The International Commission
on the Future of Food and Agriculture

MANIFESTO
ON CLIMATE CHANGE AND THE FUTURE OF FOOD SECURITY

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PRINCIPLES FOR FOOD SECURITY IN TIMES OF CLIMATE CHANGE

This manifesto is an agro-ecological response to challenge posed by climate change for ensuring the future of food security by mitigation, adaptation and equity, based on the following principles:

1. Industrial Globalised Agriculture Contributes to and is Vulnerable to Climate Change.

Industrial agriculture, based on chemicals, fossil fuels, and globalized food systems enabled by energy intensive and long distant transport, has a negative impact on climate. Industrial agriculture presently contributes at least one-quarter of current greenhouse gas emissions. This dominant system, as promoted by the current economic paradigm, has accelerated climate instability and increased food insecurity. It also increases vulnerability because it is based on uniformity and monocultures, on centralized distribution systems, and dependance on intensive energy and water inputs.

2. Ecological and Organic Farming Contributes to Mitigation and Adaptation to Climate Change.

Agriculture is the only human activity based on photosyntesis and has a potential to be fully renewable. Ecological and organic farming mitigates climate change by reducing greenhouse gas emissions and increasing carbon sequestration in plants and soil. Multifunctional, biodiverse farming systems and localised diversified food systems are essential for ensuring food security in an era of climate change. A rapid global transition to such systems is an imperative both for mitigating climate change and for ensuring food security.

3. Transition to Local, Sustainable Food Systems Benefit the Environment and Public Health.

Economic globalization has led to a nutritional transition away from local, diverse, seasonal diets to industrially processed synthetic foods, which are leading to new food-related diseases and ill health. Economic globalization policies increase the burden on the environment through resource and energy intensive consumption patterns. Localization, diversification, and seasonality are important for improving human well being, health, and nutrition.

A transition to local systems throughout the world will reduce food miles by shortening transport chains and reduce the “energy backpack” of food in terms of packaging, refrigeration, storage, and processing.

4. Biodiversity Reduces Vulnerability and Increases Resilience.

Biodiversity is the basis of food security. Biodiversity is also the basis for ecological and organic farming because it provides alternatives to fossil fuel and chemical inputs. It also increases resilience to climate change by returning more carbon to the soil, improving the soil’s ability to withstand drought, floods, and erosion. Biodiversity is the only natural insurance for society’s future adaptation and evolution. Increasing genetic and cultural diversity in food systems, and maintaining this biodiversity in the commons are vital adaptation strategies responding to challenges of climate change.

5. Genetically Modified Seeds and Breeds: a False Solution and Dangerous Diversion

Genetically modified crops are a false solution and a dangerous diversion from our task of mitigating climate change, running counter to providing sustainable food and energy and to conserving resources. GM food, fibre, and fuels aggravate all the shortcomings of industrial monoculture crops: more genetic uniformity and hence less resilience to biotic and abiotic stresses; and more demand for water and pesticides. They have been created on the basis of a discredited and obsolete genetic determinist paradigm and thus carry extra risks to health and the environment. They also lead to patent monopolies which not only undermine farmers’ rights but also impede the dedication of research on biodiversity for adaptation to climate change.

6. Industrial Agrofuels: A False Solution and New Threat to Food Security

Food is the most basic of human needs and sustainable agriculture must be based on food first policies. Industrial agrofuels are non-sustainable and spread genetically modified organisms by stealth.

Agrofuel plantations are aggravating the problem of climate change by destroying and replacing rain forests with soy, palm oil, and sugar cane plantations. This has led to an unparalleled land grab of indigenous and rural communities.

Industrial agrofuels are responsible for perverse subsidies to non-sustainable agriculture which threaten the food rights of billions of people. To make matters worse, food prices are increasing due to the rapid conversion from growing food crops to growing agrofuels.
Sustainable energy policies require decentralization combined with a general decrease in energy consumption, while maintaining food security as an overarching objective of food and agriculture systems.

7. Water Conservation is Central to Sustainable Agriculture

Industrial agriculture has led to intensive water use and increased water pollution, reducing availability of fresh water. Drought and water scarcity in large parts of the world will increase due to changes in climate. Reducing intensive water use in agriculture is a vital adaptation strategy. Ecological and organic farming reduces demands for intensive irrigation while enhancing soil capacity for retention of water while improving water quality.

8. Knowledge Transition for Climate Adaptation

Climate change is the ultimate test for our collective intelligence as humanity. Industrial agriculture has destroyed vital aspects of knowledge of local ecosystems and agricultural technologies which are necessary for making a transition to a post-industrial, fossil fuel-free food system. The diversity of cultures and of knowledge systems required for adapting to climate change need recognition and enhancing through public policy and investment. A new partnership between science and traditional knowledge will strengthen both knowledge systems and enhance our capacity to respond.

9. Economic Transition Toward a Sustainable and Equitable Food Future

Current economic and trade regimes have played a major role in creating perverse incentives that increase carbon emissions, accelerating climate change. The growth paradigm based on limitless consumption and false economic indicators such as gross national product (GNP) are pushing countries and communities toward increasing vulnerability and instability. Trade rules and economic systems should support the principle of subsidiarity - that is favouring local economies and local food systems which reduce our carbon footprint while increasing democratic participation and the quality of life.

INTRODUCTION

The Fourth Assessment Report of the United Nations' Intergovernmental Panel on Climate Change (IPCC), the latest consensus-driven assessment of climate change by the world's leading scientists, crystallizes the situation we face. It states that "warming of the climate system is unequivocal," with a global average rise in temperature having taken place over the last 100 years of 0.7 degrees centigrade. That in turn has triggered climatic changes that have already affected food production.

The IPCC concludes that "most of the observed increase in global average temperature since the mid-20th century is very likely due to the observed increase in greenhouse gas emissions." Global atmospheric concentrations of carbon dioxide (CO_2), methane and nitrous oxide have increased very significantly as a result of human activities since 1750 and now far exceed pre-industrial levels.

In the last few years, climate and energy issues have been front and center of political dialogues around the globe. The United Nations Climate Change Conference held in December 2007 in Bali discussed approaches that may lead to more 'climate-friendly' energy and transportation. However, the relationship between food and agriculture systems to climate and energy has not been part of these global discussions. Yet, as this manifesto reveals, our current industrial agriculture and food system is a major contributor of greenhouse gas emissions, some estimate that it is responsible for perhaps as much as 25 percent of emissions.

Discussions within political, financial, and trade institutions, as well as the media, must also begin to shift away from the reductionist conversation of "zero carbon" and "no carbon" as if carbon exists only in fossilized form under the ground. What is widely neglected in the discussions, and therefore not considered in the solutions, is that biomass of plants is primarily carbon. Humus in the soil is mostly carbon. Vegetation in the forests is mostly carbon. Carbon in soil, plants, and animals is organic and mostly living carbon and is part of the cycle of life.

