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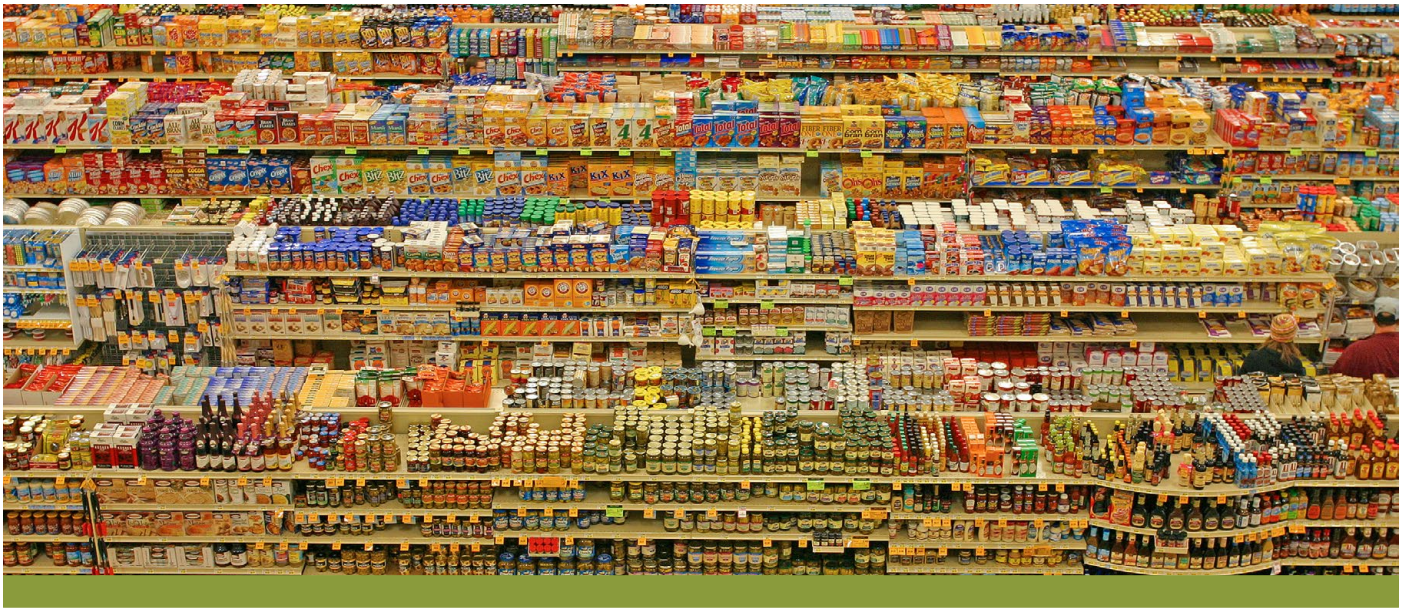
Fact Sheet

Climate change and the industrialised food system

biodiversity | food sovereignty | agroecology | social justice | www.biowatch.org.za



What is feeding climate change?

The way we produce and distribute food is causing global ecological and social crises, including one of the greatest threats of our time – climate change. The increasingly industrialised global food system that produces and distributes food from farm-to-plate-to-landfill is responsible for a whopping one-third (31–34%) of all human-induced (anthropogenic) greenhouse gas (GHG) emissions.[1]

According to the latest report just released by the Intergovernmental Panel on Climate Change (IPCC), to have any chance of limiting the global temperature rise to around 1.5°C and avoid the most catastrophic effects of climate change, global human-caused emissions must be reduced by nearly half by the end of this decade.[2,3]

In order to reduce emissions and transition to a just and low carbon society, it is critical to interrogate the industrialised food system. Not only is it destroying livelihoods, landscapes and ecosystems while bankrupting our soils and foods of nutrients, but it's failing to meet human needs as hunger and mulnutrition rates soar around the world.[4]

Fundamental transformation of the industrialised food system towards agroecology and food sovereignty is needed in order to urgently reduce emissions and ensure the right to healthy and nutritious food for all.

