



Perspectives.

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What kinds of agriculture will help us reach the sustainable development goals?

Those that help and those that hinder

Peter Stevenson
Compassion in World Farming



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A UN Environment publication series that presents views from Major Groups and Stakeholders of Civil Society or about issues that are relevant for them. PERSPECTIVES is coordinated by UN Environment's Civil Society Unit. The presented views are entirely those of the authors and do not necessarily reflect the views of UN Environment.

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The UNCCD has said: “Our inefficient food system is threatening human health and environmental sustainability ... The current agribusiness model benefits the few at the expense of the many: small-scale farmers, the essence of rural livelihoods and backbone of food production for millennia, are under immense stress from land degradation, insecure tenure, and a globalized food system that favors concentrated, large-scale, and highly mechanized farms.”¹

“The view has emerged that humankind will not be able to feed itself unless current industrial modes of agriculture are expanded and intensified. This approach is wrong and counterproductive and will only serve to exacerbate the problems experienced by the current mode

of agriculture ... there is a need to encourage a major shift from current industrial agriculture to transformative activities such as conservation agriculture (agroecology)”

Hilal Elver, UN Special Rapporteur on the right to food²



SDG 1: End Poverty

At the 10th Global Forum on Food and Agriculture in 2018 the Director General of the UN Food and Agriculture Organization (FAO), José Graziano da Silva, said:

“FAO estimates that more than half of the world’s rural poor are livestock farmers and pastoralists ... We need to make sure that smallholders and pastoralists will not be pushed aside by large capital-intensive operations.”³

Industrial animal agriculture out-competes small-scale food producers, thereby undermining their livelihoods

The FAO points out that industrial livestock production “may occur at the expense of diminishing the market opportunities and competitiveness of small rural producers”.⁴ The World Bank has recognised that intensification of livestock production carries “a significant danger that the poor are being crowded out.”⁵

The High Level Panel of Experts on Food Security and Nutrition



SDG 2: End Hunger

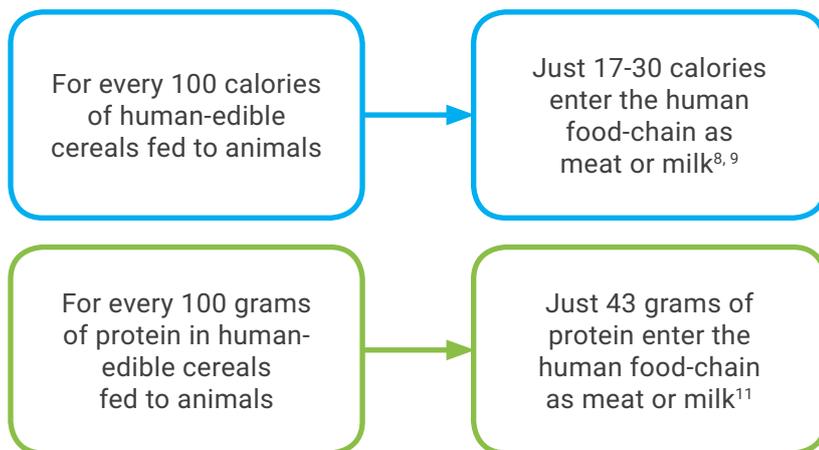
of the Committee on World Food Security states that “the social benefits of agriculture can be eroded as production becomes more concentrated and intensive. Intensive agricultural systems are associated with negative effects on employment, wealth distribution, ancillary economic activity in rural areas [and] service provision in rural areas (such as schools and health facilities).”⁶

Meeting SDGs 1 & 2

Small-scale farmers should be helped to provide improved healthcare and nutrition for their animals through better disease prevention, the expansion of veterinary services and the cultivation of fodder crops such as legumes. Better animal health and nutrition result in increased livestock productivity and longevity. This will improve smallholders’ purchasing power, making them better able to buy the food that they do not produce themselves and to have money available for other essentials such as education and health care.

With sufficient access to veterinary services and with improved management regarding animal health and animal welfare, global animal production could, according to the OIE, be increased by around 20%⁷ This would enable small-scale producers to increase their productivity without industrialisation.

SDG 2: Achieve food security



Further use of cereals as animal feed could threaten food security by reducing the grain available for human consumption
UN Food and Agriculture Organization, 2014¹⁰

If the cereals that will be fed to animals in 2050 on a business-as-usual basis were used instead for direct human consumption, an extra 3.5 billion people could be fed annually
United Nations Environment Programme, 2009¹²

Meeting SDG 2

We should aim for a 50% reduction in the use of human-edible crops as animal feed: livestock’s primary role in food production should become the conversion of materials that we cannot consume – grass, by-products, food waste, crop residues - into food we can eat.

