

How can we make agriculture more nature-friendly?

It's time to rethink our current wasteful and unsustainable farming practices. As part of the evolution towards a circular bio-economy, we need to replace toxic and inefficient methods that deplete nature in favour of regenerative agriculture, precision farming and nature-positive techniques, finds LOIM's Alina Donets and Pascal Menges

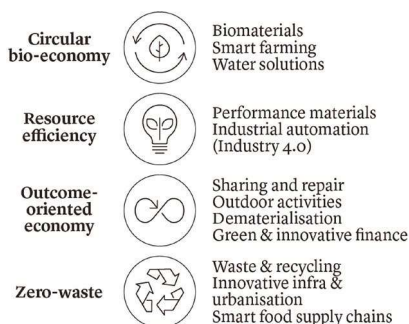
Sustainable food systems and the circular bio-economy
Humans have overconsumed the earth's resources for generations in a way that threatens to cause irreversible damage to vital land, water and biological resources. However, technology and innovation are enabling an evolution to a new, circular bio-economy – where resources are renewable, sustainably managed, recovered and reused as much as possible.

At LOIM, we recognise that nature is one of the most vital and productive assets in our economy. Our Natural Capital strategy invests in companies that leverage nature's regenerative power in order to benefit from strong secular drivers that translate into resilient financial performance.

Addressing food waste, promoting sustainable food systems, and paving the way for environmentally friendly farming techniques are all ways to protect and harness nature's own capabilities while improving resource efficiency and fostering a leaner form of industry. Commercial solutions are available to improve the efficiency and productivity of agricultural practices, and Natural Capital aims to play an important role in this transition.

Sustainable food systems are aligned with the circular bio-economy, one of

four investment sub-themes and growth opportunities in our Natural Capital strategy.



Source: LOIM. For illustrative purposes only.

Inefficient and toxic agricultural production

Agriculture alone drives 80 per cent of global land-use change¹ and 70 per cent of global freshwater use², and it is a threat to 86 per cent of species at risk of extinction³. In addition, agriculture remains associated with unsustainable practices such as monocropping and heavy tilling, or working the soil when it is too wet and not ready for turning. This can disrupt soil structure and quality, accelerating surface run-off and erosion, while reducing the variety of landscapes and habitats.

Current food production depends heavily on the use of fertilisers, pesticides and water. It harms wildlife through water extraction and reduces water quality

because of soil and chemical run-off. Downstream pollution, especially from fertilisers, further damages marine systems.

Excessive fertiliser use and disruption of nitrogen and phosphorus nutrient cycles have already led to the degradation of one-third of soils, with 90 per cent potentially at risk by 2050⁴. It is also one of the planetary boundaries that have been already transgressed.

Insufficient regulation

While environmental damage in the agricultural sector is widely recognised, regulatory action has been insufficient. Regulators are looking to rectify this through programs such as the European Commission's Farm-to-Fork initiative. Launched in May 2020, this 10-year strategy aims to address the challenge of producing and consuming food within the capacities of the planet.

In China, more inroads are being made towards sustainable farming practices. In 2021, the government issued its 14th Five-Year National Agriculture Green Development Plan. Resource protection, pollution control, restoration of agricultural ecology, and the development of low-carbon agricultural industrial chains were all identified as key goals to be achieved from 2021 to 2025.

Agricultural technology solutions

The future of food does not have to feature scarcity, pollution, and the degradation of soil and water ecosystems. Commercial solutions to these problems exist. Our Natural Capital strategy seeks to find companies that are making positive strides toward addressing the sustainability challenges in agriculture.

A number of technologies have already been introduced such as:

- smart and precise irrigation that helps save water and reduces crop strains
- precision application of fertilisers and pesticides that reduces the amount of chemicals sprayed while achieving the same yield enhancement potential

- no-tilling practices that preserve the nutrients within the soil

With greater technological advances, innovation is continuously pushing forward – creating superior precision and significantly greater integration of vast amounts of data, including geological and weather conditions – all to benefit the soil and ecosystem growth while persistently optimising yields.

