST) towards agroecological sciences will contribute to addressing environmental issues while maintaining and increasing productivity*"

'More of the same.'

In spite of the fact that 58 governments, including the UK government, approved IAASTD, they have almost entirely ignored its findings, especially the need to focus on multifunctionality, agroecology, local and indigenous knowledge and fair trade as the way forward: putting smaller-scale ecological food provision at the centre of policies and practices to secure future food. Perhaps it is because the IAASTD findings are inconvenient: they do not promote proprietary technologies and the science that develops these. Their responses to the 2007/8 food crisis, food riots and dramatically increasing hunger have been 'more of the same'. Governments have largely reinforced the corporate-dominated system of industrial agriculture, advocating the promotion of small-scale industrial technological packages to smallholder farmers and their incorporation into the global market system for inputs and their produce. But this flies in the face of experience and reality which has consistently seen such farmers marginalised as they fail to compete with larger scale and market-protected producers and global trade interests. That is, this marginalisation has not been the result only of a failure to support their agriculture. 'More of the same' is not a viable solution to hunger or marginalisation: it has negative impacts on food provision, the environment, peoples health, culture, nutrition and food sovereignty and the human right to adequate food.

[2] Wezel, A, S. Bellon, T. Dore, C. Francis, D.Vallod, C.David (2009), *Agroecology as a science, a movement and a practice*. A review. Agron. Sustain. Dev. (2009). INRA, EDP Sciences. *www.agronomy-journal.org*

According to IAASTD, a radical change is needed in both the practice of and policy for food provision in order to address the key issues of eradicating hunger, poverty and social inequity and ensuring environmental sustainability. IAASTD notes that agriculture operates within complex systems and that a multifunctional approach to agricultural knowledge, science and technology will enhance its impact on hunger and poverty, improving human nutrition and livelihoods in an equitable, environmentally, socially and economically sustainable manner. IAASTD highlights the inescapable interconnectedness of agriculture's different roles and functions recognising that agriculture is a multi-output activity producing not only food, feed, fibres, agrofuels, medicinal products and ornamentals, but also other outputs such as ecological services, landscape amenities and cultural heritages.

A 'business-as-usual' scenario is no longer tenable. Food provision must instead be aimed at both *environmental sustainability* goals, especially in the context of climate change, and *social sustainability* and *development* goals – fulfilling the right to food, improved health and nutrition, reduced poverty, enhanced livelihoods and greater equity – realising food sovereignty.

Securing future food requires policies and practices that are aimed at both *environmental sustainability* goals, especially in the context of climate change, and *social sustainability* and *development* goals – fulfilling the right to food, improved health and nutrition, reduced poverty, enhanced livelihoods and greater equity – realising food sovereignty.

The dominant industrial agricultural, livestock and fisheries system of industrialised countries, and their footprint on the rest of the world, is made up of a narrow and scientifically reductionist package of production technologies and practices, a global system of trade based on a liberal economic philosophy, which puts profits from commodity trading before food for people, and an increasing concentration of ownership and control by powerful corporations. This Briefing shows how each of these aspects, and the system as a whole, is failing and will fail to meet the needs and challenges of the 21st century to secure food for all.

This Briefing then shows that the systems that currently feed most people in the world – smaller-scale, locally-sourced – can be enhanced through support for *ecological food provision*, based on the principles and practices of *agroecology* in the context of the *food sovereignty* framework. This approach is already used to some extent by millions of small-scale and often marginalised food providers across the world to provide most of the food needs of the communities in which it is practised and for nearby urban areas, despite pressures that undermine this approach. There is also clear evidence that it could meet future global demands for food, and more reliably so than industrial agriculture, if support, research and trade policies were reoriented in its favour.

It identifies key actions that need to be taken to set food provision and the food system in this direction and presents the commitments of the small-scale food providers themselves.

IAASTD[3]

The International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) reports with its 22 Key Findings provide policy options for how agricultural knowledge, science and technology can reduce hunger and poverty, improve rural livelihoods and human health, and facilitate equitable and environmentally, socially and economically sustainable development. The Assessment was conducted by over 400 scientists from more than 80 countries. It was sponsored by five United Nations agencies, the World Bank and the Global Environment Facility. The IAASTD findings were approved at an Intergovernmental Plenary in April 2008.

The 22 findings cover: 1. Production Increases; 2. Uneven Benefits; 3. Negative Consequences; 4. Environmental Degradation; 5. Increased Demand Expected; 6. Multifunctionality of Agriculture; 7. Strengthen Agroecological Sciences; 8. Redirect Agricultural Knowledge Science and Technology (AKST); 9. Involve Women; 10. Build on Existing Knowledge; 11. Use New AKST Appropriately; 12. Research Focus on Small-Scale; 13. Create Opportunities for Poor Farmers; 14. Difficult Policy Choices; 15. Public Policy and Regulation Critical; 16. New Institutional Arrangements Required; 17. Negative Impact of International Trade; 18. Export Agriculture Unsustainable; 19. Crucial Choices; 20. More Investment in Multifunctionality; 21. Codes of Conduct Needed; 22. Multidisciplinary Approaches Required.

[3] IAASTD found that a move towards agroecological sciences is necessary if hunger is to be eradicated, equity realised and the environment restored. IAASTD key finding # 7. See: *www.iaastd.net*. More on the IAASTD Findings to be found in: Mulvany, Patrick (2008) Agriculture at a crossroads: a summary of the IAASTD findings. *www.ukfg.org.uk/docs/IAASTD_Ag4DevAutumn2008Final.pdf*

2. Reviewing the challenges: why industrial approaches will not deliver

The productivity gains of the industrial model of agricultural, livestock and fisheries production and harvesting of commodities have fallen far short of meeting the food needs of everyone – hunger is rising inexorably – and have been accompanied by a number of serious environmental problems that undermine the long term viability of food production itself. It has increased yields under certain conditions, driven by the profit motive, not people's food needs and sustainability. Furthermore, increasing corporate agribusiness involvement has diverted the goal from that of providing food for people as a basic human right to that of producing commodities for profit.

It has been clear for some decades that the benefits of increased productivity have been unevenly spread, so that despite there being enough food produced globally to meet the needs of all, more than 1 billion poor people are hungry or malnourished.[5] The number of hungry people has increased dramatically in recent years, making it even more unlikely that the Millennium Development Goal of merely halving (not eradicating) the proportion of the hungry by 2015 will be achieved.

A Dysfunctional Food System

Of the 1.02 billion people who are hungry, 60 per cent are women, 25 per cent children and 75 per cent are in rural areas. About half of the hungry people in developing countries are from marginalised farming families, around 20 per cent belong to landless families dependent on farming and related activities, and 10 per cent live in communities whose livelihoods depend on herding, fishing or forest resources. 25,000 people die every day from hunger and related causes, half of whom are children under five, while another billion people lack sufficient nutritious food for a healthy life. In contrast, more than one billion consume too many much and suffer varying degrees of obesity; diet related Type II diabetes is becoming the world's fastest growing pandemic. And up to half of foods are not eaten. They are lost or wasted in production, or through post harvest losses, processing wastage and food discarded by consumers, retailers and food outlets.[4]

Cereal Yield Increases

With the development in the 1950s/60s of high response varieties of staple crops/seeds and the use of artificial fertilisers, synthetic pesticides, machinery and irrigation, productivity per unit area increased substantially both in the developed world and in those parts of the developing world where the 'Green Revolution' was introduced. Average world cereal yields rose from 1.4 tonnes per hectare in the early 1960s to 2.7 tonnes per hectare in 1989-91. The volume of world agricultural production doubled and world agricultural commodity trade increased threefold.[6] In Punjab (India), a major green revolution area, wheat yields increased by 120 per cent in the fifteen years to 1980-1 and rice yields by 174 per cent over the same period.[7] Globally, the net amount of food calories produced per person per day increased from 2360 kcal in the 1960s to 2803 kcal per person per day in the 1990s, even as world population also significantly increased.[8] This trend has continued but increasing areas of land and volumes of product are now used for more profitable livestock feed, aquaculture and agrofuels.

[4] Eradicate Hunger Drafting Committee 2009. "Policies and Actions to Eradicate Hunger and Malnutrition". Working paper, November 2009. Prepared by a committee set up by the IPC for food sovereignty including key social movements, networks, associations and CSOs from around the world with input from academics and researchers, including those working on food rights and hunger. *www.eradicatehunger.org*

[5] The State of Food Insecurity in the World 2009 (SOFI), FAO, 2009

[6] World Food Summit 1996, FAO.

[7] Lipton, Michael and Longhurst, Richard (1989) New seeds and poor people. p 2-3. London; Boston: Unwin Hyman / Baltimore: The Johns Hopkins University Press.

[8] IAASTD (2008) Final reports; see www.iaastd.net

The key cause of hunger is not a national or regional shortage of food availability or productive resources as such, but the exclusion of the hungry from access to these resources to grow food and inequitable distribution of, or insufficient income to buy, food. It is in much of Africa and India and among marginalised farmers and their communities that, globally, most of the hungry and malnourished are now to be found.

Problem with Industrial Food Production

Industrial crop and livestock production and intensive fisheries, and associated processing, global distribution and retailing, are damaging our food systems, people and planet in a multiplicity of ways; industrial production is in the hands of unaccountable and remote corporations.

This model of production and consumption is based on intensive energy use and the mining of nature, is highly dependent on external capital and inputs, and favours production of commodities and agrofuels rather than healthy food. It contributes most of the greenhouse gas emissions (GHGs) released by agriculture, livestock production and fisheries, adding up to more than a quarter of global GHGs. It has little resilience and cannot adapt. It harms people and the planet, increasing:

- global warming;
- hunger as well as unhealthy food consumption and 'diet convergence'
- the distance between food provider and consumer;
- monocultures and homogenous eating habits
- destruction of biodiversity, soils, rural livelihoods and communities;
- air, water and marine pollution;
- corporate control;

Industrialised food system and hunger and malnutrition

HUNGER

The so-called 'green revolution' that introduced technological packages, based on industrial production methods in high potential areas, increased national food production but failed to reach the hungry and even exacerbated hunger at local levels.

The beginnings of this failure lie in the fact that the narrow technological package of the green revolution was only applied in particular, favoured areas in certain countries, those that were suitable for growing the packages' new high response varieties of selected cereals – principally wheat, rice and maize – that, with access to irrigation and protected by pesticides, responded well to fertilizer. These are sometimes referred to as High Yielding Varieties (HYVs). The approach also required significant public investment and organisation to promote and support it. In India, support was also provided by setting minimum prices for crops, underwritten by government. Most of sub-Saharan Africa was not targeted – its infrastructure and markets were less developed and therefore less suited to the approach. This meant that huge numbers of poor farmers living in less favoured areas, dependent on rainfall and customarily growing dry-land crops such as sorghum or millet, were marginalised from the start, increasing hunger, and their numbers grew as less economically efficient producers were displaced from higher potential areas.