The industrialised food system

The industrialised food system has developed out of the capitalist logic of mass production. Although this began in the late 1800s mainly in the west, many of these aspects were spread to much of the global south in the 1950–60s through the Green Revolution, which sought to structure small-scale farming and food systems by the industrial logic. This was done through marketing high yielding hybrid seed varieties coupled to chemical inputs, mechanisation and irrigation, all to increase production of a few grain crops to supply commodity markets.[5]

Food has been stripped of its social value and the web of intricate connections to local ecologies and cultures and instead has become a commodity, subject to a linear and rationalised process to produce the most product for the least cost and effort. This "value chain" includes the inputs to production, transport, processing, manufacturing, retailing and consumption.[6] As with other industrial value chains waste is generated at every step – one-third of food produced worldwide ends up as waste.

Like a factory process designed for mass produced objects like cars, the industrialised food system seeks uniformity and standardisation across the chain so that identical products are produced across time and place, and on a mass scale. At the farm level it therefore depends on genetically uniform monocultures. This specialisation extends to

"From farm-to-plate-to-landfill, the way we produce and distribute our food is responsible for a whopping one-third of all human greenhouse gas emissions."

animal genetics, where animals are bred for a single purpose, like higher milk production or larger chicken breasts.[7] This uniformity and mass scale enables massive profits for food corporations, but reduces diversity in nature and on the plate. To maintain large uniform systems, which are totally contrary to diverse and complex natural processes, extensive use of chemical inputs is required, such as synthetic fertilisers and pesticides in production, pharmaceuticals to manage animal diseases, and a range of chemicals in food processing, many of which require significant energy to produce. This is accompanied by extensive mechanisation, from the machinery used on industrial farms, to transport across the chain, and the processing of food stuffs in factories.

The industrialised food system has become a key global force driving global crises

The industrialised food system has externalised the cost of malnutrition and disease; and impoverished and marginalised the communities and workers who actually produce our food. It produces a large portion of our greenhouse gas emissions; pollutes air and water; destroys our soils to the extent that if the current trend continues the world will run out of topsoil in the next few decades; destroys biodiversity and ecosystems through clearing land for expanded production, devoting land to production of a few monocultures for export, and through mass pesticide and artificial fertiliser application.[8]

Despite its war on nature and human health, the industrialised food system has become accepted globally as the "normal" way to organise food systems, so subjecting food and its living, social context to an industrialisation process. This has also required a strong shaping of food system narratives, such as needing to produce more of a few food commodities to feed a growing population, and needing industrial farming models to intensify production of food supposedly on less land. The system may have made a narrow variety of energy dense foods cheaper over time, but these are nutritionally poor with consequent global epidemics of malnutrition, obesity and non-communicable diseases.[9]

Rather than addressing hunger this is about expanding markets and control for corporate players – enough food is produced globally to provide adequate diets to all on the planet, but the fair distribution of this food is prevented by the profit-maximising nature of corporate-controlled, industrialised food systems.

The global industrialised food system undermines the achievement of all SDGs

The global industrialised food system undermines the achievement of all the Sustainable Development Goals (SDGs), all of which connect to sustainable and healthy food.[10] A key aspect of this is how the industrialised food system drives climate change.

What are greenhouse gas emissions, and why should we care?