Furthermore, innovations in the bio-economy include safe and environmentally sound breakthroughs in seed development, green chemistry for crop protection and yield enhancements. Consumer preferences are also incentivising a larger proportion of farmers to shift toward sustainably-aligned, organic or biodynamic means of operating their fields and farms.

Given the vulnerability of global supply chains – where disruption can significantly alter agricultural commodity flows as well as the availability of core chemicals widely used to ensure productivity – even greater investments are pouring into this space.

Due to constrained land availability and looming climate change, agricultural systems are set to become more self-sufficient and trade-independent. This further shifts the sector mindset toward innovation, exercising greater care over natural resources, and, eventually, a willingness to allocate capital to enhance and upgrade the system.

Reimagining farming

We need to farm in a more nature-friendly way, replacing wasteful practices. This can be achieved through combining technological innovation with time-tested practices of regenerative agriculture to

improve yields and minimise harm to natural resources.

Precision agriculture leverages a range of technologies aimed at achieving efficiency according to the ‘4 Rs’ principle: the right source, in the right rate, in the right place, at the right time⁵. By 2030, precision agriculture could provide up to 200 million more tonnes of crops⁶.

Software systems connected to machinery can help farmers work more efficiently with high-degree sensors and application sprayers, while optimising the amount of inputs needed.

Precision irrigation, for instance, can help dramatically reduce water usage by targeting the roots of plants and monitoring soil conditions. Variable rate irrigation was found to potentially imply water savings of up to 25 per cent⁷. Smart farming equipment must be complemented by digital technologies. These can help ensure that farmers do not irrigate before rain, for instance.

Precision farming also helps reduce soil compaction, run-off and erosion⁸. Several studies show that herbicide use, for instance, could be reduced between 11 per cent and 90 per cent by precision application in different types arable crops⁹. Digital tools also enable more regenerative farming techniques.

Increasing the autonomy of machinery through better connectivity could create as much as \$60 billion of additional value by 2030. By establishing better connections between soils, farm equipment and farm managers, as much as \$175 billion in value could be unlocked¹⁰.

Natural fertilisers and pesticides

Using more bio-fertilisers and bio-pesticides that enrich soil health and

increase resilience to drought and flooding could help offset the negative impact of synthetic fertilisers and pesticides. If 10 per cent of chemical pesticides were replaced with biologicals, 250 million tons of chemicals could be kept away from our ecosystems¹¹.

Regenerative agriculture focuses on strengthening soil health, increasing land productivity, promoting biodiversity, and controlling foreign species through practices like crop rotation, intercropping and reduced tilling. Other benefits include close to a 40 per cent reduction in nitrogen run-off.

Finding solutions

The future of food will depend on nature-friendly commercial solutions, improved efficiency and innovation. These include precision equipment that reduces nutrient and pesticide run-off and soil erosion, smart-farming systems and the use of bio-based fertilisers and pesticides.

Our Natural Capital strategy seeks out companies that are aligned with the circular bio-economy, including those developing or providing agricultural solutions that address efficiency, productivity and sustainability challenges with technological and digital innovation, seed science, biological and green chemicals, and an overall integrated, sustainable approach to farming.



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¹ Chatham House (2021)

² World Bank (2017)

³ UN Environment Program (2021)

⁴ UN Food and Agriculture Organization (2015)

⁵ Chatham House (2021)

⁶ “Innovation with a Purpose: The role of technology innovation in accelerating food systems transformation,” World Economic Forum (January 2018).

⁷ (Sadler et al. 2005, Evans et al. 2013)

⁸ (Balafoutis et al. 2017)

⁹ Balafoutis et al. (2017)

¹⁰ McKinsey (2020)

¹¹ “Unlocking growth - powered by biotech,” Novozymes (2021). Accessed September 2022.

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