

Ethical
CORPORATION
MAGAZINE

SAVING OUR SOILS

How to feed the world,
and help the planet

FROM CLIMATE
CULPRIT TO
CARBON SINK

HELPING 6M INDIAN
FARMERS GO
CHEMICAL-FREE

RISE OF
PLANT-BASED DIETS
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WELCOME TO THE JUNE 2019 ISSUE

This month we have a fresh look for the magazine, and a fresh angle on one of the most important issues facing responsible business, the sustainability of our food and agriculture systems.

Rather than the hi tech side of climate-smart agriculture, this month's magazine looks at the companies, NGOs, and multi-stakeholder organisations, that aim to feed the world sustainably through regenerative agriculture methods and boosting soil health.

Amy Brown provides an overview of the challenges with food security and nutrition at risk from climate change, biodiversity loss and a world population that is expected to reach 9.8

billion by 2050. She also features the farmers who are ploughing a new furrow of regenerative agriculture in the US, and looks at what is behind the growing plant-based diets movement.

Mark Hillsdon writes about the moves in Europe and around the world to transform agriculture by boosting the capacity of soil to act as a carbon sink.

He looks at how the Netherlands is plotting a greener revolution, new finance models for sustainable soy in the Cerrado, and investigates how innovative finance from BNP Paribas is allowing 6 million Indian farmers to go chemical-free.

He also features a project by Syngenta to reduce soil erosion in the olive groves of Spain.

Meanwhile, I interview Svein Tore Holsether, CEO of Norwegian fertiliser firm Yara, about why his company was one of the founders of the Food and Land Use Coalition.

In our comment section, Dr Lesley Mitchell >



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from Forum for the Future argues that a sustainable food industry is within reach if businesses collaborate towards new dynamic systems.

And we also feature a sponsored article by The Nature Conservancy on how to catalyse a blue revolution in sustainable seafood supply.

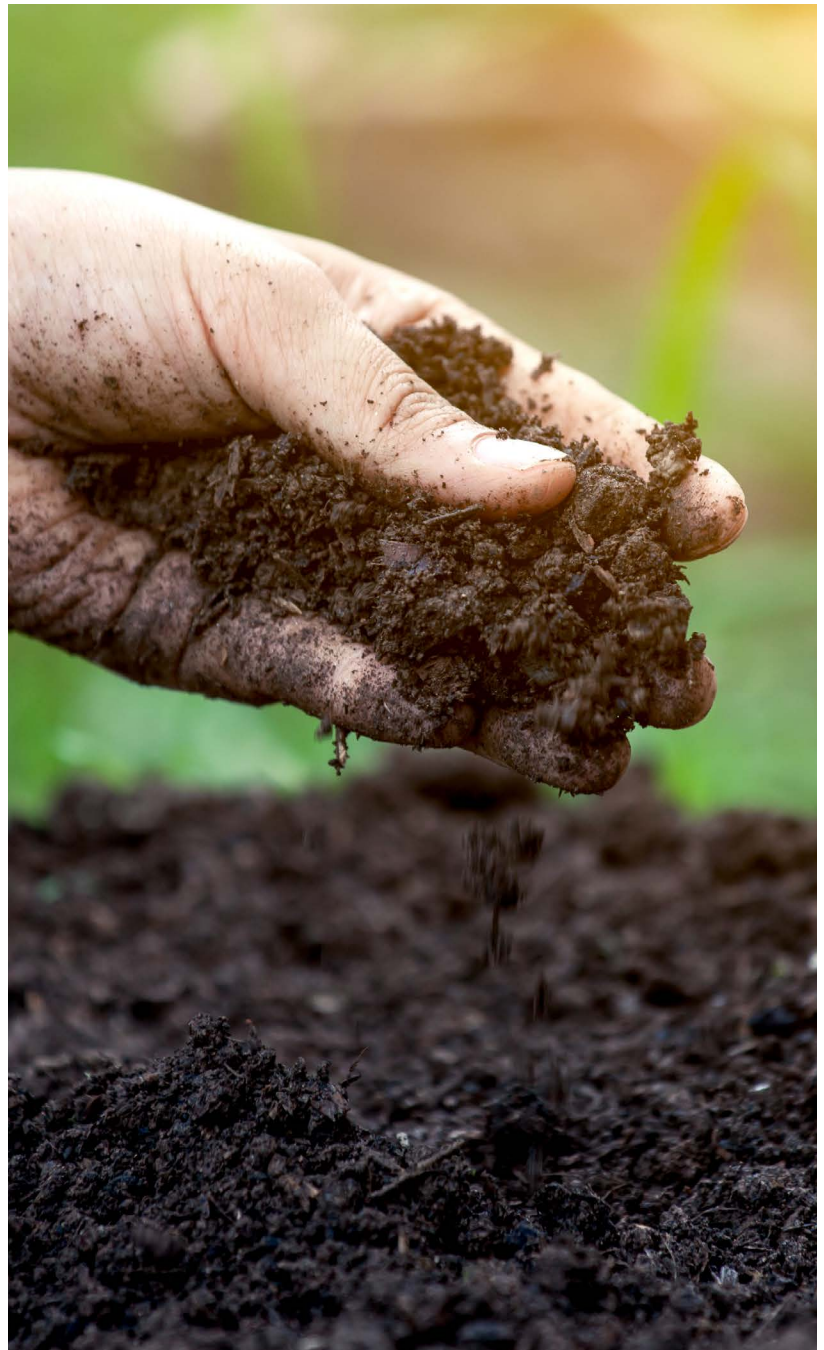
This month also marks an exciting new path for the magazine as we move from a subscription-only model to one where we can bring our content to a much wider audience as free to view. While our video recordings will still sit behind a paid-for firewall, the monthly magazine and online articles will be accessible to all.

We are doing this through a mixture of supported content, such as the opening article, supported by WBCSD, and sponsored content, such as the article by The Nature Conservancy, with which Ethical Corporation now has a partnership spanning editorial content and events.

The magazine is proud of its reputation for rigorous independent journalism, built up over nearly 18 years, and made possible by our subscribers. We pledge to preserve this, while bringing our journalism to much bigger audiences, under the new funding model by being transparent about how companies are backing our content.

Partnerships are the way forward for sustainable business, and Ethical Corporation is part of this.

We hope you enjoy the new-look magazine. ■



AP3FAMILY/SHUTTERSTOCK



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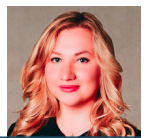
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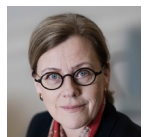
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EAT FORUM

Securing the future of food on a planet in peril

Escalating climate change and biodiversity loss will require big changes in what we put on our plates and the decisions farmers make in their fields

By Amy Brown

 [VIEW ONLINE](#)

The global food system is expected to feed a world population of 9.8 billion by 2050, but it is under threat from all sides. The system that produces and delivers food from farm to fork is responsible for 19-29% of greenhouse gas emissions, but is also threatened by the impacts of climate change, as higher temperatures, extreme weather, drought, and sea level rises take their toll on harvests.

And last month's alarming [report](#) from the UN Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services highlighted how agriculture is also a prime contributor to the catastrophic loss in biodiversity globally.

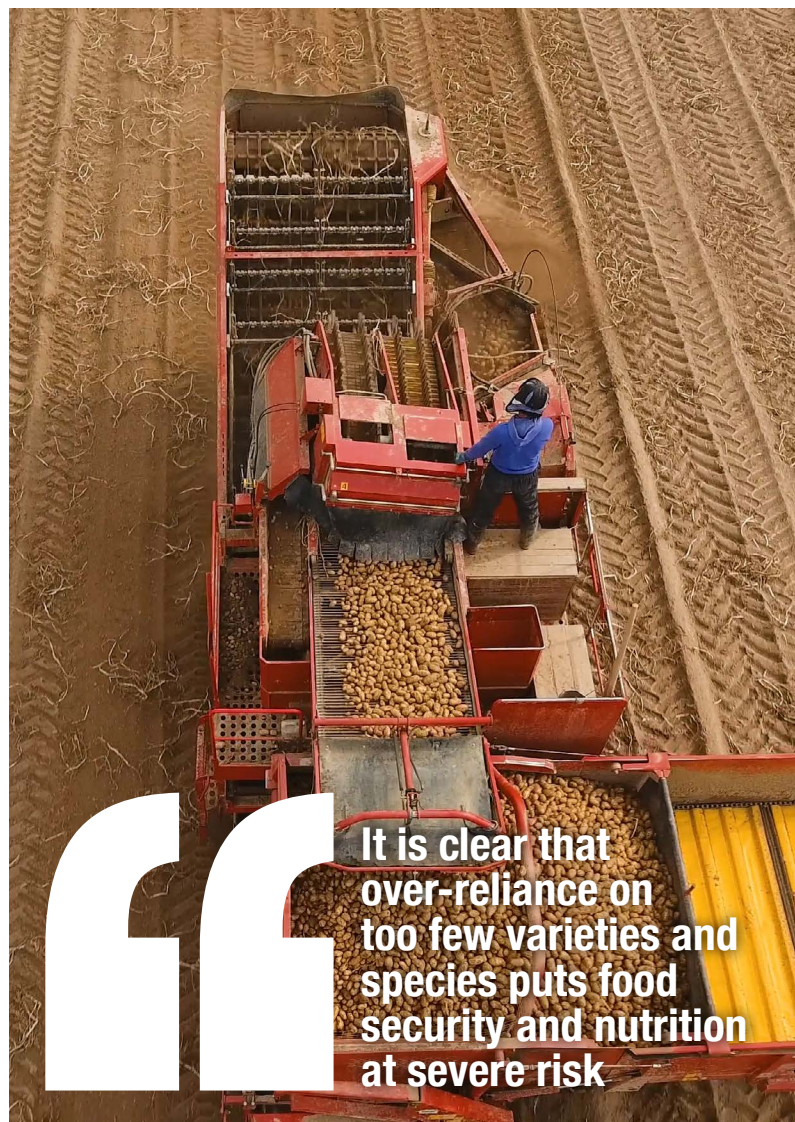
DEFINING A SUSTAINABLE DIET

Several recent reports on sustainable food systems have urged large reductions in meat consumption as their primary recommendation. Intensive livestock production is responsible for about 14.5% of annual global greenhouse gas (GHG) emissions, according to the UN Food and Agriculture Organization (FAO).

A much-publicised [report](#) from the EAT-Lancet Commission on healthy diets from sustainable food systems published in the British Medical Journal in January called for a 50% reduction in meat and sugar consumption as part of a healthy human and planetary diet. Compiled by a group of 30 scientists from around the world who study nutrition or food policy and the nonprofit group EAT, it recommended a largely plant-based diet, with small, occasional allowances for meat, dairy, and sugar.

Not all experts agree that [plant-based diets](#) are the panacea to food security or to human health (see [Climate concerns help fuel 'impossible' rise in plant-based diets](#)), but it is clear that over-reliance on too few varieties and species leaves the food system more exposed to climate change and puts food security and nutrition at severe risk.

The FAO's 2019 [State of the World's Biodiversity for Food and Agriculture report](#) points out that of



It is clear that over-reliance on too few varieties and species puts food security and nutrition at severe risk

ALEXPUNKER/SHUTTERSTOCK

some 6,000 plant species cultivated for food, fewer than 200 contribute substantially to global food output, and only nine account for 66% of total crop production.

The world's livestock production is based on about 40 animal species, with only a handful providing the vast majority of meat, milk and eggs. Nearly a third of fish stocks are overfished, and more than half have reached their sustainable limit. Less biodiversity means that plants and animals are more vulnerable to pests and diseases.

NO EASY FIX

Transforming food systems to address these risks will require unprecedented levels of collaboration across the food value chain, says Diane Holdorf, director of food and nature at the World Business Council for Sustainable Development (WBCSD). Every business engaged in producing, processing and supplying food will have to play a part. >

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More than 30 companies are now part of [FReSH](#) (Food Reform for Sustainability and Health), WBCSD’s effort to drive the transformation of the food system and to create a set of business solutions for industry change.

FReSH works in partnership with the EAT Forum to ensure the business solutions are science-based. As one of its recent activities, FReSH convened multi-stakeholder “science to solutions” dialogues to help address concrete actions to achieve dietary shifts.

Last October, the WBCSD, together with Unilever, Olam, Syngenta, Rabobank, and Barry Callebaut, also launched CSA 100, a global initiative designed to accelerate climate-smart agriculture to bring the food and agriculture sector in alignment with the Paris Agreement.

The initiative, which is supported by the World Economic Forum, the We Mean Business coalition, and the North American Climate Smart Agriculture Alliance, aims to bring 100 leading companies into the fold by 2030.

Holdorf says there are four “transformation pathways” where the private sector can collaborate and lead: climate resilience, mitigation and adaptation, biodiversity and healthy ecosystems, livelihoods and human rights, and nutrition and health.

Progress along those pathways, however, will take three to five years to bear fruit, Holdorf said. “We’re



CSA 100 is a global initiative to bring the food and agriculture sector into alignment with the Paris Agreement

seeing signs of progress but I don’t think we’ve seen a tipping point yet. I can’t wait until we get there.”