MALNUTRITION

In terms of availability of healthy food, the industrialised food system is hugely inefficient and offers a very narrow nutritional diversity, being based on a core group of only about 100 food species which provide most of our food intake[9]. About 60 per cent of human dietary energy comes from just four crops – Maize, Potatoes, Rice and Wheat. Further inefficiencies in the food system comprise food losses, food wastage and the externalized costs of environmental and human health impacts. There is no body of evidence to show any human health advantages of consuming industrially produced foods. Industrialized monocultures also reduce varietal and crop diversity in produce destined for the plate.

UNICEF estimates that one-third of the world's population of more than 6.5 billion are affected by food-related ill health, such as primary nutrient deficiencies and corresponding illnesses, in both industrialized and less-industrialized regions[10].

The practice of industrial agriculture has led to a dramatic decline in the macro- and micro-nutrient content of foodstuffs over the last century. For example, mineral levels of fruits and vegetables in the UK have fallen by up to 76 per cent between 1940 and 1991[11], and a similar trend has been seen in the USA and Canada[12]. This decline is attributed to the unintentional selecting-out of high-nutrient crop varieties when breeding crops for high yield potential (often, in the case of fruits and vegetables, through increasing water content), the use of shallow-rooting annuals that are unable to tap into soil nutrients at deeper levels, and the failure to return a full complement of nutrients to the topsoil. Ingested pesticide residues are found to damage both the structure and functioning of the immune system in animals and humans, and are also implicated in neurotoxicity, the disruption of the endocrine system and carcinogenicity[13].

Degradation of natural resources

LAND

Industrial production practices have resulted in vast tracts of degraded land, yield declines, loss of plant and animal species diversity, increase in susceptibility to disease, and other serious side-effects over the medium to long term, and have led to a loss of livelihoods[14]. The successful cultivation of crops begins with the *land and soils* in which they are planted, but the intensive methods of industrial agriculture – heavy mechanical tillage; the use of artificial fertilisers combined with the failure to add organic material; intensive irrigation - have resulted in nearly 2 billion ha (and 2.6 billion people) being affected by significant levels of land degradation.[15] Every year five to seven million hectares of agricultural land are damaged and become unproductive and millions of tons of topsoil are washed or blown away. 24 per cent of irrigated lands have been affected by salinisation.[16]

The cumulative effects of these intensive methods have been particularly pronounced in some Green Revolution areas where productivity has now declined significantly despite the use of increasing amounts of fertiliser.[17] Environmental degradation is also expensive: even in the 1990s, agricultural losses due to land degradation were about $550 million annually[18], and the UN estimates that global income loss due to desertification is $42 billion. A change to methods of cultivation which both preserve and enhance the fertility of land and soils is now essential.

[9] Lang, T. and Heasman, M. (2004) Food Wars: the *Global Battle for Mouths, Minds and Markets.* Earthscan Publications, London
[10] Baker, B. (2001) *The Truth About Food*. Soil Association, Bristol
[11] McCance, R.A. and Widdowson, E.M. (1940 – 1991). *The Composition of Foods*. 1st to 5th Editions. MAFF/Royal Society of Chemistry, London
[12] Rees, W. and Wackernagel, M. (1996) 'Urban ecological footprints: why cities cannot be sustainable', *Environmental Impact Assessment Review*, no 16, pp223-248
[13] van Rensburg, W.J. Venter, S.L. Netshiluvhi, T.R. van den Heever, E. Vorster, H.J. Repetto, R. and Balinga, S.S. (1996) Pesticides and the Immune System. World Resources Institute, Washington DC; and others
[14] Sustain (2003) *Myth and Reality, Organic versus Non-Organic*. Sustain, London
[15] IAASTD, ibid.
[16] SARD and … Agroecology, SARD Policy Brief No.11, FAO/Bioversity International, 2007.
[17] For a review of the impacts of the Green Revolution, both positive and negative, Conway, Gordon (1997) The Doubly Green Revolution – food for all in the 21st century. Penguin, London
[18] Tansey, G. and Worsley, T. (1995) *The Food System*. Earthscan Publications, London

WATER

Another essential ingredient in the growing of crops is *water.* Industrial agriculture is now responsible for 70 per cent of global fresh water use[19], but there is growing competition for water resources – including for drinking water and for other productive purposes. An International Food Policy Research Institute 'business as usual' projection concludes that by 2025 water scarcity will cause annual global losses of 350 million metric tons of food production – similar, for example, to the annual grain production in the United States of America in 2002.[20] Meanwhile, climate change projections threaten many parts of the world with increasingly uncertain rainfall patterns and more frequent drought, especially in sub-Saharan Africa. At the same time drinking water supplies are often polluted by intensive agriculture, through salinisation, by nitrates from artificial fertilisers, and by pesticides and herbicides (e.g. glyphosate pollution of aquifers), causing damage to aquatic ecosystems and to human health. Agriculture will need to use water far more efficiently in future and demand will need to be reduced. Much of the water is exported as 'virtual water', mainly from poorer and often drier countries to richer countries. The volume embedded in exported food products is estimated to be 700-1,100 km^3 per year and is expected to more than double if trade liberalisation were to continue.

AGRICULTURAL BIODIVERSITY

The rate of loss of biodiversity is greater now than at any time in human history. In 2010, the *Year of Biodiversity,* governments are urgently addressing this dangerous situation at the 10^{th} meeting of the Convention on Biological Diversity (CBD). In particular, the loss of species and the decline of *agricultural biodiversity*[21] that provides our food, as well as other important plant and animal products and key ecosystem functions in terrestrial, aquatic and marine ecosystems, is widely recognized.[22] Industrial agriculture is a major cause of these losses. Its methods - monocropping and the use of fertilisers and pesticides - destroy wildlife and soil and aquatic biodiversity. Its drive to produce more crops and livestock for export leads to expansion into new land and to deforestation - in the Amazon, for cattle and soya production, for example, or in Malaysia or Indonesia for palm oil plantations). Industrial agriculture is also dramatically reducing the numbers of crop varieties and livestock breeds grown on-farm or on the range. Traditionally farmers bred many thousands of different animal breeds and cultivated many hundreds of thousands of crop varieties. However, industrial farming now uses only a very limited number of these breeds and varieties. As a result, millions of non-commercial varieties have disappeared from farmers' fields, along with the valuable genetic diversity they contain and its associated knowledge. Since 1900, approximately 90 per cent of the genetic diversity of agricultural crops has been lost from farmers' fields. Similarly, each month a livestock breed of one of the forty domesticated animal species becomes extinct. Also, the majority of the world's fisheries are overexploited and near collapse with the loss of important species and sub-species.[23]

Agricultural biodiversity is important for developing new crop varieties, livestock breeds and fish species and as a potential source of new medicines and other benefits. It provides a range of key ecological goods and services, such as pollination of crops, maintenance of soil fertility, decomposition of wastes with sequestration of carbon dioxide and methane, purification of water and air, and even the stabilization and moderation of the climate, thus helping to reduce floods and drought. It is a key component and product of [agro]ecological food provision systems. In other words, *agricultural biodiversity* underpins the food system and the wider economy, human health, the security of food supplies, and the viability of the biosphere.

Agricultural Biodiversity

Agricultural biodiversity comprises the diversity of genes, species and [agro]ecosystems nurtured and developed by humans. It encompasses the variety and variability of all terrestrial and aquatic animals, plants and micro-organisms (including invertebrates, insects, aquatic organisms and other species) which are necessary to sustain key functions of terrestrial and aquatic ecosystems, their structures and processes for, and in support of, food production.

[19] FAO (2009) Aquastat, FAO, Rome.
[20] IFPRI (2002) *Global Water Outlook to 2025: Averting an Impending Crisis*, IFPRI, Washington DC.
[21] For more, see *www.ukabc.org*
[22] See, for example, UN Convention on Biological Diversity. *www.cbd.int/agro/*
[23] FAO (1998) Natural Resources Management and Environment Department, Food and Agriculture Organization (FAO). "Biodiversity for Food and Agriculture: Crop Genetic Resources." FAO, Rome. *www.fao.org/biodiversity/biodiversity-home/en/*

The challenges of climate change

The impact of greenhouse gas emissions on the global climate is now beyond doubt: the earth's temperature will rise throughout the coming century.[24] As time passes the emerging science continues to suggest that the changes may be more profound and with us sooner than first thought.[25] However, the precise implications remain unclear: predictions of rainfall rates, the likely frequency of extreme weather events, and regional changes in weather patterns cannot be made with certainty.

Global agriculture is a major contributor to greenhouse gas emissions.[26] The IPCC conclude that agriculture accounts for 10-12 per cent of all anthropogenic greenhouse gases, including around 47 per cent of methane and 58 per cent of nitrous oxide.[27] While carbon dioxide is the main greenhouse gas currently in the atmosphere, small changes to methane and nitrous oxide can have a major impact, as they carry a 'greenhouse warming potential' 72 and 289 times that of carbon dioxide, respectively.[28]
The emissions attributable to agriculture are hard to measure and estimates vary.

The World Resources Institute (WRI) suggests that agriculture comprises 15 per cent of the total. The impact of land use change, principally due to the clearance of forests to create pasture or crop land[29] are estimated to be between 15 and 18 per cent of total global anthropogenic carbon dioxide.[30] Land use change is dominated by industrial agriculture's desire for pasture for livestock, for crops including those such as soybean used as feed for cattle in industrial systems across the world, and increasingly for large scale agrofuel production.[31] A significant component is the direct result of the transition from traditional resource-driven to demand-driven livestock production, and in particular towards a model of intensive, grain-fed livestock: the FAO estimate that livestock related land use change accounts for 9 per cent of global anthropogenic emissions.[32] As a report for the Food Climate Research Network notes in relation to soybean production in the Amazon region, intensive livestock rearing can be the catalyst for an unsustainable chain reaction of land clearing[33]:

(*adapted from:* Ensor, Jonathan (2009). *Biodiverse agriculture for a changing climate.* Practical Action. *practicalaction.org/advocacy/biodiverse_agriculture_paper*)

Climate change

Climate change, exacerbated by industrial agriculture and livestock production, has now been recognised as the most serious environmental challenge facing agriculture.

Food production is fundamentally dependent on the weather, but climate change is set to bring uncertainties and stresses which will have significant negative effects on agricultural output in many parts of the world. This is likely to apply particularly in equatorial regions where millions of poor farmers live, but also in some major grain producing areas at higher latitudes. There will be an increase in storms, floods and drought, and changes to the seasons, altering the distribution and growth of plants, animals and fish, and the spread of plant, animal (and human) diseases. The Intergovernmental Panel on Climate Change (IPCC) have projected falls in agricultural productivity of up to 30 per cent over the course of the 21st century.[34] Climate change will also bring extensive loss of agricultural land owing to sea level rise.