A cluster of SDGs focus on the environment



Sustainable food production systems



Reduce pollution; restore water-related ecosystems



Prevent nutrient pollution



Restore degraded soil; halt deforestation & biodiversity loss

Industrial animal agriculture undermines food security by using human-edible crops as animal feed

Industrial livestock production is dependent on feeding human-edible cereals and soy to animals who convert them very inefficiently into meat and milk. Globally 36-40% of crop calories are used as animal feed.^{13,14}

Livestock's huge demand for feed and land drives both the expansion of cropland and pastures and the intensification of crop production

Intensification: Industrial livestock's massive need for feed has fuelled the intensification of crop production. This, with its use of monocultures and chemical fertilisers and pesticides, has led to overuse and pollution of ground- and surface-water,¹⁵ soil degradation,^{16,17} biodiversity loss,¹⁸ and air pollution.¹⁹ In short, industrial animal agriculture undermines the key resources on which long-term productive farming depends.

Expansion: Increasing demand for land:

- to grow soy and cereals for the rising number of industrially farmed animals, and
- as pasture for cattle

Leads to expansion of farmland into forests and savannahs with massive loss of wildlife

habitats and biodiversity as well as release of stored carbon into the atmosphere.

Mammals, birds, insects – all declining

Population and species extinctions are proceeding rapidly and a sixth mass extinction may already be underway.²⁰ Globally vertebrate wildlife populations have declined by 60% between 1970 and 2014.²¹ A UN report states that “biodiversity loss is occurring at an alarming rate” and that habitat loss from unsustainable agriculture is among “the primary drivers of this assault on biodiversity”.²² A 2019 FAO report states that many key components of biodiversity that support agriculture are in decline and that the drivers for this include

The UNCCD states that livestock production is “perhaps the single largest driver of biodiversity loss”²³

the overuse of harmful external inputs and the intensification of agriculture.²⁴

Ever more forests and savannahs are being destroyed to grow soy and cereals for industrially farmed animals. This is eating into wildlife habitats driving many species – including elephants and jaguars – towards extinction.²⁵ Agricultural intensification – in particular the high use of pesticides and monocultures and habitat loss – is the main driver of population declines in birds, pollinators and other insects.²⁶

Water

Industrial livestock production generally uses and pollutes more surface- and ground-water than grazing systems.²⁷ This is in part due to industrial systems' dependence on grain-based feed.²⁸ Huge quantities of nitrogen fertilisers are used to grow this feed. However, only 30-60% of this nitrogen is taken up by feed crops.²⁹ Also, the feed given to industrial livestock has high levels of nitrogen. Pigs and poultry assimilate less than half of the nitrogen in their feed; most is excreted in their manure. The nitrogen that is not absorbed by the crops or the animals runs off or leaches to pollute rivers, lakes and groundwater.

Dead zones

In marine ecosystems the excess nitrogen leads to a surge in plant growth. When these die their decomposition consumes oxygen, leaving areas largely depleted of oxygen. The body of water can no longer support fish and other life and becomes a 'dead zone', destroying the livelihoods of fisherfolk.

Degraded Soils

Intensive agriculture, in seeking to maximize yields, has caused compaction and loss of soil organic carbon.³⁰ This has degraded soils to the point where poor soil quality is constraining productivity.³¹ Synthetic nitrogen fertilisers, while boosting yields in the short term, lead to a decline in the amount of humus – the organic matter – in soils so causing long-term damage to soil health and quality. Monocultures which year after year draw the same nutrients from the soil in time rob soils of their fertility. Intensive farming with its chemical pesticides and herbicides has reduced soil biodiversity; without rich biodiversity soil fertility declines.³²

The UN FAO calculates that soils are now so degraded that we have only about 60 years of harvests left.³³

Dramatic rates of loss may lead to the extinction of 40% of the world's insect species over the next few decades.³⁴ This would be a disaster as insects are of "paramount importance to the overall functioning and stability of ecosystems worldwide".³⁵ They provide pollination, natural pest control, nutrient recycling (and so build soil quality) and decomposition services. Loss of insects leads to declines in birds, frogs and lizards as they depend on insects for their food.

Breaching planetary boundaries

Research has established nine planetary boundaries which, if crossed, could generate irreversible environmental changes and drive the planet into a much less hospitable state.³⁶ In two cases – (i) biodiversity loss and (ii) nitrogen and phosphorus flows – we have not only crossed the boundary but have entered a high-risk zone. Industrial livestock production has played a major part in this. Nitrogen and phosphorus are primarily used in fertilisers much of

which are used to grow animal feed crops.^{37,38,39} The demand for huge quantities of feed has led to biodiversity loss through the intensification and the expansion of arable production.⁴⁰

"High-input, resource-intensive farming systems, which have caused massive deforestation, water scarcities, soil depletion and high levels of greenhouse gas emissions, cannot deliver sustainable food and agricultural production. Needed are innovative systems that protect and enhance the natural resource base, while increasing productivity. Needed is a transformative process towards 'holistic' approaches, such as agroecology, agro-forestry ... and conservation agriculture, which also build upon indigenous and traditional knowledge."

