

Growing Better:

Ten Critical Transitions to Transform Food and Land Use



The Global Consultation Report
of the Food and Land Use Coalition
September 2019



The
Food and Land Use
Coalition

Table of Contents

| | |
|--|----|
| Foreword | 4 |
| Acknowledgements | 6 |
| Executive summary | 9 |
| Annex A: | |
| FOLU partners, supporters and Ambassadors | 23 |
| FOLU country platforms | 26 |
| References | 31 |

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Cover image:

Villagers of the Sagai forest villages in the Narmada district of Gujarat, India, where land rights have been reinstated to the community members, enabling them to make a better living by restoring and protecting the land and forests they depend on.

Foreword

Transforming the world's food and land use systems is necessary to achieve the targets for climate and sustainable development set out in the 2015 Sustainable Development Goals and the Paris Agreement on climate change. The Food and Land Use Coalition (FOLU) was launched in 2017 to catalyse and speed up this transformation.

The term "food and land use systems" covers every factor in the ways land is used and food is produced, stored, packed, processed, traded, distributed, marketed, consumed and disposed of. It embraces the social, political, economic and environmental systems that influence and are influenced by those activities. Food from aquatic systems, marine and freshwater, is also included in the definition because fish (wild and farmed) accounts for a significant share of the protein in human diets and this share will potentially increase.ⁱ The report also covers agriculture for non-food purposes, such as bioenergy, fibres for textiles and plantation forestry products, as these already compete with food for fertile land and the competition could intensify in the future.ⁱⁱ

To achieve its purpose, FOLU develops knowledge, tools and partnership platforms to help those involved in economic and political decision-making to identify and pursue pathways to sustainable food and land use systems. We demonstrate that applying systems thinking to these tasks can foster productive, prosperous rural economies, protect and value natural resources and ecosystems, and provide nutritious, affordable food to a growing global population.

FOLU's work divides between (i) making the strategic case for rapid change, (ii) supporting countries with their food and land use planning, policy and market redesign, (iii) empowering diverse change leaders across public, private and civil society sectors, (iv) developing evidence-based transformation pathways and (v) accelerating shifts throughout the private sector.

FOLU values independent, science-based thought leadership and policy recommendations and engages diverse stakeholders in their development. We believe business has a critical role to play in achieving the outcomes for climate, biodiversity, public health and prosperous livelihoods that the world needs. The World Business Council for Sustainable Development, a FOLU core partner, convenes business leaders to support them in this role. FOLU acknowledges the invaluable contribution of Unilever, Yara International and the Business and Sustainable Development Commission in nurturing our initial development.

For more information, please visit our website at www.foodandlandusecoalition.org

ⁱ FOLU recognises the importance of the ocean as an essential source of protein and many other critical ecosystem services. We address the role of the ocean in the critical transition 4 on "Securing a healthy and productive ocean" and will look to strengthen our work on this critical aspect of the overall food and land use agenda over the coming years.

ⁱⁱ See Box 25 in critical transition 3 on Protecting and Restoring Nature in Chapter 3 of the full online report.

The FOLU community continues to grow and evolve.

It currently comprises the following elements:

Core Partners: organisations responsible for the Coalition's global-level initiatives and engagement.

These include:

- Alliance for a Green Revolution in Africa (AGRA)
- EAT
- Global Alliance for Improved Nutrition (GAIN)
- International Institute for Applied Systems Analysis (IIASA)
- Sustainable Development Solutions Network (SDSN)
- SYSTEMIQ
- World Business Council for Sustainable Development (WBCSD)
- World Resources Institute (WRI)

FOLU Country Platforms: stakeholder networks that support the development and implementation of food and land use transformation strategies at the national level, including through the FABLE Consortium which currently comprises independent research teams from 18 countries, including the European Union (see Box 39 in Chapter 3 of the full online report).ⁱⁱⁱ

Ambassadors: professionals who serve in an individual capacity, drawing on their expertise to support FOLU's objectives.

Supporters: donors and philanthropic organisations providing financial support to our work.

These include:

- The Gordon and Betty Moore Foundation
- The MAVA Foundation
- Norway's International Climate and Forest Initiative (NICFI)
- The UK Department for International Development (DFID)

ⁱⁱⁱ These independent research teams do not necessarily reflect the views of their respective governments.

The final report and its content are the sole responsibility of the Food and Land Use Coalition as represented by the undersigned:

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FOLU Country Institution Leads: Sofia Ahmed (WRI Africa, FOLU Ethiopia), Eli Court (Land Use Futures Project, FOLU Australia), Xiaotian Fu (WRI China, FOLU China), Vijay Kumar (TERI, FOLU India), Claudia Martinez (E3 Asesorías, FOLU Colombia), Sonny Mumbunan (WRI Indonesia, FOLU Indonesia), Sue Pritchard (RSA, FOLU UK) and Amanda Wood (Stockholm Resilience Centre, FOLU Nordics).

Acknowledgements

This publication is funded by the Gordon and Betty Moore Foundation, the MAVA Foundation and NICFI.

The field of food and land use systems is full of institutions and talented individuals doing exceptional work. We have gratefully drawn upon all of them and wish to acknowledge our debt in that regard. There is also a rich and extensive body of existing research and analysis. The bibliography in the full online report details the key reports and analyses consulted by this report's authors.

We would in particular like to acknowledge our debts to the following institutions outside of the Coalition:

Food and agriculture:

Chinese Academy of Agricultural Sciences
Cornell University
Cranfield University
Brazilian Agricultural Research Corporation (EMBRAPA)
Global Alliance for the Future of Food
International Federation of Organic Agriculture Movements (IFOAM)
International Food Policy Research Institute (IFPRI)
Alliance for a Green Revolution in Africa
Consultative Group on International Agricultural Research (CGIAR) centres
Food and Agriculture Organization of the United Nations (FAO)
Sustainable Food Trust
University of California, Davis
University of Leuven
Wageningen University
World Farmers Organisation
World Vegetable Center

Environment:

Bioversity International
CGIAR Research Program on Water, Land and Ecosystems
Columbia University
Conservation International
Environmental Market Solutions Lab (emLab) at the University of California, Santa Barbara
Global Environment Facility (GEF)
Alexander von Humboldt Biological Resources Research Institute

Hoffmann Centre For Sustainable Resource Economy at Chatham House
Stanford University
The Economics of Ecosystems and Biodiversity (TEEB)
The Nature Conservancy
The United Nations Environment Programme (UNEP)
The Intergovernmental Panel on Climate Change (IPCC)
In particular, we would like to thank the authors of Climate Change and Land: An IPCC Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security and Greenhouse Gas Fluxes, published August 2019
The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)
The International Resource Panel
WorldFish
World Wildlife Fund (WWF)

Health:

The CGIAR Research Program on Agriculture for Nutrition and Health
The Institute for Health Metrics and Evaluation (University of Washington and the Global Burden of Disease)
Johns Hopkins University
The Leverhulme Centre for Integrative Research on Agriculture and Health (LCIRAH)
Partners in Public Health
Tufts University
The World Health Organization (WHO)
UNICEF



Left: Ma Jinzhong joined the farm in 2013 and is now overseeing the greenhouses at the Pear Garden Farm in Beijing, China. He reflects on how farming approaches are going back to traditional ways: "We used cow manure before, and we use it now. I am going back to how I worked in the beginning." Right: Balaynesh Kasa with three of her children. She farms hops at a watershed restoration and homestead development in Bahir Dar, the Amhara Region of Ethiopia. This provides her with enough income to support her family and send her four children to school.