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[24] IPCC (2007) 'Summary for Policymakers' in Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M.Tignor and H.L. Miller (eds.), Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
[25] Hare, B. (2008) The science of climate change, Breaking the Climate Deadlock Briefing Paper, The Climate Group.
[26] Carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) are the three main anthropogenic greenhouse gases. IPCC (2007) ibid.
[27] 2005 figures. Smith, P., D. Martino, Z. Cai, D. Gwary, H. Janzen, P. Kumar, B. McCarl, S. Ogle, F. O'Mara, C. Rice, B. Scholes, O. Sirotenko (2007) 'Agriculture' in Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, L.A. Meyer (eds), Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, s8.3.
[28] Calculated over a 20 year time horizon. The global mean radiative forcing (a comparison of the strength of different human and natural agents in causing climate change) of each of the gasses for the period 1750-2005 is 1.66 (carbon dioxide) 0.48 (methane) 0.16 (nitrous oxide). See Table 2.12 and 2.14 in Forster, P., V. Ramaswamy, P. Artaxo, T. Berntsen, R. Betts, D.W. Fahey, J. Haywood, J. Lean, D.C. Lowe, G. Myhre, J. Nganga, R. Prinn, G. Raga, M. Schulz and R. Van Dorland, 2007: Changes in Atmospheric Constituents and in Radiative Forcing. In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M.Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
[29] Forestry Commission 'The international challenge: deforestation' *http://www.forestry.gov.uk/forestry/infd-6vjhlf*
[30] Bruinsma, J. (ed) (2003) 'World Agriculture: Towards 2015/2030. An FAO Perspective' FAO, Rome p334; Baumert, K.A., T. Herzog, J. Pershing (2005) 'Navigating the Numbers: Greenhouse Gas Data and International Climate Policy', World Resources Institute p91; Forestry Commission ibid.
[31] Baumert (2005) op cit. p91; Garnett, T. (2008) 'Cooking up a storm Food, greenhouse gas emissions and our changing climate' Food Climate Research Network p27
[32] FAO (2006) 'Livestock's Long Shadow: Environmental issues and options' FAO, Rome p112
[33] Garnett (2008) *ibid*. p27
[34] IPCC Third Assessment Report, 2001

Trading ecosystems

There is growing pressure to include agriculture in carbon trading schemes, including under the UN Climate Change Convention, and even to develop trading schemes for the range of ecosystem services that agriculture can provide, conserving and enhancing biodiversity for example, or water management. However, quite apart from questions about the efficacy of such schemes in achieving their stated environmental aims, they are also likely to increase the opportunities for commodification of resources, corporate expansion and profit and to lead to the further marginalisation of smaller scale food provision.[35]

Meanwhile, agriculture is itself a major producer of the greenhouse gases that are causing climate change - methane, much of it from cattle; large amounts of nitrous oxides from the use of artificial fertilisers; and carbon dioxide from land clearance for pasture, animal feed and now fuel crops, from intensive soil cultivation and from fuel use. In total, agriculture may contribute 30 per cent or more to human-produced greenhouse gases.[36] Reliance on oil, from which fertilisers are manufactured, is another challenge for current agriculture given future uncertainties of supply and increases in price.

It is a general rule that the more diverse an ecosystem, the better able it is to withstand environmental stress and shocks. This resilience allows it to be more productive across a range of environmental conditions. Loss of biodiversity is therefore likely to decrease the ability of the system to maintain itself or to recover from damage or disturbance – including disruption caused by climate change.

Adaptation to, and increased *resilience* in the face of climate change will be essential for agriculture in the future, but methods which reduce the production of greenhouse gases and realise the huge potential of soils to capture carbon will also be necessary. This implies major changes to current practices.

Corporate control and concentration

The rapidly increasing takeover of agriculture, livestock production and fisheries by corporate interests is increasing the marginalisation of small-scale food providers and their communities. Under neo-liberal economic policies promoted by powerful Northern governments on behalf of corporations, public support to agriculture, particularly in the South, has been drastically cut and private companies have been encouraged to promote and provide inputs on a commercial basis. This has meant not only the continuing neglect of lower potential rain-fed areas but also the marginalisation of smaller scale food providers in general as they have been unable to afford increasingly costly inputs. Extension services have also been cut, replaced by commercial sales systems that naturally focus on those who can afford to buy the products on offer. Commercial interests have also increasingly sought to extend their areas of ownership and control in the food system, by developing and introducing proprietary products and asserting ownership rights, and through mergers and take-overs leading to increasing corporate concentration.

The original HYVs were produced by government-funded international research institutes and were, quite deliberately, open pollinated varieties. It was recognised that this gave farmers the option to multiply and develop these varieties themselves, as they had always done with traditional varieties. Commercial companies, however, introduced hybrid varieties, with the advantage (to the companies) that hybrid seeds need to be bought afresh every year if their higher yields are to be maintained. They were also legally protectable under Plant Breeders Rights (PBR) rules. More recently, the combination of Genetically Modified crops, linked proprietary agrochemicals, and World Trade Organisation (WTO) rules which allow the patenting of these crops and their seeds, extends corporate control yet further.[37]

So too does increasing concentration of corporate ownership. From thousands of seed companies and public breeding institutions three decades ago, 10 companies now control more than two-thirds of global proprietary seed sales and the proprietary seed market now accounts for 82 per cent of the commercial seed market worldwide. From dozens of pesticide companies three decades ago, 10 now control almost 90 per cent of agrochemical sales worldwide; from almost 1,000 biotech start-ups 15 years ago, 10 companies now account for three-quarters of industry revenues.[38] In the livestock sector, three quarters of the world's chicken

[35] Agriculture and Climate Change : real problems, false solutions, Grupo de Reflexion Rural, Biofuelwatch, EcoNexus, NOAH - Friends of the Earth Denmark, Practical Action. Copenhagen, Dec 2009, *www.econexus.info/pdf/agriculture-climate-change-june-2009.pdf*

[36] Bruinsma, J. (ed) (2003) World agriculture: towards 2015/2030. An FAO Perspective, Earthscan, London, 334; Baumert, K.A., Herzog, T., Pershing, J. (2005) Navigating the numbers. Greenhouse gas data and climate policy, World Resources Institute, 91.

[37] The World Trade Organization's (WTO) Trade-Related Aspects of Intellectual Property (TRIPS) agreement

[38] Who owns nature? ETC group. *www.etcgroup.org*

and half of its eggs (poultry breeds are controlled by just four companies worldwide), two thirds of its milk and one third of its pigs are produced from industrial breeding lines, i.e. genetically similar animals bred for industrial farming. These are produced by a decreasing number of companies, with global market shares of up to 60 per cent.[39]

The continuing growth of forms of contract farming also increases corporate control and further marginalises smallholder farmers in developing countries because corporate buyers generally prefer to deal with larger-scale producers who are better placed to meet stringent quality and time requirements. The production of agrofuels is likely to take this further, as well as enabling agribusiness corporations to move into a totally new and highly remunerative area. The increase in privatisation of the natural resources necessary for food production, including land, water and other genetic resources is another manifestation of increasing control.

A key means by which corporations have been extending their control is in the development and use of WTO-related intellectual property rules, in particular the rules which allow the patenting of genetic material and of life forms. Genetic engineering technology is of such interest to corporations because they can charge for the use of GM varieties. They can also charge for the use of genetic material that they have taken from the wild, or even from local and traditional crop varieties – material actually created by generations of farmers and traditionally free to be used by all.

The ultimate goal of corporate involvement in the food system is to vertically integrate the entire process of food production, from proprietary DNA through to the distribution, processing and sale of food to consumers. Some corporations – Archer, Daniels, Midland (ADM), Monsanto, Cargill - are now well on the way to achieving this in their sectors.

Trade

At the same time as private control has grown, neo-liberal trade policies, have been introduced which have put trade interests above the provision of food and other development goals. Structural Adjustment Programmes, required by the International Monetary Fund (IMF) and World Bank as a condition for financial support, have included opening up to food imports. The WTO Agreement on Agriculture is also aimed at increasing agricultural trade but it does have some safeguards that member countries can use in specific circumstances. Other arrangements, however, such as the EU's Economic Partnership Agreements (EPAs) and bilateral and regional Free Trade Agreements (FTAs) often override even these safeguards, including in terms of intellectual property rights.[40]

The result of these policies has been that national and local markets have been opened up to often subsidised imports which have frequently undercut local prices and farmer livelihoods, leaving only larger, corporate or contract farms able to compete. The prices of those commodity crops which have traditionally been produced by smaller farmers – coffee, cocoa, for example – have consistently fallen as new producers have been encouraged under neo-liberal economic adjustment programmes. According to Olivier De Schutter, UN Special Rapporteur on the right to food, trade tends to benefit the 1 per cent of farms larger than 100 hectares, while harming the 85 per cent of farms with less than 2 hectares.[41]

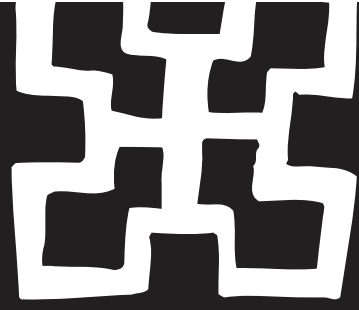
It is the combination of proprietary agricultural technologies, neo-liberal policies and corporate interests that has created the current industrial agriculture and food system which now dominates the wealthy world – both North and South. It is a system designed to be commercially profitable for corporations, not to meet food needs, livelihood or anti-poverty goals, and it is of such a scale and nature that it increasingly marginalises the poor and reduces agricultural and food system options for the future. But it has proved itself unable to adequately fulfil either environmental or social sustainability goals – equity, food provision, even human health[42] – and is unlikely to be sufficiently adaptable or resilient in the face of the impending challenge of climate change.

[39] Gura, Susanne (2008) Industrial livestock production and its impact on smallholders in developing countries, Consultancy report to the League for Pastoral Peoples and Endogenous Livestock Development, Germany. *www.pastoralpeoples.org*

[40] UK Food Group (2009) Hidden Threats: an analysis of Intellectual Property Rights in EU-ACP economic partnership agreements: unveiling the hidden threats to securing food supplies and conserving agricultural biodiversity. UK Food Group Briefing. *www.ukfg.org.uk/docs/HIDDEN_THREATS.pdf*

[41] The right to food and the WTO, Carnegie Endowment, *www.carnegieendowment.org/events/?fa=eventDetail&id=1315&prog=zgp&proj=zusr*

[42] See IAASTD, Executive Summary of the Synthesis Report, 2008.