SOLUTIONS WITHIN REACH

The EAT-Lancet report was not alone in advocating a more climate-smart approach to food production. A report from the World Resources Institute (WRI) in December presented a five-course menu of solutions for a sustainable food future. While acknowledging there “is no silver bullet” to closing the food, land and GHG mitigation gaps that need to be closed to feed the planet in 2050, it identifies 22 solutions that include changes in consumption, reduction of food loss and waste, and avoiding competition from bioenergy for food crops and land.

To get more food out of every acre of land, WRI suggests increasing livestock and pasture productivity, improving crop breeding to get additional yield gains, improving soil and water management, and planting existing cropland more frequently.

New technologies can help reduce enteric methane, or cow burps, such as a chemical additive being tested in New Zealand that cuts methane emissions by 30% and may increase animal growth rates.

Emissions from fertilisers, accounting for about 19% of agricultural production emissions, can be cut by increasing nitrogen use efficiency.

And, WRI cautions, it will be important to implement “realistic options to sequester carbon in soils” including halting conversion of forests and developing innovative strategies for building carbon where soil fertility is critical for food security. (See [Turning agriculture from climate culprit to carbon sink](#))

“We’re trying to be pragmatic here,” says Richard Waite, one of the authors of the WRI report. “Really big changes have to happen, and behaviour changes are hard. What you put on a plate and the decision farmers make in their field – there is a reason why those decisions are made. >

WRI identifies reducing food waste as one of 22 solutions to feed the planet.



EVAN LORNE/SHUTTERSTOCK



TARAS VYSHNA/SHUTTERSTOCK

both food production and ecosystems services, she notes.

INVESTORS WEIGH THE RISKS

Environment, social and governance (ESG) investors, however, are paying increasing attention to the challenges faced by the \$7 trillion food industry, particularly risks and opportunities caused by intensive livestock production.

Maria Lettini, executive director of Farm Animal Investment Risk and Return (FAIRR), says: “Animal factory farming poses myriad environmental and human risks that we believe have not been fully understood by both the capital markets and consumers. These material financial risks, if left unaddressed, could significantly impact long-term value of corporate earnings and institutional investor portfolios.”

Among the problems that FAIRR seeks to address in the food system are antibiotic use for animals, which increases antimicrobial resistance, GHG emissions, waste management and food safety standards. The Coller FAIRR Index, launched in May 2018, assessed 60 of the world’s largest intensive farming companies and, according to Lettini, “found many extremely concerning trends across all these and other risk factors.”

FAIRR sides with the reports recommending reduction of meat consumption and a shift to plant-based diets. Its investor engagement on sustainable proteins, which is supported by 74 institutional investors with \$5.3trn assets under management, asks 25 global food companies to diversify their protein sources to drive growth, increase profitability, reduce risk exposure, and improve their ability to compete and innovate in a resource-constrained world. ■

Technological innovation will be necessary, as well as a greater emphasis on education and awareness for consumers.

“Given the scope of the challenge, it would be a mistake to rely completely on the market or public policy to get it right,” Waite says. “Not only do diets have to change to meet ambitious climate targets, but the whole way we produce and provide food.”

Some farmer groups, meanwhile, say they want more of a role in defining a sustainable food system.

Erin Fitzgerald, CEO of the US Farmers & Ranchers Alliance, said: “I think many of these well-intentioned multi-stakeholder coalition groups should really include farmers in the conversation. As stewards of the land, they’re full of untapped ideas and can be part of the solution and increased pathways to a more sustainable food system. The EAT-Lancet report failed to even imagine a future where agriculture is successful.”

Agriculture in the US, in particular, she says, has shown continuous improvement over the last 30 years, with developments such as precision agriculture, integrated pest management, crop protection, and harvesting techniques all helping to reduce inputs, improve resiliency and outcomes to

Industrial agriculture in the Australia wheat belt.



Amy Brown is a journalist covering sustainability and responsible business with a particular interest in sustainable agriculture. She also works occasionally as a freelance writer preparing reports for the US Farmers & Ranchers Alliance



A Nicaraguan farmer who is using rainwater harvested during the rainy season to irrigate food crops.

NEIL PALMER/CIAT

Turning agriculture from climate culprit to carbon sink

Mark Hillsdon reports on how the idea of increasing the capacity of soil to absorb CO₂ emissions is gaining traction around the world

In 2015, the International Year of Soils, Maria Helena Semedo, a deputy director at the UN's Food and Agriculture Organization, famously commented that the world's topsoil had become so degraded that it could only support another 60 harvests.

Decades of deforestation, monoculture, and poor farming practices, often over-reliant on chemical inputs, had stripped the land of all its goodness. It's estimated that 75 billion tonnes of fertile soil are lost to land degradation every year, leaving Earth, which is still expected to feed an ever-growing global population, in a parlous state.

Last month, the United Nations' Food and Agriculture Organization (FAO) warned that more than 90% of all the Earth's soils could be degraded by 2050 if we continued on the same path.

At Ethical Corporation Responsible Business Summit in March, Satya Tripathi, assistant secretary-general at UN Environment, said that by >



In Kenya, the Drylands Natural Resource Centre works with 600 smallholders on agricultural and agroforestry best practice.

DNFRC

over-using fertiliser: “We jettisoned soil biology and focused on soil chemistry ... [and] completely destroyed the soil ecosystem, so that in most parts of the world, we hardly grow anything.”

Last year, the World Business Council for Sustainable Development (WBCSD) launched [The Business Case for Investing in Soil Health](#), a report that included a call to action for businesses to explore greater supply chain co-operation, public-private partnerships and landscape alliances that could help spread costs and risks of land remediation.

There is also a greater realisation that as well as playing a central role in food security, healthy soil can also help in the fight against climate change. The Earth is a huge carbon sink, with soil holding three times more carbon than the atmosphere, but this carbon is now being allowed to escape.

Nevertheless, André Leu, a director of Regeneration International, believes that by taking a few fairly simple steps not only can we keep this carbon locked underground, but we can add to it, too. “We can change agriculture from being one of the major contributors to climate change to becoming one of the major solutions,” he says.

This idea of soil as something that could >

30 SECOND READ

Healthy soil can help in the fight against climate change. Soil holds three times more carbon than the atmosphere. It is estimated that increasing the amount of carbon in the soil by four parts to every 1000 would be the equivalent of locking up all man-made GHG emissions.

However, poor farming practices have stripped the land. It's estimated that 75bn tonnes of fertile soil are lost to land degradation every year. But regenerative agriculture techniques such as no tilling, crop rotation and tree planting can improve soil health.

The Food and Land Use Coalition (FOLU) has called on food companies to enter into agreements with farmers to reduce chemical loading and banks to provide lower cost credit to encourage regenerative practices.

In Colombia, FOLU is helping Colombian farmers tap markets that value responsibly sourced produce. In Australia, Commonland is aiming to transform the country's wheat-belt and is also aiming to regenerate 500,000 hectares around Port Elizabeth in South Africa.

sequester carbon dioxide began to gain traction at the Paris Summit in 2015, when scientists explained that if we could change agriculture so that farms are actually increasing the amount of carbon in the soil, by four parts to every 1000, that would be the equivalent of locking up all man-made greenhouse gas emissions. This became the [4 per 1000 initiative](#), which is now backed by 35 countries and over 1000 organisations.

In their current state, the world’s soils are far from being a solution to global warming. But regenerative, or restorative, agriculture can change this, by encouraging farmers to adopt a mixture of techniques that improve soil health and promote plant growth.

No tilling, and a lack of soil disturbance, is one way of keeping carbon in the soil, while cover cropping, which helps prevent soil erosion, crop rotation and tree planting, are also used. “These are the kinds of practices that keep carbon in the soil, underground, and out of the atmosphere,” says Daniella Malin, deputy general manager of the [Cool Farm Alliance](#) (CFA), a partnership of retailers, manufacturers and NGOs. “[But] the core of regenerative agriculture is soil and organic matter... that’s the foundation of everything.”

Many NGOs are now running composting workshops for smallholders, showing them how they can turn farm residues, which would often have been burnt, into something they can dig into the soil to replenish its nutrients. The CFA has been working with coffee farmers on different ways of managing waste too, and has developed new methods of turning pulp from coffee production into a rich, natural fertiliser.

CFA is also behind the [Cool Farm Tool](#), a greenhouse gas calculator that can measure carbon production from the use of fertilisers and fossil fuels, but also estimate the amount of carbon that the land and crops are sequestering, to provide a net carbon figure.

Large agribusinesses such as PepsiCo, Danone and Unilever have used the tool to meet their



COOL FARM ALLIANCE

PepsiCo used the Cool Farm Tool to cut CO₂ emissions and water use from the potatoes in Walkers Crisps by 50%.

corporate commitments, and from next year they will be able to further measure their progress with the launch of a new Science Based Targets Network. This will allow companies and cities to set targets for the inter-related systems of land, biodiversity, freshwater and the oceans across their value chains.

Smallholders are also applying the CFA tool as a way of monetarising their sustainable practices, with climate-friendly farming often a way of gaining easier access to finance and loans. Leu believes it is critical that regenerative agriculture is made as attractive and hassle-free as possible for farmers. “What we want to show is that these systems do make farms more profitable,” he explains. “We can increase yields, lower production costs and, really importantly, increase resilience to the adverse effects of climate change.”

Among the businesses Regeneration International works with are health firm Mercola and clothing company Patagonia, corporations which Leu says >



What we want to show is that these systems do make farms more profitable. We can increase yields and resilience



PERU COCOA ALLIANCE

are actively promoting regenerative agriculture, as well as sourcing materials from regenerative systems. “At the end of the day, landowners or farmers have to make a living,” he explains, “and if we can set up market-based systems that can help farmers earn a good living while they’re regenerating their farms and landscapes, that will make a big difference.”

ENCOURAGING INVESTMENT

According to Jeremy Oppenheim, a principal at the [Food and Land Use Coalition](#) (FOLU), the support of agribusiness is one of three fundamental ways of creating the incentives that are needed to encourage more long-term investment into regenerative agriculture.

The first, he says, is for food companies to enter into long-term agreements with farmers to reduce chemical loading and increase regeneration in the soil. It’s already happening in places, he adds, with the likes of Danone, and some of the cocoa

Long-term contracts allow these cocoa farmers in Peru to practice agroforestry.

companies, “entering into long-term contacts precisely to achieve these outcomes,” and to give farmers a greater degree of financial stability.

In the same way, he says, banks could provide lower cost credit to farmers that use the right practices. “It’s not just a piece of corporate social responsibility, it’s brilliant banking,” he says, “because ultimately they see those farmers as lower risk.” It’s an approach that is working in the Indian state of Andhra Pradesh. (See [Innovative BNP Paribas loan helping 6 million Indian farmers go chemical-free](#))

The third area is subsidies. FOLU estimates that around 80% of the \$500bn spent on agricultural subsidies each year goes to the wrong people. As well as ending up in the pockets of agribusinesses, rather than farmers, Oppenheim says, “a lot of the subsidies are effectively linked to production, so the more you produce, the more subsidy you get.” In some parts of the world the subsidy regime is also connected to inputs, when farmers are paid to >

In some parts of the world farmers are paid to use more fertiliser and pesticides.

use more fertiliser and pesticides. “So there’s a huge opportunity not to spend more, but spend better,” says Oppenheim.

Partnerships are a key element to all these ideas. In Colombia, FOLU is working with local stakeholders, the private sector and a range of government ministries to reduce the use of harmful agrochemicals, which have been damaging the health of people and the land. The initiative includes returning to traditional practices and using naturally derived inputs, and has won the support of several private firms. Fertiliser company Yara International is now providing extension services to farmers who employ sustainable practices, for instance, (see [interview with Yara CEO](#)) while biosolutions firm EcoFlora is supporting them with the use of bio-inputs.

The project is also helping Colombian farmers to tap into international markets that put a greater emphasis on food safety standards, deforestation commitments and the growing consumer demand for responsibly sourced produce.

In September, at the UN Secretary-General’s Climate Action Summit, FOLU is launching a major report that sets out the economic case for the transformation of food and land use systems. It will focus on the political and economic opportunities of shifting food and land-use from being a major contributor to climate change and inequality, into a source of balanced economic growth, human health and a flourishing natural environment.

CONNECTING LANDSCAPES

Commonland is another key player in landscape regeneration. The not-for-profit was set up by Willem Ferwerda after he realised that while a thousand hectares could be preserved by a local NGO, around it were a million hectares that had been converted from rainforest to palm oil.

Commonland’s approach combines and connects natural and economic landscape zones, he explains. “What we are talking about is the transformation of the old system, which has brought us a lot but is now killing the planet.”

The system is based on four returns, three landscape zones, and 20 years, which is the amount of time it takes to restore a degraded landscape, he explains.