UN Food and Agriculture Organization, 2017⁴¹

Deforestation

The FAO states that agriculture is the most significant driver of global deforestation.⁴² The

UN states that deforestation is "primarily due to the conversion of forest to agricultural land, which is responsible for an estimated 73% of forest loss in tropical and subtropical regions".⁴³

Innovative production Agroecology

Agroecology seeks to enhance productivity by supporting and harnessing natural processes such as beneficial interactions between different plants and animal species. Olivier De Schutter, former UN Special Rapporteur on the right to food, states that agroecology mimics nature instead of industry.⁴⁴ Diversity is a core principle of agroecology; diversity in time (e.g. rotations) and in space (e.g. intercropping; integrated crop-livestock-forestry systems). Moreover, diverse foods are at the heart of nutritious diets.

Resource-conserving agriculture increases yields in developing countries

Studies show that resource-conserving agriculture can deliver substantial productivity gains. One study examined the impact of 286 projects in 57 poor countries.⁴⁵ The projects included integrated pest and nutrient management, conservation tillage, agro-forestry and rainwater harvesting. These projects increased productivity on 12.6 million farms. The average crop yield increase was 79%, while the African projects showed a 116% increase in crop yields. All crops showed water use efficiency gains. Of projects with pesticide data, 77% resulted in a decline in pesticide use by 71% while yields grew by 42%.

An analysis of 40 projects in 20 African countries has been carried out.⁴⁶ The projects included agro-forestry, conservation agriculture, integrated pest management, livestock and fodder crops. Crop yields more than doubled on average over a period of 3-10 years.

Meeting the Environment-related Goals

We need to move to forms of farming that do not just reduce the harm caused by industrial agriculture but that positively benefit the environment by enhancing soil fertility, restoring biodiversity and storing carbon. We need approaches that increase the productivity of small-scale farmers while avoiding industrialisation as this undermines such farmers and natural resources.

Sustainable Agriculture Tanzania: Morogoro case study⁴⁷

- Since agroecology was introduced they have produced improved yields, better nutrition and good livelihoods
- Soil health and fertility have been built by composts and crop residues
- Steep land has been terraced to prevent soil erosion
- Use of beneficial insects and intercropping to repel insect pests
- Water is retained in soil through mulches; water use has been reduced by 59%
- Reduced use of agro-chemicals e.g. pesticides to almost zero
- They use inputs that are produced on the farm rather than relying on inputs brought in from far away
- Have revived and regenerated degraded land

Silvopastoral systems for cattle in South America with feed at 3 levels

Alongside pasture at ground level, these systems also provide shrubs (preferably leguminous) and trees with edible leaves and shoots.⁴⁸

Such systems do not need synthetic fertilisers (due to the leguminous shrubs), produce more biomass than conventional pasture and so result in increased meat and milk production.

Integrated crop-livestock systems

Here animals are fed on grass and crop residues and their manure provides the soil with vital nutrients. These systems work best when they are rotational. With rotation a crop that removes certain nutrients from the soil is followed by a dissimilar crop that may replenish those nutrients or utilise different nutrients. The rotation should include legumes as these are able to fix atmospheric nitrogen in the soil. This, along with the animals' manure, can support crop production without the need for chemical fertilisers.

Soil quality should be enhanced through rotations, legumes and fallow periods and by increasing soil organic matter (SOM) by the use of green manure and animal manure. SOM builds fertility and stores carbon so mitigating climate

change. The organisms in SOM (e.g. earthworms) decompose plant residues, turn them into humus, and distribute this fertility-giving substance throughout the soil.⁴⁹ Soil with plentiful SOM is able to retain water so mitigating droughts and preventing flooding. Such soils are less vulnerable to erosion.

The use of chemical pesticides can be minimised by **Integrated Pest Management**. This primarily relies on nature's own processes to control pests. These include allowing the natural enemies of pest species to thrive (whereas

pesticides tend to kill pests' predators), and the development of healthy soil as this promotes strong healthy crops which are better able to withstand disease and pest attack. Rotational systems can also reduce the use of pesticides. Rotation impedes the build-up of pathogens and pests that often occurs when one plant is continuously cropped.



Cattle browsing Leucaena in a silvopastoral system, Caribe, Colombia. Photo ©Walter Galindo, CIPAV

Water harvesting in Ethiopia: Improving the lives of people & farm animals⁵⁰

In the dry season, there is no rain for around six months. Farmers often had to sell their livestock as they could not afford to feed them and needed the money from the sales to buy food for their families. A few years ago the Government helped farmers with the cost of water harvesters. A water harvester is a large, deep hole dug into the soil and lined with a geo-membrane to stop leakage. It stores rainwater for reuse.