FOLU would like to thank the large number of individuals and institutions that have generously contributed time and energy to comment on various drafts of this report. They include:

Peter Alexander

(University of Edinburgh),

Fitrian Ardiansyah

(IDH-The Sustainable Trade Initiative),

Tim Benton

(University of Leeds),

Joao Campari

(Food Practice Leader, WWF International),

Arne Cartridge

(Yara International),

Emma Chow

(Ellen MacArthur Foundation's Food initiative),

Nicolas Denis

(McKinsey & Company),

Philip Duffy

(Woods Hole Research Center),

John Ehrmann

(Meridian Institute),

Nadia El Hage Scialabba

(UN FAO),

Volkert Engelsman

(Eosta),

Madhur Gautam

(Agriculture Global Practice at the World Bank),

Daniela Goehler

(Deutsche Gesellschaft für Internationale Zusammenarbeit, on behalf of the German Federal Ministry for the Environment),

Norbert Gorissen

(German Federal Ministry for the Environment),

Claire Kneller

(WRAP Global),

Joost Oorthuizen

(IDH-The Sustainable Trade Initiative),

Janez Potočnik

(International Resource Panel),

Tim Lang

(City, University of London),

Michael Lesnic

(Meridian Institute),

Martin Lok

(Natural Capital Coalition),

Steven Lord

(University of Oxford),

Will Martin

(IFPRI and the International Association of Agricultural Economists),

Robin Maynard

(Population Matters),

Marco Meloni

(Ellen MacArthur Foundation),

Sabine Miltner

(Conservation and Markets, Gordon and Betty Moore Foundation),

Melissa Miners

(Unilever),

David Nabarro

(4SD),

Walt Reid

(Conservation and Science, the David and Lucile Packard Foundation),

Ruth Richardson

(Global Alliance for the Future of Food),

Marta Santamaria

(Natural Capital Coalition),

Jeff Seabright

(formerly Unilever; IMAGINE),

Bernhard Mauritz Stormyr

(Yara International),

Pavan Sukhdev

(President, WWF International),

Pablo Vieira

(NDC Partnership Support Unit),

Christina Voigt

(University of Oslo),

Robin Willoughby

(OXFAM),

Simon Zadek

(UNEP),

Dan Zarin

(Climate and Land Use Alliances).

FOLU would also like to thank the authors and peer reviewers of the new research and analysis which has been commissioned for this report, including:

- **Charles Victor Barber and Karen Winfield**, *Forest and Fisheries Crime – Understanding and Overcoming a Key Barrier to Achieving Sustainable Food and Land Use Goals*, WRI/FOLU Working Paper, due 2019
- **Chris Costello, Christopher Free, Jason Maier, Tracey Mangin and Andrew Plantinga**, *Estimating the Ocean's True Potential for Feeding the Planet*, emLab, University of California, Santa Barbara, 2019
- **Diletta Giuliani and Katherine Stodulka**, *Better Finance, Better Food: Investing in the New Food and Land Use Economy*, SYSTEMIQ (Blended Finance Taskforce), 2019
- **Douglas Flynn, Sanna O'Connor and Morten Rossé**, *Prosperous Forests in the Tropical Belt*, SYSTEMIQ, 2019
- **Christophe Bellmann, Jonathan Hepburn and Bernice Lee**, *Impacts, Barriers and Opportunities: Where Can International Trade Hinder or Help Deliver a Sustainable Food and Land Use System?*, Hoffmann Centre for Sustainable Resource Economy at Chatham House, 2019
- **Juliano Assunção**, *Markets, Policies, and Technology: Pathways for Zero Deforestation Agriculture*, Pontifical Catholic University of Rio de Janeiro, 2019
- **Rohini Chaturvedi, Helen Ding, Craig Hanson and Frances Seymour**, *Public Sector Measures to Conserve and Restore Forests: Overcoming Barriers*, WRI, 2019
- **Abdullah Mamun, Will Martin and Simla Tokgoz**, *Reforming Agricultural Subsidies for Improved Environmental Outcomes*, IFPRI, 2019
- **Paul Burgess, Lynda Deeks, Anil Graves and Jim Harris**, *Regenerative Agriculture: Identifying the Impact, Enabling the Potential*, Cranfield University, 2019
- **Chris Costello**, *Seafood Demand Literature Review: Consumer Preferences, Drivers of Seafood Demand, and Demand for Sustainable Ocean Management*, emLab, University of California, Santa Barbara, 2019
- **Assan Ng'ombe and Julia Turner**, *People, Health and Nature: A Sub-Saharan African Transformation Agenda*, SYSTEMIQ and AGRA, 2019
- **Christophe Bellmann, Isadora Ferreira, Jonathan Hepburn and Bernice Lee**, *The Global Food Value Chain: A Snapshot*, Hoffmann Centre for Sustainable Resource Economy at Chatham House, 2019
- **Brian Walsh and Julie Rozenberg**, *The Poverty Impacts of the FOLU Transformation*, 2019
- **Alex Blei**, *Urban Expansion and Cropland Impacts*, Marron Institute of Urban Management, New York University, 2019
- **Andre Deppermann, Hugo Valin, Mykola Gusti, Miroslav Batka, Jinfeng Chang, Christian Folberth, Stefan Frank, Petr Havlík, Nikolay Khabarov, Pekka Lauri, David Leclère, Amanda Palazzo, Frank Sperling, Marcus Thomson, and Michael Obersteiner**, *IIASA-FOLU Integrated Scenarios Global Biosphere Management Model Project*, IIASA, 2019

The FOLU Global Report team is grateful for the insights and case studies relevant to corporate stakeholders provided by the WBCSD. The report's recommendations are grounded in detailed modelling work conducted by the team at IIASA. Their work was augmented by the Global Burden of Disease research lab at the University of Washington and by an independent analyst using the World Bank Shockwaves model. We are grateful to all those involved. In addition, IIASA received technical support from the modelling teams at Projecting Responses of Ecological Diversity In Changing Terrestrial Systems (PREDICTS) at the London Natural History Museum and the United Nations Environment World Conservation Monitoring Centre (UNEP-WCMC), as well as teams at the PBL Netherlands Environmental Assessment Agency using the Integrated Model to Assess the Global Environment (IMAGE). We would also like to thank Ashkan Afshin (University of Washington), and Julie Rozenberg and Brian Walsh (The World Bank). For details of the modelling please see the Executive Summary, Chapters 1 and 4, as well as the technical annex (Annex B) in the full online report.

We particularly want to thank the core team at SYSTEMIQ that has delivered the bulk of the work for this report: Maximilian Bucher, Gina Campbell, Annabel Farr, Natasha Ferrari, Douglas Flynn, Diletta Giuliani, Elinor Newman-Beckett, Sanna O'Connor, Alexandra Philips, Lloyd Pinnell, Rupert Simons, Talia Smith, Katherine Stodulka, Julia Turner and George Wiggin.

A number of people from FOLU Core Partner institutions and the FOLU Ambassador network made important contributions. Our special thanks go to Andreas Merkl for his support at a crucial junction as well as: Alison Cairns (WBCSD), Ed Davey (WRI), Fabrice DeClerck (EAT), Jessica Fanzo (Johns Hopkins Berman Institute of Bioethics), Lawrence Haddad (GAIN), Craig Hanson (WRI), Sharada Keats (GAIN), Michael Obersteiner (IIASA), Guido Schmidt-Traub (SDSN), Tim Searchinger (WRI), Ann Tutwiler (Meridian Institute) and Richard Waite (WRI).

Executive summary

“You may delay, but time will not.”

Benjamin Franklin

The world faces a remarkable opportunity to transform food and land use systems over the next ten years. This report lays out the scientific evidence and economic case that demonstrate that, by 2030, food and land use systems can help bring climate change under control, safeguard biological diversity, ensure healthier diets for all, drastically improve food security and create more inclusive rural economies. And they can do that while reaping a societal return that is more than 15 times the related investment cost (estimated at less than 0.5 percent of global GDP) and creating new business opportunities worth up to \$4.5 trillion a year by 2030.¹ Delivering such a transformation will be challenging but will ensure that food and land use systems play their part in delivering the Sustainable Development Goals (SDGs) and the Paris Agreement targets on climate change.