People and community play a key role in Ferwerda’s vision, so the returns include inspiration, which gives people hope and a sense of purpose; social capital; natural capital, such as biodiversity >

“What we are talking about is the transformation of the old system, which has brought us a lot but is now killing the planet”



WIDE OPEN AGRICULTURE

“

Wide Open Agriculture is working to transform the Australian wheat belt, a vast arid landscape of abandoned towns, degraded soils and an ecosystem in crisis

and soil quality; and financial capital, which is sustainable and long term.

To realise this, he continues, three different landscape zones need to be established, each with a different emphasis. On the one hand is the natural zone, where investment is aimed at restoring nature and biodiversity, in return for forestry and tourism. At the other end is the economic zone, where there is an acceptance of real estate and agriculture, in return for crops and economic development. In the middle is a combined zone, a buffer, where

The half-hectare smart shade house in Australia allows vegetables to flourish in a controlled environment.

restoring the landscape would be important, alongside agroforestry and orchards. Importantly, all three zones would be actively involved in absorbing carbon.

Commonland works in some of the most climate-stressed areas in the world, including the Mediterranean, South Africa and Australia, where they look to breathe new life into degraded landscapes.

Ferwerda certainly doesn't lack ambition and, working with Wide Open Agriculture, he has plans >



What links so many of the projects is that they involve re-introducing simple, often traditional farming techniques

to transform the Western Australian wheat belt, a vast arid landscape of abandoned towns, degraded soils and an ecosystem in crisis, into a new sustainable food belt.

Ideas for achieving this include farming practices based on innovative water management, measures to restore the soil and biodiversity, huge greenhouses to allow for the growth of fruit and vegetables, and plans to encourage immigrants – the “new Australians” – to move to the area and re-establish businesses, farms and whole communities. There are also plans to scale-up and encourage investment by listing on the Australian Stock Exchange.

Ferwerda is confident the finance is there, too. Having spoken to a number of investors, he discovered that many were searching for sustainable projects where their long-term investment could make a difference, but until now there simply wasn't a pipeline of initiatives to support.

Commonland is also working in South Africa, in partnerships with NGOs, local farmers, businesses, and government, to bring back life to 500,000 hectares of land around Port Elizabeth. Among the initiatives launched to restore this important food production area is a move away from traditional goat farming to more sustainable, profitable farming practices, and a partnership with a major corporate to reforest the area.

Elsewhere, dozens of other NGOs are forging partnerships with the private sector to revitalise degraded land. In Kenya, the Drylands Natural Resource Centre (DNRC) works with over 600 smallholders on agricultural and agroforestry best practice, and has so far planted over 100,000 new trees. In the central Africa state of Niger, farmer-managed natural regeneration (FMNR) has revived more than 200 million trees across 5 million hectares using simple techniques to regrow trees and shrubs, and integrate them back into farming systems to improve soils.

What links so many of these projects is that they involve re-introducing simple, often traditional



Young soybean plants grown in the residue of a wheat crop, a no-till method that protects the soil.

farming techniques. “This is the other wonderful thing about it,” says Leu. “There are multiple techniques that farmers can pick and choose from... (but) it can be done without having to make any major modifications to their farms or equipment.

“This is resonating with farmers because it is so doable, it makes sense, it's achievable.” ■



Mark Hillsdon is a Manchester-based freelance writer who writes on business and sustainability for Ethical Corporation, The Guardian, and a range of nature-based titles including CountryFile and BBC Wildlife.



AGRICULTURE DEPARTMENT ANDHRA PRADESH

Innovative BNP Paribas loan helping 6 million Indian farmers go chemical-free

 [VIEW ONLINE](#)



The Sustainable India Finance Facility is being used to train farmers to grow crops without chemicals.

BNP PARIBAS

W

hen change is needed, and systems appear broken, so-called green revolutions are often 10 a penny, and can be met with a mixture of ennui and scepticism. But one initiative being rolled out in the fields of Andhra Pradesh is gaining near-universal approval.

The Sustainable India Finance Facility (SIFF) is an agreement between the state government, the United Nations Environment Programme (UNEP) and BNP Paribas, and is designed to bring zero-budget natural farming (ZBNF) to India's seventh-largest state.

The project involves a loan of \$2.3bn through SIFF to help scale up the scheme, explains Hervé Duteil, chief sustainability officer at BNP Paribas. "This >

financing is to ultimately transform the way of doing agriculture by more than six million farmers,” he says, adding that this isn’t just about financing one crop season, but long-term change over 10 years.

It is modelled on a similar agreement, the Tropical Landscape Finance Facility (TLFF), that was introduced in Indonesia at the end of 2016, and has helped to bring new levels of sustainability to some of the country’s huge rubber plantations.

The Indian programme was officially launched in June 2018, although trials have been running for several years, and will ultimately see over eight million hectares switch from conventional synthetic chemical agriculture to ZBNF. So far, over 500,000 farmers have moved on to the scheme, and by 2024 it is hoped that all the state’s farmers will be working the land with nature in mind.

Instead of relying on expensive inputs such as fertilisers and pesticides, ZBNF uses a system of bio-inoculations based on readily available cow dung and urine. This helps naturally build up nutrients and microbes in the soil, which in turn promotes growth. The term “zero budget” refers to the zero net cost of production, with farmers’ income improving the less they spend on inputs.

Other regenerative farming methods helping to improve biodiversity include mulching, which

From left: Antoine Sire and Joris Dierckx of BNP Paribas with (centre) Satya Tripathi UN assistant secretary-general.



BNP PARIBAS

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Instead of fertilisers and pesticides, zero-budget natural farming uses bio-inoculations based on cow dung and urine

reduces the need for watering; soil aeration; and planting a variety of crops to improve the soil’s nutrient balance. Chemical pesticides are also being replaced with natural solutions such as neem, chilli or simple insect-trapping tools like sticky paper.

According to SIFF, trials showed that maize and cotton output grew by 10%, groundnut, chilli and black gram by more than 20% and ragi, or finger millet, by 40%. And in an important nod to climate resilience, photos also showed that crops in ZBNF fields stood up to the onslaught of a 100kmph cyclone far better than conventional ones.

Speaking at Ethical Corporation’s Responsible Business Summit in New York in March, Satya Tripathi, UNEP assistant secretary-general, described the initiative as “the world’s largest and most transformative programme”, bringing “people together to create system-scale impact.”

He explained that the finance would be cost-neutral to the state government because currently it spends \$1bn in fertiliser subsidies. Once the loan is paid off, the state will save £1bn a year in perpetuity.

ZBNF is also creating social capital by establishing farmers’ federations and self-help groups, while over 30,000 head farmers – 90% of them women – are working as ZBNF ambassadors, and helping other farmers make the switch.

The Indian states of Karnataka and Himachal Pradesh are also now introducing ZBNF, and UNEP ultimately hopes that Andhra Pradesh will also provide an agricultural blueprint that can be adapted to other areas of the world. ■

Mark Hillsdon

Amy Brown reports on how food companies like General Mills and Danone are encouraging US farmers to shift to practices that make agriculture more resilient and productive



Regeneration game on the ranch

 [VIEW ONLINE](#)

MARK GODFREY/THE NATURE CONSERVANCY

More than 25 years ago, cattle farmer Will Harris of White Oak Pastures, a 152-year-old family farm in Bluffton, Georgia, rejected industrial farming in favour of his great-grandfather’s methods: pasture-raising his livestock and using regenerative land management practices to improve his soil, enhance biodiversity and strengthen resilience against pests and disease.

The shift boosted carbon storage in the soil to such an extent that it offsets at least 100% of the

emissions from rearing his grass-fed beef, according to a lifecycle assessment by environmental research firm Quantis, funded by General Mills, one of Harris’s customers.

In Minnesota, farmer Paul Lanoue uses crop rotation and rotational grazing of his 180 cows on his 2,700-acre farm, enhancing plant diversity and wildlife habitat. Soil samples allow him to place just the right amount of fertiliser using GPS technology, increasing his yield and profitability, he says.

“I have six kids and I want to be able to create a legacy so the kids can still be on the farm and be productive or even more productive in the future,” Lanoue says.

In Texas, Jeremy Brown, a cotton, peanut and sorghum farmer, practices crop rotation, minimum >

Several generations of the Lee family on land they farm near Barneveld, Wisconsin.

tillage and plants green cover crops on his 4,000-acre farm.

“In the semi-arid climate where I farm, my whole goal is to conserve water,” Brown says. “Every time I use no-till or minimum till, I’m helping the water-holding capacity of my soil.”

These farmers represent the future of sustainable agriculture in the US, according to a growing number of food producers, companies, scientists, academics, conservation organisations and government bodies. They have all voiced support for a shift to farming practices that make American agriculture more productive and resilient while also helping to mitigate – possibly even reverse – climate change by drawing down CO₂ from the atmosphere and improving the water cycle.

Regenerative agriculture practices use compost and animal manures rather than synthetic and artificial fertilisers, but differ from other practices used in organic agriculture, which is aimed primarily at producing food not laden with chemicals. While there may be overlap, organic farming does not necessarily follow the principles of regenerative agriculture to improve the soil with every harvest and encourage biodiversity.

Soil is one of the most biologically diverse ecosystems on Earth, producing 95% of the world’s food, filtering drinking water, and reducing the impact of climate change through carbon storage.

But soil managed for agricultural purposes in the US has lost as much as 60% of its original organic carbon content, due in large part to common-row crop farming practices that have, inadvertently degraded soil health and threatened America’s waterways, according to The Nature Conservancy.

“Over the last 200 years of farming, we’ve seen a slow degradation of soils everywhere in the world where we have large-scale agriculture, says Michael Doane, global managing director for sustainable food and water at The Nature Conservancy. “It’s not that farmers and ranchers want to degrade the soil – it is their main capital asset – but we’re only starting to understand that soil is a living ecosystem and we must treat it as such.”

In its report [reThink Soil: A roadmap to US Soil Health](#), The Nature Conservancy estimates that each 1% of cropland in the US that adopts an adaptive soil health system generates \$226m of societal value through increased water capacity, reduced erosion and nutrient loss to the environment, and reduced greenhouse gas (GHG) emissions, as well as \$37m of on-farm value through greater productivity.



WHITE OAK PASTURES

White Oak Pastures farm has boosted the carbon storage capacity of its soil.

In the most optimistic case, the report estimates soil health solutions could address up to \$50bn in social and environmental impacts annually across the US.

“We’re really describing a paradigm shift for the agriculture sector, to go from thinking about soil as a structural asset to thinking about it as a living ecosystem that can be protected and enhanced through agricultural practices,” Doane says.

ENCOURAGING REGENERATION

With cover crops used on only about a 10th of suitable corn and soybean acres in 2015, according to the United States Department of Agriculture (USDA), regenerative agriculture is still in its infancy. But major food companies are making substantial investments in helping farmers adopt regenerative practices. General Mills has committed to advance regenerative agriculture practices on 1 million acres of farmland by 2030.

In 2017, General Mills made a three-year \$2m commitment to The Nature Conservancy, the >

Danone North America is spending \$6m on improving the soil health of its supplier farms.



DANONE NORTH AMERICA

independent, non-profit Soil Health Institute and the farmer-led Soil Health Partnership to support the development of tools and resources for farmers, landowners, and supply chain leaders to achieve widespread adoption of soil health practices.

In working with farmers like Harris of White Oak Pastures and others, it is looking to connect best practices to real outcomes, says Jerry Lynch, chief sustainability officer for General Mills.

“Our business case for sustainability overall is inextricably linked to the health of the planet and farming communities. As we look out over the next 50 years, there are a lot of reasons to be concerned about the decline of our planetary system and the decline of farming communities. Looking at the viability of our supply chain, and specifically, the regenerative agricultural work we’ve been doing, there are very few catalysts that make a difference in so many areas all at the same time,” Lynch says.

He ticks off the benefits: greater profitability for farmers, enhancing their economic resilience; a lower carbon footprint; greater sequestration of carbon; better water quality management; and improved biodiversity.



Our business case for sustainability overall is inextricably linked to the health of the planet and farming communities

DANONE

Danone North America, the largest yogurt producer and leading maker of organic food in the US, has committed up to \$6m over the next five years towards its soil health research programme. This cost includes soil sampling, review of grower yields, grower engagement, data collection and analysis, and field days with farmers to provide training around soil health best practices.

Danone intends to eventually create a set of recommendations for improving crop yields and increasing the carbon intake of soil on its partner grower and dairy farms. >

“We believe that regenerative agriculture, still at an early stage of development, is critically important for the future of agriculture, as it encompasses farming and grazing practices that, among other benefits, may reverse climate change by rebuilding soil organic matter and restoring degraded soil biodiversity – resulting in both carbon drawdown and improving the water cycle,” says Christina Owens, senior director of agriculture funding and communication for Danone North America.

Danone North America is working with non-profits The Carbon Underground and Green America, and other food companies, to develop a new global certification standard for food grown in a regenerative way across agricultural systems. As a member of the Regenerative Organic Certification Alliance, it is also working on a Regenerative Organic Certification to set standards for such practices within organic farming.