Livestock no longer have to be sold during the dry season as year-round availability of water has boosted crop yields up to ten-fold. It has also improved food security, nutrition and farm animal welfare while reducing poverty in small-scale farming in the highlands of Ethiopia.



The high levels of consumption of red and processed meat that have been made possible in the developed world and certain emerging economies by industrial animal agriculture contribute to heart disease, obesity, diabetes and certain cancers.^{51,52,53}

Generating disease:

Industrial livestock production plays an important part in the emergence, spread and amplification of pathogens, some of which can be transmitted to people.^{54,55}

Antimicrobial resistance: Industrial livestock production tends to rely on routine use of antimicrobials to prevent the diseases that are inevitable when animals are confined in overcrowded, stressful conditions.⁵⁶ Overuse of antimicrobials in industrial animal production contributes significantly to antimicrobial resistance in humans.⁵⁷

“WHO and other health agencies are advising populations to reduce meat consumption as part of an overall healthy diet.”

World Health Organization, 2017⁶⁷

Meeting SDG 3

Consumption of less but better meat and dairy products in the developed world and certain emerging economies should be encouraged. However, people with low consumption of animal-derived foods are not expected to reduce their intake. The developing world should aim for a balanced intake of animal-source foods and should not adopt western diets as these have an adverse impact on health.



To meet the Paris Agreement's targets, all sectors need to **reduce** their emissions.

However, research shows that on a business-as-usual basis emissions from food and agriculture will **increase** substantially and could make it very difficult to reach the Paris targets.^{58,59}

Supply side measures will not on their own be able to achieve a sufficient reduction in farming's GHG emissions; indeed they may well not be able to prevent an increase.^{60,61}

Demand side: It is unlikely that global temperature rises can be kept below 2°C without a reduction in meat and dairy consumption.⁶²

Studies show that a significant reduction in meat consumption is essential if food-related emissions are to decrease.^{63,64,65}

Meeting SDG 13

“The world's current consumption pattern of meat and dairy products is a major driver of climate change and climate change can only be effectively addressed if demand for these products is reduced”

Hilal Elver, UN Special Rapporteur on the right to food⁶⁶



The Goal of Responsible Consumption and Production – SDG 12 - brings together many of the changes that are essential if we are to move to food and farming that can meet the SDGs.

Recommendations

Responsible production

Monocultures and agro-chemicals should be replaced with forms of farming - such as agroecology and integrated crop-livestock systems – that can build soil fertility, restore biodiversity and minimise water use by harnessing beneficial natural processes and interactions.

Redefining the role of livestock

We need to move away from industrial animal agriculture as this entails feeding soy and human-edible cereals to animals which convert them very inefficiently into meat and milk. This undermines food security. Animals only make a positive contribution to food production when they are converting materials we cannot consume – grass, by-products, crop residues and unavoidable food waste – into food we can eat. Only raising animals that can be fed in this way would lead to major reductions in GHG emissions,

deforestation, soil erosion and nitrogen and phosphorus losses as well as reduced use of cropland, freshwater, energy and pesticides.⁶⁸

Change is also needed on ethical grounds; industrial animal agriculture entails low animal welfare standards that fail to respect animals as sentient beings.

Responsible consumption

We perhaps need to tailor our consumption to what can be produced in a sustainable manner. Many studies now recognise that in the developed world and certain emerging economies reduced meat and dairy consumption would deliver multiple co-benefits. It would:

- help feed the growing world population as a greater proportion of crops would be used for direct human consumption which is much more resource-efficient ► SDG 2

- allow cropland to be farmed less intensively so enabling the environment to be restored and birds, pollinators and insects to thrive once again ► SDGs 2 & 15
- enable the cessation of the expansion of cropland (to grow crops for animal feed) and pasture for cattle into forests and other fragile ecosystems ► SDG 15
- reduce pressures on wildlife as habitat destruction could be reversed ► SDG 15
- make it possible to meet the Paris climate targets ► SDG 13
- reduce the incidence of heart disease and certain cancers (this applies to reduced consumption of red and processed meat) ► SDG 3
- enable animals to be farmed extensively to high welfare standards ► Paragraph 9 of the 2030 Agenda includes in its vision a world “in which wildlife and other living creatures are protected”.

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About the organisation:

Compassion in World Farming is the leading international charity specialising in farm animal welfare. We were founded over 50 years ago by a British farmer who became horrified by the development of factory farming. Today, we campaign peacefully for good standards of welfare on-farm, during transport and at slaughter. Factory farming not only results in poor welfare but also undermines small-scale farmers, damages the environment and depends on the routine use of antibiotics.