Leaving these systems to continue on current trends, by contrast, means sleepwalking into a scenario wherein climate change, sea-level rise and extreme-weather events increasingly threaten human life, biodiversity and natural resources are depleted, people increasingly suffer life-threatening, diet-induced diseases, food security is compromised, and socioeconomic development is seriously impaired. Such a pathway would place the SDGs and the Paris Agreement targets out of reach and within a few decades threaten our collective security.

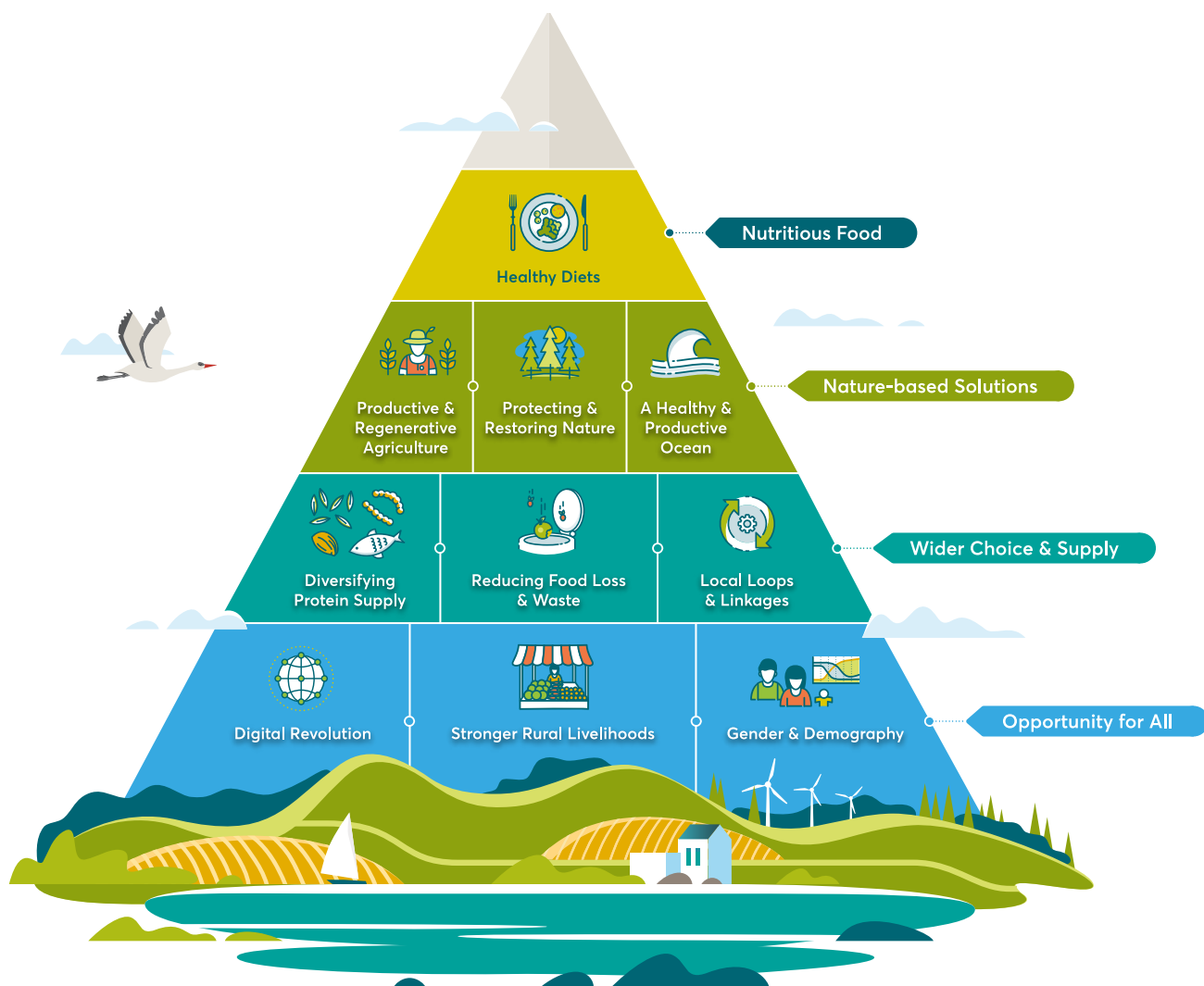
Transformation of food and land use systems thus needs to become an urgent priority globally – for leaders in the public and private sectors, and for civil society, multilateral institutions, the research community, consumers and citizens.

To support such leadership, this report from the Food and Land Use Coalition (FOLU) proposes a reform agenda. This agenda is centred around ten critical transitions that would enable food and land use systems to provide food security and healthy diets for a global population of over nine billion by 2050, while also tackling our core climate, biodiversity, health and poverty challenges (Exhibit 1). The specifics of the reform programme will inevitably vary from one country to the next, and from one community to the next. But all countries and communities could benefit from taking a holistic approach to the transformation of food and land use systems, combining the massive opportunities that are becoming available in respect of “nutritious food”, “nature-based solutions”, “wider choice and supply” and “opportunity for all” agendas.

Conceiving of the programme as a pyramid, the transition at the apex is toward diets that are conducive to good human and planetary health. This is because the consumption patterns of more than nine billion people – what they choose to eat and how they make (or are influenced to make) those choices – are the critical factors shaping how food and land use systems evolve. Empowering consumers to make better-informed decisions that are healthier for them and for the planet ignites the whole reform agenda.

At the second level, the power of nature-based solutions is mobilised to create more productive, regenerative techniques of food production, new approaches to protecting forests and other critical ecosystems, and new ways to manage the ocean in order to protect ocean life and increase ocean protein production. All nature-based solutions have common features. They require effective legal mechanisms to protect natural capital. They require producers – farmers, fishermen and indigenous communities – to be paid transparently and fairly for the ecosystem services they provide. And they show that it is possible simultaneously to strengthen food security, tackle climate change and protect biodiversity. No trade-off is necessary.

Growing Better: Ten Critical Transitions to Transform Food and Land Use



Economic Prize
 \$5.7 trillion economic prize by 2030 and \$10.5 by 2050 based on avoided hidden costs

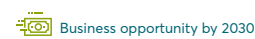
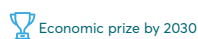
Investment Requirements
 \$300-\$350 billion required each year for the transformation of food and land use systems to 2030

Business Opportunity
 \$4.5 trillion annual opportunity for businesses associated with the ten critical transitions by 2030

Cross Cutting Reforms to Transform Food and Land Use

| | | | | |
|--|--|---|--|---|
|  |  |  |  |  |
| <p>Government: Establish targets; break down governmental silos; put a price on carbon; land use planning; repurpose agricultural support and public procurement; massively increase R&D and target it on healthy, natural solutions.</p> | <p>Business & Farmers: Organise pre-competitively to support government reform agendas and set internal standards for specific sectors; establish true cost accounting for food and land use.</p> | <p>Investors & Financial Institutions: Build on the Task Force on Climate-related Financial Disclosures to cover nature; develop a set of financing principles for food and land use; develop innovative finance instruments, including blended finance, to manage risks and leverage opportunities.</p> | <p>Participants in multilateral processes and multi-stakeholder partnerships: Raise ambition in the United Nations Framework Convention on Climate Change 2020 stock-take and ensure an ambitious outcome in the 2020 Convention on Biological Diversity in Kunming, China.</p> | <p>Civil Society: Drive information campaigns for food and land use reform and direct campaigns against serial offenders (public and private).</p> |