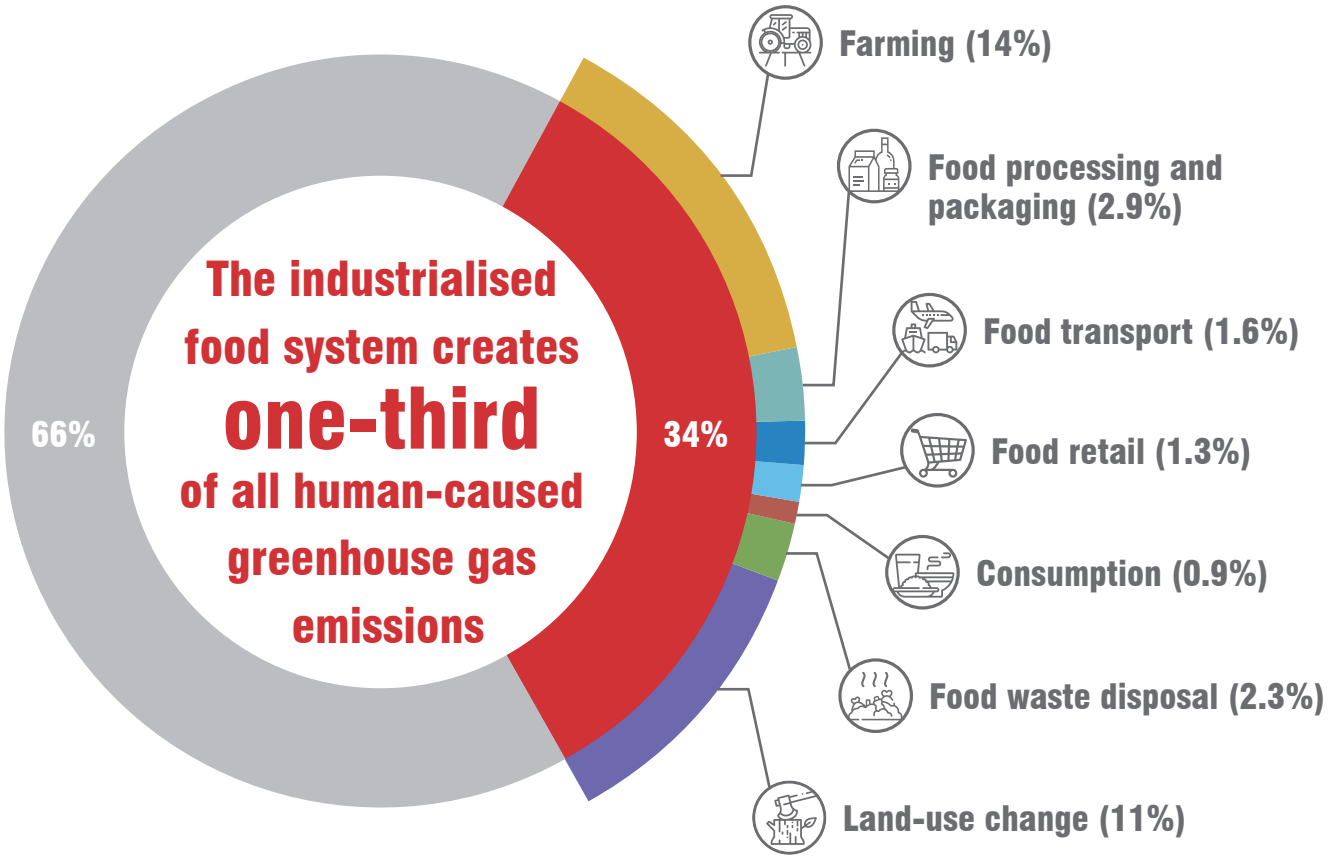
Life on Earth depends on energy from the Sun. About half the light reaching the Earth's atmosphere passes through the air and clouds to the surface, where it is absorbed and then radiated upward in the form of infrared heat.[38] Greenhouse gas (GHG) emissions trap this heat and raise temperatures.

Global economic activities have fundamentally increased the concentration of greenhouse gases in the Earth's atmosphere.[39] These gases are carbon dioxide, methane, nitrous oxide, ozone and water vapor. There are also a growing number of human-made GHGs polluting and trapping heat in the atmosphere, including halocarbons and other chlorine- and bromine-containing substances.

Greenhouse gas concentrations are at their highest levels in 2-million years and continue to rise; the past decade was the warmest on record.[40] As global society changes over time, and because of how we use energy to power our homes, how we plan and build our cities and towns, our transport and how we travel, and especially how we grow, distribute and trash our food, we are experiencing unprecedented and ever-more devastating changes in our climate.

Climate change refers to long-term shifts in temperatures and weather patterns around the world. Many people think climate change mainly means warmer temperatures. However, because the Earth is a system and everything is connected, changes in one part of the system influence and drive changes in other parts of the system. As a result, the consequences of climate change, caused by increasing levels of GHGs in the atmosphere, include intense droughts, water scarcity, severe fires, rising sea levels, flooding, melting polar ice, catastrophic storms and declining biodiversity. [41]

"The industrialised food system must be fundamentally transformed towards agroecology and food sovereignty in order to urgently reduce emissions."