Danone is also a founding member of the Sustainable Food Policy Alliance, where it is working with Mars Inc, Nestlé USA, and Unilever United States. Launched in 2018, the group wants to drive progress in US public policy around consumer transparency, sustainable agriculture, food safety and nutrition, and support for the



Wetland conservation is an important part of regenerative agriculture.

IVAN KUZMIN/SHUTTERSTOCK

30 SECOND READ

Agricultural soil in the US has lost as much as 60% of its original organic carbon content, due in part to poor farming practices. Now food producers, scientists, conservation organisations and government bodies are advocating a shift to farming practices that will make US agriculture more resilient.

The Nature Conservancy estimates that each 1% of cropland in the US that adopts an adaptive soil health system generates \$226m of societal value through increased water capacity, reduced erosion, nutrient loss and GHG emissions, as well as \$37m of on-farm value through greater productivity.

Major food companies are investing in regenerative practices, with General Mills making a three-year \$2m commitment, and Danone North America committing up to \$6m towards its soil health research programme.

However, there are barriers to be addressed. The science is still evolving and there is a lack of soil health measurement tools. Also, restoring soil health may require economically struggling farmers to make up-front capital outlays.

supply chain, including rural economies.

The alliance wants to see federal farm policies increase the scale of action to address water quality, water conservation, and soil health, and deployment of renewable energy.

It also supports greater financial incentives to reduce emissions and transition to low-carbon alternatives, with a particular focus on ways to create value for farmers, ranchers, and others who are implementing leading-edge practices to cut greenhouse gas emissions.

Ocean Spray, a multi-generational co-operative of over 700 farmers, recently announced a commitment to certify by 2020 that 100% of its crop across 36,000 acres of cranberry bogs worldwide is sustainably grown, using the Farm Sustainability Assessment, a sustainable farming tool developed by the Sustainable Agriculture Initiative Platform (SAI Platform). It marks the first time a worldwide fruit co-operative is verifying its fruit as sustainably farmed.

In another effort to benchmark performance in regenerative agriculture, Kellogg's has started labelling its Kellogg's Corn Flakes sold in Europe as “responsibly sourced corn” certified by third-party organisation Control Union. Kellogg's goal >



LIJUAN GUAY/SHUTTERSTOCK

is to support 500,000 farmers with climate-smart agricultural practices by 2025 (with 329,000 to date).

Nevertheless, The Nature Conservancy says there are multiple barriers that will have to be identified and addressed before soil health systems can be adopted at scale.

For one, the science of soil health is still evolving and there is a lack of accurate, standardised and cost-effective on-field soil health measurement tools. “Food and agricultural systems are by and large not easily monitored,” Doane says.

Another barrier is that practices to restore soil health may require farmers to make higher capital

Ocean Spray says 100% of its crop will be certified sustainably grown by 2020.

or variable cost outlays in the short term.

Since the majority of farmers in the US lease the land they manage, lease terms incentivise short-term planning and prevent the farmer from recouping costs or planning for a longer horizon.

Farmers in the US are also under serious economic strain, with current farm debt at its highest point since 1980, according to the USDA. Declining commodity prices mean that many farmers receive only 14.6 cents out of every dollar spent on food, a 17% decline since 2011, the lowest number since the USDA began keeping track in 1993.

The record number of billion-dollar weather >

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If we want these ideas to scale up, it has to make economic sense to the stakeholders involved

and climate disasters in recent years such as the California drought and Hurricane Florence’s impact on farmers and ranchers in North Carolina have compounded the difficulties.

As the “reThink Soil Health” report points out, public policy has not been fully developed and implemented to encourage landowners and farmers to reduce production risk and support soil health investments requiring longer planning horizons. “Given the value-creation potential to address important social and environmental challenges, broadening the coalition of interested stakeholders who advocate for these improvements in state and federal policies is essential,” the report states.

In one innovative approach, however, the city of Cedar Rapids, Iowa, has partnered with farmers upstream to form the [Middle Cedar Partnership Project](#) in the Middle Cedar watershed to use cover crops, nutrient management, wetlands and saturated buffers to improve water quality, reduce flooding risk and boost soil health. This type of project could be further utilised to unite cities and farmers in finding solutions to climate change, according to Dr Nick Goeser, vice president of sustainability sciences and strategy for the US Farmers and Ranchers Alliance.

“If we want these ideas to scale up, it has to make economic sense to the stakeholders involved. It may take some time, investing in different management practices. The payback may not be immediate, but farmers will see it accrue over time,” Doane of The Nature Conservancy says. “We want to show how farmers and ranchers can be solutions-providers to the climate challenges we face.” ■

Texas farmer Jeremy Brown plants cover crops on his 4,000-acre farm.



The Netherlands plots a **GREENER REVOLUTION** in farming

Mark Hillsdon reports on how innovative finance and technologies are helping Europe's food production powerhouse to move from monoculture to agro-biodiversity

 [VIEW ONLINE](#)



FRIESLAND CAMPINA



FRIESLANDCAMPINA

Dutch agriculture, like so much of the global food system, is running up against its ecological limits, with soil quality and biodiversity flatlining. But now moves are afoot to change this, as banks, farmers, food producers and conservation groups come together to put agro-biodiversity on the menu.

The memories of famine in wartime Holland helped to power a revolution in Dutch agriculture, explains Berry Marttin, an executive board member at Rabobank. “After the war, we were incredibly successful in producing quality, affordable food and have now grown into the second-largest exporter of food in the world,” he says.

The sector’s annual turnover is €140bn, contributing nearly 10% to the national economy

and accounting for a similar percentage of all jobs. Yet the Netherlands also has one of the highest population densities in the world and this pressure for space has seen intensive agriculture thrive.

Nearly two-thirds of the country is given over to dairy and in recent years poor environmental performance has tarnished the sector’s image. Low food prices have meant that farmers had to continue to increase production to make a living, with many dairy farms operating as a monoculture, where the same crop – grass – is sowed year-on-year, with no crop rotation, or chances for the soil to recover.

In many areas this has led to soil exhaustion, with the medicine often huge doses of fertilisers, phosphates and nitrogen, rather than natural cures like organic matter and manure.

Now the aim is to reverse this, maintaining food security while regenerating the environment at the same time.

“The current environmental footprint of this success is not sustainable,” says Marttin, who believes circulatory farming, with its emphasis on >

Dutch dairy farmers are being encouraged to ditch fertilisers and pesticides and let nature take back control.



MARK BRANDON/SHUTTERSTOCK

returning agricultural residues to the soil instead of chemical fertilisers, is now a key driver for change.

The bank's [Banking for Food](#) initiative is looking to improve global food security, encouraging a system that produces more food but with less inputs. As an agrifood bank that serves 80% of all Dutch farmers, Rabobank is also in a strong position to influence the future course of Dutch agriculture.

And in a scenario that is increasingly being played out around the world, Dutch farmers, especially those with dairy herds, are being encouraged to ditch the fertilisers and pesticides and let nature take back control; this is the basis of agro-biodiversity.

The problem for farmers such as Willem van der Schans, who runs Den Eelder, a dairy farm of 550 cows in central Holland, is that during the transition from a monoculture to a more balanced form of farming, milk production can initially drop, along with the farm's overall income. This is where Rabobank can step in with green loans and financing that can help farmers bridge the gap.

"Moving away from monoculture is definitely a new chapter in agriculture and we have to learn to connect with this changing system," says Van der Schans.

Among the changes the farm has made is a push to supplement cattle feed with leftover food produce, such as spent grain from brewing and sugar beet pulp, which means less overall waste, and

less expenditure on other animal feeds.

The farm is also self-supporting on energy and, alongside 1100 solar panels, a manure digester turns methane gas into energy.

Van der Schans is also reaping the benefits of taking sustainability into the fields. Last summer, one of the driest on record, the pasture he planted with a different mix of grass and herbs, and which he cut (for fodder) later so that birds could benefit, proved far more resilient to the drought than conventionally planted fields.

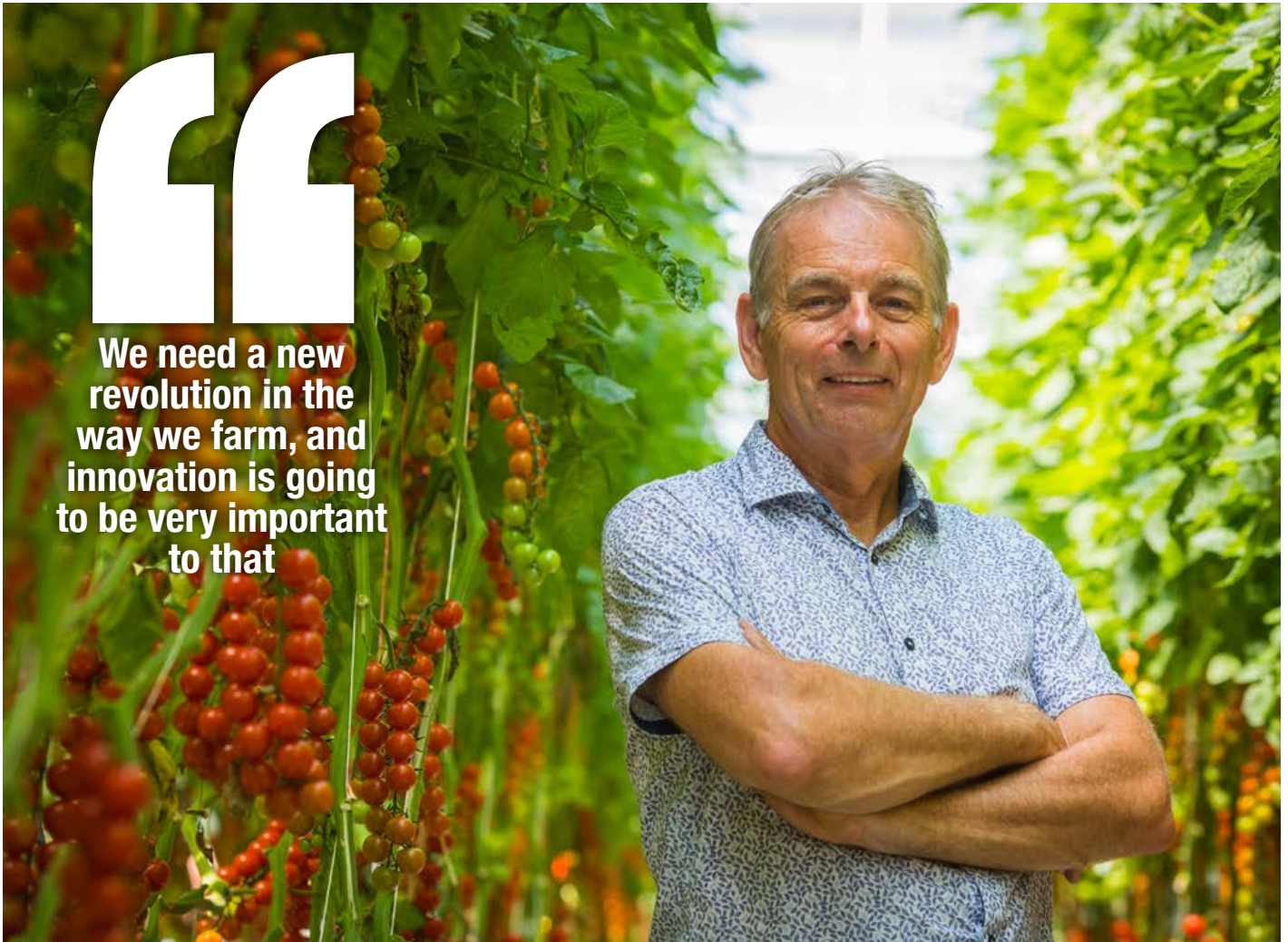
He is also proud of a field that he has allowed to flood, rather than use for production, in order to encourage birds back on to the farm.

So while there may be a short-term hit to profits, in the long term he believes it will prove a much more sustainable and profitable model. "Because we're so dependent on the nature around us, it's logical to try to work as sustainably as possible," he says.

Rabobank has also teamed up with WWF and dairy giant Royal FrieslandCampina to launch a biodiversity monitor for dairy farms that measures the performance of the entire farm, rather than just looking at individual initiatives. It shows the positive effects of actions on landscape and wildlife, and highlights which approaches are best for healthy soil and the reduction of greenhouse gases. The bank then rewards farmers with a lower interest rate on loans up to €1m.

With such a strong farming sector, it's no >

One problem with the transition to a more balanced form of farming is that milk production can drop.



“We need a new revolution in the way we farm, and innovation is going to be very important to that

DUIJVESTIJN TOMATOES

surprise that the Netherlands is a global leader in agriculture technology. Much of it is based at the [Wageningen University & Research \(WUR\) centre](#), the hub of the “Food Valley” region in central Netherlands, with its cluster of agricultural start-ups and innovative farms.

Recent developments have ranged from ideas around feeding livestock grasshoppers instead of grain, and growing plants that have a symbiotic relationship with, and can create their own, bacteria.