The problem is not carbon per se, but our increasing use of fossil carbon as coal, oil, and gas, which took millions of years to form. Today fossil carbon is being burned in huge quantities at an alarming rate. Plants are a renewable resource; fossil carbon is not. The "carbon economy," based on fossil fuels, embodies an industrial, growth-based economy, which only serves as a source of the greenhouse gas CO_2. The renewable carbon economy and ecology embodies biodiversity, is based on cycles of assimilation and dissimilation (source and sink), and offers the solution to food security in times of climate change.

Current global trade and economic policies are enforcing a centralized, fossil fuel-driven food and agriculture system that is directly at odds not only with the ecological imperative but also with the time table and reduced emission targets that most governments are committing to in international fora. This huge contradiction must be addressed if we are to meet the challenges of climate change and global warming.

At the same time, the present food system is also extremely vulnerable to climate change, which this report also demonstrates. Almost every corner of the globe has already been touched by dramatic weather shifts that have affected crop production and food distribution.

Additionally, the manifesto explores some of the false agricultural solutions that are being promoted in the name of "clean" or "green" energy - namely, genetically modified organisms (GMOs) and large-scale production of agrofuels. Most importantly, it demonstrates that ecological organic food systems are a real solution to current climate concerns in terms of mitigation and adaptation and an energy transition to a post-fossil fuel era.

The last section of this report outlines transitions based on the recognition that ecological organic agriculture is a vital solution both for mitigating climate change and for ensuring food security for all. Finally, this manifesto makes a call for food systems to be an integral part of the climate and energy discussion in the post-Bali climate negotiations.

IPCC Predicts More Extreme Weather Events

The IPCC has found that it is likely that the area affected by drought globally has increased between 1900 and 2005, with reductions in rainfall occurring in the Sahel, the Mediterranean, southern Africa and parts of southern Asia. The IPCC also states that it is likely that heat waves have become more frequent and the frequency of heavy precipitation events has increased over most land areas.

The IPCC warns that such impacts will worsen as temperatures continue to rise. It estimates that warming by 2100 will be worse than previously expected

with a probable temperature rise of 1.8 to 4 degrees C and a possible rise of up to 6.4 degrees C.
The impact on agriculture will be significant. Warmer days and nights, more frequent heat waves, and an increase in the area affected by drought will decrease yields in warmer environments due to heat stress, increased insect outbreaks, decreased water availability and land degradation, as well as an increase in livestock deaths. These impacts are already being experienced by many communities in countries of the South. There will also be an increase in heavy precipitation events, which will further damage crops by eroding and water logging soils. An increase in intense tropic cyclone activity will cause crop damage in coastal ecosystem, while sea level rise will salinize coastal aquifers. Pacific islands and large deltas are already affected.
Some regions will be particularly badly affected. In some African countries, yields from rain-fed agriculture - the vast majority of agriculture in Africa - could be reduced by 50 percent by 2020. Additionally, agricultural production in many African countries is projected to be severely compromised.
In Latin America, productivity of some important crops is projected to decrease with adverse consequences for food security. In much of southern and eastern Australia and over parts of eastern New Zealand, agricultural production is projected to decline by 2030 due to drought. In southern Europe, higher temperatures and increased drought will also reduce crop productivity. Even in North America, major challenges are projected for crops that are near the warm end of their suitable range or which depend on highly utilized water resources. Such circumstances will affect food production dramatically and experts predict that there will be a grave increase in malnutrition and hunger, affecting millions followed by a decline in worlds population in the middle of the 21st century.
But one need not wait for the future to witness the horrific, real-life effects that climate change has on peoples' ability to grow food and nourish themselves. This manifesto makes evident the impact of the present blinkered and destructive industrialized approach to producing food under increasingly variable weather patterns and urges instead embracing a sustainable, nourishing and safe mode of feeding ourselves that also helps to mitigate and adapt to the hazards of climate change.

Section One
INDUSTRIAL GLOBALISED AGRICULTURE CONTRIBUTES TO AND IS VULNERABLE TO CLIMATE CHANGE

Industrial agriculture, based on chemicals, fossil fuels, and globalized food systems enabled by energy intensive and long distant transport, has a negative impact on climate.
Industrial agriculture presently contributes at least one-quarter of current greenhouse gas emissions. This dominant system, as promoted by the current economic paradigm, has accelerated climate instability and increased food insecurity. It also increases vulnerability because it is based on uniformity and monocultures, on centralized distribution systems, and on dependence on intensive energy and water inputs.

.1 Industrial Agriculture – A Major Contributor to Climate Change

The dominant industrial food production - characterized by commercial seeds, chemical use, high water usage, giant gas-guzzling farm equipment, and a massive fossil fuel based global transport system - is both very vulnerable to climate change and a significant contributor to it. The way we produce our food should play an important part in how we reduce greenhouse gas emissions and adapt to climate change.
According to the Stern Review Report on the Economics of Climate Change, agricultural activities directly contribute 14 percent of greenhouse gases. However, this is not the entire picture. Land use (largely referring to deforestation for globalized agriculture) accounts for 18 percent, and transport accounts for 14 percent. As is known, much of deforestation is related to conversion of forests to food or fuel growing. And, under the current global food model, food is shipped thousands of miles from the region where it was grown. Thus, a significant percentage of emissions from both the land use and transportation categories can also be attributed to industrial food and agriculture systems. When percentages from these two categories are included in a total picture calculation, some estimate that at least 25 percent of global emissions are related to non sustainable agriculture.

Industrial agriculture contributes directly to climate change through emissions of the major greenhouse gases - Carbon dioxide (CO_2), methane (CH4), and nitrous oxide (N2O). Carbon dioxide emissions are largely caused by the loss of soil carbon to the atmosphere (land use change – forestry sector) and the energy intensive production of fertilizers (industrial sector). Modern industrial agriculture contributes to this by practices such as drainage of wetlands, deep plowing that exposes the soil to the elements, use of heavy machinery that compacts the soil, overgrazing that leads to desertification, and the practice of growing large-scale monocrops. Methane and nitrous oxide are particularly powerful contributors to climate change as the global warming potential of methane is 21 times, and of nitrous oxide 310 times, that of CO_2. Since 1970 the emission of these greenhouse gases has increased by 40 percent and 50 percent respectively.[1]
According to the 2007 IPCC Report, nitrogen fertilizers account for 38 percent, the largest single source of emissions from agriculture. Chemically fertilized soils release high levels of nitrous oxide because they increase the concentration of easily available mineral nitrogen in soils. In particular ruminants produce methane via enteric fermentation which increases when cattle are fed intensive feed. At 32 percent this is the second largest source of emissions. An additional 11% percent of agricultural emissions comes from intensive chemical cultivation of rice.

Monocultures – An Imperative of Industrial Agriculture System

The current industrial system calls for a monoculture imperative - less crop variety and diversity in order to conform to uniformity needed for land management, food transport and processing. Commercial high-yielding variety seeds are designed to perform well only within a predictable, very narrow weather band. Conversely, different cultures have successfully adapted seeds and developed traditional knowledge that responds to difficult environments via innovative techniques for irrigation, drainage, soil fertility, frost control, and disease management.