3. Ecological food provision

Ecological food provision using agroecological methods in the framework of food sovereignty policies, enables sustainable zero carbon production, collection and consumption of healthy, local foods. It also increases resilience and can enable production to adapt to climate change.

It requires localised, ecological, diverse, and low external input methods of production, harvesting, fishing, pastoralism, processing and distribution. These maximise the functions and contribution of ecosystems, increase agricultural biodiversity and improve resilience and adaptability of production and harvesting systems, especially in the face of climate change and other threats.

As a result, sustained whole system productivity per unit area and unit of water is higher and losses are lower. It is smaller scale, people-centred with both women and men having decisive roles. It is knowledge-intensive and maintains livelihoods in systems that conserve, develop and manage localised food production and harvesting and increase synergies with nature.

Accordingly, research, development and production systems should build upon the skills and local knowledge of food providers and their organisations creating space for local experimentation and building the store of knowledge that can be shared, without high costs.

This model of production and harvesting regenerates soils and keeps carbon in soil organic matter and uses organic manures and nitrogen-fixing plants in place of chemical fertilisers. It is not dependent on agrochemicals. This ecological, locally-controlled model of food production cannot be appropriated or 'owned' by an individual but is responsive to democratic demands and respects collective rights.

As seen above, the UN sponsored International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) concludes that what is required now is to move away from the narrow, technological package of the green revolution and the industrial system which has grown from it:

> Successfully meeting development and sustainability goals and responding to new priorities and changing circumstances [will] require a fundamental shift . . . [in] science, technology, policies, institutions, capacity development and investment. Such a shift would recognize and give increased importance to the multifunctionality of agriculture, accounting for the complexity of agricultural systems within diverse social and ecological contexts. . . . It would also recognize farming communities, farm households, and farmers as producers and managers of ecosystems. . . .In terms of development and sustainability goals, these policies and institutional changes should be directed primarily at those who have been served least by previous . . . approaches, i.e., resource-poor farmers, women and ethnic minorities.[43]

The IAASTD reports refer repeatedly to the importance of the agroecological context of farming, and call specifically for an 'increase and strengthening of agricultural knowledge, science and technology towards agroecological sciences'. The reports also call for greater attention to the multifunctionality of agriculture. As we will see in the next section, the science, knowledge and practices of agroecology are fundamentally different from those of the narrow and scientifically reductionist approach of industrial agriculture.

[43] IAASTD, ibid, p5.

AGROECOLOGY

An established method of realising ecological food provision of crops is through agroecology. The agroecological approach, with its raft of biodiverse solutions, is able to spread risks so that if one individual variety fails in one context another will succeed; this is the basis of resilience.

Agroecology is an approach to agriculture and to meeting people's need for food which gives particular attention not only to the important goal of productivity but also and equally to the goals of *sustainability, resilience* and *equity*.

It starts from the recognition that agriculture is multifunctional and has a wide range of outputs and impacts - environmental, social, and economic. Environmental sustainability is fundamental. Agriculture takes place in an ecological context and it is necessary for it to be adapted to that context both in order to be resilient season to season and if it is to continue to produce reliably into the future. However, agriculture also takes place in a social context and with social and economic impacts and goals. It must both provide food for all and sustainable livelihoods for producers. It must therefore be designed to first meet the needs of people rather than narrow commercial interests.

Agroecology is based on knowledge drawn from both the natural and the social sciences, as well as on farmers' own knowledge, experience and experimentation. It therefore combines knowledge from agricultural research institutions with that of *local contexts*, both environmental and social. It emphasises, mainly local, technology, innovations and inputs that are knowledge-intensive, low cost, practical for small and medium-scale producers, and locally available, including on the farm or range itself in an integrated or mixed-farming or pastoral system. It emphasises practices which enhance the adaptive capacity of agriculture and livestock raising and so reduce its vulnerability, or, make it more resilient to environmental stresses and shocks such as flood or drought and climate change.

Sustainability and resilience are achieved through the diversification of farming systems and the biological or physical methods employed - crop diversification; conserving and developing local seed and crop diversity and conserving local breeds of livestock, developing new varieties that are best adapted to local conditions, ecosystems and needs; encouraging pest predators; using composts/manures; and improving rain-water capture and retention. Sustainability and resilience are also achieved through social, economic and political means – through the diversification of local economies; through farmer support organisations and the food providers own organisations and networks; through education, training and field research; and through alternative financial support systems such as microcredit and savings schemes. Resilience in local food systems can be enhanced still further through establishing community grain banks and providing for local markets.

As with ecosystems, so with social systems and organisation : the more diverse they are the more resilient they are likely to be in the face of social and economic shocks, such as fluctuations in energy/oil costs or in farm-gate and market prices, or in times of conflict.

Biodiverse agroecology: meeting the challenge of Climate Change

There is extensive evidence of the multiple benefits of ecological approaches to mitigation and adaptation to climate change. Agroecology responds to these challenges: the need to foster sustainable productive agricultural environments, reduce emissions associated with food production, capitalise on sequestration potential, build resilience in food provision practices and foster the adaptive capacity of communities. Two different classes of resilience can be identified: the resilience of agroecosystems, achieved by fostering homeostasis,[44] and livelihood resilience, which is achieved through a reduced dependency on external inputs (which harbour uncertainties such as price volatility) or a diversification of produce (preserving yields in the face of climate, pest or disease variability). As adaptive capacity and resilience both reduce vulnerability to a wide range of climate change hazards, vulnerability reduction can be achieved through many agroecological practices, depending on the context. For example, existing vulnerability to rainfall variability may be reduced through the regeneration of soils, yielding agroecosystem resilience.

(*adapted from:* Ensor, Jonathan (2009). *Biodiverse agriculture for a changing climate.* Practical Action. *ibid*)

[44] Egziabher, Tewolde B.G (2002) 'The Human Individual and Community in the Conservation and Sustainable Use of Biological Resources', Darwin Lecture *www.ukabc.org/GeneticFutures/tewolde_darwin_lecture.pdf*. Egziabher's discussion of homeostasis relies on Heywood, V. H., and R. T. Watson (1995) 'Global Biodiversity Assessment', UNEP and Cambridge University Press.

Much of the above also directly contributes to the goal of social equity – addressing the needs of otherwise marginalised farmers and their communities for support, improved livelihoods and food security. A particular focus on women farmers is also important as they produce up to 80 per cent of the food in Africa, but own little land and have limited access to credit or other support services. Supporting women also has the benefit of more directly tackling issues of child and family health and nutrition.

Agroecology can also contribute to a range of public goods or services which conventional agriculture too often fails to address but which other sectors cannot always provide. For example, clean water, flood protection and groundwater recharge; wildlife and landscape conservation; carbon sequestration in soils; on-farm biodiversity; enhancing the rural economy as a whole; reducing urban to rural migration, and contributing to social cohesion.

Sustainable Agriculture in Ghana

"Sustainable agriculture in Ghana dates back to the days of our forefathers. However, with the pressures of meeting the food needs of the growing population the use of machines, chemicals and pesticides was introduced. The consequences have been destruction of soil micro organisms, pollution of water bodies, and the destruction of biodiversity.

Despite this gloomy situation, there are still best practices in Ghana of sustainable agriculture. One such common practice can be observed in the Upper East Region of Ghana, where the land is somewhat rocky. The inhabitants combine the rearing of cattle and growing crops, so improving the fertility of the soil as well as biodiversity, and the land is tilled with animal traction.

In Ghana, going back to earlier systems of agriculture has become necessary in view of the high cost of inputs, tractor services, fertilizers, and pesticides. The practice is growing among small scale food crop farmers, who produce mainly for the household and only sell when there is more than the family needs for the year.

There have also been initiatives where small scale farmers have been introduced to inter-cropping food with tree crops to assist in improving the soil fertility, as well as serving as source of fuel wood for the farm families. This system also helps maintain biodiversity. The current quest to meet the food needs of the population means that there is growing pressure on the government to explore various means of increasing food production. This makes Ghana vulnerable to the current push by the multi- national corporations to adopt GMOs as a means to ensure food security in Africa."

Mohammed Issah – Agriculture & Rural Development Practitioner

The productivity of biodiverse agroecology

In an era that is set to be dominated by climate change, it is hugely significant that the introduction of agroecological approaches offers benefits to both adaptation and mitigation. Yet a further advantage also arises from the application of agroecological approaches. Yield increases frequently result due to the combination of[45]

- Organic matter accumulation and nutrient cycling
- Increased soil biological activity
- Natural control mechanisms (disease suppression, biocontrol of insects, weed interference)
- Resource conservation and regeneration (including soil, water and germplasm)
- Enhanced agricultural biodiversity and synergies between components.

Diverse systems benefit from the efficient use of resources such a light, water and nutrients, and reduced susceptibility to pests and disease, contributing to yield improvements that have been particularly significant for small holder farmers and those in marginal environments. As Altieri notes in reference to the introduction of agroecological approaches in developing countries, increases in production of 50–100 per cent are fairly common with most alternative production methods. In some of these systems, yields for crops that the poor rely on most - rice, beans, maize, cassava, potatoes, barley - have been increased by several-fold, relying on labour and know-how more than on expensive purchased inputs.[46]

Similarly, a 2008 UNEP-UNCTAD study concluded:

> All case studies which focused on food production in this research where data have been reported have shown increases in per hectare productivity of food crops, which challenges the popular myth that organic agriculture cannot increase agricultural productivity.[47]

Reporting on the results of maize and soybean trails the FAO observes that 'organic systems can achieve yields comparable to conventional intensive systems [that are dependant on inorganic fertilisers and pesticides], while also improving long term soil fertility and drought resistance'.[48]

The Rodale Institute's 22 year trial comparing organic and industrial methods similarly find that corn or soybean yields are the same under both systems, 'except in drought years, when regenerative systems yielded about 30 per cent more corn than the petroleum-based system.' [49]

Some results from Northern research have suggested yield decreases for agroecological approaches compared with well established industrial agriculture. However, even when yields fall, the overall result is less clear cut. A Swiss research centre, for example, reported a 20 per cent reduction in yield, 'although input of fertilizer and energy was reduced by 34 to 53 per cent and pesticide input by 97 per cent' leading the researchers to conclude that organic approaches 'are a realistic alternative to conventional farming systems'.[50] A study in the United States of America running since 1948 provided yields of 8% lower within the trial, but 13 per cent higher than on an adjacent conventional farm. Moreover, the loss of topsoil in the industrial system was profound (16cm lost from an initial total of 60cm), leading the researchers to conclude that 'at some point the increasing yield reduction from erosion may exceed the diminishing yield increase due to technical progress.'[51]

A simple focus of crop yields per hectare is also misleading: agroecological approaches in particular demand a focus on the output of the whole farm, including livestock that are an integral part of the agroecology. Raising fish in rice paddies, growing crops with trees or including goats or poultry are all common practices and all contribute to the total farm output beyond crop yields.[52] Other advantages that accrue to agroecological approaches include lower variance in crop yields and labour needs. On farm labour is an average of 15 per cent higher and is more evenly distributed through the year, offering realistic full time employment in place of the demand for seasonal workers.[53]