FINANCIALS KEY



| Ten Critical Transitions | | Essential Actions | Financials (by 2030) |
|---|---|---|--|
| <p>Healthy Diets</p> | <p>Global diets need to converge towards local variations of the "human and planetary health diet" – a predominantly plant-based diet which includes more protective foods (fruits, vegetables and whole grains), a diverse protein supply, and reduced consumption of sugar, salt and highly processed foods. As a result, consumers will enjoy a broader range of high-quality, nutritious and affordable foods.</p> | <p>Government: Establish and promote planetary and human health dietary standards through repurposed agricultural subsidies, targeted public food procurement, taxes and regulations on unhealthy food</p> <p>Business: Redesign product portfolios based on the human and planetary health diet</p> | <p> \$1.28 trillion</p> <p> \$30 billion</p> <p> \$2 trillion</p> |
| <p>Productive & Regenerative Agriculture</p> | <p>Agricultural systems that are both productive and regenerative will combine traditional techniques, such as crop rotation, controlled livestock grazing systems and agroforestry, with advanced precision farming technologies which support more judicious use of inputs including land, water and synthetic and bio-based fertilisers and pesticides.</p> | <p>Government & Business: Scale up payments for ecosystem services (soil carbon/health and agrobiodiversity) plus improve extension services (training and access to technology, seeds, etc.)</p> <p>Business & Investors: Shift procurement from buying commodities to investing in sustainable supply chains; deploy innovative finance to reach currently underfinanced parts of supply chains</p> | <p> \$1.17 trillion</p> <p> \$35-40 billion</p> <p> \$530 billion</p> |
| <p>Protecting & Restoring Nature</p> | <p>Nature must be protected and restored. This requires an end to the conversion of forests and other natural ecosystems and massive investment in restoration at scale; approximately 300 million hectares of tropical forests need to be put into restoration by 2030.</p> | <p>Government: Put in place and enforce a moratorium on the conversion of natural ecosystems, and give legal rights and recognition to the territories of indigenous peoples</p> <p>Government: Scale REDD+ to \$50 billion per year by 2030 if results delivered and establish a Global Alliance Against Environmental Crime</p> <p>Business: Establish transparent and deforestation-free supply chains and demand the same of suppliers</p> | <p> \$895 billion</p> <p> \$45-65 billion</p> <p> \$200 billion</p> |
| <p>A Healthy & Productive Ocean</p> | <p>Sustainable fishing and aquaculture can deliver increased supply of ocean proteins, reducing demand for land and supporting healthier, and more diverse diets. This is only possible if essential habitats – estuaries, wetlands, mangrove forests and coral reefs – are protected and restored and if nutrient and plastic pollution are curbed.</p> | <p>Government: Protect breeding grounds, end both illegal fishing and overfishing, and provide title/ access rights to artisanal fishers</p> <p>Government & Investors: Develop new approaches and business models for insurance against catastrophic events affecting fisheries (storms, warming events, reef collapse) and for compensating poor fishermen for the cost of fish stock recovery</p> | <p> \$350 billion</p> <p> \$10 billion</p> <p> \$345 billion</p> |
| <p>Diversifying Protein Supply</p> | <p>Rapid development of diversified sources of protein would complement the global transition to healthy diets. Diversification of human protein supply falls into four main categories: aquatic, plant-based, insect-based and laboratory-cultured. These last three sources alone could account for up to 10 percent of the global protein market by 2030 and are expected to scale rapidly.</p> | <p>Government: Use public procurement to secure long-term offtake for alternative protein sources</p> <p>Government: Increase R&D spending in alternative proteins (especially those with large benefits for lower-income consumers) and ensure that the resulting intellectual property remains in the public domain</p> | <p> \$240 billion</p> <p> \$15-25 billion</p> <p> \$240 billion</p> |
| <p>Reducing Food Loss & Waste</p> | <p>Approximately one third of food produced is lost or wasted. To produce this food that is never eaten by people requires an agricultural area almost the size of the United States. Reducing food loss and waste by just 25 percent would therefore lead to significant benefits relating to environmental, health, inclusion and food security.</p> | <p>Government: Regulate and incentivise companies to report on and reduce food loss and waste</p> <p>Investors: Finance income-sensitive, climate-smart storage technologies</p> | <p> \$455 billion</p> <p> \$30 billion</p> <p> \$255 billion</p> |
| <p>Local Loops & Linkages</p> | <p>With 80 percent of food projected to be consumed in cities by 2050, what urban dwellers choose to eat and how their needs are supplied will largely shape food and land use systems. This transition sets out the opportunity to strengthen and scale efficient and sustainable local food economies in towns and cities.</p> | <p>Investors: Invest in emerging technologies and innovations which will close the food system loop</p> <p>Government: City governments to foster local circular food economy through targeted public procurement and zoning</p> | <p> \$240 billion</p> <p> \$10 billion</p> <p> \$215 billion</p> |
| <p>Harnessing the Digital Revolution</p> | <p>Digitisation of food and land use systems is occurring through gene-editing techniques, precision farming, and logistics and digital marketing tools, enabling producers and consumers to make better, more informed choices, and to connect to the value chain rapidly and efficiently.</p> | <p>Government: Open access to public sector data (e.g. on national land registries, fisheries, agriculture, soil health etc.) and regulate and incentivise the private sector to provide open source data where appropriate</p> <p>Civil Society: Create, maintain and communicate results from real-time platforms for transparency, as is currently done through Global Forest Watch</p> | <p> \$540 billion</p> <p> \$15 billion</p> <p> \$240 billion</p> |
| <p>Stronger Rural Livelihoods</p> | <p>Underlying all ten critical transitions is a vision of rural areas transformed into places of hope and opportunity, where thriving communities can adapt to new challenges, protect and regenerate natural capital and invest in a better future. Ensuring a just transition.</p> | <p>All: Establish public-private-philanthropic partnerships to train a new generation of young farmer entrepreneurs over the next decade</p> <p>All: Scale up rural roads and digital investments to drive productivity, end rural isolation, and, in particular, initiate a global campaign for renewable electricity access for all</p> <p>Government: Safety nets for individuals and stranded communities to ensure a just transition</p> | <p> \$300 billion</p> <p> \$95-110 billion</p> <p> \$440 billion</p> |
| <p>Gender & Demography</p> | <p>Women can be enormously powerful in shaping food and land use systems, thanks to their central role in agriculture and in decisions concerning nutrition, health and family planning. Making sure women have equal access to resources, such as land, labour, water, credit and other services, should be central to policies concerning the ten critical transitions, including by accelerating the demographic transition to a replacement rate of fertility in all countries.</p> | <p>All: Invest in maternal and child health and nutrition as well as education for women and girls</p> <p>All: Ensure access to reproductive health services and products</p> | <p> \$195 billion</p> <p> \$15 billion</p> <p> n/a</p> |

The third level of the pyramid is made up of transitions that expand consumer choice and supply, especially of resource-intensive, healthy foods such as proteins. Accelerating the diversification of protein supplies, reducing food loss and waste, and creating more local supply chains, together with tighter resource looping, are all ways to diversify supply, reduce environmental pressures and expand consumer access to affordable, healthy food. All need different forms of public-private partnership and behaviour change, often at a local level, if they are to lend themselves to being scaled up fast.

Finally, the pyramid's foundation puts opportunity for all at the heart of the transformation. The transitions at this level will ensure that digitisation empowers people rather than concentrates data, that investment is made in the talent, infrastructure and social systems needed for a rural renaissance, and that women are supported in making choices that are better for themselves, their families and communities.

Why the hurry? Why not wait?

The need for urgent change is not obvious. On the surface, food and land use systems have been doing well in recent decades. Despite a growing global population, more and more people enjoy affordable, safe and plentiful food. But dig deeper, and the end-to-end system losses are well over 50 percent as a result of poorly allocated land and water resources, slow diffusion of best farming practice beyond large farms, under-investment in rural infrastructure and human capital, and food loss and waste amounting to one-third of primary production.² Food and land use systems also generate "hidden" environmental, health and poverty costs estimated at almost \$12 trillion a year, a number larger than the value of the system's world output measured at market prices (Exhibit 2).³

- **Environmental costs.** Current food and land use systems cause up to 30 percent of total greenhouse gas emissions driving climate change and are the leading cause of the continuing conversion of the world's tropical forests,^{iv} grasslands, wetlands and other remaining natural habitats – and thus the main culprit of the ongoing "sixth extinction"^v of biodiversity.⁴
- **Health costs.** In addition to the direct impact of agricultural pollution on public health, food systems generate widespread malnutrition. More than 820 million people, most of them in sub-Saharan Africa and South Asia, still regularly go hungry.⁵ At the same time, some 680 million adults are obese.⁶ On current trends, half of the world's population will suffer from malnutrition and related health effects by 2030, placing a heavy financial and operational burden on health services and reducing productive potential.⁷
- **Socio-economic costs.** These perpetuate poverty and inequality. Two-thirds of the 740 million people living in extreme poverty (on less than \$1.90 a day purchasing power parity (PPP) 2011) are agricultural workers and their dependents.^{vi} Where smallholders participate in markets that are becoming structurally more concentrated, they often receive minimal returns: coffee farmers earn around one percent of the retail value of a cup of coffee sold on high streets across the world.⁸ Underinvested, inequitable food and land use systems consign many to lives of constant insecurity.