How we produce, distribute and waste food is warming our planet

Due to the GHG-emitting and energy-intensive nature of industrial food production and processing, globally it is the cause of one-third of all human greenhouse gas emissions, contributing annually in the region of 31–34%.[11] The main gases it emits are carbon dioxide, methane and nitrous oxide, the latter two of which are significantly more potent than carbon dioxide in their contributions to warming.[12]

The largest share of 25% comes from agriculture – this includes 11% from land use change (such as deforestation to make way for crops or livestock grazing), and 14% from the production of the inputs used, and on-farm emissions including from energy use, livestock, tilling and fertiliser off-gassing. GHGs from farming alone almost doubled between 1961–2016, with most of this increase coming from increased synthetic fertiliser use, rice cultivation and livestock rearing.[13]

Crop and livestock production together contribute more than 50% of the methane and 75% of the nitrous oxide of human-caused emissions.[14] Livestock production alone, and in particular industrial livestock production for meat and dairy, contributes 14% of total human-caused emissions and is the single largest source from the food system.[15,16] This is because of deforestation and the clearing of natural vegetation to create grazing and cropland for livestock feed; the process of growing crops for feed; global transport of feed; and the methane released from enteric fermentation (the digestive process in ruminants like cows). In fact, the emissions of the top five global meat and dairy companies together are on par with fossil fuel giants like ExxonMobil.[17]

Meat and dairy consumption continues to grow globally, but if the livestock industry continues to grow as projected while other sectors cut their emissions, it would constitute more than 80% of the carbon budget and make it impossible to limit global temperature rise to 1.5ºC above pre-industrial levels.[18] Industrially-raised livestock is also generally exceptionally resource intensive, at a time when many of those resources will come under increasing strain with climate change. For example, half a kilogram of beef requires 6800 litres of water to produce![19]

Pre- and post-production processes contribute 9%, with the bulk taken up by food processing and packaging, and food waste disposal. In this regard greater commercialisation and industrialisation beyond the farm gate are key sources of increased GHG emission growth – for example, refrigeration in the form of cold storage across long value chains, during transport, to maintain produce freshness for consumption out of season, and in supermarkets, has tripled since 1990 to 5% of food system emissions.[20]

"Shockingly, the emissions of the top five global meat and dairy companies together are on par with fossil fuel giants like ExxonMobil."

The climate impact of South Africa's food system

The industrialised food system, which is dominant in South Africa, is responsible for proportionally lower amounts of our GHG emissions, largely because our reliance on dirty coal for energy makes an over-sized contribution compared to most other countries. However, the system still contributes close to one-fifth of our emissions, approximately 18%. Farming is responsible for 6%, land use change about 1%, and pre-and post-production processes about 10%.[21]

Of agriculture's contribution, livestock-raising contributes 70%,[22] while the production of field crops contributes 11%. Most of this comes from the application of synthetic fertiliser (57% of field crop emissions) and lime (a further 30% to field crop emissions). The largest crop contributors to GHG emissions are maize, wheat and sugarcane (largely because they are the most extensively cultivated), while industrial production of vegetables has the highest rate of GHG emissions.[23]

Furthermore, transport of food, which is predominantly by road in South Africa, contributes 1% of overall carbon emissions, but processed foods constitute the greatest share from total road freight transport in the country.[24] This reflects the centralised distribution systems of major food manufacturers and supermarkets, where goods are transported from distant locations to a few manufacturing and distribution points, and distributed out again to retailers across the country.

The food system in South Africa is therefore not only a significant source of our emissions, but also reflects and deepens inequality in the country.

South Africa's industrialised food system is deepening inequality and vulnerability to climate change

South Africa is the most unequal country in the world.[25] This is reflected in the fact that we have a highly developed commercial food system, profitable for the few corporations that control it, that sits alongside vast hunger and malnutrition.