(*adapted from:* Ensor, Jonathan (2009). *Biodiverse agriculture for a changing climate.* Practical Action. *ibid*)

[45] Altieri, M.A. (2002) 'Agroecology: the science of natural resource management for poor farmers in marginal environments', Agriculture, Ecosystems and Environment 1971
[46] Altieri (2002) *ibid*
[47] UNEP-UNCTAD Capacity-building Task Force on Trade, Environment and Development (2008) Organic Agriculture and Food Security in Africa, Geneva and New York
[48] FAO (2006) 'Livestock's Long Shadow: Environmental issues and options' FAO, Rome. p117
[49] LaSalle, T.J. and P. Hepperly (2008) 'Regenerative Organic Farming: A Solution to Global Warming', Rodale Institute
[50] Mäder, P., A. Fließbach, D. Dubois, L. Gunst, P. Fried, U. Niggli 'Soil Fertility and Biodiversity in Organic Farming', Science, 31 May 2002: Vol. 296. no. 5573, pp1694 - 1697
[51] Reganold, J. P., L.F. Elliott, Y.L. Unger (1987) 'Long term effects of conventional and organic farming on soil erosion', Nature 330(26)
[52] Altieri (2002) op. cit.
[53] Pimentel, D., Hepperly, P., Hanson, J., Douds, D., and Seidel, R. (2005) 'Environmental, Energetic, and Economic Comparisons of Organic and Conventional Farming Systems', Bioscience, 55(7)

Agroecology and productivity

A key challenge frequently made by the supporters of industrial agriculture is whether agroecology can produce the amount of food that is needed to feed the world. Monoculture yields can appear large when measured for a particular crop per hectare in a specific season, yet on mixed farms the whole farm output per year can be greater, less dependent on favourable weather conditions and more sustainable in the long term.[54]

While early yield comparisons between certified organic and industrial agriculture has indicated a yield decline of the specific crop product of approximately 20 per cent for organic production, these studies were based on the performance of certain market-oriented organic systems in temperate climatic regions. Whereas outputs of any one specific crop product may be lower on an agroecological farm than an industrialized one, total farm yields are higher.[55] Farmers using composting techniques, botanical pest controls, legume planting, animal manure and water harvesting have raised soil quality, reduced erosion, improved nutrition and increased yields by 60 to 195 per cent.[56] Moreover, there is a strong case that if ecologically based systems had a fraction of the investment poured, at taxpayers' expense, into industrial agriculture and its protected markets, their performance would be even greater.[57]

Increased Food Provision by Organic Agriculture in Sub-Saharan Africa

A study applied IFPRI's IMPACT model to non-intensive farming systems data to answer the question *"What if the world converted on large scale to organic agriculture?"* The study found that even at high levels of conversion to organic agriculture (up to 50 per cent) in Europe and North America, there would be relatively little impact on the availability of food and price changes would be limited. For the case of sub-Saharan Africa, a conversion of up to 50 per cent would be likely to *increase* food availability and decrease food import dependency, with negligible changes in prices.[58]

Other studies show agroecological farming approaches to achieve significant yield increases over both traditional and industrial agriculture. In particular, in resource-poor regions on marginal lands and in tropical and subtropical climates[59] they indicate that agroecological methods, which use leguminous cover crops to replace nitrogen fertilizer, could produce enough food, on a global per capita basis, to sustain the current human population, and potentially a larger population, without increasing the agricultural land base.

Overall, not only is the common uncontextualized focus on yield performance over the short term based on outdated evidence, but it also interferes with achieving improved food availability. This focus diverts attention from equally important goals of guaranteeing harvests, increasing community resilience to shocks and stresses, and enabling local availability of a diverse range of quality foods.[60]

Sustainable agriculture in Zambia

In Zambia sustainable agriculture has been practiced since time immemorial in villages but is coming even to urban areas where those who cannot afford to buy expensive inputs are using natural methods of improving their land without cutting trees and use of pesticides. Whilst most agricultural institutes teach about ecological agriculture there are only a few that are actually practicing it. Kasisi Agricultural Training Centre is one such centre promoting sustainable agriculture. Small-scale farmers have adopted sustainable ways of conserving the environmental by practicing agriculture that is environmentally friendly and high yielding. A farmer can cultivate vegetables without using chemical fertilizers or pesticides, as commonly used in the commercial sector. What farmers practice is 'alley cropping' using *gliricidia* (a nitrogen fixing shrub) which provides nutrients to the vegetable crop without destroying the soil and environment. They also use ginger as a pest repellent. The *gliricidia* and ginger are intercropped with the vegetables.

Dominic Chanda – Agro-Economist, Zambia

[54] Altieri, M.A. and C.I. Nicholls (2005) Agroecology and the Search for a Truly Sustainable Agriculture, UNEP, Mexico.
[55] Altieri, M.A. Rosset, P. and Thrupp, L.A. (1998) *The Potential of Agroecology to Combat Hunger in the Developing World*. 2020 Brief 55. IFPRI, Washington DC
[56] FAO (2002) World agriculture: towards 2015/2030. FAO, Rome
[57] Pretty, J. and Shaxson, F. (1997) *The potential of sustainable agriculture*. DFID, London
[58] FAO International Conference on Organic Agriculture and Food Security, Rome 3-5 May 2007. *www.fao.org/organicag/ofs/index_en.htm*
[59] Badgley, Perfecto, I. et al (2007) 'Organic agriculture and the global food supply', *Renewable Agriculture and Food Systems*, vol 22, no 2, pp86-108
[60] Wright, J. (2005) Falta Petroleo. *Perspectives on the Emergence of a More Ecological Farming and Food System in Post-Crisis Cuba*. Doctoral Thesis, Wageningen University

The different approaches of genetic engineering and agroecology

Agroecological practices for the realisation of food sovereignty reject the use of GMOs. Genetic engineering is a technology for producing GMOs that emerges from an industrialised approach to agricultural production. That is, an approach that typically breaks crop production down into individual, isolated and inert components; that depends on external inputs; that cultivates as a monoculture; that works to maintain a simple uniformity; and that aims to maximise yields over the short term. In contrast, agroecological approaches to production can be characterised as focusing on the whole farm system, with the whole and its parts as living organisms, they depend on the development of on-farm synergies and the intensive use of knowledge, they cultivate polycultures with a broad range of agricultural biodiversity, they work to build location-specific complexity, and they aim to optimise yields over the long term. In practical terms these two approaches deal with 'problems' in different ways, as shown in Table below. The agroecological approach uses a raft of solutions to mitigate any one problem, whereas genetically engineered crops contain one – or two at most – mitigating strategies.

Comparison of genetic engineering proposals and agroecological solutions to the same problem.

"The Problem"	Genetic Engineering Proposals	Agroecological Solutions
Weeds	Crop resistance to a chemical herbicide	Ground cover, mulches, soil fertility management, rotations, mechanical weeding, varietal choice (of vigour, habit), transplants, stale seed beds, canopy cover, "weed" crops as food/predator attractants.
Pests and diseases	Crop resistance to a pesticide or pest/disease	Variety/crop/farm diversity, multi-varietal planting, buffer zones, predator attractants/ antagonists, biological controls, rotations, mechanical covers (fleece/mesh), forecasting/ monitoring – timing, mixed cropping, varietal selection/ breeding, grafting, module planting
Poor nutrition	Crop containing added vitamin or mineral content.	Multi-species cropping, biodiversity, varietal selection/ breeding for nutrition, soil management, efficient irrigation (higher dry matter), availability of wider range of nutritious foods in local markets.

Food Sovereignty

Providing healthy, local food while cooling the planet

Food sovereignty: uses *the contributions of nature in diverse, low external input [agro]ecological production and harvesting methods that maximise the contribution of ecosystems and improve resilience and adaptation, especially in the face of climate change; it seeks to heal the planet so that the planet may heal us;* **and, rejects** *methods that harm beneficial ecosystem functions, that depend on energy intensive monocultures and livestock factories, destructive fishing practices and other industrialised production methods, which damage the environment and contribute to global warming.*

Nyéléni 2007: Forum for Food Sovereignty, Sélingué, Mali
Synthesis Report *www.nyeleni.org/spip.php?article334*

The food sovereignty framework focuses on [agro[ecological methods of food provision, local autonomy, local markets and community action. It has the particular distinction of having been developed largely by representatives and organisations of farmers who mostly focus on local food production. It was first launched by La Via Campesina, the global movement of small-scale and peasant farmers and landless people, with the global fisherfolk and indigenous peoples' organisations, and their supporters, at the 1996 World Food Summit in Rome. Subsequently it has been developed in global processes and international forums. (See inside Front Cover for more details.)

Most recently at the Forum for People's Food Sovereignty Now! held in Rome in November 2009 delegates from nearly 100 countries and representative of most small-scale food providers in the world declared that "food sovereignty entails transforming the current food system to ensure that those who produce food have equitable access to, and control over land, water, seeds, fisheries and agricultural biodiversity. All people have a right and responsibility to participate in deciding how food is produced and distributed. Governments must respect, protect and fulfil the right to food as the right to adequate, available, accessible, culturally acceptable and nutritious food." (See inside Back Cover for more details.)

A close look at the substance of the IAASTD's key findings shows that many of them are indeed consistent with the underlying principles of food sovereignty and can be usefully drawn on in devising a rights-based approach to the fair governance of food and agricultural systems. The IAASTD defined food sovereignty simply as 'the right of peoples and sovereign states to democratically determine their own agricultural and food policies'. The IAASTD report includes a brief history and analysis of the food sovereignty movement, its significance within social and environmental justice movements, and its increasing relevance to states and international agencies grappling with their responsibilities and obligations to protect and fulfil every individual's right to food, nutrition, and livelihood security. The IAASTD presents the rights-based approach that is embedded in food sovereignty as 'an explicitly moral enterprise that stands in contrast to the economic processes of market-driven globalization', noting that 'this implies a radical shift from the existing hierarchical and increasingly corporate-controlled research system to an approach that devolves more responsibility and decision-making power to farmers, indigenous peoples, food workers, consumers and citizens for the production of social and ecological knowledge'.[61]

Food sovereignty measures are now incorporated in the legislation or constitutions of several countries including Bolivia, Mali and Nepal.