The Imperative for Long Distance Food Miles

Long distance food supply chain imperatives of the globalised economic system are also responsible for major greenhouse gas emissions. Food processing, packaging, long distance refrigeration, and massive transport infrastructure systems add to the use of fossil fuels.

In the U.S., for example, the average plate of food travels 1,500 miles from source to plate. The import of food products and animal feeds into the United Kingdom by sea, air, and road accounts for over 83 billion ton kilometers, which requires 1.6 billion liters of fuel, leading to annual emissions of 4.1 million tons of carbon dioxide.[2]

.2 Industrial Food Systems Vulnerable to Climate Change

Natural ecosystems consist of a diversity of plants and animals that represent a substantial, actively assimilating, standing carbon stock, up to half of it lying underground in live and dead biomass and other forms of organic carbon in the soil. These systems are stable and resilient to biotic and abiotic stresses and act as net carbon sinks. Conversion of natural ecosystems for industrial agricultural causes depletion of the soil carbon pool by 60-75% which is mostly emitted to the atmosphere as CO_2. Some soils have lost as much as 20 to 80 tons carbon per hectare, thus degrading soil quality and stability[3] and creating systems that are most vulnerable to climate change.

Long distance transport also adds to the vulnerability of our food systems in a regime of climate change. Food availability becomes vulnerable to vagaries of weather, transportation costs, fuel availability, and political and social instability. Extreme weather events, such as cyclones, flooding, and hurricanes, can break down food systems of entire regions.

Monoculture crops are vulnerable to the effects of climate change, and aggravate it by requiring intensive chemical inputs. The Irish Potato Famine of 1845 which killed millions is an example of this vulnerability. On the other hand biodiversity based systems are highly evolved and are the basis of resilient sustainable agriculture systems worldwide.

The findings of the IPCC and the fragilities of the present industrialized globalised food system make clear the urgent need for a shift toward diverse, decentralized food models.

Section Two
ECOLOGICAL AND ORGANIC FARMING CONTRIBUTES TO MITIGATION AND ADAPTATION TO CLIMATE CHANGE

Agriculture is the only human activity based on photosynthesis and has the potential to be fully renewable. Ecological and organic farming mitigates climate change by reducing greenhouse gas emissions and increasing carbon sequestration in plants and soil. Multifunctional, biodiverse farming systems and localised diversified food systems are essential for ensuring food security in an era of climate change. A rapid global transition to such systems is an imperative both for mitigating climate change and for ensuring food security.

Industrial farming and the globalised food system are major contributors to climate change, while also being unsustainable in terms of use of vital resources such as soil, biodiversity and water. In many regions, especially in what is called the "developing world," traditional systems are still successfully feeding diverse populations and providing sustainable livelihoods for communities. Other regions that have been dominated by the industrial paradigm (primarily in "developed" countries) are undergoing a successful revival of traditional as well as other forms of ecological farming systems in recent years. These farming systems are based on a diversity of regional crops and livestock breeds and avoidance of external inputs such as synthetic fertilizers and pesticides. They rely instead on nutrient recycling and biological pest management.

Organic and ecologically friendly farming have additional benefits; increased soil fertility is one of these. The fertility and stability of soils is strengthened by adding organic fertilizer from the farm, by diversifying crop rotations and by keeping soils under plant cover as much as possible in order to use much of the free solar energy by photosynthetic processes to build up biomass and to prevent wind and water erosion. The outcome is that soils under ecological organic agriculture are harvesting 733 – 3000 kg or more of carbon dioxide per hectare and year from the atmosphere.[4]

Increasing the sequestration of carbon in soils is a vital aspect of climate change mitigation. By increasing carbon absorption, organic farming has a lower climate impact than industrial chemical agriculture. Climate impact can be measured in terms of greenhouse gas emissions in terms of CO_2 equivalents per unit land area. Ecological agriculture is found to reduce emissions by 64%.[5] It also improves soil structure and stability, thus also improving water holding capacity and erosion stability.[6] Due to the permanent and diverse plant cover symbioses between plants and microorganisms (e.g., mycorrhiza, rhizobia) are becoming increasingly abundant and important for the self-sustenance of crop production.[7]

Contrary to general belief and prejudice, ecological organic agriculture does not yield less than conventional agriculture. A comprehensive study of 293 comparisons of conventional and organic, low input agriculture demonstrated that organic agriculture yields are roughly comparable to conventional agriculture in developed countries and result in much higher yields in developing countries.[8] Additionally, it was found that more than enough nitrogen can be fixed in the soil by using green manure alone.

A long-term study in the Rodale Institute in the United States found that while organic and conventional yields are comparable in years with normal rainfall, organic yields are much higher during drought years, confirming that organically managed fields are much more resistant to abiotic stresses.[9]

Self sufficiency of farming systems is an ideal that to-date is best represented by ecological organic farming. There are, however, ways to even further advance yields and sustainability, such as reducing tillage (minimizing energy input), including agroforestry (system stabilization and diversification), and improving animal housing systems (manure handling, diets for ruminants that lower methane emissions).

Two key elements in mitigating climate change through ecological organic agriculture include: 1) favoring food production for local consumption over food production for export, and 2) using indigenous agricultural biodiversity over commercial monoculture varieties. These elements are contained in the principle of “food sovereignty” now generally accepted by the United Nation’s Food and Agriculture Organization (FAO).

Section 3
TRANSITION TO LOCAL, SUSTAINABLE FOOD SYSTEMS BENEFIT THE ENVIRONMENT AND PUBLIC HEALTH

Economic globalization has led to a nutritional transition away from local, diverse, seasonal diets to industrially processed synthetic foods, which are leading to new food-related diseases and ill health. Economic globalization policies increase the burden on the environment through resource and energy intensive consumption patterns. Localization, diversification, and seasonality are important for improving human well being, health, and nutrition.
A transition to local systems throughout the world will reduce food miles by shortening transport chains and reduce the "energy backpack" of food in terms of packaging, refrigeration, storage, and processing.

During the last century, a radical new approach to agriculture emerged. Instead of local farmers growing food primarily for their own communities, a new highly centralized global system of industrialized agriculture rapidly began replacing the local, decentralized small-scale food systems.
According to the FAO, the liberalized economic globalization model has led to a 54 percent increase of food imports between 1990 and 2000 by least developed countries (LDCs). Mexico, which traditionally has grown enough maize to feed its populations for centuries, has become a net importer of maize due to dumping of artificially cheap corn flooding in from the U.S. Imports of chicken parts from the EU has displaced small poultry farmers in Ghana. Numerous other examples exist of how the global industrial food system has turned food security on its head.
The centuries-old food models are connected to traditional cultures, climates, geography, ecosystems, and other endemic factors. The industrial model has been the dominant paradigm for "developed" countries for the past several decades. Beginning with the Green Revolution of the 1970s and '80s, many "developing" countries began to adopt these chemical, energy intensive agriculture practices as well. For example commercial "high yielding" seeds of the Green Revolution required nitrogen fertilizers, an especially potent contributor to greenhouse gas emissions.
The industrial regime of the last few decades is foisted upon developing countries by international institutions such as the World Bank and the International

Monetary Fund (IMF) via financial strictures known as structural adjustment programs (SAPs). The World Trade Organization (WTO) promotes and enforces industrialized agriculture in both the North and the South. WTO rules are legally binding and have strong enforcement capability, and thus are a powerful agent for the transition to globalized industrial food systems and are also important vehicles for implementing economic and social policies. Bilateral agreements as well as international aid agencies are also part of the current agriculture paradigm. Although the rules and policies of these global agreements and institutions are negotiated between governments, they are largely crafted by large agribusiness corporations who are the primary beneficiaries of such agreements. Growing food has shifted from providing a basic necessity of life to the production of global commodities.