While we have about 40 000 recorded commercial farm units, most of our food is produced by around 15 000 commercial farm units.[26] This food then travels through the corporate-controlled distribution, processing, manufacturing and retailing network, with substantial profits extracted from this control.[27] Such corporations exert significant influence over government policy, the market, and our diets, shaping these in their favour but at the expense of the right to food, nutrition, health, small farmers and traders, and the environment.

This corporate power and profitability contrasts with the poor ability of millions to access the food produced by this system. Before the COVID-19 pandemic, 20% of South Africans had inadequate or severely inadequate access to food.[28] With rising food prices and a deepened unemployment crisis, by March 2021 35% of households were still failing to purchase adequate food and 17% of households experienced consistent hunger.[29] At the same time, food corporations continued to post healthy profits, and agriculture grew economically by 13.4% in 2020 and 8.3% in 2021.[30]

The economic performance of the current food system thus has little direct relationship to the social needs of the country, while making significant contributions to climate change. The intersection of climate change and our inequality will deepen vulnerability, hunger, health consequences[31] and the potential for conflict.

Southern Africa is a climate change "hotspot" and could heat at double the global average

Southern Africa, which is a climate change "hotspot", could heat at double the global average.[32] With some of the highest global rates of food insecurity, sub-Saharan Africa will also experience some of the greatest declines in food production.[33] Smallholder farmers will be particularly hard hit by extreme weather events (including increasing temperatures, drought and variability in rainfall) and a rise in pests and crop diseases. With most arable land in South Africa being rainfed, these impacts will have dire effects on livelihoods, food security and prices.

But the impacts will not be felt equally. In South Africa's dualist food system, access to and control of productive resources remains skewed in favour of large-scale commercial farmers. This inequality means that smallholder farmers are especially vulnerable to climate changes, with lower capacity to cope.[34] The country's poorest households, who already spend as much as 80% of their incomes on food,[35] will be further devastated as climate change fuels rising food prices, which globally will increase by more than 80% by 2050.[36]

If our industrialised food system doesn't change, it will break

Overall, without the required changes, food systems are going to experience a "state shift" – abrupt and irreversible changes because of the industrial food system's susceptibility to climate change, and "will break in the current century."[37] It is clear that to avoid these impacts and build a fair and climate-resilient food system, urgent and far-reaching changes are necessary.

"The poorest households, who already spend as much as 80% of their incomes on food, will be further devastated as climate change fuels rising food prices, which globally will increase by as much as 84% by 2050."

How NOT to transform the food system for climate resilience

Deep and fundamental transformation is needed to cut emissions and build climate resilience in the food system, but there are also a range of false solutions being pushed through the corporate take-over of policy spaces and promoted in international policy fora that assume that all that is needed are a few tweaks to the existing system.

These false solutions must be avoided as they are a distraction from real changes and solutions and simply promise more of the same – they reproduce the same thinking and systems that are the cause of the ecological crisis, and they invariably reinforce existing patterns of power and inequality.

False solution 1: Technological fixes

Many of the "solutions" presented in the context of climate change are technological fixes aimed at maintaining productivity (as well as control and profits) – genetically modified seed including those falsely promising drought tolerance and extra nutrition, precision planting, digitalisation and big data, and climate smart agriculture (CSA). South African policy has particularly promoted CSA as a means to address the ecological impacts of agriculture, but rather than radically transforming the existing food system, CSA targets smallholders to increase production through inputs and controversial technologies (e.g. herbicide tolerant GMOs) controlled by multinational agri-businesses, so further expanding their markets. It hands further control of the food system to these corporations, undermining smallholder sovereignty over their land and resources.[42]

There are three key problems with these techno-fixes. Firstly, agriculture and food systems are embedded in wider natural processes. It does not work to try and reduce nature into isolated constituent parts to be further manipulated and managed, which such techno-fixes attempt to do.[43] Second, techno-fix approaches tend to reinforce a domineering approach to nature and are shaped by existing power relations, so benefitting those who are already in a favourable position (including through public sector subsidies and funds), and those who control technology and markets.[44] In other words, they reinforce corporate power. This also means that, thirdly, such techno-fix approaches fail to address underlying causes of ecological damage and hunger, and cannot address social inequity.