Food Security concept can undermine small-scale food providers

In contrast to the Food Sovereignty framework the concept of 'food security', as endorsed at UN Food Summits and promoted elsewhere is less sustainable and equitable. Food security is concerned that regular access to adequate nutrition is achieved but does not determine where the food comes from, who produces it, or how and under what conditions it has been grown.[62] The argument is that the best way for most poor countries to achieve food security is to produce for export and then import cheap, industrially produced food from the global market, rather than trying to meet their needs domestically. However, the economic and trade policies that follow undercut peasant farmers and other small-scale food providers who cannot compete with the often subsidised imports; who are too often forced off their lands into towns and cities to look for jobs that do not exist; and who otherwise have to move to increasingly marginal lands where food production is still more difficult and often environmentally damaging. That is, food security understood in this way, only contributes in the medium and long term to more poverty, marginalisation and hunger.

Realising food sovereignty will entail a fundamental shift away from the industrial and neo-liberal paradigm for food and agriculture towards:

- More direct democracy and greater citizen participation in framing policies for food and agriculture; respecting and including the voices of the very poor and marginalised, especially women).
- Federations of elected citizen-based local councils linking villages, towns, neighbourhoods, local economies and ecological units to act as a significant counter-power to the state and transnational corporations.
- Democratised research and strong networks of local innovators.
- Reformed and equitable access and resource use rights, including land, water, forests, seeds, livestock breed and the means of production.
- Re-localised and resilient food systems based on agroecology, eco-literacy and circular economy models.[63]

[61] Ishii-Eiteman, Marcia (2009) Food sovereignty and the International Assessment of Agricultural Knowledge, Science and Technology for Development. Journal of Peasant Studies 691

[62] Windfuhr, Michael and Jonsén, Jennie (2005) Food Sovereignty: towards democracy in localized food systems. ITDG Publishing, UK. *practicalaction.org/docs/advocacy/foodsovereignty_fian.pdf*

[63] Pimbert, Michel (2009) Towards Food Sovereignty. Gatekeeper 141. IIED, London. *www.iied.org/natural-resources/key-issues/food-and-agriculture/multimedia-publication-towards-food-sovereignty-re*

The future of Uganda is in its smallholder farmers

Defiant Smallholders – seeking another food system

As in most sub-Saharan African countries, Uganda's agriculture is primarily practiced by smallholder farmers. The vast majority of households engaged in maize production have land holdings of 0.2-0.5 hectares. Together, they contribute over 75 per cent of the marketable maize in Uganda. The problems that face Ugandan smallholder farmers are basic, and they are also systemic. In Uganda, maize is a staple food crop as well as a crop that can be sold for cash. Small-scale farmers sell off most of their surplus maize to rural traders immediately after harvest. These rural traders traverse villages on bicycles and occasionally pick-up trucks, buying maize directly from the farmers at "farm gate" prices in cash. These prices are, naturally, lower than the prices at major trading centres, and far lower than the peak prices achieved prior to the next harvest. Farmers sell at the farm gate because of limited storage facilities on their farms, lack of roads or transport to get to the main trading centres, and also a need for immediate cash. Ugandan maize farmers also tend to have low yields, which they say is due to low use of fertilizer and responsive seeds, because the cost of these is too high, but recognising low-input alternatives are also productive.

Unfortunately, these challenges are not unique to Uganda's farmers. In the initial years after Independence, many sub-Saharan African countries invested heavily in agriculture, with the aim of meeting their own needs and those of the regional markets. In the 1980s and 1990s, however, the International Monetary Fund and the World Bank spearheaded a series of Structural Adjustment Programs (SAPs) that required African governments to drastically reduce support to agriculture and switch emphasis to the supply of a few commodities to export markets. For example, Uganda had to withdraw its price support policies for milk and government cooperatives that had bought directly from farmers, such as the Ugandan Dairy Cooperative, collapsed. In addition, the liberalisation of the financial market meant that rural farmers had a much harder time accessing credit.

How can these challenges be overcome? One answer proposed by policy makers is to increase the size of farms, increase the import of chemical fertilizers and introduce GM seeds. But Ugandan farmers are not thinking along these lines. They want Uganda to increase its budgetary support to agriculture from 4 per cent to 10 per cent of the national budget to support sustainable agriculture. Many are organizing to form small cooperative groups that can better store and market produce. At the annual national agricultural show, hundreds of farmer groups show off their innovations: home-made pest control methods made from local products; new ways to add value to basic products (e.g. pawpaw wine!); and improved and affordable bee hives to improve pollination and provide healthy honey.

In other words, many Ugandan smallholder farmers see their future in strengthening smallholder farming… but with more support from their government for sustainable agriculture, more coordination amongst themselves, and with agricultural innovations that fit their ecosystems and lives.

Edited extract from original by
Caroline Adio & Deborah Scott, ACORD

4. Implications for change

'Business-as-usual' is not an option, as emphasised by the IAASTD. Agriculture and the food system need to be transformed in methods, organisation and purpose. Agroecology and food sovereignty provide a sustainable way forward, as IAASTD has found.

Promoting ecological food provision including agroecology

Agroecological methods are already well developed and widespread. However, in order to replace the methods of industrial agriculture they must be supported, promoted and developed further. There is a need to establish capacity at a range of levels for agroecologically oriented research, from international institutions to local levels. There must be collaboration between and among researchers, farmers, extension workers and educators in problem identification, experimentation and innovation. This requires the redirection of institutions, professional incentives and educational programmes, and the adoption of such methods as farmer field schools and farmer-scientist research groups. It will also require increased public funding.

At the same time there will be a need to provide support to smaller-scale farmers, including women farmers, to their organisations and also to CSOs and others which help to promote community organisations, agroecological methods and other development interventions. This should begin with investment in rural areas generally, in infrastructure, transport, communications, and so on. It must also include ensuring secure access to productive resources – land, credit, seeds, water - and providing technical assistance in agroecological production and agro-processing. There must then be provision of accessible marketing infrastructure, to help farmers serve local and more distant markets. Properly functioning markets are essential, to improve small farm profitability and help ensure that farm-gate prices are above the costs of local production.

Financial incentives should be put in place to encourage agroecological, and therefore resource-conserving methods, through targeted credit and crop insurance schemes, for example. In order to help identify where such support should be given it should become standard practice to use full-cost accounting to evaluate and compare the social, environmental and economic costs of different agricultural production methods and systems.

In order to both encourage production and enhance food sovereignty, supply management mechanisms, such as price bands and food reserves, should be employed to reduce volatility in food prices and so provide a secure context for farmer investment decisions, and encourage longer-term sustainable strategies rather than resource over-exploitation. For the same reason it is essential that appropriate land reform covering ownership, tenancy and traditional rights is implemented. The adoption of local and regional food procurement policies by public bodies and others can have a similar benefit.

Not all of the above need be provided by the public sector. Small and medium enterprises must also be encouraged to participate in the new direction, through encouraging private investment in safe, sustainable products and technologies, for example, in establishing and running local and regional food reserves and markets, or in collaborating with producers in equitably structured out-grower schemes and similar arrangements. At the same time governments should initiate open bidding for public funding and contracts based on meeting equitable, sustainable development criteria. They must also establish social and environmental standards for production, procurement and food quality, with liability rules in place should damage to social enterprises, health or the environment occur.

Tackling climate change

Agroecological methods can both increase the resilience of agriculture to climate change and contribute to its reduction. Many techniques are already available to be used, while others will need to be researched and developed.

Agroecological methods increase the adaptive capacity of food producers and enhance agriculture's resilience through planned environmental, ecological and biodiversity management. This includes techniques of water harvesting, irrigation management, soil and water conservation technologies, the diversification of agriculture systems and the protection of biodiversity including the diversity of crop varieties and livestock breeds. Research is need on a wide range of topics, and in local circumstances – on encouraging pest predators, for example, on breeding varieties for tolerance to climate change, on agroforestry techniques, on inter-cropping and nitrogen-fixation, on conservation tillage techniques, and so Greenhouse gas emissions can be reduced by the use of organically based fertility techniques – composts and manures, nitrogen-fixing crops, planting pits, for example. These must be encouraged and the use of oil-based fertilisers reduced or abandoned. Biomass based energy systems – biogas digesters or direct combustion for the generation of electricity, for example – and other renewable energy technologies are needed to reduce reliance on fossil-fuel based energy both on-farm and more widely. Research into reducing methane emission from cattle, through diet for example, is needed, as well as a shift away from energy intensive systems of livestock production. Agriculture can also serve to capture carbon – to provide carbon sinks – through increasing soil biodiversity to build up soil organic matter, using perennial crops to store carbon below ground, or through conservation tillage and agroforestry /tree planting. Improved soils not only improve productivity and restore degraded lands: the potential contribution to climate change mitigation is huge. Up to 10 per cent of current annual greenhouse gas emissions could be absorbed through improved land management and the restoration of degraded soils.[67]

Increase adaptive capacity for resilience

Critical to adaptive capacity is agricultural biodiversity as an asset that enables adaptation of food species to a changing environment.[64] This can be achieved by:

- Selecting, developing and breeding locally-adapted crop varieties, animal breeds and fish species for resistance to disease or pests, and intercropping a range of varieties to ensure against different weather conditions[65]
- using biodiverse agriculture to build soil organic matter through crop rotation, composting, green manures and cover crops, which enriches the soil for better yields, drought-resistance, and absorption of excess rainfall.[66]

Reforming trade rules

The food sovereignty approach is not opposed to trade, but rather to the priority now given to food exports rather than meeting local needs. Nor is it against subsidies to support farmers in fulfilling national food needs, to preserve the environment, to develop sustainable agriculture, and to meet other public needs and desires, which will differ according to circumstances and cultural traditions. What it does oppose are trade distorting subsidies which lead to the dumping of cheap food on international markets and which undermine family farm based agriculture in both the North and the South.

There is an urgent need to establish fair regional and global trade arrangements that enable farmers to meet livelihood security goals and countries to meet the food needs of all. This implies greater democratic control at all levels to decide how best to meet that need and other development goals and major reform of the current system of international rules which restrict options and give priority to commercial interests.

Countries should be allowed to prioritize local and regional production and food needs before exports. That is, economic reform programmes must be designed to support food sovereignty goals, and indeed the general right of peoples and countries to choose their own development pathways.

[64] Swedish Society for Nature Conservation (2008) Ecological in Ethiopia – Farming with nature increases profitability and reduces vulnerability, Stockholm.
[65] FAO (1996) Safeguarding fish supplies: key policy issues and measures International Conference on the Sustainable Contribution of Fisheries to Food Security, FAO, Rome; ITDG (1996) Livestock keepers safeguarding domestic animal diversity through their animal husbandry Dynamic Diversity Series, Rugby.
[66] Altieri, M.A. and P. Koohafkan (2008) Enduring farms: Climate change, smallholders and traditional farming communities, Third World Network, 20-29.
[67] Smith (2007) ibid.