The future looks grim unless these costs are tackled now. Modelling carried out for this report shows that leaving food and land use systems on their current trajectory would put the SDGs and the Paris Agreement targets beyond reach. Catastrophes previously considered "tail end" risks^{vii}, such as concurrent crop failures in several of the world's main food-producing regions, would become increasingly likely, causing untold human misery.

^{iv} Forests function as carbon sinks by removing carbon dioxide from the atmosphere during photosynthesis. Atmospheric carbon dioxide is fixed into the plant's chlorophyll and the carbon is integrated to complex organic molecules which are then used by the whole plant. When forests are cleared, for example through burning, they release the carbon within the plant into the atmosphere, becoming a source of carbon dioxide.

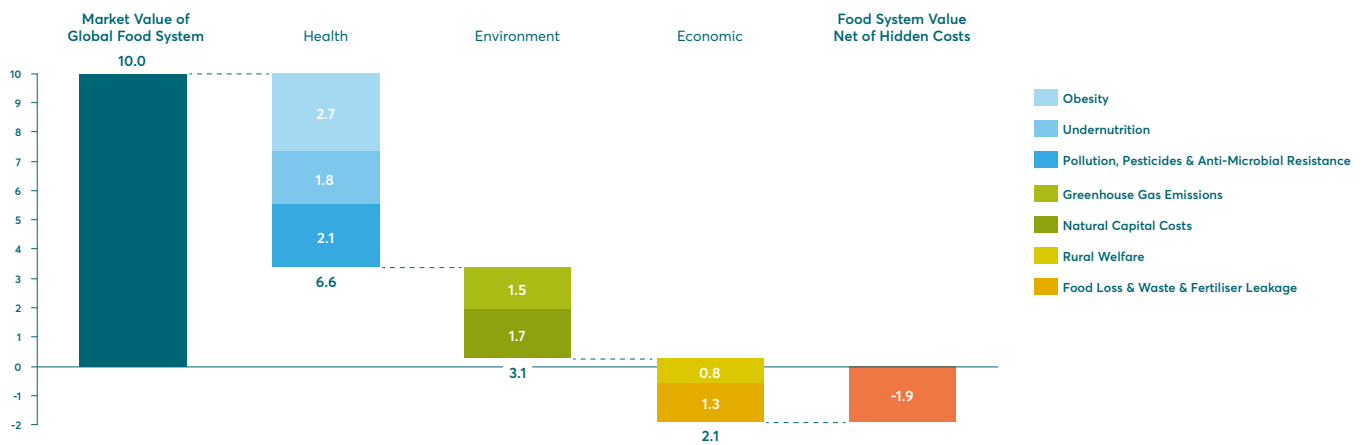
^v For more information on the "sixth extinction", see Ceballos, G., Ehrlich, P. and Dirzo, R. 2017. 'Population losses and the sixth mass extinction'.

^{vi} This report adopts the World Bank's \$5.50 per day poverty line for upper-middle income countries as the measure of poverty. Since the majority of the world's poor now live in lower-middle and upper-middle income countries, this more accurately reflects current levels of global poverty. World Bank data indicates that 40 percent of the world's working poor, as defined by this measure, are employed directly in the agricultural sector. This report therefore assumes that approximately 40 percent of people in rural poverty are directly reliant on food and land use systems. We note that this is a conservative estimate, as many service and manufacturing jobs are also related to food and land use systems, especially in rural areas.

^{vii} Tail risk is defined here as the risk (or probability) of the occurrence of rare events.

The hidden costs of global food and land use systems sum to \$12 trillion, compared to a market value of the global food system of \$10 trillion

Trillions USD, 2018 prices



A great deal for the planet

The economic and social benefits offered by this programme would yield exceptional returns on investment. Total economic gains to society could reach an estimated \$5.7 trillion a year by 2030 and \$10.5 trillion a year by 2050 versus the Current Trends scenario.⁹ The transitions also open up business opportunities – from tackling food loss to creating the new value chains needed for regenerative agriculture and the shift to healthy diets – worth an estimated \$4.5 trillion a year by 2030.¹⁰ Some entrepreneurs and progressive corporates are already leading the charge to capitalise on these opportunities, but a strategic reframing that today's hidden costs are tomorrow's new markets still needs to go mainstream.

Taking a more granular perspective, the ten critical transitions could drive a turnaround of food and land use systems.

They could deliver:

- **Better environment.** Benefits to be achieved include becoming net carbon-neutral, contributing up to one-third of the mitigation needed for the 1.5-degrees Celsius climate pathway recommended by scientists and the Paris Agreement, halting biodiversity loss, restoring ocean fish stocks and bringing about an 80 percent reduction in air pollution caused by food and land use systems.
- **Better health.** Through a global convergence on the planetary and human health diet and producing enough nutritious food – including a diversified mix of proteins to fulfil everyone's needs – eliminate under-nutrition (in aggregate, recognising that there will still be extreme poverty-driven pockets) and halve the disease burden associated with the consumption of too many calories and unhealthy foods.
- **Inclusive development.** The critical transitions could boost income growth for the bottom 20 percent of the rural population, increase yields of low-productivity smallholders, create over 120 million extra decent rural jobs, and contribute to a more secure future for indigenous peoples and other local communities across the world.
- **Food security.** The transitions could increase food security significantly by helping to stabilise or even lower real food prices, supplying enough food of the right quality and quantity and improving access for the poorest and most vulnerable.

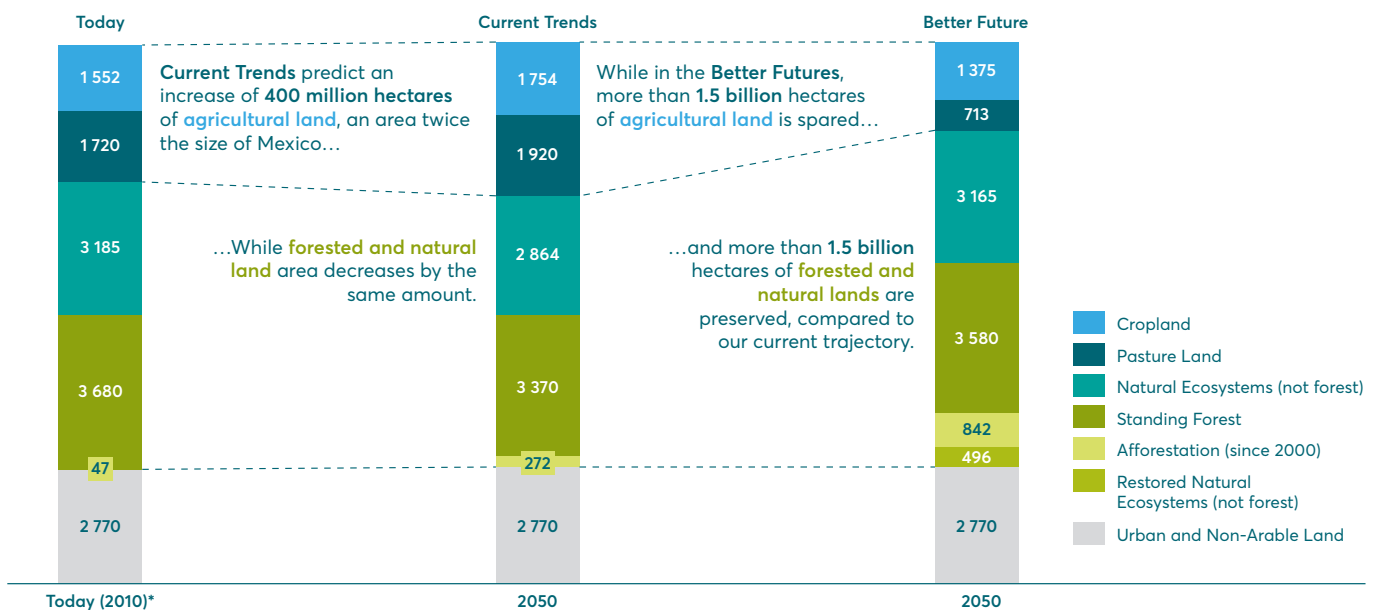
The explanation for the – somewhat counterintuitive – downward rather than upward pressure on food prices is a combination of the dietary shift towards less resource-intensive foods, combined with ongoing increases in agricultural productivity and reductions in food loss and waste.