Rather than viewing food as a commodity tied to technology and capital investment, people and natural resources ("natural capital") are at the center of traditional systems that have been feeding humanity for millennia. Yet such systems are being eliminated for systems highly dependent on fossil fuels; and, perversely, the industrial system destroys the very carbon-absorbing plant and wildlife that are now so desperately essential for planetary health.

Concentration of Control of Food Production and Consumption

Concentration of production and consumption is a hallmark of industrial systems and this is clearly demonstrated in agriculture as food production and consumption increasingly are controlled by large industry. Subsistence farming becomes marginalized and local food systems shrink.

Some examples of corporate concentration of food include:

- As of 2005, the top 10 commercial seed companies - the first link in the food chain - controlled more than 50 percent of the world's commercial seed sales. This is an increase of 17 percent in only two years.
- As of 2000, five grain trading companies controlled 75 percent of the world's cereal commodity market and its prices.
- In the vegetable seed market, Monsanto dominates. It controls 31 percent of bean sales, 38 percent of cucumber seed sales, 34 percent of hot pepper sales, 29 percent of sweet pepper sales, 23 percent of tomato seed sales, and 25 percent of onion seeds.

"(Figures provided by Rural Advancement Foundation International, Canada and the ETC group, Canada.)"

Concentration in processing and trade has treated differentiated flows of foodstuff. Export-oriented countries such as Argentina and Brazil export millions of tons of GM soybean cultivated under monocultures to Europe to feed intensively reared and highly subsidized animals. This contributes to soil erosion and social desertification of the countryside and allows the maintenance of a highly unhealthy and energy-inefficient meat-based diet.

The trade of fresh fruit and vegetables from the South to the North results in a "virtual flow" of water from producing and exporting countries to importing countries. Water diversion from local food systems exacerbate conflict over resources and disparities. Over 70 percent of highly processed foods move from the South to the North, also affecting natural resources and increasing energy use in developing countries.

Consumption Transitions

Structural changes in production and distribution patterns accelerate change in diets and increase inequalities in consumption and welfare.

Advertising promotes unhealthy changes in consumers' tastes and behaviors. The availability of easily palatable food (based on strategic use of salt, sugar, and fats), and communication strategies contribute toward the shift away from local food systems to supermarket-based chains. This concentration of sourcing generates standardization and erosion of food variety. The nutritional transition based on meat, dairy and fats increase the incidence of food related diseases such as obesity, diabetes, and strokes. As the South adopts more western-style diets, such diseases are on the rise. Diet-related chronic disease is projected to be responsible for 52 percent of all deaths in China by 2025. In Sri Lanka, diet-related chronic diseases currently account for 18.3 percent of all deaths and 10.2 percent of public hospital expenditures.[10]

Such pre-cooked, processed foods are based on high energy consumption, including use of packaging materials, and have expanded at double the growth than conventional food sales. This food system increasingly replaces family activities and contributes to a loss of food knowledge, culture, and socialization.

Relocalization as a Key to Transition

Transition to a sustainable food system should be based on relocalization of production, trade, and consumption.

First, relocalization should be symbolic: consumers should know where the products come from so that they can make an informed and responsible choice.

Labels should indicate the source of the raw material. For example, under present EU regulations, except for a few products, it is not always possible to know the place of origin of the raw product and labels need only indicate the place of processing or packaging of the product. European Geographical indications and Slow Food Praesidia, among other schemes, allow the consumers to link quality features of products to the place they come from. Fair trade labels give consumers knowledge about social conditions of production. A "food miles" labeling scheme would help consumers to select the product with the shortest, and most energy efficient route.

Second, relocalization should be relational in that alternative marketing arrangements should reconnect farmers to consumers, giving farmers the opportunity to create a trust relationship and mutual learning with consumers. A large number of initiatives have blossomed in the last years in this area, such as consumer cooperatives, box schemes, home deliveries, special events, fairs, mail order local shops, restaurants, tourist enterprises, and more. The basis of communication is centered on environment, quality, ethics, lifestyle, and responsibility. Collaboration of the organic and fair trade movements is of key importance. The recently founded Bio-Regional-Fair venture is an example of how to counter globalized food. This Bavarian association brings together a large number of groups involved in fair trade, consumer associations, church organizations, regional initiatives and organic farmers, with the aim of enabling farmers to earn a fair income that secures their livelihoods, and strengthens regional economic cycles and also protects ecosystems.

Third, relocalization should be physical - production, distribution and consumption should be concentrated in a defined space. Farmers' markets, on-farm selling, community supported agriculture, local menu restaurants, cooperatives are innovative organizational arrangements based on collective action, often on already established social networks. These kinds of production and distribution practices maintain or improve natural capital and reduce the energy backpack of food.

Section 4
BIODIVERSITY REDUCES VULNERABILITY AND INCREASES RESILIENCE

Biodiversity is the basis of food security. Biodiversity is also the basis for ecological and organic farming because it provides alternatives to fossil fuel and chemical inputs. It also increases resilience to climate change by returning more carbon to the soil, improving the soil's ability to withstand drought, floods, and erosion. Biodiversity is the only natural insurance for society's future adaptation and evolution. Increasing genetic and cultural diversity in food systems, and maintaining this biodiversity in the commons are vital adaptation strategies responding to challenges of climate change.

Biodiversity is living carbon and a solution for climate change. Industrial agriculture is a dead carbon economy. Additionally, more biodiversity means more biomass that increases food production while also providing energy. Resilience to climate disasters comes only through biodiversity. After the Orissa Super Cyclone of 1998 and the Tsunami of 2004, Navdanya Seed Center distributed seeds of saline resistant rice varieties. These "seeds of hope" rejuvenated agriculture in lands that had been salinated by the sea. The seed saving movement is now creating community seed banks of drought resistant, flood resistant, and saline resistant seed varieties to respond to climate extremes. Diversity offers a cushion against both climate extremes and climate uncertainty. Monocultures and centralization are a myopic obsession that must give way to diversity and decentralization.

While reducing vulnerability and increasing resilience, biodiverse organic farming also produces more food and higher income. As scientist and professor David Pimentel observes: "Organic farming approaches for maize and beans in the U.S. not only use an average of 30 percent less fossil energy but also conserve more water in the soil, induce less erosion, maintain soil quality, and conserve more biological resources than conventional farming does."

After Hurricane Mitch in Central America, farmers who practiced biodiverse organic food growing suffered less damage than those practicing chemical agriculture. The ecologically farmed plots had more top soil, greater soil moisture, and less erosion, and experienced less economic losses.