Developing countries should be allowed to preserve the flexibilities needed to shield their smallholder farming sectors from the competition of industrialised countries' farmers.[68] Countries must have the right to protect themselves and their producers from excessively cheap food imports, especially those produced or exported with the support of subsidies, by the use of tariffs for example. Meanwhile, developed countries should reduce or eliminate escalating tariffs designed to keep out value-added products. They should also allow greater preferential access for developing country commodities important for rural livelihoods.

However, regional trade should be encouraged, both for economic and environmental benefits, which means the reduction or removal of tariff and other barriers between neighbouring countries.

The supporters of current arrangements under the World Trade Organisation (WTO) may argue that many of these provisions are already present, with the inclusion of 'special and differential treatment', for example, and 'non-reciprocal access'. However, the goal of the WTO, including the Agreement on Agriculture, is the liberalisation of trade, and the pressure is constantly to remove protection. A reorientation of the organisation, or the removal of agriculture from its remit altogether, is required if food sovereignty is to be made a reality. Furthermore, whatever protection may be allowed under WTO rules, as noted above, the EU has attempted to push greater trade liberalisation on developing countries through separate trade agreements - although there has also been resistance.

Resistance to EPAs

The European Union has been negotiating 'Economic Partnership Agreements' (EPAs) with its members' former colonies in Africa, the Caribbean and the Pacific since September 2002 in order to replace previous non-reciprocal trade arrangements with WTO compatible agreements. However, African countries have been afraid that the reciprocal market opening demanded by the EU would not only slash government budgets by eliminating tariff revenues, but also give powerful European companies protection through Intellectual Property Rights[69] and open access to developing markets, killing off local industry, and damaging agriculture. African farmers agree. Faced with an EU deadline, Faty Kane, national coordinator of the Senegalese campaign to fight hunger, 'Kaa KonKo Kele', said : 'Senegal must urgently put into practice protection and development policies for its national agricultural industries to combat hunger and strengthen national agricultural productivity. This is the case with groundnut, the staple crop which also feeds livestock in Senegal. Developing this sector would allow us to stop importing products like soya oil from Europe or Brazil.'[70] African leaders rejected the EU plans and agreed only limited interim arrangements. "We are not talking any more about EPAs, we've rejected them" said Senegalese President Abdoulaye Wade.[71] However, the pressure to sign continues.

Controlling corporations

The lack of an agreement to control monopoly at the international level is a major threat to future food supplies. There is an urgent need to implement and enforce appropriate anti-monopoly and competition regulations to break up and prevent further concentration of control over the food system.

There is a also a need for a change in the neo-liberal policy of privatising the natural resources necessary for food production, including land and water provision, and to prevent and reverse the growing corporate ownership and control of these resources. Private companies will have a role to play, but these resources must be under democratic and/or local producer control if they are going to be used in a sustainable and equitable way.

Current intellectual property rules serve corporate interests and marginalise smaller farmers. They need to be replaced with rules which re-confirm traditional rights of farmers to save, grow, exchange and sell seed, and which control the privatisation of both wild and traditional genetic resources for food and agriculture.

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[68] The high-level meeting on food security for all, Madrid, 26-27 January 2009, Taking the right to food seriously - Analysis by the Special Rapporteur on the Right to Food, Olivier de Schutter, Office of the United Nations High Commissioner for Human Rights.
[69] Hidden Threats: an analysis of Intellectual Property Rights in EU-ACP economic partnership agreements: unveiling the hidden threats to securing food supplies and conserving agricultural biodiversity. UK Food Group Briefing, 2009 *www.ukfg.org.uk/docs/HIDDEN_THREATS.pdf*
[70] In Senegal, farmers versus Europe, Alexandre Pollack, Paris, 06.12.07, Cafebabel.com, *www.cafebabel.com/eng/article/23166/in-senegal-farmers-versus-eur*
[71] EU-Africa Summit fails on trade, Euractive.com, 10.12.07, *www.euractiv.com/en/trade/eu-africa-summit-fails-trade/article-168988*

The IAASTD identifies that 'weaknesses and inequities' in the current system need to be addressed as well as the need 'to balance private, communal and national rights systems'. Among other options, it concludes that there should be a closer connection between protection levels and development goals – that is, limiting private rights in the interests of the majority. It talks of establishing legal protection from predation by external interests for traditional knowledge, community innovation and local and national natural resources. If products are legally derived from these resources by external actors then there should be explicit benefit-sharing policies.[72]

Via Campesina, as the voice of peasant farmers and other small-scale food providers, is clear. Its position is that the patenting of life forms should be forbidden; patented GMOs in general and sterile seed ('terminator') technology in particular should be banned from agricultural production; and small-scale food providers should have rights to grow and sell seeds and livestock, and to develop new varieties and breeds as they have always done, without the restrictions of intellectual property rights on these materials.

What small-scale food providers will promote

Delegates from food movements in all regions of the world at the November 2009 Forum for People's food sovereignty Now! agreed to promote localised, ecological, diverse, low carbon and low external input methods of production, harvesting, fishing, pastoralism, processing and distribution as part of the solution to future food provision. They emphasised that these methods maximise the contribution of ecosystems to the provision of food, increase agricultural biodiversity and improve resilience and adaptability of systems, especially in the face of climate change and other threats. Small-scale food providers need to be recognized, supported and strengthened by public policies and practices. They need to be recognized as essential actors in defining our food provision and consumption systems – after all, they provide more than two thirds of the world's food.[73] They recognised that their biodiverse, ecological model of food provision and consumption develops localised food systems which:

- provide healthy food for people in both rural and urban areas in all regions, improving productivity per unit land and/or water
- prioritise and protect local markets in a framework of policies of market regulation and supply management
- shorten links between food providers and both rural and urban consumers
- increase livelihood security and incomes
- value local knowledge and skills and local innovations in participatory research systems and support its outreach and exchange
- ensure agricultural and fishery workers rights
- provide sustainable livelihoods for youth and future generations
- respect collective rights, rejecting patents and other controls over life forms
- reject GMOs including biofortified foods
- improve the environment, regenerate soils, improving nitrogen fixing and fertility, and maximise ecosystem functions
- are (bio)diverse and prioritise use of locally adapted seed varieties, livestock breeds and fish species
- conserve water
- use less external inputs including agrochemicals
- reduce losses of food in all links in the food chain
- can adapt to climate change and cool the planet but rejecting the carbon market in this process
- reject domination of the food system by corporations
- reject industrial production of commodities – crops, livestock, fish, aquaculture products, agrofuels

Also which

- reclaim the language of (healthy) food and regain control of nutrition and the need for more diverse diets
- strengthen urban food consumer and small-scale food provider movements
- use the findings of IAASTD to promote their proposals

[72] IAASTD Summary for Decision Makers of the Global Report,2008, p23.
[73] "Who will feed us?" *www.etcgroup.org*

5. Action points

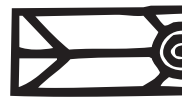
There is a clear need for action in the following areas in support of a move towards ecological food provision:

1. Agroecology and implementing the IAASTD findings

The UK government, and 57 other governments, approved the report of the International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) in 2008, but there has then been no promotion of its 22 findings by DFID, DEFRA or by Ministers, although the All Party Parliamentary Group on Agriculture and Food for Development in their report on Global Food Security recommended that DFID implement the Findings of IAASTD.[74] The UK Government, and the international development community as a whole, should recognise the radical changes in agricultural policy and practice that the IAASTD calls for by actively supporting the implementation its findings, including the promotion of agroecology in place of current, industrial practices; increased use of pesticides and other agrochemicals is not a sustainable way forward for tackling hunger and achieving global food security. Furthermore, a focus on GM crops is diversionary; leaving aside their potential health, environmental and corporate control problems, a focus on these crops diverts resources from supporting and developing viable, non-appropriable agroecological practices, identified as the way forward by IAASTD. **Agricultural support and research should be redirected towards agroecology.**

Reframe research[75]

- **Research should be redirected and include technology, energy and post harvest issues**, among others, in support of diverse smaller-scale ecological practices in cropping, livestock-raising, pastoralism and small-scale fisheries that conserve resources, with a focus on producing good quality local food in support of food sovereignty.
- **Knowledge, research, education/training and public assessment systems must empower women food providers** and strengthen their capacities to participate in policy formulation and decision-making about food and agricultural policies.
- **A new paradigm for research, in tune with food sovereignty principles, is urgently needed** that will build on local and traditional knowledge and will use regular citizen panels, consensus conferences, citizen juries, future scenario workshops and referenda to capture the full diversity of interests and values in deciding on strategic research and funding priorities in the social and natural sciences, the allocation of resources and technological risk assessments.
- **Open up decision-making bodies and governance structures of research and development (R&D) organisations** to allow a wider representation of different actors, and greater transparency, equity and accountability in budget allocation and decisions on R&D priorities.
- **Reorganise conventional scientific and technological research to encourage participatory knowledge creation and technological developments** that combine the strengths of small-scale farmers and fishers, pastoralists and other small-scale food providers with those of scientists in the search for locally adapted solutions and food systems. Capacity building to realise this is essential.
- **Ensure that knowledge, genetic resources and innovations remain accessible to all**, and especially for small-scale food providers, as a basic condition for economic democracy and human rights, including the right to adequate food.



[74] Why No Thought for Food? A UK Parliamentary Inquiry into Global Food Security. January 2010
[75] Pimbert, Michel (2007) 'Transforming knowledge and ways of knowing for food sovereignty'. See: *http://www.iied.org/pubs/pdfs/14535IIED.pdf*

2. Inclusion, participation and an end to marginalisation

An agroecological approach calls for opening up to participatory decision-making and agenda setting for agricultural policy and development as well as research. Such decision making processes should include the representatives and organisations of all types of small-scale food providers – farmers, pastoralists, fisherfolk, forest dwellers, indigenous peoples – especially including women.