Several of these results are made possible by the freeing of more than 1.5 billion hectares of land that would otherwise be used for farming and livestock grazing in 2050 – owing largely to the same factors driving down food prices. This land could be restored to nature, creating potential not only to protect all remaining forests and other natural ecosystems, but also to enable more sustainable, secure food production by helping to stabilise climate conditions. Instead of repeating the developed-country cycle of massive destruction of natural capital, followed by partial regeneration, developing countries could deploy their land in ways that would be better for farmers, for indigenous communities, for nature and for the climate. With the right policies, transition support and investments in place, these objectives would not be in conflict, but would positively reinforce one another. But the change will not happen without real support, financing and leadership.

EXHIBIT 3

In the Better Futures scenario, 1.2 billion hectares of land which is currently used for agriculture will be freed up for restoration of natural ecosystems by 2050. Conversely, in the Current Trends scenario, a further 400 million hectares of natural ecosystem will be converted for agriculture

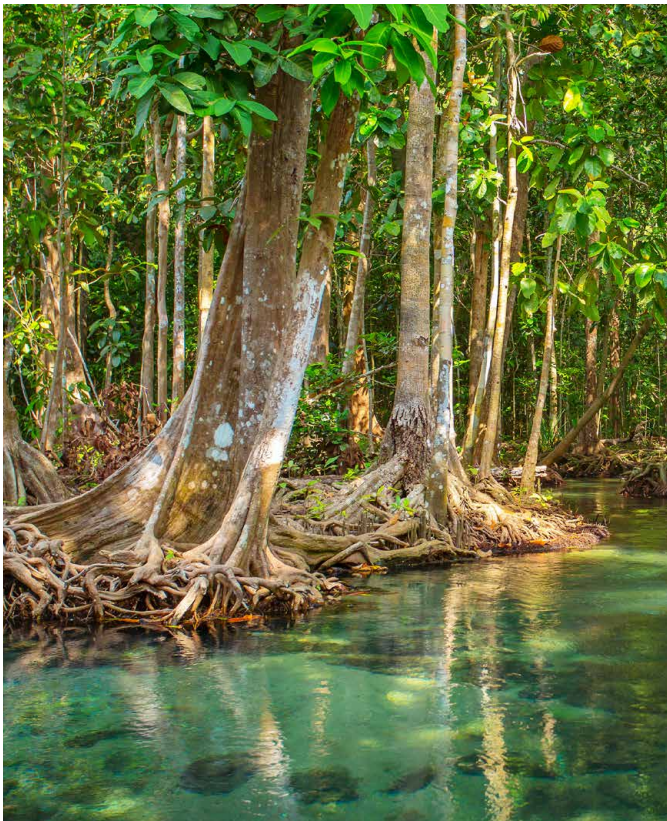
Total Surface Land Use: million hectares



* Baseline data forecast from 2000
Source: IIASA GLOBIOM 2019

Note: According to IIASA estimates, parts of the permanent pastures, as defined in the IPCC 2019 Special Report on Climate Change and Land report, are pastures without significant contribution to total livestock production and thus, are included in the land use classification 'Natural Ecosystems Land'. The 'Pasture' land use classification includes only grassland utilised for agricultural production.

The investment required is modest compared with the gains. New investment of between \$300 billion and \$350 billion a year is all that is needed to capture the \$5.7 trillion annual prize by 2030, a return ratio of more than 15:1.¹¹ Public and private capital will need to be reallocated across food and land use systems. This will be a challenge, and financial innovation, including large-scale deployment of blended capital, will be needed to de-risk and scale new food and land use systems assets. But based on these numbers, scaling the ten critical transitions for a better food and land use future would be a great deal for society and for the natural world on which society depends.



What needs to happen to drive the change with speed and scale?

Implementing these transitions will not be easy. Each faces barriers, whether related to policy, regulation, finance, innovation or behaviour. The current system is fragmented, with vested interests defending their turf. However, practical examples of all ten critical transitions are already up and running across the world, driven by policy, business, farming, community and social entrepreneurs. These entrepreneurs are creating waves of change, many arising from local communities. What they have begun has the same potential to surge as the renewable energy movement, with disruptive technologies – from precision farming to agro-genomics, digital traceability systems and large-scale platforms for alternative protein and algae production – ushering in a fourth agricultural revolution. But there is no time to lose. Unless food and land use systems are turned around in the next ten years, the compounding risks of their current trajectory will be unmanageable.

What would it look like if leaders in public, private and civil society sectors were to make food and land use systems an urgent priority, grasping the scale of the opportunity as well as the risks of inaction? What would it mean if they were to push this transformation to the top of their short-term priority list rather than allowing the tyranny of the urgent to crowd out the essential?



Right: A farmer tends to plants in a greenhouse at the Shared Harvest farm, a 66 acre community-shared organic farm in the Tongzhou and Shunyi Districts of Beijing, China.

First, **governments** – ideally working with key stakeholders – would develop national food and land use pathways rooted in science, and consistent with the SDGs and Paris Agreement targets, and a comprehensive reform agenda creating numerous win-win opportunities. These pathways would then be translated into consistent policy signals to the market and society at large:

- On **healthy diets**, governments would issue strong, clear health guidelines; use public procurement to scale the market for healthy food; and deploy fiscal instruments to reward producers of healthy food (making it more affordable for everyone, but especially lower-income households) and penalise producers of unhealthy food.
- On **nature-based solutions**, governments would shift public support for agriculture and fisheries, currently running at over \$700 billion a year with only around 15 percent targeted at public goods^{viii}, towards paying farmers and fishers to produce the right food in climate- and nature-friendly ways.¹² Pricing carbon and water use properly and fairly would be a game-changer. Governments would also institute regimes to protect and pay for nature, especially tropical rainforests, and grant secure tenure and the means to defend it to the indigenous communities whose wisdom is critical to their stewardship. Policies that add to competition for land – such as subsidy regimes driving agricultural expansion, or biofuels mandates directly or indirectly driving deforestation or other ecosystem conversion – would be phased out.
- On **wider choice and supply**, governments would increase, perhaps double, public research and development (R&D), with strong open source principles, over the next decade, to accelerate the scale-up of regenerative agriculture, promote value creation based on natural solutions, and help mitigate climate-related impacts on agricultural production. They would act to cut food loss and waste, requiring greater transparency from larger companies, and level the playing field to stimulate a flowering of local, smaller suppliers.
- On **opportunities for all**, governments would take a lead in putting key public data into the public domain, helping civil society to monitor large players and hold them to account. In parallel, they would increase public investment in rural infrastructure (roads, broadband, solar power) and in rural education and training by \$100 billion to \$150 billion a year, with funding support for low-income countries from the international community.