Rabobank runs [FoodBytes!](#), a series of events connecting food industry leaders and investors with start-up companies that are innovating and disrupting the food chain.

The bank’s funding mechanism aims to achieve a net gain in sustainability and it also sets out to fund individual projects, providing farms meet certain environmental criteria.

Ted Duijvestijn heads up Duijvestijn Tomatoes, which in 2015 was named the most innovative tomato grower in the world. He explains that the business has received financial support from



Tomato grower Ted Duijvestijn, main photo, has received finance from Rabobank to invest in geothermally heated greenhouses (right).

Rabobank to implement a number of sustainable innovations. These include using geothermal energy to heat greenhouses, and developing a new type of greenhouse that enables maximum light penetration and reduces energy consumption by 60%.

As Marttin of Rabobank points out: “We need a new revolution in the way we farm, and innovation is going to be very important to that.” ■

How Syngenta's regenerative approach allows

SPANISH OLIVE GROVES TO FLOURISH



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he traditional olive groves of the Mediterranean are often a barren affair. Gnarled twisted trees, with their bountiful canopies, grow from bare, arid soils, where few other plants take hold.

In the Spanish province of Andalusia, nearly 1.6 million hectares of land are under olive cultivation, accounting for almost a third of the world's olive oil. Traditionally, olives are planted in the least productive plots on a farm, and many of these groves cling to steep slopes and hillsides. But increasingly, these rocky plots have a new green tinge.

Syngenta, working with the Asaja Sevilla farmers association and the Andalusian environmental authorities, have introduced >

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It's not philanthropy; it is something that is absolutely vital to enhance our offer to growers

the concept of cover cropping, with vegetation planted among the trees, as part of their support for regenerative agriculture.

The effects have been amazing, explains Alexandra Brand, Syngenta's chief sustainability officer, with soil erosion on some Andalusian groves reduced by 95%. Cover cropping also protects the soil from direct sunlight, helping to reduce water evaporation as well as field run-off, when sediment and chemicals can contaminate local water supplies.

The vegetative cover, which includes species that attract beneficial insects and flowering plants for pollinators, also helps to reduce the temperature of the soil, which can help some pest-predatory insects to thrive. With a no-till approach, too, the soil can be left to fulfil its role as a carbon sink.

Traditionally, groves were left bare for convenience and because of the expense of buying seeds to plant, explains Brand. Now, to help cover costs, local environmental subsidies linked to the region's rural development plans have been leveraged, and more than 100 farmers are now taking part in Syngenta's Multifunctional Covers (MFC) campaign.

Unlike a dressing of fertiliser, investing in this kind of regenerative agriculture isn't a quick-fix solution, she continues. But many of the groves are family plots: "So investing in the land for the long-term makes a lot of sense.

"Some food companies want to procure food from regenerative agriculture, too, so working this way helps farmers to access new markets," she adds.

The work in Spain is part of Syngenta's Good Growth Plan, which was launched in 2013 to help improve the fertility of 10 million hectares of degraded farmland. The company works with partners to develop and promote local solutions farmers can easily adopt, and so far 197 projects have been implemented in 41 countries, with the programme already benefiting 10.8 million hectares.

As a research and development company,



Cover cropping between olive trees in Andalusia has reduced soil erosion, water evaporation and field run-off.

Syngenta works with scientific partners, and growers who are interested in experimenting, to develop new crop protection products, continues Brand. "When a farmer changes their practices, they need to change the way in which they protect their crops, because now the crops can protect themselves differently."

With less soil-borne diseases, fewer inputs are needed, and those that are used must be applied precisely, she says. "We will accelerate our innovation towards these sorts of agricultural systems, which take nature into account."

Syngenta is also working with smallholders in Brazil, helping them to comply with local laws and reforest parts of their land, while over the border in Columbia it is helping farmers to manage pests and crop diseases in a way that also protects habitats, with strict protocols around how its products are used.

In China, as part of a project to create more biodiverse field margins, a particular bush is being planted around paddy fields, creating the perfect habitat for wolf spiders, which predate many of the insects that attack the rice crop.

Brand agrees that it can seem counter-intuitive for an agro-business to encourage natural pest controls, but adds: "For us it is not philanthropy, it is something that is absolutely vital to enhance our offer to growers. The more profitable and the more successful the grower is, the more successful Syngenta is, it's as simple as that." ■

Mark Hillsdon



WIKIMEDIA

YARA'S MISSION TO SOW HOPE IN AFRICA

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ith fertiliser one of the biggest contributors to greenhouse gas emissions from agriculture, it is not surprising that the CEO of the company that invented fertiliser in 1905 has climate risk at the top of his agenda.

Svein Tore Holsether's company, [Yara International](#), together with Unilever, helped found the Food and Land Use Coalition, a multi-stakeholder platform that is dedicated to protecting natural resources and ecosystems. The platform, which also includes EAT, the scientists behind the EAT-Lancet [report](#) (see [Climate concerns help fuel rise in 'impossible' plant-based diets](#)), has a mission to transform agriculture and food systems so that instead of contributing a quarter of greenhouse gases, they absorb more than they emit.

In an interview with Ethical Corporation, last year Holsether acknowledged the industry's responsibility to decrease its contribution to agricultural emissions, but said there should be greater recognition of the benefits of fertiliser in >

Svein Tore Holsether, CEO of the Norwegian fertiliser company, tells Terry Slavin how new technology allowing smallholder farmers to access agronomic advice on their smartphones will help boost yields without threatening forests

 VIEW ONLINE

the debate over the food industry and climate change.

“Fertiliser enables a more efficient use of land for the production of food,” he said, citing a [Stanford University](#) study that showed agricultural sector emissions would be 4.5 times higher than they are now without chemical fertilisers because of the amount of land that would be deforested if farmers could not restore depleted land.

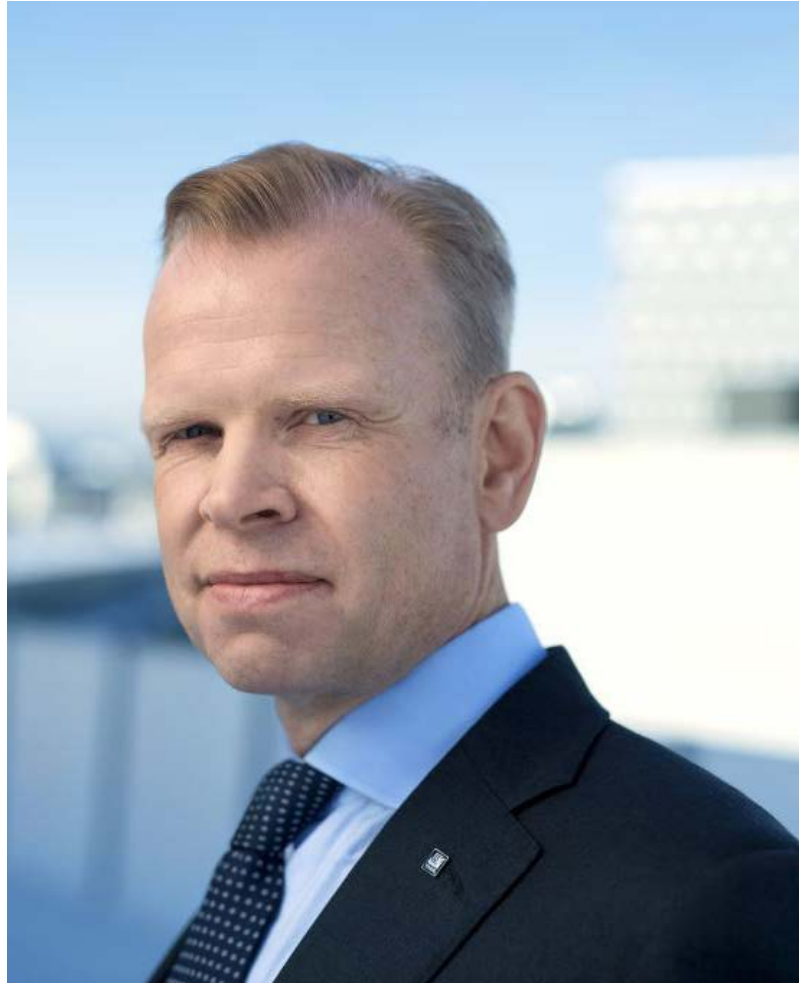
The recent [WRI report](#) *Creating a Sustainable Food Future* said in order to fully meet expected food demand while avoiding massive additional deforestation, crop and pasture yields must increase at rates even faster than those achieved over the past 50 years, with the widespread use of synthetic fertiliser and scientifically bred seeds. It also said the amount of irrigated area will have to double.

“The single most important need for a sustainable food future is boosting the natural resource efficiency of agriculture, that is, producing more food per hectare, per animal, per kilogram of fertiliser, and per litre of water,” the report said.

Holsether said fertilisers only put back into the soil what was there in the first place – phosphates and potassium, which are naturally in the ground, and nitrogen, which makes up 78% of the air we breathe.

But he accepted that misuse of fertiliser can lead to big environmental implications.

“If you use fertiliser wrong, you risk it being washed away and getting into water courses. And you risk the emissions from the fertiliser itself going



Yara
International
CEO Svein Tore
Holsether.

into the air instead of the ground. It’s about applying the right type of fertiliser at the right time, and that is where we’ve invested a lot of money.”

N-sensors, which are mounted on tractors, monitor the nitrogen in the air and spread fertiliser accordingly, and soil sampling is used extensively to ensure only needed nutrients are added to the soil. This year the company also announced the European launch of YaraLix, a tool for precision farming that allows farmers to measure crop nitrogen requirements using their smartphones, something that has traditionally required expensive equipment.

But he said his company’s real strength lies in its 800-strong team of agronomists, who help farmers to understand the specific fertiliser needs of their crops.

Until recently, such advice has only been available to large commercial farmers, but in April, Yara announced [a partnership with IBM Services](#) to build what they described as the world’s leading digital farming platform. This will combine Yara’s expertise in agronomy with IBM’s expertise in artificial intelligence and data analytics to >



**If you use fertiliser
wrong, you risk it
being washed away
and getting into
water courses**



YARA INTERNATIONAL

dispense instant advice to millions of professional and smallholder farmers.

The digital platform aspires to reach 100 million hectares of farmland, close to 7% of all arable land worldwide, with the first services planned for the end of this year.

Though Holsether was speaking before the IBM partnership announcement, he is clearly enthusiastic about the potential for digital technology to allow the company to reach 450 million smallholder farmers, particularly in Africa, which lags the world in fertiliser use though 80% of people in Sub-Saharan Africa depend on agriculture for their livelihood.

“A core part of our work is to connect with smallholder farmers and make them more productive,” he said. “In Africa we could help multiply their yields by six to eight times. That’s the difference between producing enough food to sustain themselves, and being able to send their children to school, and build a house.”

in 2015 it built a new fertiliser terminal in Dar

es Salaam, Tanzania, and placed warehouses across seven regions, partnering with 58 other organisations in the country to transfer knowledge and make quality fertiliser more accessible.

While the entire continent of Africa only accounts for 5% of the company’s global sales, a tiddler compared with its main markets in Latin America, Holsether says the company sees its main growth opportunities in the developing world.

“I keep saying that at some point Africa will be our biggest market. What that point is, though, I don’t know.”

He said one of the key bottlenecks is access to finance for farmers. “The ability to invest in the right input factors is a big challenge in many parts of the world.”

Given the fact that \$9trn is invested in negative interest rate yielding sovereign debt, he added, “Countries and investors can do much more to invest in farmers and make them more productive.”

But with the huge potential risks for misuse of fertiliser, including waterway pollution, increased >

Africa is seen as Yara’s biggest potential growth market.

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When we work at getting solutions, it needs to be holistic, looking at the entire food chain

air pollution, acidification of the soil and mineral depletion of the soil, shouldn't policymakers give priority to encouraging the use of organic fertiliser?

Holsether said both organic and mineral fertilisers are needed: “There are many good things about organic farming, but it's not possible to scale it up to the level that is needed to feed the world. You can't exchange mineral fertiliser with organic fertiliser. There just isn't enough available.”

At the same time, he said, “I'm a big believer in the circular economy and reusing nutrients.”

In January, the company signed an agreement with global resource recovery company Veolia to develop new business models for circular agriculture in Europe, with a focus on recycling nutrients such as nitrogen and phosphorus from organic materials and using them in new fertiliser products.

Yara uses natural gas as its main feedstock, is also working towards making carbon-free fertiliser, and in February signed an agreement with energy company ENGIE to test green hydrogen technology in fertiliser production. The two companies agreed to access the feasibility of converting its ammonia plant in Pilbara, Western Australia, which derives hydrogen from natural gas, into one where a significant share of hydrogen will come from renewable energy.

“Climate risk is very high on the agenda [for Yara]” said Holsether. “I think it will drive policy and transparency and demand for the right fertilisers.”