Such inclusion is essential if the poor are not to be further marginalized. Non-viability is circumstantial and structural and given the right policy framework, especially the removal of obstacles to their development, most smaller-scale farmers could become effective producers of an agricultural surplus. Issues such as 'land grabs' by foreign corporations and diversion of land resources from food to agrofuel production need to be urgently addressed as they undermine local food production options. Safety nets and social protection measures should be for emergency use only and should not take the place of interventions aimed at transforming the livelihoods of those who are impoverished in the first place by policies that support the concentration of productive resources and markets in the hands of a few. Growth should never be at the expense of the poor. **There is a need for increased support to smallholder, peasant and family farmers and other small-scale food providers, and their inclusion in decision making, so that their biodiverse production systems and livelihoods can improve and can become fully viable so that they can continue to provide sufficient food for the majority.**

3. Climate change resilience

Ecological practices are more resilient and adaptive. They give emphasis to improving soil health, ecosystem functions and plant nutrition. Especially at smaller scales they can be more productive per unit area or unit of water. Industrial approaches that focus on feeding crops with fertilisers and using pesticides, which are energy intensive both to produce and to use, contribute to greenhouse gas emissions and are less resilient. Redirecting support from fertiliser subsidies and technological input packages to promoting ecological practices would provide a long-term sustainable alternative, mitigating the impacts of global warming and making food production more resilient and adaptive. **Priority in terms of policy and practice should be given to biodiverse, adaptive, resilient and carbon retaining ecological food provision that will cope better with the uncertainties of climate change.**

4. Food Sovereignty, trade reform and controlling corporations

Food sovereignty is a countervailing policy approach to the industrial farming, trade and food system, controlled by agribusinesses, that prioritises profit over meeting people's right to food in socially and environmentally sustainable ways. There is a need for bold and radical action to change the direction of agribusinesses and the global food system from seed to sewer. This means changes to food and agriculture polices, international development programmes, governance structures, economic policies and trade rules that will assist countries and communities to realise food sovereignty. Regulation and breaking the monopoly control of agribusinesses, which concentrate power over resources, technologies, trade and retail, are urgently needed. **States and competent United Nations organisations should recognise and implement the food sovereignty framework, including obligations to fulfil the right to food, that has been developed by small-scale food providers in order to deliver a secure, just and sustainable food system.**

Change the rules[76]

Necessary changes to policies and rules as identified by CSOs include:

- a major reorientation of the rules which govern international agricultural and food trade to prioritise food sovereignty through sustainable and local production and markets
- a major reorientation of international trade rules to enable governments to set agricultural and food policies according to national needs and cultural preferences
- changes in trade rules which will allow governments to protect local agriculture and food systems from cheap imports
- a change in current economic policies which will once again allow and enable governments to provide support to agriculture, not only for agroecological research but also subsidy support aimed at national food goals, funding for agricultural extension services, and investment in local infrastructure development and for strengthening local and regional markets
- an agreement to implement and enforce appropriate anti-monopoly and competition regulations at the international level to break up and prevent further concentration of control over agriculture and the food system, and a change in the policy of privatising the natural resources necessary for food production, including land and water, to prevent and reverse the growing corporate ownership and control of these resources
- replacement of current intellectual property rules with rules which re-confirm collective rights of farmers to save, grow, exchange and sell seed, and which prevent the privatisation of both wild and cultivated genetic resources for food and agriculture, as should be provided for by the International Seed Treaty. New rules must establish legal protection from commodification for traditional knowledge, community innovation, local and national natural resources, and products derived from them. Benefit-sharing policies which put development goals and traditional rights first should be adopted urgently
- rejection of ecosystem services trading schemes, including use of carbon markets, which would increase the power of corporations and further marginalise smaller scale and marginalised farmers.

International Seed Treaty

The International Treaty on Plant Genetic Resources for Food and Agriculture (IT PGRFA), commonly known as the International Seed Treaty, is the only international legal instrument for governing agricultural biodiversity and its associated agroecological production systems. It aims at guaranteeing food security through the conservation, exchange and sustainable use of the world's plant genetic resources for food and agriculture, as well as the fair and equitable benefit sharing arising from their use. It also recognises Farmers' Rights: to freely access genetic resources, unrestricted by intellectual property rights; to be involved in relevant policy discussions and decision making; and to use, save, sell and exchange seeds, subject to national laws. Its provisions are designed to deliver benefits to farmers who, through their biodiverse, ecological food production methods that preserve genetic resources on-farm, are custodians and the principal developers of agricultural biodiversity. The Treaty is a comprehensive international agreement in harmony with the Convention on Biological Diversity (CBD). It came into force in 2004 after 7 years of negotiations. More than 120 countries are party to the Treaty and 25 per cent more have also approved the Leipzig Global Plan of Action (GPA) that supports biodiverse and ecological methods of food provision, the legal framework for which is provided by this Treaty. See *www.planttreaty.org*

[76] Policies and Actions to Eradicate Hunger and Malnutrition, Working Paper, November 2009. *www.eradicatehunger.org*

6. Conclusions

Small-scale food providers have long asserted that their model of food provision can provide for current and future needs, given the chance. At their Forum for People's Food Sovereignty Now! in November 2009 they repeated their commitment to provide the world's food and resolved to:

- strengthen and promote their ecological model of food provision in the framework of food sovereignty;
- call for a reframing of research, using participatory methods, that will support their ecological model of food provision;
- strengthen their interconnecting rural - urban food webs, building alliances within a *Complex Alimentarius* that will link small-scale food providers, processors, scientists, institutions and consumers.

The need for this more enlightened and nuanced approach to agriculture and food provision is long overdue, in order to deal with both the increasing numbers of hungry people as well as the simultaneous challenges of climate change, depletion of fossil fuels, water shortages, rising obesity, increasing population and more, which affect us all and have special devastating impacts in sub-Saharan Africa.

The international community recognises these challenges and has committed to tackling them. However, despite the accumulated evidence of the failures of industrialised approaches and the contrasting positive practices of small-scale food providers supported by those of IAASTD that chart a different, sustainable and equitable way forward, institutions and governments continue to invest in and roll out industrialised approaches, at all scales, promoting the proprietary technologies they depend on.

The scientific challenge now is to move away from this reductionist approach and towards ecological food provision, one that embraces complexity and diversity, sustainably using technologies that are freely available for the majority of food providers.

The political challenge is for governments to regulate and reduce the negative impacts of industrial food systems and defend, support and promote ecological food provision, using natural wealth that may not be commodified, though there are increasing attempts to privatise it, and adopting policies within the food sovereignty framework in order to safeguard the world's food supply.

> "Agriculture is not a business like any other, it beats to the drum of biology"
>
> **Colin Tudge**
> *So Shall We Reap: what's gone wrong with the world's food - and how to fix it.*
> Penguin Books, London, 2004.

PROPOSALS BY SMALL-SCALE FOOD PROVIDERS TO SECURE FUTURE FOOD

Forum People's Food Sovereignty Now!

Rome, 13 – 17 November 2009

Promoting Ecological Food Provision

From the report of Working Group#3

WHAT FOOD IS PRODUCED, HOW AND FOR WHOSE BENEFIT?

The context for this report was the Forum for People's Food Sovereignty Now!. This was a gathering of 642 people from 93 countries and representing 450 organisations of peasant and family farmers, small-scale fisherfolk, pastoralists, indigenous peoples, youth, women, the urban people, agricultural workers, local and international NGOs, and other social actors, who gathered in Rome from the 13 -17 of November, 2009. We were united in our determination to work for and demand food sovereignty - the real solution to the tragedy of hunger in our world. The final Declaration is at **peoplesforum2009.foodsovereignty.org**

We reaffirm that our ecological food provision – embraced in the food sovereignty framework including the right to food – linking small-scale food providers with consumers actually feeds the large majority of people all over the world in both rural and urban areas (more than 70 per cent). Our practices focus on food for people not profit for corporations. It is healthy, diverse, localised and cools the planet. The women and men small-scale farmers/peasants, livestock keepers/pastoralists, fisher peoples provide us all with healthier food, while sustaining the environment. Our practices, food systems, health and livelihoods are threatened by the corporations that dominate industrial commodity production, trade and retailing, and the policies that support these interests, which provide little but aim to control more.

1. We commit to strengthen and promote our ecological model of food provision in the framework of food sovereignty.

Our practices, because they prioritise feeding people locally, minimise waste and losses of food and do not create the damage caused by industrial production systems including crops, livestock, animal feed, agrofuels, fisheries and aquaculture. They are resilient and can adapt to and mitigate climate change. We insist, however, that food and agriculture be kept out of the carbon market. We will defend and develop our agricultural biodiversity (of all species including crops, livestock, fish and other aquatic organisms, pollinators, predators, soil micro-organisms etc) in the face of the aggressive commodification of nature, food and knowledge by corporations and that is also being facilitated by the 'new Green Revolutions'. We call for a global moratorium on GMOs. Our practices require supply management policies in order to secure availability of food and to guarantee decent wages and fair prices. This includes governments protecting and properly regulating domestic food markets. We call for new policy and legal frameworks to support our practices.

2. We call for a reframing of research, using participatory methods, that will support our ecological model of food provision.

We are the innovators building on our knowledge and skills. We rehabilitate local seeds and livestock breeds and fish/aquatic species for a changing climate. We commit to promote the Findings of IAASTD (International Assessment of Agricultural Knowledge, Science and Technology for Development). We call for accountability by researchers. We reject corporations' control of research and will not engage in forums that are dominated by them. We will promote our innovations through our media and outreach programmes for training, education and information dissemination.

3. We will strengthen our interconnecting rural - urban food webs.

We will build alliances within a *Complex Alimentarius* - linking small-scale food providers, processors, scientists, institutions, consumers - to replace the reductionist approach of the *Codex Alimentarius*. We commit to shorten distances between food provider and consumer. We will strengthen urban food movements and advance urban and peri-urban agriculture. We will reclaim the language of food emphasising nutrition and diversity in diets that exclude meat provided by industrial systems.

Securing future food:
towards ecological food provision

The world's food futures are in the balance. In all regions including sub-Saharan Africa, where hunger is endemic in many countries, the sustainability of food supplies is threatened. The livelihoods of the small-scale food providers who produce, harvest and collect most of the food we eat, are being eliminated. And the productive, biodiverse environment and its natural wealth, which is used for food provision, is becoming increasingly degraded.

Securing future food requires policies and practices that are aimed at both *environmental sustainability* goals, especially in the context of climate change, and *social sustainability* and *development* goals – fulfilling the right to food, improved health and nutrition, reduced poverty, enhanced livelihoods and greater equity – realising food sovereignty.

This Briefing shows how each of these aspects, and the system as a whole, is failing and will fail to meet the needs and challenges of the 21st century to secure food for all now and forever. It shows that the systems that currently feed most people in the world – smaller-scale, locally-sourced – can be enhanced through *ecological food provision*, based on *agroecology* to meet current and future global demands for food, and more reliably so than industrial agriculture, if support, research and trade policies were reoriented in its favour.

It identifies key actions that need to be taken to set food provision and the food system in this direction and presents the commitments of the small-scale food providers themselves.

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UK Food Group Briefing, January 2010

UK FOOD GROUP

The UK Food Group is the principal civil society network in the UK on global food and farming issues and is the UK focal point for many European and International networks. It represents BOND (British Overseas NGOs in Development) on these issues. Members of the UK Food Group include both large and smaller NGOs that work on development and environment issues related to food and farming, as well as farmer-centred organisations.

This Breifing has been written for the dialogue-oriented, public advocacy project: "African smallholders in focus - a voice in EU trade policy". The views expressed do not necessarily reflect those of all partners. The aim of this project, organised by BothENDS, FIAN Germany, FIAN International, Germanwatch and the UK Food Group, is to raise awareness about the impact of international trade and other policies on the livelihoods of smallholder farmers in Africa: www.ukfg.org.uk/smallholders/

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