^{viii} The amount of subsidies aimed at “public goods” is captured by the Organisation for Economic Co-operation and Development (OECD) definition of General Services Support Estimates, that is “public financing of services that create enabling conditions for the agricultural sector.”¹³

This report recommends a massive global push to drive solar energy electrification throughout low- and medium-income rural economies. The gains for the environment, agriculture, food value chains and off-farm employment would be substantial.

Second, **business leaders** would get behind the transformation programme, voice strong public support for government reform agendas, and work with government and civil society to accelerate the transitions. Chief Executive Officers (CEOs) and company boards would recognise the risks of a business-as-usual strategy and commit their companies to science-based targets in line with the SDGs and the Paris Agreement. They would put in place easily monitored plans for reshaping their supply chains, product development, and marketing strategies in line with healthier diets and nature-based solutions, expanding choice and inclusion. And they would develop and scale new coalitions across the ten critical transitions, working with government, academia and civil society.

BOX 1

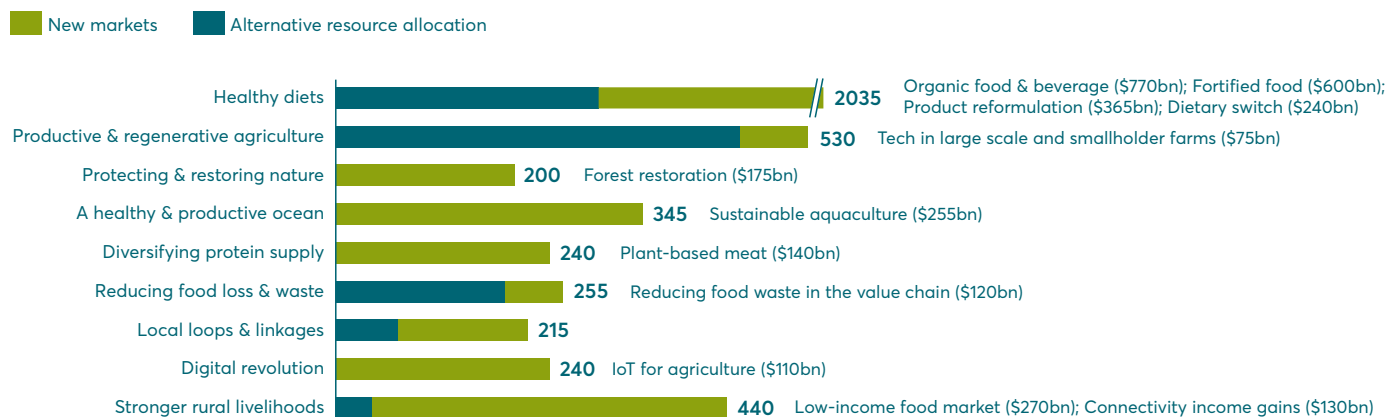
The role of farmers in food and land use systems

Farmers are the original food and land use systems entrepreneurs. They are CEOs of the most critical set of businesses in these systems. Today, however, farmers everywhere face ever more pressure and risks: from growing weather uncertainty as a result of climate change, increasingly stringent customer demands, shifting and complex public policies and support regimes, and new banking terms and conditions. This, indeed, is mainly why this report puts such emphasis on changing the rules of the game, and on shaping the game so that farmers are paid fairly to produce the right food in the right way. This includes allocating risk (market, weather, production) in ways that do not leave farmers carrying most of the risk while getting the least of the returns; protecting their tenure and giving them confidence to make longer-term investments; and improving opportunities for women and younger farmers while respecting their experience in land stewardship and food production. Farmers are natural entrepreneurs – and will play a critical role in any successful transformation of food and land use systems.

For many companies in food and land use industries, whether growers, traders, processors, retailers or caterers, these changes will be huge. Their current business models are typically based on traditional scale economies, with product formulations designed for cost, convenience and shelf life. Traceability between producer and end-consumer is limited or even non-existent. There are huge opportunities – up to \$4.5 trillion a year by 2030 – for those companies that can translate today's hidden costs into tomorrow's new markets and purpose-driven strategies.¹⁴ But seizing them is likely to require new business models that emphasise value over volume-based economics, which in turn might require a generational shift in mindsets and leadership.

There is an annual business opportunity of \$4.5 trillion associated with the ten critical transitions in 2030

USD billions (2018 prices), 2030 estimates, examples of opportunities >\$100bn



Source: SYSTEMIQ, Blended Finance Taskforce, 2019 (see online technical annex for methodology)

Third, **private investors** would demonstrate how, with public counterparts, they could by 2023 drive up to \$100 billion a year into the relevant asset classes and instruments needed to transform food and land use systems globally. Together with regulators, they would pilot the extension of the guidelines issued by the Task Force on Climate-related Financial Disclosures (TCFD) into food and land use systems, covering physical, transition, health and social risks. And they would establish a set of core financing principles, along the lines of the Equator Principles or Principles for Responsible Investment, that would guide their capital allocation into better food and land use systems and away from high-risk companies.

Fourth, **the UN Secretary-General, leaders in UN agencies, presidents and shareholders of multilateral development banks and the International Monetary Fund (IMF)** would align their institutions' investment, advisory and normative activities on food and land use systems to support and inspire governments' reform agendas, adapting organisational strategies and mobilising resources to reflect the scale and urgency of the challenge. Their governing bodies would provide unequivocal and well-aligned direction across the different entities in the multilateral system to maximise efficiency and effectiveness, in keeping with the ongoing reform processes led by the UN Secretary-General. The banks, together with bilateral donors, would set ambitious targets to increase their investments, including the use of first-loss instruments and guarantees, to support the \$300 billion to \$350 billion investment requirements. And the IMF would include more explicit consideration of climate and food and land use systems risk in its Article IV surveillance activities.^{ix}

Fifth, **civil society** would shape social change movements, support the government and private sector and hold all parties to account. The philanthropic community could have an outsized impact if it tripled its funding for food and land use and directed it to the ten critical transitions, taking the risk to get behind new coalitions and social entrepreneurs.

Finally, the next one to two years will provide opportunities to set a new direction and pursue unprecedented global collaboration, via meetings of the G7 and G20, the UN General Assembly Climate Action Summit, the UN conventions on climate change, biological diversity, and combatting desertification, the World Bank and International Monetary Fund Annual Meetings, the Global Nutrition Summit, the UN High Level Meeting on Universal Health Coverage, the World Health Assembly and the Sustainable and Inclusive Food Systems Summit.

^{ix} When a country joins the IMF, it agrees to subject its economic and financial policies to the scrutiny of the international community as part of the IMF's Article IV surveillance activities. This regular monitoring is intended to identify weaknesses that are causing or could lead to financial or economic instability.



Left: Farmer Usha Rani from the Agripally village in the Krishna district of Andhra Pradesh, India, utilising Zero-Budget Natural Farming (ZBNF) practices.

For governments, a particular opportunity exists to embed food and land use reforms in ambitious Nationally Determined Contribution submissions under the UN Convention on Climate Change, and in similar commitments – the format of which will hopefully be determined at the biodiversity conference in Kunming in October 2020 – under the UN Convention on Biological Diversity. The latter occasion also provides an unmatched opportunity for broad global agreement on an ambitious new deal for nature, and for countries to come together on some key priorities like protection of remaining natural ecosystems, deforestation-free supply chains and global action against environmental crime.

There is no silver bullet for transforming food and land use systems, just as there is none for solving climate change or eliminating poverty. There is no universal blueprint that is right for every country. Rather, change will look different from one country to the next, and from one food and land use system to the next. But the complexity of transforming food and land use systems is a strength. It provides scope for building winning political coalitions behind broad transformation agendas. And it means that the process of transformation is dispersed, making it more open and accessible and, therefore, likely to engage millions of citizens and entrepreneurs.