Organic matter in soils is decomposed under aerobic and anaerobic environments and carbon (C) is returned to the atmosphere as carbon dioxide (CO_2) and methane (CH4), respectively. A 10 percent reduction of "C pool" in the soil and its emission into the atmosphere equals a 30-year period of the anthropogenic emissions of CO_2 by fossil fuels. Organic agriculture can contribute directly and indirectly to reduce CO_2 emissions by preserving soil resources via reduced tillage, increased surface residues (reduces soil erosion and C losses) that will later be incorporated through the combined action of soil invertebrates and soil micro-organisms (fungi and bacteria). This reduces mineralization of organic matter.

Biodiverse organic and local food systems contribute both to mitigation of and adaptation to climate change. Mitigation of climate change results from lower emissions of greenhouse gases and higher absorption of CO_2 by plants and the soil. Organic farming is based on recycling of organic matter, unlike chemical agriculture based on nitrous oxide emitting fertilizers. Small, biodiverse, organic farms, especially in developing countries, are almost entirely fossil fuel free. Energy for farming operations comes from animal energy. Soil fertility is built by feeding soil organisms by recycling organic matter. This reduces greenhouse gas emissions. Biodiverse systems have higher water holding capacity and thus are more resilient to droughts and floods. Navdanya studies have shown that organic farming increases carbon absorption by up to 55 percent (even more when agro-forestry is added into the mix), and water holding capacity by 10 percent; thus, contributing to both mitigation and adaptation to climate change. Finally, biodiverse organic farms are not a trade off with food security. Research by Navdanya and other research institutes show that biodiverse organic farms produce more food and higher incomes than industrial monocultures.[11] Biodiversity intensification can thus increase mitigation per acre and carbon sequestration per acre, thus reducing the pressure of land use conversion from forests to chemically intensive monoculture plantations.

In sum, biodiversity is our natural capital, our ecological insurance, especially in times of climate change. Biodiverse farming and small-scale farms go hand in hand, yet corporate-driven globalization policies are pushing farmers off the land and peasants out of agriculture. A great U-turn is needed so that policies encourage and protect small-scale, biodiverse, organic farming.

Section 5
GENETICALLY MODIFIED SEEDS AND BREEDS (GE) - A FALSE SOLUTION AND DANGEROUS DIVERSION

Genetically modified crops are a false solution and a dangerous diversion from our task of mitigating climate change, running counter to providing sustainable food and energy and to conserving resources. GM food, fibre, and fuels aggravate all the shortcomings of industrial monoculture crops: more genetic uniformity and hence less resilience to biotic and abiotic stresses; and more demand for water and pesticides. They have been created on the basis of a discredited and obsolete genetic determinist paradigm and thus carry extra risks to health and the environment. They also lead to patent monopolies which not only undermine farmers' rights but also impede the dedication of research on biodiversity for adaptation to climate change.

Genetically modified organisms, (GMOs), also referred to as genetically engineered organisms (GE), are often presented as the solution to many problems critical for the survival of our species. Proponents claim that GMOs are the answer to feeding the hungry, especially in light of population increase; that they will cure diseases; and will mitigate climate change.
To date, none of these claims have been substantiated and there is much scientific research, as well as on-farm experience that repudiates such claims. In fact, biotechnology companies have failed to introduce a single genetically modified crop that increases yields, enhances nutrition, and is either drought- or salt-tolerant.

Failures of GMOs

Not only have GMOs failed to deliver on its claims, it has caused a host of other serious problems which include GM contamination of non-GM crops; an increase in chemicals and pesticides; a reduction in biodiversity; harm to wildlife; creation of "superweeds;" and the ability of corporations to further control seeds and food supplies.
To date, plant genetic engineering has delivered merely two traits, or characteristics, of GMOs in only four plant species. The four GMO crops are

maize, soybean, canola, and cotton and they are modified in two characteristics: insect resistance (Bt) and herbicide tolerance.
GMO proponents claim that these two traits lower pesticide and water usage, and therefore will mitigate climate emissions. However, the reality is quite different.
There have been major crop failures of insect resistant (Bt) cotton. We cite here one such example that can be repeated in many regions of the world: Monsanto's Bt cotton entered South Sulawesi, Indonesia, in 2001 promising farmers higher yields and less need for pesticide. Instead, a drought led to a pest population explosion on Bt cotton, though not on other cotton varieties. As a result, instead of reducing pesticide use, farmers had to use a different mix and larger amounts of pesticides to control the pests.
Furthermore, the Bt cotton - engineered to be resistant to a pest that is not a major problem in Sulawesi - was susceptible to other more serious pests. The average yield was only 1.1 ton per hectare (instead of the promised 3-7 tons), with some fields experiencing total harvest failure. Some 70 percent of the 4,438 farmers growing Bt cotton were unable to repay their credit after the first year of planting. To make matters worse, the company unilaterally raised the price of the seeds.[12]
In India the largest number of suicides of farmers pushed into debt for costly seeds and high priced chemicals have taken place in regions where Bt. Cotton has spread most.
The trait of herbicide tolerance, in which plants are designed to survive direct application of an herbicide (i.e., pesticide) to kill nearby weeds, has demonstrated similar failures.
Monsanto's herbicide (glyphosate)-resistant soy, introduced in Argentina in the mid-1990s, is a prime example of failures common to herbicide-tolerant crops. In recent years soy farmers have turned to using highly potent herbicides to combat the proliferation of weeds that are naturally resistant to glyphosate and "volunteer" GM soy plants that have become a weed problem. This heavy herbicide use has affected neighboring farms, causing human health problems, death of farm animals, and crop damage. Some of the other problems associated with the GE soy include loss of soil fertility, deforestation, and flooding, as well as displacement of small farmers and farm laborers.
According to the most comprehensive, independent analysis based on data

from the United States Department of Agriculture (USDA), GM crops increased pesticide use in the U.S. by 122 million pounds from 1996-2004.[13]

Claims of lower water usage for GMO plants are also, to date, unsubstantiated. The opposite seems to be the case. Farmers are finding that GMO plants require more amounts of water than crops that are indigenous, or traditional, to a region. This is the case because GM was introduced into commercial high yielding plant varieties, which require much more water because they typically have shorter roots and therefore need shallow sources of water such as irrigation.

Additional Risks of GMOs

It is now known that pollen is regularly passed between GMOs and cultivated or wild plants. Depending on the crop and the type of pollination, the pollution may spread far beyond the official limits laid down to protect neighbouring fields. And other species, as well as closely related ones, are contaminated. If GMO field trials become widespread, we know that biological farming will soon become impossible. Growing GMOs is an irreversible act of ecological folly.

With such disastrous performance, it is difficult to fathom how GMOs help to mitigate climate change. In practice, the opposite obtains.