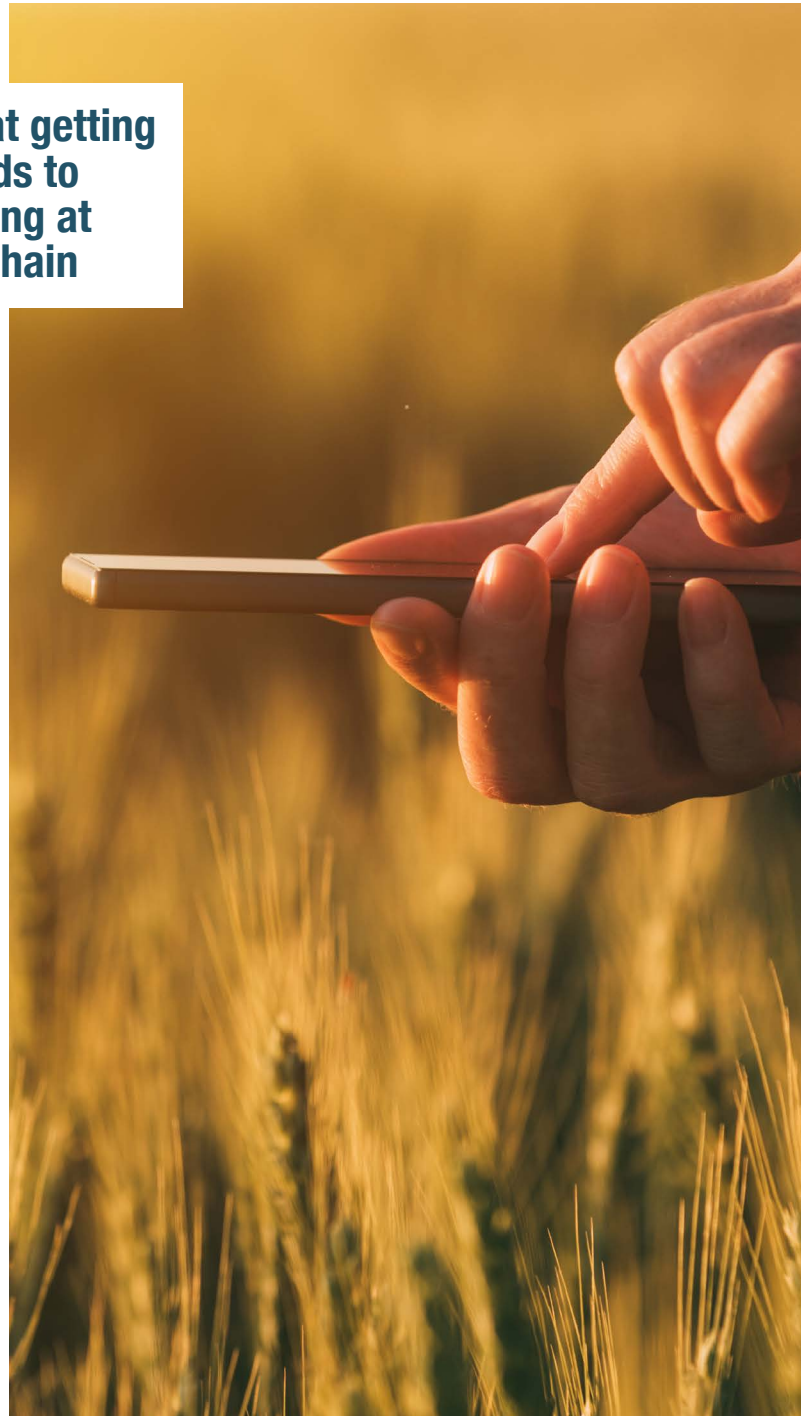
But he added: “When we work at getting solutions, it needs to be holistic, looking at the entire food chain. That's why I'm optimistic about the Food and Land Use Coalition, because it is scientific and takes a holistic view, down to [the contribution] of diets and consumers.”

He said emphasising the company's role in helping to avoid deforestation “is an area that is smart for us to focus on as a company. If you can produce more on existing land there's no need to cut down forests. It's right for us to do this for both the top and bottom line.” ■

A new partnership with IBM will allow millions of farmers to get instant agronomic advice.



Terry Slavin
is editor of Ethical Corporation



IGOR STEVANOVIC/SHUTTERSTOCK

Amy Brown reports on how green-minded millennial and Gen Z consumers are boosting the boom in meat alternatives



 [VIEW ONLINE](#)

FOREST MANUFACTURE/SHUTTERSTOCK

Climate concerns help fuel rise in interest in plant-based diets

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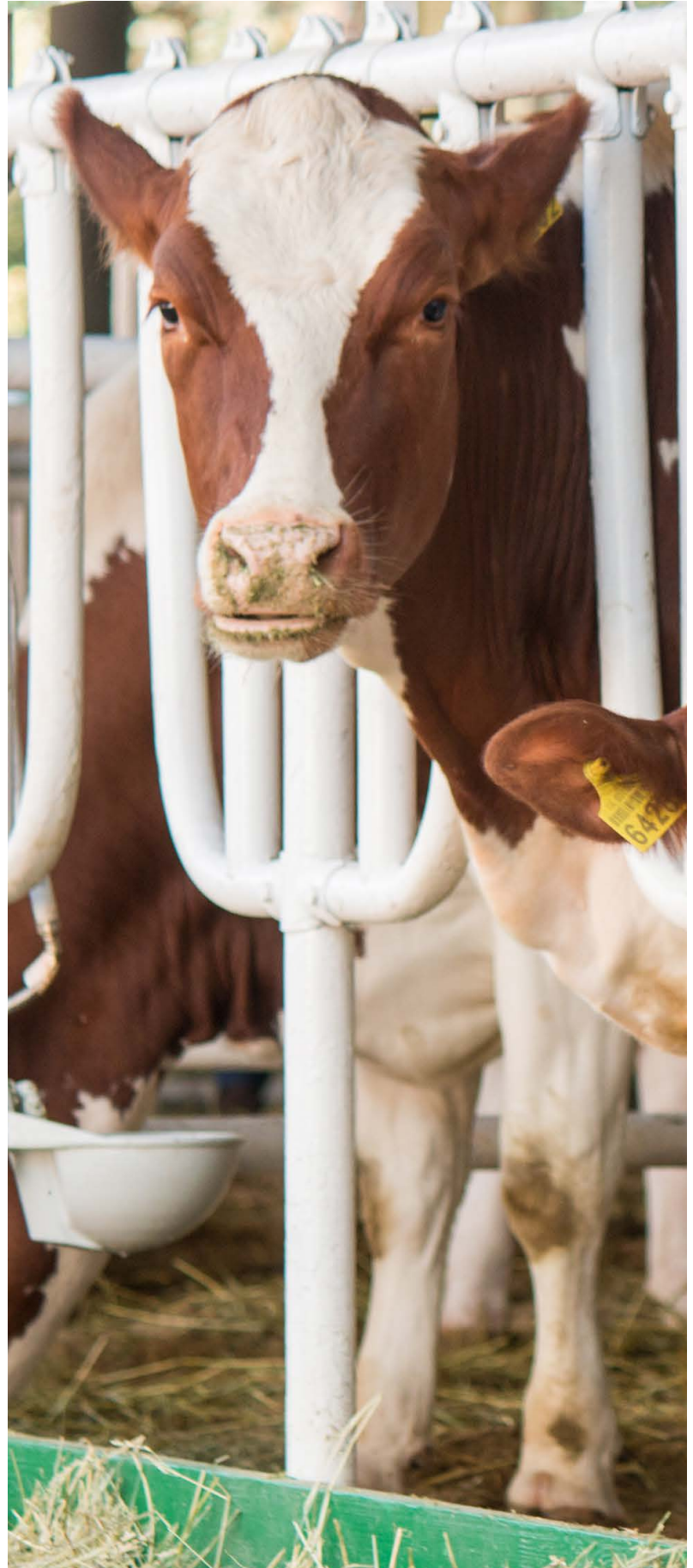
lant-based diets are rapidly gaining ground in the US and Europe, amid changing consumer demand and growing concern over the climate impacts of beef production. Much of the new food innovation is coming from start-ups, attracting a flood of investment, but traditional food companies are also getting in on the action.

The number of people committing to a strictly plant-based, or vegan, diet is on the rise, as well as those who define themselves as “flexitarians”, or occasional meat eaters. Although fewer than one in 10 Americans follows a vegetarian or vegan diet, a Gallup poll found that there were 3 million more vegans in the US in 2018 than in 2012. And sales of alternative meat products are growing at an annual rate of 24.5%, according to Nielsen Total Food View.

One third of Britons have scaled down or stopped meat purchases altogether, according to supermarket chain Waitrose. And consumers in France, Germany, Spain and Sweden are also cutting back on meat as attitudes shift, with Euromonitor predicting that sales of meat substitutes globally will grow 22% by 2023.

Drivers of the plant-based diet trend include consumer preferences for greater choice, health benefits and, for a growing group of consumers, concern about the environmental impacts of food production, including climate change, biodiversity and animal welfare.

“Today, the consumer has a real voice in the food choices available to them,” says Phil Lempert, a US food marketing expert known as the Supermarket Guru. “People care about where their food is coming from. They care about the values of the people who make that food and if they align with their own values. This is especially true for millennial and Generation Z consumers. They >





Beyond Meat (pictured) and Impossible Foods have attracted the biggest dollars from venture capitalists.

BEYOND MEAT

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The number of people committing to a plant-based diet is increasing – there were 3m more vegans in the US in 2018 than in 2012. Sales of alternative meat products are growing at an annual rate of 24.5%.

Drivers of the trend include preferences for greater choice, health benefits and concern about the environmental impacts of food production. The EAT-Lancet [report](#) called for a 50% reduction in meat and sugar consumption as part of a diet that is healthy for humans and the planet.

Venture capitalists committed \$1.3bn to food tech in the first five months of 2018. US firms Impossible Foods raised \$450m from investors. Tesco recently announced it would sell vegetarian foods in the meat aisle and Danone opened the largest plant-based yogurt facility in the US.

Farming groups are lobbying against the plant-based food industry using the terms ‘meat’ or ‘dairy’ to describe their products. Overall, global meat consumption is increasing, due to rising affluence in developing countries.

really care about the whole supply chain, from the farm to the warehouse to the supermarket shelves.”

A number of recent reports, including from the EAT-Lancet Commission and the World Resources Institute, recommend deep reductions in animal protein consumption due to the climate impacts of livestock production. (See [Securing the future of food on a planet in peril](#))

The EAT-Lancet [report](#), published in the British Medical Journal in January, called for a 50% reduction in meat and sugar consumption as part of a diet that is healthy for humans and the planet.

There has been some pushback in nutrition and science circles against EAT-Lancet’s recommendations. Dr Frank Mitloehner, an animal scientist from the University of California, Davis, argues that meat has been disproportionately linked to climate change emissions, citing statistics from the US Environmental Protection Agency that agriculture represents about 9% of greenhouse gas (GHG) emissions, with livestock roughly 4% of that.

The World Health Organisation (WHO) >



Danone North America opened the largest plant-based yogurt facility in the US this year.

DANONE NORTH AMERICA



IMPOSSIBLE FOODS

withdrew its sponsorship of the commission's launch in March after the Italian representative to the Geneva-based organisation questioned its scientific basis, and warned that it could lead to the loss of millions of jobs linked to animal husbandry, the production of "unhealthy" foods, and the destruction of traditional diets.

However, the World Business Council for Sustainable Development (WBCSD) describes the EAT-Lancet report as the "first to connect scientific targets for global healthy diets with those for sustainable food production", and produced a [summary of its findings for business](#).

Asked about WHO's decision to pull out of the EAT-Lancet launch, Diane Holdorf, managing director of food, land and water at WBCSD, said: "People make decisions about food based on how it tastes and if they believe it is good or healthy for them. Those are the biggest drivers in the trend for plant-based foods. But the signals we are seeing from the science are really critical." She added that more work needs to be done in nutritional research, but reports like EAT-Lancet help companies prepare for the coming shift.

NOT SO IMPOSSIBLE DREAMS

There is no question that money is flowing into the alternative-meat sector. Venture capitalists committed \$1.3bn to food tech in the first five months of 2018, compared with \$1.5bn in the whole of 2017, according to a June 2018 Pitchbook report.

Attracting the biggest dollars are US firms Impossible Foods and Beyond Meat. Impossible Foods raised \$450m from investors, >

including Microsoft Corp co-founder Bill Gates, and Beyond Meat raised \$240m in an initial public offering in May.

Both companies assert that their products not only taste better and more like real meat than any previous meatless alternatives, but are also far better for the environment.

According to an Impossible Burger spokesperson, its burger requires 87% less water, releases 89% fewer greenhouse gases, contributes 92% less water contamination, and spares 96% more land. Similarly, Beyond Meat claims it takes 99% less water, 93% less land and 50% less energy to make its plant-based burgers, and they emit 90% fewer greenhouse gases. Both companies have published lifecycle assessments to back their claims.