False solution 2: Putting the private sector in the driving seat

In the context of the UN Food Systems Summit agenda of public-private partnerships (PPPs), the South African government has positioned PPPs as the nexus of food system "solutions".[45] PPPs are another form of techno-fix thinking – that a complex and public problem can be solved simply by bringing the market and profit motive to bear on it. But a key aspect to the unsustainability and injustice of our existing food system is the entrenchment of private and corporate power and hence that the profit motive is what structures our food system, rather than what is good for people, ecosystems and the climate.

PPPs are also a key way in which public funds are siphoned off to the private sector by paying for techno-fixes that benefit corporations, and which they can then greenwash as their contribution to solving food system challenges. This has been illustrated in the failed drive to industrialise African food systems through the Alliance for a Green Revolution in Africa (AGRA): levels of donor funding were eclipsed by government funding for the process, which were used to purchase private sector products, only to fail to reach any of its targets of improved yields, farmer incomes and food security.[46] The private sector will not be the saviour of our food system.

False solution 3: Bending food systems to the logic of financialisation

Agriculture's relation to climate change is gaining increasing attention globally, and therefore also that of the distorted logics of financial markets. One way this is taking shape is in the prominence of private finance for climate-related projects. However, the necessary shifts in the food system under climate change cannot be funded in ways that are designed to serve private finance and the private sector, as has been framed in the Treasury's draft technical paper on sustainable finance. Approaches like blended finance and public-private partnerships further commodify public goods and favour (commercial) mitigation projects at the expense of adaptation interventions, such as are needed in the food system.[47] They will limit the prospects of a just transition to serving private sector priorities, whereas finance needs to serve democratically decided, public priorities.

A further way that finance capital shapes climate change strategies is to use emissions reductions and removal of carbon from the atmosphere through "regenerative" agricultural practices to enable other sectors to continue polluting, through carbon trading. This has also started in South Africa.[48] This is no solution to reducing emissions. Firstly, the effects of released CO_2 in increasing atmospheric CO_2 levels are greater than the effects of removing CO_2, nor can carbon in the soil be equated with carbon released from fossil fuels.[49] Secondly, such schemes can drive further consolidation of farmland,[50] thus undermining the potential for linking land reform to ecosystem restoration, biodiversity protection and food security. Thirdly, carbon pricing mechanisms provide a way for big polluters to continue polluting and are a distraction from necessary emissions reductions, and so agriculture shouldn't be seen as a way to offset emissions in other sectors or steps of the value chain.[51] Climate finance needs to be crafted to serve real, peoples' solutions to the climate crisis.

"A range of false solutions are being pushed. They want us to believe the lie that all that is needed are a few tweaks to the existing system."

Towards a just and climate-resilient food system: agroecology for food sovereignty and climate justice

We can point to three key tasks for building climate resilience in the food system for a just transition:

1. **Reduce emissions across the food system (mitigation).**
2. **Make food production and distribution more climate resilient (adaptation).**
3. **Meet social and nutritional needs.**

This means a transformative resilience that addresses the roots of vulnerability and tackles the systems and power relations that need changing, instead of a shallow approach that props up existing systems and puts the onus on households and workers to create resilience by adapting to conditions they have little fault in creating.[52]

To achieve this resilience, the current food system needs to be deeply transformed towards agroecology and food sovereignty. As the International Panel of Experts on Food Systems (IPES-Food),[53] as well as global experience, has shown, agroecological transformation of the food system is essential because it integrates biodiversity, builds up soil micro-organisms and fertility, reduces external input use, manages water sustainably, incorporates local knowledge, and localises production and consumption networks. This reduces emissions from transport, packaging, processing and refrigeration, builds up the capacity of soil and plants to absorb carbon from the atmosphere, and nourishes communities with affordable, highly nutritious, poison-free food.

A very different model of agriculture, based on diversifying farms and farming landscapes, is required; one that sees land and agrarian reform

How does agroecology build climate resilience in the food system?