Section 6
INDUSTRIAL AGROFUELS - A FALSE SOLUTION AND NEW THREAT TO FOOD SECURITY

Food is the most basic of human needs and sustainable agriculture must be based on food first policies. Industrial agrofuels are non-sustainable and spread genetically modified organisms by stealth.
Agrofuel plantations are aggravating the problem of climate change by destroying and replacing rain forests with soy, palm oil, and sugar cane plantations. This has led to an unparalleled land grab of indigenous and rural communities.
Industrial agrofuels are responsible for perverse subsidies to non-sustainable agriculture which threaten the food rights of billions of people. To make matters worse, food prices are increasing due to the rapid conversion from growing food crops to growing agrofuels.
Sustainable energy policies require decentralization combined with a general decrease in energy consumption, while maintaining food security as an overarching objective of food and agriculture systems.

Agrofuels, also referred to as biofuels, are fuels derived from food crops such as corn, soya, canola and sugar cane, and oil bearing perennials such as jatropha and palm oil.
Agrofuels are being promoted as the “green” alternative to fossil fuels and the panacea to climate change. However many scientific reports are now revealing that when the “cradle to grave” cycle - growing, producing, and burning the fuels - is considered, agrofuels are a net negative energy system. Research by professor David Pimental, Cornell University in New York, and professor Ted Patzek, University of California at Berkeley, reveal that it takes more than one gallon of fossil fuel (30 percent more) to make one gallon of ethanol, a corn-based fuel. Thus, ethanol and other agrofuels actually have higher emissions than fossil fuels.
Yet, despite such evidence that agrofuels do not solve climate issues, many countries are investing billions and providing mass subsidies to growers and

producers. Brazil is betting on sugarcane ethanol, Indonesia and Malaysia are clearing few remaining forests for palm oil production, and the U.S. is heavily subsidizing corn-based ethanol.

In the U.S. - The Greening of GMO Corn

The "greening" of GMO corn used to produce ethanol is a particularly troubling and dangerous aspect of the evolution of agrofuels. The crescendo of marketing campaigns in the U.S. that ethanol is good for family farmers, good for U.S. consumers, and good for the environment is inextricably linked to the dwindling corn exports of U.S. GM corn. Monsanto, Archer Daniel Midlands, and a handful of other companies invested heavily in GM corn and ethanol production. GM corn was promoted to U.S. farmers in the mid-1990s and by 2003 approximately 45 percent of all U.S. corn, representing over 36.5 million acres was genetically modified. However, consumer markets in the European Union, Africa, and other regions rejected the GM corn and U.S. corn producers were left with corn surpluses. Growers and agribusiness felt the pinch and began scrambling to find a market for GM corn - ethanol provided the market. And, in a highly cynical marketing scheme, GM corn is now presented as a green solution to fossil fuels, with no regard to the numerous dangers that GMOs pose to ecosystems and potentially to human health. The sudden demand for more corn to produce ethanol has increased overall corn production acreage in the U.S. to record highs. In 2007, the U.S. Department of Agriculture (USDA) estimated that growers harvested over 24 percent more corn than in 2006. Over the course of the next five years, the 2007 U.S. Farm Bill will dole out billions of dollars in subsidies to mainly corporate-controlled corn producers. In addition to direct corn farm subsidies, corn ethanol is given a 51 cent tax credit for every gallon of ethanol blended into gasoline (refiners are now required by law to mix some ethanol into gasoline). Highway funds contribute another $600 million per year toward ethanol production. Additionally, numerous subsidies are given to develop pipelines for ethanol transport, which cannot be shipped through existing and traditional pipelines due to its corrosive qualities. And, in a move to protect U.S. corn producers, the U.S. Congress has set huge tariffs to help prevent cheaper Brazilian ethanol (sugarcane based) from entering the country. Additionally, the U.S. Congress is discussing the prospect of increasing subsidies for sugarcane ethanol as part of its next farm bill.

Agrofuel Crops Result in Increasing Deforestation

According to the World Resources Institute over the last 150 years, deforestation accounts for 20 to 30 percent of global greenhouse gas emissions (mainly carbon dioxide). The destruction of natural ecosystems - whether tropical forests or grasslands - not only releases greenhouse gases into the atmosphere when they are burned and plowed for clearing, but also deprives the planet of natural sponges, or sinks, to absorb carbon emissions. Croplands absorb far less carbon than rain forests or even scrubland it replaces, yet the demand for agrofuels is resulting in continued destruction of forests, grassland, and land set aside for regeneration and conservation.

A 2004 report from the International Energy Authority estimated that a 10 percent substitution of fossil fuels would require 43 percent and 38 percent of current cropland area in the U.S. and the EU respectively. To have a meaningful substitution of fossil fuels, many more forests and grasslands would have to be cleared.

In Brazil, vast swathes of the Amazon forest have already been cleared for soybean cultivation for cattlefeed. Encouraging soybean biodiesel would bring further devastation to the Amazon. At the same time, sugarcane plantations also encroach on the Amazon, but is mainly grown on the Atlantic forest and the Cerrado, a very bio-diverse grassland ecosystem. Already two-thirds of these areas are destroyed or degraded.[14] Also, as farmers in the U.S. have switched from planting soy to planting corn, Brazil is trying to make up this difference in soy production and it is doing this by clearing more of the Amazon.

The pressure on forests in Malaysia and Indonesia is even more devastating. A Friends of the Earth report, The Oil for Ape Scandal (2005) reveals that between 1985 and 2000 the development of palm oil plantations was responsible for an estimated 87 percent of deforestation in Malaysia. In Sumatra and Borneo, 4 million hectares of forests were lost to palm farms; and a further 6 million hectares are slated for clearance in Malaysia with 16.5 million hectares to be cleared in Indonesia.

Palm oil is referred to as the “deforestation diesel,” as it is now moving to become the major bioenergy crop. Current global palm oil production is more than 28 million tons per year and is projected to double by 2020. Malaysia and Indonesia have announced a joint commitment to each produce 6 million tons of crude palm oil per year to feed production of biofuels.

In the face of such destruction there are still those who say that it is an unfortunate necessity given the climate and energy future; however, numerous reports demonstrate that a forest sequesters two to nine times more carbon over a 30-year period than planting the same amount of land with agrofuel crops.[15]

Fuel or Food?

Over 850 million people currently suffer from hunger and even more from nutritional deficits.[16] As land is converted to growing crops for fuel instead of for food (including "feedstock"), hunger and food insecurity increases. Providing adequate food for all is a moral issue and is a measure of our humanity; therefore, substituting food for fuel in order to maintain consumeristic and industrial lifestyles for the few is an immoral course of action. Prices of many traditional food crops that have been converted to use for fuels have resulted in an increase in food prices. For billions of the poor, even a slight increase in food prices has dire consequences. By 2006 around 60 percent of total rapeseed oil produced in the EU was used for making biodiesel. The price of rapeseed oil increased by 45 percent in 2005. Unilever, the giant food company, estimated that additional costs in 2007 to food manufacturers would translate to close to 1,000 euros per ton. U.S. corn prices have increased by more than 50 percent since September 2006 which has caused scarcities of corn in many areas of the world dependent on U.S. corn exports.

Species Extinction and Other Environmental Concerns

The alarming rate of species extinction is expected to climb dramatically due to climate change; eliminating even more forests and grasslands for agrofuel crops will exacerbate this crisis still further.