Whether consumer demand for these products is driven more by environmental concern or health reasons, both Impossible Foods and Beyond Meat are having a moment. Impossible Foods' burgers are flying off the shelves so fast it has experienced a shortage in the US. Burger King announced it would begin testing sales of the Impossible Burger at its St. Louis locations this spring and then roll it out to its more than 7,000 locations nationwide this year.

Beyond Meat's burgers and sausages are carried by more than 12,000 restaurants and food-service outlets in North America as well as at national chains such as Whole Foods, Kroger and Target. Mexican fast-food chain Del Taco announced it would add the first plant-based meat on its menu this year, with Beyond Tacos, made with Beyond Meat.

While it is too soon to tell whether the plant-based trend is a true disrupter of conventional animal proteins and dairy milk, a number of major food companies and retailers are hedging their bets. Tyson Foods, the biggest meat processor in the US, recently announced it would introduce a meatless protein product in coming months.

Major UK retailer Tesco recently announced it would start selling vegan and vegetarian foods in the meat aisle "to promote health and sustainability", following competitor Sainsbury's, which did so last year.

And Danone is moving decisively into plant-based beverages. In 2016, Danone North America acquired WhiteWave Foods, maker of Silk brand soy and nut beverages, and earlier this year opened the largest plant-based yogurt facility in the US.

Some food producers are also seeing the opportunity in blended products of half mushroom and half ground beef, to meet consumer demand for a healthier, more sustainable meal. Sonic



“Whether for environmental concern or health, Impossible Foods and Beyond Meat are having a moment”



(Clockwise from left) Diane Holdorf of WBCSD, Maria Lettini of FAIRR, and Erin Fitzgerald of the US Farmers & Ranchers Alliance.

Drive-In is the first to offer a blended burger at all of its over 3,500 US locations. Food service company Sodexo is replacing up to 25-30% of the beef in its school-served burgers with mushrooms. And in March, Applegate Farms, a subsidiary of Hormel Foods Corp, introduced its Great Organic Blend Burger at nationwide retailers like Kroger and Sprouts.

The Impossible Burger uses an ingredient called heme, short for leghemoglobin, a molecule found in all living organisms, and highly abundant in animals, to create its product's beefy, bloody appearance. The firm uses the heme-containing protein from the roots of soy plants, taking the DNA from soy plants and inserting it into a genetically engineered yeast.

Beyond Meat does not use heme, or soy or GMO ingredients for its burgers, opting to use only plant-based ingredients.

The use of the term "meat" does not sit well with the beef and farming industry groups, which are >



BEYOND MEAT

lobbying to make it illegal to call lab-grown or plant-based meat-alternative products “meat”.

According to Danielle Beck, senior director of the National Cattlemen’s Beef Association (NCBA) in the US: “Our members welcome competition, innovation, and consumer choice, but ... the federal government must ensure that fake meat companies are held accountable if they make baseless, unscientific claims.”

The group adds that “high-quality scientific evidence shows that beef provides high-quality protein and nutrients like iron, zinc and B vitamins, offsets nutrient deficiencies and serves as an integral part of healthy diets.”

Alan Bjerga, spokesperson for the National Milk Producers Federation, says it’s “crucial” that plant-based beverages not be called “milk”. “The dairy industry doesn’t oppose the existence of these products, but it does oppose their mislabelling,” he said.

A PASSING FAD OR HERE TO STAY?

The jury is still out on whether the enthusiasm for plant-based alternatives will live up to its current hype and reward investors. It certainly won’t happen overnight. Overall meat consumption is increasing globally, due to rising affluence in developing countries including China and Brazil. And in the US – the world’s biggest beef eater, according to the OECD – per capita consumption is growing.

“Alternative proteins are more than just a fad,

The jury is out on whether enthusiasm for plant-based alternatives will live up to the hype.

it’s a shift that is well under way, accelerating at a breakneck pace,” says Maria Lettini, executive director of FAIRR, an investor network that raises awareness of the material environmental, social and governance (ESG) risks and opportunities caused by intensive livestock production. “We simply do not have enough protein in the world to meet growing demand, and while producing animals intensively may provide a short-term and inexpensive means to that end, the irreparable damage to the environment and human health will result in a significant economic cost over the medium term.”

Erin Fitzgerald, CEO of the US Farmers & Ranchers Alliance, which represents over 100 farmer and rancher-led organisations and agricultural partners, believes it doesn’t have to be an either-or proposition.

“Given the global landscape, I think there is room for both traditional beef and animal proteins and dairy as well as plant-based foods and drinks. There are many ways to achieve a healthy and sustainable diet that is affordable and accessible, and all nutrient-dense foods have a role to play. We should not limit any nutrient-dense food as an option,” she says.

Lempert agrees. “It will never be as big as beef or chicken, but it doesn’t have to be. If we take just 20% or 25% of our diet and convert that to plant-based foods, people will feel the health benefits and it will be good for the planet as well.” ■



New hope for
**SOLUTIONS TO
DEFORESTATION**
in the Cerrado

Mark Hillsdon reports on how pre-competitive approaches such as the Soy Buyers Coalition are allowing retailers to share the costs of incentivising soy farmers to refrain from converting land

 [VIEW ONLINE](#)



“Land that is not converted or deforested provides an environmental service that is not sufficiently recognised, valued or even paid for”

THE NATURE CONSERVANCY

The Cerrado, the vast area of savannah that stretches across Brazil, has come under increasing threat from a huge boom in the global demand for soy, as [previously reported in Ethical Corporation](#). The crop now accounts for 90% of all agriculture across the landscape, and while the economic boost to Brazil has been undeniable, there has been a huge environmental impact too, with as much as half of this biodiverse ecosystem now converted to fields and grazing land.

One of the key problems that NGOs have come up against when trying to turn around this ecological disaster is that farmers in the Cerrado are legally allowed to clear up to 80% of their land for farming. And since soy has been such a lucrative crop, why should they stop?

Marina Born, president of The Round Table on Responsible Soy (RTRS), sees their point. “Land that a producer decides not to convert or deforest is land that does not produce, and as a result represents less profit,” she explains. “Similarly, land that is not converted or deforested provides an environmental service that is currently not

sufficiently recognised, valued or even paid for.”

She adds. “It is critical to have instruments and mechanisms to favour producers who introduce sustainable and responsible practices that preserve native vegetation.”

David Cleary, director of global agriculture at The Nature Conservancy (TNC), says it has to be worth farmers’ while to go down a zero-conversion route, or it is unlikely to happen.

Now he believes there may be an answer. In 2017, Brazilian NGOs, in partnership with the country’s soy trade association (ABIOVE), published a Cerrado Manifesto, based on a need for stronger control of soy production. This led to a statement of support signed by a dozen major retailers, including Tesco and Marks and Spencer, as well as other buyers of Brazilian soy such as Unilever and McDonald’s.

Toby Gardner is director of Trase, a joint Global Canopy/Stockholm Environment Institute project that aims to bring greater transparency to forest-risk commodity supply chains.

In the last five years, he says, there has been an increasing shift by businesses involved in soy, and other commodities, to approach sustainability issues in a pre-competitive way. This has included the launch of the Soy Buyers Coalition by the Consumer Goods Forum, a collective effort to identify hotspots of deforestation that are common to several different supply chains. This means >

Pio Stefanello is a farmer working with The Nature Conservancy on more sustainable soy production in the state of Para.

resources can then be pooled and the costs to each company of improving the sustainability of production can be shared.

Clary of TNC agrees that spreading the cost makes sense. “Remember that there’s a climate change benefit here as well, and governments, most of them anyway, want to do something about climate change. So companies would be able to leverage additional funding from the public sector if they acted pre-competitively.”

BUT WILL THEY DO IT?

Jean-François Timmers, WWF Global Soy Lead, says: “Some progress is being made in protecting the Cerrado, particularly with companies coming together in a pre-competitive way to incentivise farmers not to clear more land, such as with the statement of support for the Cerrado Manifesto group. But these incentives still need to be concretely implemented.”

Price rises have also been floated as a way to cover the cost of any incentives, says Gardner of Trase, but “there is a lot of resistance to placing a price premium on more sustainably [produced] soy, especially given how sensitive end-consumers are to small changes in price.” Instead, he says, giving farmers longer-term contracts that guarantee a stable price for their products can also be a major inducement not to clear more land.

The purchase of credits, issued by the Round Table on Responsible Soy certifying that soy meets its RTRS standard, is also growing, although companies will be wary of the controversies that have dogged carbon credits over the years.

The Co-op has recently funded 100% RTRS credits for the soy in its products, which it says will help make soy sustainable and deforestation free in the long term by driving responsible agriculture, including working conditions, environmental impact and agricultural best practice. The retailer is also working towards sourcing 100% sustainable and deforestation-free soy across its supply chain by 2025.

“Increasingly major companies like Co-op are recognising their need to act rapidly to eliminate deforestation and conversion,” says Timmers, “and WWF expects to see further announcements by food businesses in the near future.” Asda, Lidl and Aldi, have all recently made similar commitments.

This growing mobilisation is already having an impact, says Timmers, with WWF figures showing a year-on-year drop of 18% in deforestation and conversion rates in 2018. “Still very high – and >



Increasingly, major companies like Co-op are recognising the need to act rapidly to eliminate deforestation and conversion



The Co-op has recently funded 100% RTRS credits for the soy in its products.



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amongst the world’s highest – but decreasing” he says. “We are hopeful for much quicker and significant progress soon.”

Sarah Wakefield, the Co-op’s sustainable sourcing and Fairtrade manager, adds: “Soy plays a part in the production of many products, far more than many people realise.

“The increasing demand for animal feed and rising global consumption of meat is having a major impact on the environment in major soya-producing countries in South America, as well as the wildlife, which depends on the native vegetation for its very survival. This is an issue that will create major challenges for the environment tomorrow, unless transparent, joined-up and, decisive steps are taken today.”

The other important aspect of any future Cerrado agreement, and why Cleary has previously hailed it as “potentially the biggest deforestation victory of all time”, is that it will be an agreement that covers all habitat, not just forests.

Zero-deforestation commitments are difficult to apply to mixed landscapes like the Cerrado.

“Deforestation commitments, as the words imply, apply to forests,” he explains, and while it is straightforward to relate them to somewhere like the Amazon, it’s far more difficult to apply them to places like the Cerrado, with its mixture of wetlands, grasslands and scrub, as well as areas of forest. The same is true of other South American ecosystems such as the semi-arid Caatinga in Brazil, and Chaco dry forests of Argentina, Paraguay and Bolivia.

“It is much simpler to define, monitor and control habitat conversion in general: trying to apply a deforestation commitment to the Cerrado is just too complicated,” continues Cleary.

“And that’s the real importance of the debate in the Cerrado: it makes explicit something that has only been implicit up to now ... a deforestation commitment should not be seen as an end in itself but as a waystation on a longer journey towards committing to the protection of all habitats.” ■

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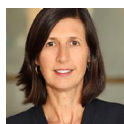
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There is big potential for innovation in animal feed made from algae.

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WHY BUSINESS HOLDS THE KEY TO A HEALTHY, FAIR AND SUSTAINABLE FOOD SYSTEM

Dr. Lesley Mitchell of Forum for the Future, argues that a sustainable food industry is within reach if companies collaborate to create dynamic new systems

The sustainability spotlight is increasingly focused on the impact of our global food system. Businesses face diverse, conflicting demands from consumers and society. The question of their role in shaping a future-fit food system is more urgent than ever in the context of increasing demand, rapid urbanisation and ever-shrinking natural resources. Is all this concern for sustainable food just another flash in the pan, and if not, what should we do?

Our understanding of human impacts on the planet has grown to recognise the effects of how we produce and consume food – both for the environment and health. In this often polarised, agenda-driven space, future signals are clear. Agriculture accounts for around a third of greenhouse gas (GHG) emissions; livestock production is around half that total. As populations and economies flourish, food demand will grow by up to 70% globally by 2050, if we don't adjust our diets.

This impact isn't evenly distributed. Demand for meat, fish and dairy will grow most in Asia and Africa, which face challenges of under-nutrition alongside increased levels of processed diets and >

over-consumption. Health metrics flag non-communicable diet-related diseases as the biggest future global health challenge, beyond tobacco or alcohol.

Controversially, the recent [EAT-Lancet report](#) called for drastic reductions in meat consumption and increased plant consumption on health grounds. The environmental message is also stark: business-as-usual growth in animal protein demand could swallow our entire remaining carbon budget to keep us under 1.5C warming by 2040. Yet the picture is dynamic – on the upside, global dairy production reduced emissions intensity by 11% in just 10 years.

But climate change is expected to reduce agricultural productivity globally by around 17% at the same time that we are seeking to increase production. UN estimates suggest we have fewer than 60 harvests left, as monoculture and productivity maximisation lead to soil degradation. The biodiversity that supports our agricultural systems, such as vital crop pollinators, is disappearing.

