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FOCUS ON CHANGE

Food Systems

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We all need to eat, and global demand for food is set to keep increasing,[i] propelled by growing populations and demand for meat. However, food supply chains are under mounting pressure and at risk of failure, which has implications for both investors and the climate.

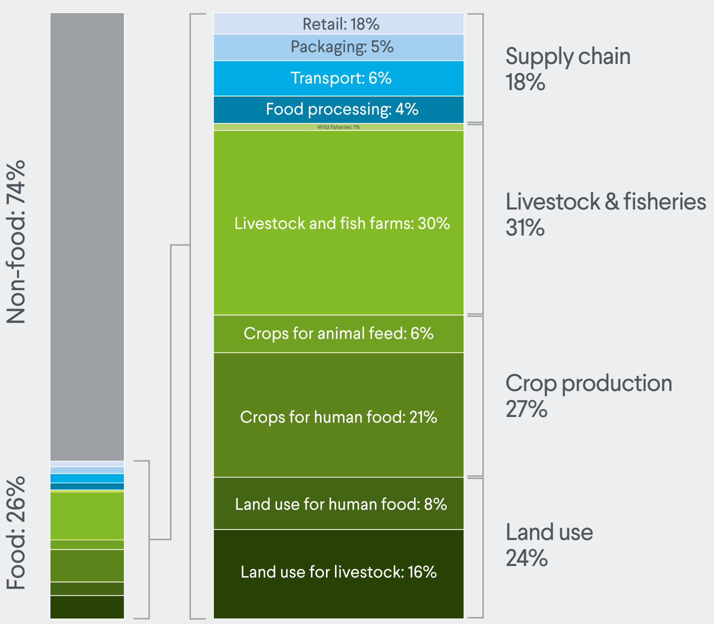
The world's largest publicly listed food producers (around 230 companies) had a market capitalisation of over US$2.3 trillion in July 2023. Agriculture, forestry, and other land use, which intersect considerably with the food sector, accounted for over 4% of global GDP[ii] in 2021 (a figure that has been relatively stable over the past decade).

Food producers are among the most important actors in the global land-use system, but it's a sector associated with high greenhouse gas (GHG) emissions, as well as other environmental impacts including biodiversity loss.

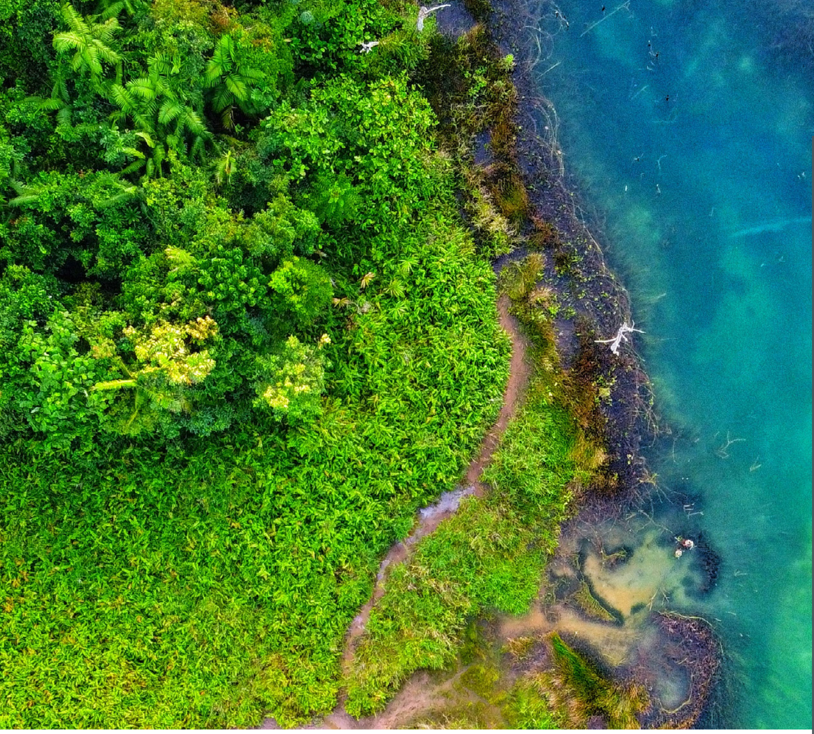
The entire food sector contributes, either directly or indirectly, up to a quarter of annual global GHG emissions, placing the food sector on par with the oil and gas industry's contribution to global GHG emissions. Most of the food processing sector's emissions are driven by upstream Scope 3 emissions from purchased goods and services, especially emissions associated with crop and livestock production, and land-use change.[iii]

Global greenhouse gas emissions from food production

Global emissions: 52.3 billion tCO_2e



Source: Our World in Data



A sector ripe for change

The food sector is not only one of the greatest contributors to climate change, but also one of the most vulnerable to adverse climate impacts, further highlighting the need for this sector to mitigate and adapt to climate change.