Soils are also threatened by agrofuels because crop residues are often used to produce biofuels instead of being plowed back into the soil to provide nutrients.

Other concerns include air pollution. Research at the Flemish Institute for Technological Research concluded that biodiesel causes additional health and environmental problems because it creates more particulate pollution and generates more waste and causes more eutrophication.

Cellulosic Biofuels

As mounting evidence reveals the many problems of large-scale agrofuels based on food crops, many are claiming that there is a next generation - cellulosic fuels - that will provide the solution.

However, there are many barriers to this technology. Professor David Pimental, (University of California at Berkeley) points out that it takes twice as much cellulose or wood to make the same gross energy as from corn. Additionally, cellulose is trapped inside lignin, which requires an acid or enzyme to break it down. After this, an alkali treatment is used to stop the acidity; and then bugs must be introduced for fermentation. These numerous processes add up to energy inputs that outweigh the energy output of cellulose.

Further diverting biomass for cellulosic fuels instead of recycling organic matter to the soil will deplete soil organic matter and contribute to desertification and increased vulnerability to drought.

While centralized agrofuel schemes are clearly not the way to respond to climate change, research does show that decentralized small-scale, on farm production of bioenergy can lead to a net energy gain without causing ecological harm or generating food insecurity.

Section 7
WATER CONSERVATION IS CENTRAL TO SUSTAINABLE AGRICULTURE

Industrial agriculture has led to intensive water use and increased water pollution, reducing availability of fresh water. Drought and water scarcity in large parts of the world will increase due to changes in climate. Reducing intensive water use in agriculture is a vital adaptation strategy. Ecological and organic farming reduces demands for intensive irrigation while enhancing soil capacity for retention of water while improving water quality.

Industrial chemical agriculture has contributed to a water crisis both through intensive water use and through pollution of surface and ground water through agrichemical pollution.

In tropical countries, intensive irrigation has caused additional problems of water logging and salinization, putting fertile lands out of food production.

Climate change will increase water stress in many parts of the world. Australia is already suffering from an extended drought, and the Darfur conflicts between pastoralists and settled agriculturalists have been linked to depleting water resources of Lake Chad.

The destruction of the tropical rainforests in Brazil for soya and in Indonesia for palm oil is also disrupting the local hydrological cycle created by the rainforests.

Global warming is triggering the melting of glaciers that recharge water of major river systems. More than 5,018 glaciers of the Himalaya are being impacted. Pindari glacier is retreating at 13 metres a year, and the Ganges glacier at 30 metres annually. In 13 years it has receded by one-third of a kilometre. In two decades Himalayan glaciers will shrink from 500,000 sq. km to 100,000 sq. km. In a few decades there will be no glacial melt in the Himalayan Rivers in the peak of summer leading to a further aggravation of drought. As a result per capita availability of water will drop from 1800 cubic metres to 1000 cubic metres.

Reducing water waste and pollution has become a survival imperative.

Ecological and organic farming can contribute to reduction in water use by increasing soil moisture conservation through increasing the organic matter content of soils. Organically farmed soils are better adapted to weather extremes because they make the soil sponge-like, allowing it to retain more

rainwater. Water retention can increase by 20-40% in organically managed soils.[17]
Organic soils hold 816,000 litres per ha in the upper 15 cm of soil, making soil a major water reservoir.[18] Water capture in organic crops is twice as high in organic farmed crops, thus reducing risks of both floods and droughts.[19]
Promotion of water prudent crop species and varieties is another strategy for reducing intensive water use. Millets use 200-300 mm water compared to 2500 mm for Green Revolution (industrial) paddy cultivation and provide more nutrition per acre than rice.
Water harvesting is also a vital technology for water conservation.

Section 8
KNOWLEDGE TRANSITION FOR CLIMATE ADAPTATION

Climate change is the ultimate test for our collective intelligence as humanity. Industrial agriculture has destroyed vital aspects of knowledge of local ecosystems and agricultural technologies which are necessary for making the transition to a post-industrial, fossil fuel-free food system. The diversity of cultures and of knowledge systems required for adapting to climate change need recognition and enhancing through public policy and investment. A new partnership between science and traditional knowledge will strengthen both knowledge systems and enhance our capacity to respond.

Industrial agriculture is based on a reductionist, mechanistic paradigm and is an outmoded and fragmented way of looking at the world. The industrial paradigm replaces intimate knowledge of biodiversity and ecosystems with careless technologies such as use of agrichemicals which destroy biodiversity and soil, pollute air and water and destabilise the climate. Traditional and indigenous knowledge systems are based on plurality and diversity, necessary principles for adaptation that are increasingly needed because of climate change.

The diversity of agricultural knowledge systems has developed over generations in thousands of different eco-systems and varying cultural conditions. The chemical industrial paradigm of agricultural science and technology emerged in the course of the 19th century in Europe and America and improved the productivity of particular crops in many parts of the world. However, the entire calculus of productivity of industrial agriculture is based on externalization of costs and increased energy inputs.

Such progress increased dependence on fossil fuels, displaced farmers and led to an erosion of a wealth of traditional knowledge, of indigenous approaches to agriculture and the extinction of many specializations in horticulture, farming, forestry, animal husbandry, aquaculture and other forms of agriculture, as well as of food preparation and medicines.

While increasing external energy inputs, large-scale industrial agriculture and shifts in the control of land and water and other natural resources resulted in a steep decrease of the number of people working in primary production and an even more dramatic decrease of people actually in charge of maintaining and further developing agricultural production systems. In combination with cheaper and cheaper energy inputs from fossil fuels, large-scale machinery, fertilizers and pesticides, knowledge became more and more concentrated on the ability to adapt the environment to the needs of industrial agricultural production rather than adapting agricultural practices to environmental conditions and to maximum ecological efficiency.

This destructive approach of exploitation of natural resources is usually combined with different forms of exploitation of labour and expropriation of the traditional owners and guardians of the land.

In recent decades agricultural knowledge, which had been largely a public domain until the 1970s, has undergone dramatic structural changes. Private investment and to a much larger extent private control of agriculture and food-related science and technology has become the dominant form of research and development. This includes new forms of expropriation of agricultural knowledge, which go far beyond classical and colonial forms of biopiracy.

The industrial patent system is extended to plants, animals and even parts of humans. Scientific findings as well as discoveries are increasingly perceived as private assets and property. The ongoing conversion from traditional ethics of science as a servant of public good to a private business has massive detrimental implications on the availability and use of knowledge and information. Moreover, this shift in scientific interest results in an unhealthy focus on the development of products that can be marketed at the widest possible market, instead of methods and their best application to diverse local environmental and socio-economic conditions.

As a result of these tendencies, thousands of communities around the world and humanity as a whole have actually lost an enormous wealth of knowledge, including the culture and values in which it was embedded.

In order to meet the challenges of climate change it is necessary to save, maintain, preserve, and innovatively combine the diversity of knowledge and different knowledge systems and to keep or bring them back in appropriate ways into the public domain at local, regional and global level.