Financial forecasts for climate change impacts offer stark warnings for business – from Mark Carney at the Bank of England to global ratings agencies, it's clear that integrating climate transformation into business models is vital. Others highlight risks specific to the food system. From the UN Principles for Responsible Investment, to international investor consultancies such as FAIRR, investor signals emphasise risks from wider sustainability parameters. Businesses are increasingly expected to deliver the Sustainable Development Goals as the rationale for deep and



JASPER SUJITEN/SHUTTERSTOCK

The UN estimates we have fewer than 60 harvests left.

rapid transformation is becoming both value and values led.

However, it's not all doom. The rapidly shifting food system brings huge opportunities for transformation and disruption, and the future is dependent on how we act right now. So where do we start?

At Forum for the Future we've spent over 20 years partnering with companies on sustainable transformation. But some major systemic challenges require action across whole sectors. Let's look at three areas where this approach has begun to reshape the future of food: protein, fats, and regenerative agriculture.

COLLABORATING TO TRANSFORM THE FOOD SYSTEM

In 2015, Forum's Futures Centre, alongside leading businesses, began seeing signals that protein was a hot topic. With leadership from pioneering businesses such as Volac and Waitrose, alongside NGO engagement, the [Protein Challenge 2040](#) has become a dynamic international pre-competitive collaboration aiming to tackle the question: how >



Financial forecasts for climate change impacts offer stark warnings for business, from Mark Carney to global ratings agencies



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**Animal feed
accounts for 45%
of livestock GHG
emissions and a
whopping 78% for
poultry**

do we provide 10 billion people with enough protein in a way that is healthy, affordable and good for the planet? Forum brings its futures and systems expertise, while the project's multi-stakeholder leadership group works to drive change across the food system.

As Andy Richardson, director of public affairs at Volac, says: "The Protein Challenge 2040 is not about promoting personal beliefs or commercial interests but instead it is about working together with other like-minded organisations to create real change. In this way you better understand the market environment in which you operate and align your business to the future."

So far, Protein Challenge 2040 has helped to shift the narrative from "good and bad" protein

toward rebalancing protein consumption, whilst challenging leading chefs to innovate plant-protein menus. We're now working with food-service and culinary colleges who train chefs to use diverse protein sources. In the US, we've brought together food manufacturers and school districts to develop a model for transformation of a challenging food-service system to deliver more plant-based protein in children's diets.

We have also identified otherwise hidden challenges, including the role of animal feed in livestock sustainability, responsible for 45% of livestock GHG emissions, and a whopping 78% for poultry. There is significant potential for innovations such as algae and insect feeds. The resulting [Feed Compass](#) collaboration aims to >



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Protein is a major part of the sustainable nutrition puzzle, but two new collaborations aim to tackle the biggest challenges facing our food system in coming decades. Hardly anyone in food or the wider fast-moving consumer goods (FMCG) sector will have escaped the reach of the palm oil debate. While potential implications for deforestation and habitat loss are clear, sustainable solutions are a slippery challenge. Take-up of sustainable palm oil is still low, while existing substitutes are often far less efficient and removing palm can cause dire unintended consequences for land use. Innovations such as oils from algae have exciting potential, but are under-explored. An international workshop in 2018 demonstrated the sector's motivation to work together and the newly launched [Edible Fats and Oils Collaboration](#) aims to focus action.

Even deeper at the heart of sustainable nutrition are our food production systems. The green revolution was successful in increasing productivity, but externalised many costs – from loss of soil, to impacts of monoculture on biodiversity. However we feed the world, the warnings are that we have to act now to regenerate agriculture. Rebuilding soil health can act as a major carbon sink, enabling resilient food systems and restoring the natural resources we depend on. This requires collaborative systemic action to make regenerative production viable as the mainstream, and we're working to build regenerative collaborations to accelerate its potential.

The picture is far from bleak. Business has a leading role to play in transforming the food system to be resilient, productive, viable and flourishing now and in future. Collaboration is key to meeting the scale and urgency of the challenge, and building a good future for food. ■



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Take-up of sustainable palm oil is still low, while removing palm can cause dire unintended consequences for land use

enable the feed, livestock and food industry system to radically reshape itself, working with producers and retailers to design and use a framework to include sustainability in decision-making on feed.

The increased global attention to sustainable nutrition has driven the growth of diverse collaborations, partnerships, research and innovation, and the potential for disparate signals and confusion is clear. Looking forward, we are aligning with other initiatives to ensure we work together on common goals and play to each other's strengths.

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FROM  The Nature Conservancy

CATALYSING THE BLUE REVOLUTION

An opportunity to shape the future of sustainable seafood supply

By Robert Jones, global aquaculture strategy lead, The Nature Conservancy and Jason Scott, co-managing partner at Encourage Capital

 [VIEW ONLINE](#)

Aquaculture is the fastest-growing form of food production, as well as one of the most resource-efficient forms of animal-protein production, when done right. How the industry develops will help determine the sustainability of the booming global seafood trade.

With consumer awareness finally starting to catch up with the imperative for more sustainable food systems, market forces are shifting in favour of those who can produce >

FROM  The Nature Conservancy

food with less impact. Demand for sustainable seafood, for example, is [growing much faster than the conventional market](#).

That's a big market: seafood is the [primary source of protein for over 3 billion people](#), and fish is the single-most traded food-based commodity in the world. And with many of the ocean's wild-caught fish already in decline, more and more of this demand will likely be filled by aquaculture.

Aquaculture is currently the fastest-growing form of food production, and one that has significant economic, social and environmental implications. A \$243bn industry, aquaculture employs 20 million people worldwide and supplies more than half of the world's seafood, and current projections anticipate a 6% rate of growth.

While farming seafood remains one of the most efficient ways of producing animal protein overall, it's had an inconsistent environmental record, and localised environmental impacts have been a major challenge. Some practices have been linked to water pollution, habitat destruction and a range of impacts on wild fish populations.

Today, the industry is at an inflection point. If business continues as usual, the global reliance

on seafood could jeopardise marine ecosystems and the livelihoods they support in myriad ways, especially in coastal communities and the developing world. But if production is shifted toward the most sustainable forms of aquaculture, we can foster both healthier oceans and a stronger global food system.

This shift presents an opportunity that is both environmental and financial in nature: the key will be how we direct future investments in the industry. Current forecasts suggest aquaculture companies will need \$150bn to \$300bn in capital expenditures in the next 10 years to build out the infrastructure required to accommodate growing consumer demand. That means impact investors, those who seek environmental or social impact as well as financial returns from their investments, can help steer the future of the industry by directing investments toward the most sustainable forms of aquaculture.

Driving additional investment toward production methods with lower environmental impacts can help ensure these systems achieve commercial scale and become more competitive relative to conventional production systems. For companies >

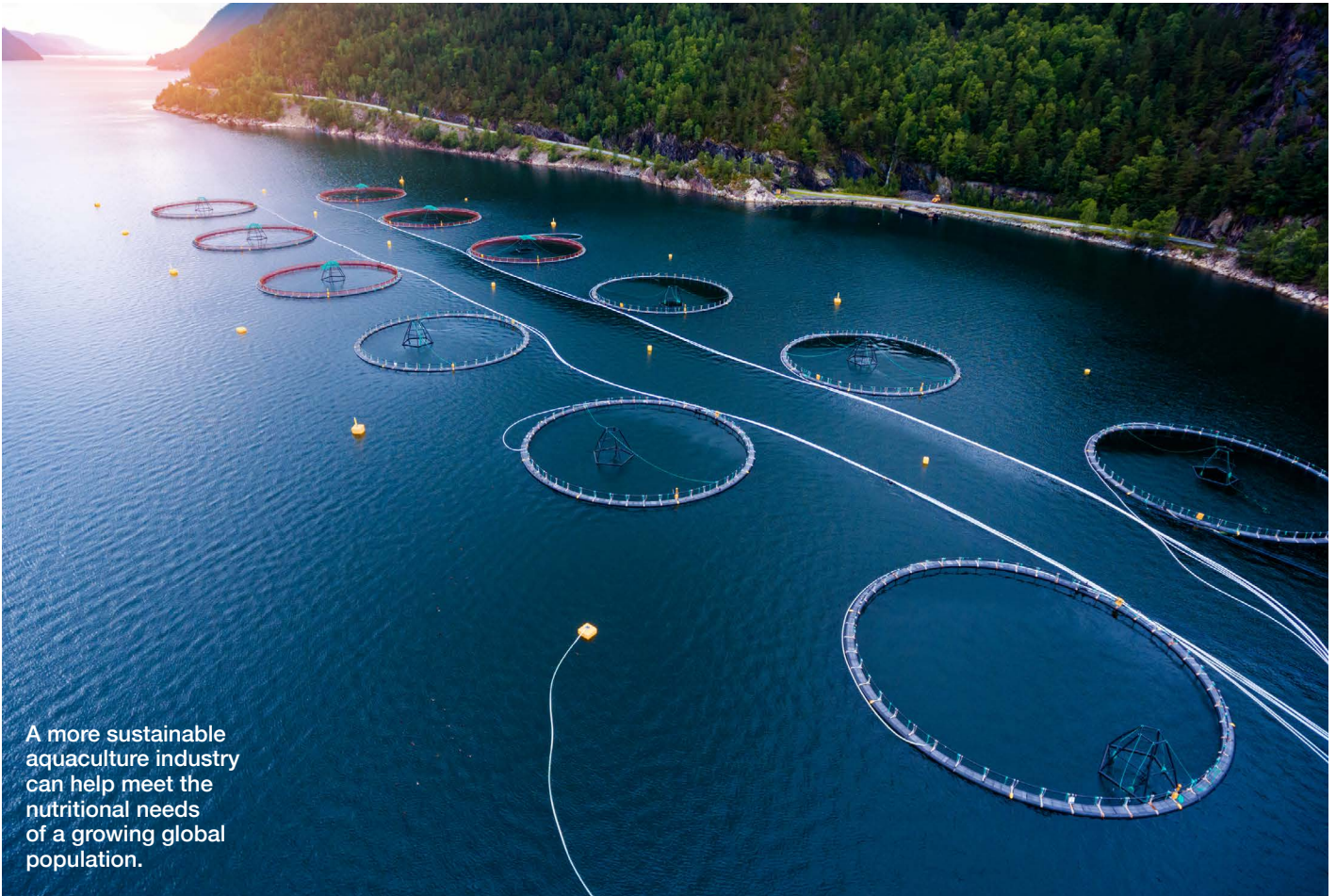
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 The Nature Conservancy

Seafood is the primary source of protein for more than 3bn people.



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A more sustainable aquaculture industry can help meet the nutritional needs of a growing global population.

ANDREY ARMYGOV/SHUTTERSTOCK



BJOERN WYLEZICH /SHUTTERSTOCK

looking to scale up in anticipation of growing demand, especially for more sustainably produced seafood, the availability of impact capital could incentivise them to invest in more sustainable production systems. And for investors with a longer-term outlook, these farming methods present a compelling opportunity to invest in the sector while helping to shape a sustainable emerging food system.

To help catalyse this opportunity, The Nature Conservancy (TNC) and Encourage Capital have partnered to create a [guide to impact investing in sustainable aquaculture](#). This represents the first attempt to comprehensively assess this space through both a financial and environmental lens. A more sustainable aquaculture industry can not only help to meet the nutritional needs of a growing global population, but also generate environmental and social benefits for coastal communities and provide investment opportunities with compelling financial returns.

The guide focuses primarily on the production stage of the supply chain, as opposed to innovative feeds, monitoring systems or consumer-facing products. Production systems are core to >



MANDY GODBEHEAR/SHUTTERSTOCK

addressing aquaculture's sustainability challenge, so we determined that this would be an ideal starting point for the blue revolution we envision.

Production systems also represent a unique investment opportunity because of the long-term demand for seafood products and the value inherent in owning a real asset. And while investing in production does carry risks, experience with other emerging technologies such as wind, solar and battery storage have taught us lessons about the optimal way to structure capital for these projects. With all this in mind, the guide addresses three attractive opportunities for impact investment: seaweed and bivalve systems, on-land finfish (fish species, as opposed to shellfish or other aquatic species) recirculating aquaculture systems (RAS) and off-shore finfish systems.

Seaweed and bivalves – a category of shellfish that includes oysters, clams and scallops – are an easy sell, especially when it comes to major retailers keeping up with demand. Not only do they require few inputs, but each has been shown to have [restorative effects](#) on degraded habitats by

Demand for sustainable seafood is growing much faster than the conventional market.

improving water quality, providing habitat for other species and reducing excess nutrients from their immediate environment. The ecological incentives, combined with a growing interest in both species groups for food and non-food uses, create an opportunity to expand production both in scale and geographic scope.

While RAS and off-shore finfish systems are relatively new, they could avoid many of the impacts that plague production by physically separating operations from the marine environment and siting farms away from critical habitats, respectively. With 90% of global wild fish stocks overfished or fully fished, there is hope that these novel forms of fish farming, when practiced well, could create an alternative supply to overfished wild stocks.

All of this adds up to a rare opportunity: a chance to generate compelling financial returns for investors and help businesses generate products that are in line with what consumers expect, all while tackling one of the signature challenges of our era: feeding a growing population without degrading the environment. ■

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