- Agroecology connects producers, consumers and their local environment. Locally-produced food is more likely to be locally adapted, and therefore resilient, appropriate and supportive of the ecology and culture of that place leading to resilience to climate change and other stressors such as increased disease or pests.
- Agroecology emphasises reciprocity and participatory approaches, building from local knowledge with scientific innovations that strengthen community relationships and ability to respond to challenges with locally relevant solutions.
- Agroecology focuses on local and regional markets and exchange, which avoids the need for energy guzzling transport and refrigeration. Production for more local consumption also means that food can be more easily processed with locally available, smaller scale, affordable and appropriate technologies.
- Agroecology uses and builds local natural resources that are free and accessible to producers, which promote self-sufficiency and helps save money for use in times of crises instead of creating debt. It avoids using chemical pesticides and fertilisers, which damage soils, pollute the environment especially scarce water resources, and release greenhouse gases during their energy intensive manufacture and off-gassing in the field.
- Agroecological production practices support the living processes between organic matter, microbes and plants to improve the health, structure and nutrition available in soils. These living soils avoid compaction that creates water run-off and erosion, and are better able to hold water and restore soil carbon.
- Agroecological practices (including creating water retention structures, increasing plant diversity and cover, mulching, and preparing soils that are deeply fertile and full of living organisms) conserve water by increasing infiltration and holding water for longer. This helps to absorb and reduce the force of flood waters but also provides moisture for crops and soil life which can then thrive through longer periods without rain.
- Agroecology builds on local and traditional knowledge and inheritance including locally adapted but genetically diverse seeds and breeds of animals that are more resilient to climatic variations and disease.
- Agroecology values natural ecosystems as part of food and livelihood systems. These are conserved and provide landscape-level resilience to extreme weather and other climatic shocks.

“Building climate resilience in the food system for a just transition means a transformative resilience that addresses the roots of vulnerability and tackles the systems and power relations that need changing.”

as opportunities for climate justice, ecosystem restoration and food sovereignty. To achieve this we must build natural soil fertility, and productive and genetically diverse agro-ecosystems linked to secure and dignified livelihoods. This also calls for supporting curriculum change at tertiary agricultural institutions in favour of agroecology, and similar changes in the agricultural extension approach.

Government must refocus support towards building national food sovereignty, especially smallscale production and agroecology, instead of the current preoccupation with gearing up to supply value chains for exports in the global commodity market.

Building a climate-resilient food system also requires investments in improving nutrition. This includes investing in support for production of marginalised indigenous and traditional crops, in order to move away from emissions-intensive, non-climate resilient and less nutritious maize production, and to improve crop diversity and nutrition. This should also be connected to wider biodiversity conservation in terms of the contribution of wild foods to rural diets. In this regard, there are opportunities to stimulate dietary change to move away from industrial, ultra-processed diets and to increase demand for indigenous, nutritious and climate-friendly foods.

For this shift towards a food system grounded in agroecology it is also necessary to invest (in part with climate finance) in infrastructure that supports localised food system development. This will help reduce the energy needs and hence emissions from refrigeration, transport, processing and packaging. This also requires ways to make finance available on fair terms to small farmers and other operators in localised food systems, through public financial mechanisms specifically designed to support these systems.

The existing powerful actors in the food chain also need to be regulated to reduce emissions across their operations in line with that required by science – without linking their reductions to carbon trading. This should go along with decisive measures to limit corporate concentration and expansion in the food system. Pathways should also be implemented to shift existing agricultural production to agroecological systems, on the basis of worker justice and social needs.

IPES-Food has argued that continuing to devote support to industrialised, climate-destroying food systems would "represent a major missed opportunity." Instead, agroecological food systems offer people "a development pathway that builds on their existing knowledge and on the principles of resilience often central to smallholder systems – particularly those on the front lines of the fight against climate change."[54] This has been proven across the world, as well as by farmers Biowatch works with in northern KwaZulu-Natal, who have achieved production for household food security as well as the market, in ways that care for the earth, reduce GHG emissions and build resilience to climate change.

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"The climate crisis is not only an emergency to be confronted, but an opportunity to build agroecological food systems that are just, that nourish people, protect the ecosystems that sustain us, and build food sovereignty."

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"Agroecology is a holistic science, a practice, and a global movement for food sovereignty and climate justice."

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This Biowatch Fact Sheet was published in May 2022. Visit our website for more Fact Sheets and other publications.