The hubris of western science and technology has many reasons to humbly join the diversity of knowledge-systems, skills and wisdom. The most striking successes of adaptation to present and future ecological conditions, of improved sustainability and eco-efficiency, are actually fully or partly based upon local and traditional knowledge. Historic wisdom and knowledge about how to make the best, most exhaustive and least destructive use of all natural resources available, how to let gardens and fields "work themselves" and how to reduce weather related risk, is invaluable in times of dwindling resources and an inevitable paradigm shift from industrial to ecologically adapted food production and processing.

Combined with the dramatically expanded scientific insights and means of measurement and understanding of life processes at the micro and macro level, the so called non-scientific knowledge at local, traditional and indigenous levels, including the wealth and diversity of value systems and spiritual means of integration, could boost humankinds ability to cope with the unprecedented challenges ahead. At the same time it offers much needed concepts of holistic approaches and value based changes of our perception and lifestyles as well as our ethics of using and sharing, acknowledging and scrutinizing our present knowledge and understanding.

Section 9
ECONOMIC TRANSITION TOWARD A SUSTAINABLE AND EQUITABLE FOOD FUTURE

Current economic and trade regimes have played a major role in creating perverse incentives that increase carbon emissions, accelerating climate change. The growth paradigm based on limitless consumption and false economic indicators such as gross national product (GNP) are pushing countries and communities toward increasing vulnerability and instability. Trade rules and economic systems should support the principle of subsidiarity - that is, favouring local economies and local food systems which reduce our carbon footprint while increasing democratic participation and the quality of life.

In material, physical, and biological terms the industrial agriculture economy is a negative economy that requires huge energy inputs. The cost of energy inputs are externalized and the financial calculus is dependent upon subsidies. This distorts the real price of food and its real costs in environmental, social, cultural and political terms.

Current financial and trade regimes continue to perpetuate and enlarge this negative economy. Instead of rewarding long-distance, uniform, centralized food systems, policies should support the principle of subsidiary. In other words, local production for local consumption should be the first tier of food security. This means shortening the food chain and food miles.

Subsidiarity devolves power downward to local communities, local and regional governments, instead of setting uniform policies at an international level that are mandated for all countries, as is done via WTO rules. Localization more easily increases democracy and control by communities, regions, and nation-states. Although climate change is a global problem and the global community must work together for the future of the planet, the solutions and adaptations must be grounded in local solutions which ensure diversity, the key strategy for survival.

ACTIONS REQUIRED FOR ENSURING FOOD SECURITY IN TIMES OF CLIMATE CHANGE

This manifesto proposes two levels of action: people's actions and policy actions.

People's Actions:

1. Maintain and nurture biodiversity - this begins with promoting biodiversity of seeds and breeds in farming and your own backyard.
2. Shift from chemical, energy intensive agriculture practices to ecological, organic food production.
3. Choose water prudent agriculture - conservation and water harvesting should be the primary aims instead of intensive irrigation and groundwater mining.
4. Choose and favor farmers' markets and local, organic, fresh seasonal products and short chains. In this way, the energy backpack is lightened.
5. Initiate and support incentives that make the shifts to rebuild local food economies. Farmers must be allowed to be the guarantors of the quality of the seed and food they produce without being squeezed out by the bureaucratic industrial standards of seed registration and food safety.
6. Create democratic spaces for farmers, local communities and consumers to decide how to make the transition to a post fossil fuel food system based on localization and sustainability.

Policy Actions:

1. End perverse subsidies for fossil fuel-based food economies: this document calls upon the World Bank, the International Monetary Fund, and regional and global financial institutions to end funding mega fossil fuel-based projects such as damn construction, pipeline and irrigation projects, and massive transport infrastructures.
2. End subsidies for agrofuels and laws imposing their use.
3. Redirect public investment to ecological, local, and organic food models that reduce climate risks while enhancing food security.
4. Key WTO rules need to be reformed. These include:
    - <u>Allow Quantitative Restrictions (QRs):</u>

as part of the market access commitments of the Uruguay Round of GATT (Article XI), along with rules in the Agreement on Agriculture, countries were forced to remove all bans, or quantitative restrictions, on imports and exports. Developing countries had traditionally used import restrictions to protect their domestic food production and producers against a flood of artificially low-priced imports; now this mechanism has been stripped away. Quantitative restrictions are the only secure mechanism that can begin to build food sovereignty and food democracy, and can protect the livelihoods of our rural communities. Because richer nations have not done much to reduce the level of subsidies they provide to their agricultural sectors, all countries should be allowed to respond to subsidy distortions by applying quantitative restrictions on imports to ensure food security.

- Eliminate Minimum Access Requirements:
  the WTO "minimum access rule" should be eliminated. This rule requires each member nation to accept imports of up to 5 percent of the volume of domestic production in each designated commodity and food sectors (based on 1986-88 quota levels).
  This rule directs domestic agriculture policies toward an import/ export model, instead of encouraging policies that favor local production for local consumption. It perpetuates a fossil fuel-based food system.
  The bias invariably should be to strengthen local production for local consumption and to reduce long-distance food shipments.
- Allow Selected Tariffs and Quotas:
  new rules must permit the judicious use of selected trade tariffs, as well as import quotas, to regulate imports of food that can also be produced locally. For developing countries, this is called "Special and Differentiated Treatment" (SDT). SDTs can help offset dumping by rich countries of subsidized commodities (i.e., selling below actual cost of production).

5. Promote biodiverse agriculture systems and end WTO intellectual property right rules that enforce corporate concentration of seeds and piracy of traditional knowledge systems. Regarding the WTO's Agreement on Trade Related Intellectual Property Rights, the following changes should be made:
   - Article 27.3 (b) should be amended to clarify that: 1) No life forms of any kind can be patented; 2) No natural processes for producing plants

and animals can be patented; and 3) A sui generis system can include national laws that recognize and protect traditional knowledge of indigenous and local communities.

- Article 27.1 should be changed to allow countries to elect to not patent food and medicine, and to limit the time scope of a patent or process (most often applicable to medicines).

6. Allow GMO-Free Zones: WTO policies and rulings must be reversed to unequivocally allow for the complete and explicit right of regions and nation-states to remain GMO-free to the extent that they choose.
7. Include CO_2 sequestration through organic farming into the Clean Development Mechanism, both because it takes effect very quickly and is very cost effective while contributing to rural development.
8. Ecological organic farming needs to be central to all adaptation strategies for dealing with climate change.
9. Biodiversity conservation needs to be a vital part of adaptation to climate change since biodiversity is an insurance in the context of unpredictable climate conditions.
10. Indigenous local knowledge needs to be protected and promoted as part of all adaptation strategies.
11. Remove regulatory, economic, physical constraints that impede relocalization

Ecological organic agriculture and local food production must now urgently be brought into the fold of local, national, and international efforts to combat climate change.

Some believe that the climate chaos crisis is the single biggest test of our humanity. The collective action or inaction of our societies will determine the fate of millions of both human and animal species.

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INTERNATIONAL COMMISSION ON THE FUTURE OF FOOD AND AGRICULTURE

A joint initiative of

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