> **Research into the potential for collapse in our food supply due to the effects of climate change points to significant underestimation of this risk.[iv]**

The sector is also a crucial driver of economic development, poverty alleviation, and rural employment.

Agriculture constitutes 80% of total food sector emissions, with the remainder associated with the processing, transport, and disposal of food products. To address this, the food sector must undergo a fundamental transformation and dramatically reduce its GHG emissions, while also building resilience to the physical damage already being caused by the effects of climate change.

The changes needed extend beyond emissions, as agriculture is also a major contributor to groundwater pollution and depletion, desertification, deforestation, and biodiversity loss.

What are the risks if we maintain the status quo?

Food systems encompass the entirety of the production, transport, manufacturing, retailing, consumption, and waste of food, as well as their collective impacts on nutrition, health and wellbeing, the environment and, **ultimately, global food security**. Most countries' food systems are highly complex, reflecting the interplay between locally produced and imported food, serviced by globalised trade networks.

These food supply chains are increasingly susceptible to systemic risks, with natural (eg drought, flooding), social and economic shocks in one region potentially leading to price spikes and supply changes on a global scale. Biodiversity loss is of particular concern, as the functioning of food systems is deeply rooted in the environment and is highly dependent on multiple ecosystem services provided by biodiversity. Food production directly benefits from a range of vital ecosystem services. These include:

- Natural pest regulation, which is estimated to contribute $906bn per year.
- Soil-based services such as decomposition, nutrient retention, and nutrient cycling.
- Nitrogen fixation by microorganisms, estimated to be 140–170 million tons of nitrogen pa, valued at approximately $90bn pa.
- Shocks and stresses affecting pollinators, such as unseasonal weather, pollution, and disease, can have significant impacts on food systems.[v]

What needs to change in the sector?

The agricultural industry has undergone major transformations in the past. For example, the post-war revolution, which started in the 1950s, allowed agriculture to meet demand for food induced by a rapidly expanding global population. These innovations were based on the use of synthetic nitrogen fertilisers and the development of high-yielding crop varieties, including genetically modified varieties. There were also advances in machinery and the productivity of farm equipment.

But today, the agricultural system is increasingly unsustainable. It has become a major driver of climate change and environmental damage and, due to growing soil degradation and the physical impacts of climate change, current practices will most likely make the production of food more challenging.

> **There's a clear need for innovative agricultural models based on regenerative and resource-efficient practices.**

Increasing input costs may provide an incentive for the agriculture sector to adopt more efficient practices more quickly. Combine this with changing consumer demand and the potential for regulation to provide the stimulus needed, and we will see interesting opportunities for investment.

Where are the opportunities for investment?

We believe that the transition of food systems will be an ongoing theme over coming years. Two areas for consideration by asset owners are explored below.

Sustainable farmland

This is a real asset involving the ownership of agricultural land. Returns come from the capital appreciation of the land, together with income from lease payments and the sale of the agricultural commodities it produces. However, differences lie in farming techniques that focus on the more efficient use of limited resources (energy, land, water) through technological developments and improved management.

We can expect a focus on preserving soil fertility, preventing water pollution and protecting or indeed enhancing biodiversity. There's also a specific focus on reducing emissions – for example, through the better use of renewable energy and using soil for carbon sequestration. In time, we could anticipate sustainable farmland generating an additional source of return from the provision of ecosystem services and the use of carbon or biodiversity credits.

Agriculture technology

The use of technology within food production dates back to the agricultural revolution. Similar themes have been evident over the last decade, with developments including:

- Alternative proteins, such as meat substitutes
- Sustainable materials, such as biomaterials and recycling
- Controlled environment agriculture, eg vertical farming, hydroponics
- Digital tech including smart-crop monitoring, drone farming, smart-livestock monitoring and autonomous machinery

While some of these themes address changing consumer requirements and increased environmental and ethical considerations, others seek to direct resources such as pest/weed control and water to where they are needed. Investments in these areas predominantly, but not exclusively, lie within private equity space at present.

What should investors do?

Agricultural technology and sustainable farmland are currently niche areas for investment, requiring a long-term investment horizon. Both could, however, be considered within diversified natural capital strategies.

More immediately, the risks and opportunities associated with food systems is a topic for engagement. Topics such as resource use and deforestation within portfolio companies and the drive for a more sustainable food system can be explored in depth with asset managers.

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[i] UN; www.un.org/en/desa/world-population
[ii] Statista; Global GDP - Statistics & Facts
[iii] TPI; Discussion Paper
[iv] Nature Communications; www.nature.com/articles/s41467-023-38906-7
[v] Pure; Food system resilience (PDF)