Together, humanity faces an opportunity to design food and land use systems that protect our environment, improve our health, increase social justice and strengthen food security. We have one to two years in which to turn them in the right direction, and a decade thereafter to transform them. There are already many courageous change agents working – often at significant professional and personal risk – to advance transformation. This consultation report is fundamentally for them: to support their efforts, to accelerate the process of creative discovery, debate and learning, and to help us all shift our food and land use systems on to pathways that lead to hitting the SDGs and Paris Agreement targets on climate change. There is no time to lose.

Modelling Current Trends and Better Futures

The main modelling for this report has been produced by the International Institute of Applied Systems Analysis' (IIASA) Global Biosphere Management Model (GLOBIOM), informed by in-depth analytical work on specific sectoral issues. The model provides a link between agricultural production choices and their impact on the planet. Complementary modelling was done by the University of Washington on diets and health; in addition, we run scenarios on income and employment using the World Bank Shockwave model. A more detailed exposition on the modelling can be found in the technical annex (Annex B) of the full online report.

The aim of the modelling is to offer broad insights into developments under two different scenarios.

The baseline scenario, "Current Trends", was designed to deliver a picture of a future grounded in historical trends. This future would see considerable progress and innovation (for example with regards to agricultural productivity) within the framework of the current system. Current Trends mainly relies on the standardised set of assumptions that has informed the analysis of the Intergovernmental Panel on Climate Change's 5th Assessment Report (IPCC AR5), coupled with the matching set of climate assumptions.^x Under this scenario the world gets nowhere close to meeting the Sustainable Development Goals or the Paris Agreement targets.

The reform scenario, "Better Futures", is based on ten assumptions of fundamental change, derived from the ten critical transitions. Strong (but not perfect) implementation of the ten critical transitions would be the key to achieving the outcomes described in this report.^{xi}

The key assumptions are:

- 1. Aggregate average agricultural productivity** continues to increase following historic trends at a rate of 0.9 percent a year under Current Trends. The Better Futures scenario assumes an additional 12 percent increase in productivity by 2050 due to technological advancements, i.e., an annual rate of increase of 1.1 percent overall. This reflects renewed efforts in R&D and technological diffusion, and large investments in infrastructure, which would help raise yield and reduce the yield gap between more productive and less productive producers.
- 2. By 2050, food loss and waste could be reduced by 25 percent.**^{xii}
- 3. Negligible conversion of forests and other natural ecosystems from 2020 onwards is possible.**

This assumption is based on what exogenous climate modelling finds necessary to limit global warming to 1.5-degrees Celsius. It thus describes the necessary level of ambition. This report recognises that ending deforestation next year is unrealistic under any assumptions. However, the essential point to take away from the modelling is that the reform agenda to halt deforestation needs to be put in place without delay. The reform agenda described in this report aims to achieve the desired result as soon as possible, realistically between 2025 and 2030 (this has a knock-on effect for biodiversity, as well, where the model has recovery starting in 2020, yet realistically that would happen gradually between 2025 and 2030, as deforestation is gradually halted).

- 4. Systematic measures to increase energy efficiency globally** can achieve a reduction in energy demand by 40 percent relative to current demand – this would help the planet stay within a 1.5-degrees Celsius pathway without deployment of bioenergy with carbon capture and storage technologies (BECCS).^{xiii}

^x Our Current Trends scenario is defined by the Shared Socio-Economic Pathway 2¹⁴ and by the climate assumptions of the Representative Concentration Pathway 6.0.¹⁵

^{xi} A number of the key institutional features introduced in the critical transitions, such as structural changes that would lead to shorter supply chains, could not be modelled with the tools available. Their impacts are, therefore, described in more qualitative terms. These challenges were particularly strong when constructing socio-economic scenarios, given the limited number of variables that could be used to depict changes to livelihoods.

^{xii} Note that the Sustainable Development Goal target is to reduce per capita global food waste at the retail and consumer levels by 50 percent, and to achieve a reduction in food losses along production and supply chains, including post-harvest losses by 2030. Recent analysis, however, demonstrates that achieving this goal is only achievable with breakthrough technologies and behavioural change. To avoid unrealistic assumptions, a 25 per cent reduction has been modelled for this report.

^{xiii} Grubler et al (2018) illustrates how such a low energy demand scenario is possible based on rapid social and institutional changes in how energy services are provided and consumed, in addition to technological innovation. Trends in this direction are already observable (e.g. digitalisation and device convergence reduce energy demand, with a smartphone providing a single integrated digital platform which potentially replaces over 15 different end-use devices).¹⁶

Though achievable, this is an ambitious assumption. For this reason, and because a number of other 1.5-degrees Celsius assumptions are also ambitious, an option is maintained to deforest, starting around 2040, some of the newly reforested land and use the biomass for BECCs, if such a solution becomes imperative to avoid runaway climate change and if further analysis demonstrates the relative merits of such an option relative to relevant alternatives.¹⁷ Note that if the BECCS alternative is implemented, there will be significant negative consequences for biodiversity from 2040 onwards (see Box 25 on bioenergy in Chapter 3 in the full online report).

5. **Enough food will be produced in 2030 to deliver on the ambitions of SDG2** (to end hunger, achieve food security and improved nutrition and promote sustainable agriculture), making it possible to eliminate food insecurity by 2030.
6. **The world would converge towards “human and planetary health” diets by 2050** (see Chapter 3, critical transition 1 on healthy diets), with significant progress in that direction by 2030. This would include a global convergence in calorie intake and average level and composition of protein consumption.
7. **The ocean would deliver 40 percent more sustainable proteins over the next 30 years.**

Note that the potential is far larger, as Chapter 3 demonstrates, but a number of uncertainties makes a conservative assumption more realistic.

8. **Significant investments in human capital, technology diffusion and the digital revolution** would support the emergence of a new generation of young rural entrepreneurs who can take advantage of the opportunities offered by the transformation of food and land use systems and create decent jobs in agriculture and in the processing of agricultural products.
9. **Increased investment in rural infrastructure (e.g. roads, clean electrification) and connectivity** would be the key to overall income growth, helping to drive off-farm value added and the creation of non-agricultural jobs.
10. **The combination of investments in rural assets and the design of new productive safety nets** increases the resilience of the rural population in the face of possible dislocations caused by the transformation of food and land use systems and increasingly likely weather shocks.

These assumptions were tested by conducting sensitivity analysis around variable specifications. The narrative accounts for key uncertainties – such as the potential negative impact of climate change and the potential positive impacts of technology – on agricultural yields. In sum, the assumptions provide a realistic basis for the Better Futures scenario, though, again, that scenario depends on the full implementation of the ten critical transitions laid out in this report.

The implication of recent reports from the IPCC is that limiting global warming to as close to 1.5-degrees Celsius as possible is essential to avoid the risk of runaway climate change and to minimise the consequences of unavoidable climate change. Following the precautionary principle, the modelling underpinning this report, therefore, takes the need for the world to get on to a 1.5-degrees Celsius pathway as an ongoing assumption. Success depends on fundamental changes not only in food and land use systems but also in other key systems, notably energy. None of these systems are advancing fast enough today. Implementing the report’s framework of reforms can get the world’s food and land use systems on the right track fast. However, success in transforming food and land use systems depends on other sectors stepping up the pace of change with the same degree of urgency (and vice versa).

The main outcomes of the modelling include:

1. **Higher productivity, reduced food loss and waste and dietary shifts** yields the opportunity to shift more than 1.5 billion hectares of land away from agriculture compared to the Current Trends scenario by 2050, meaning that:

Greenhouse gas emissions are reduced in a way that is consistent with the 1.5-degrees Celsius pathway recommended by science. At a conservative estimate of the social cost of carbon, the differential in emissions between the Better Futures and Current Trends scenarios can be estimated at around \$1.3 trillion annually, mainly achieved by protecting and restoring tropical forests.

The Biodiversity Intactness Index (BII) in the Better Futures scenario decreases by 1 percent between 2010 and 2020, which represents around one third of the losses experienced over the past 40 years. It starts to recover after 2020, a sign of halting and reversal of biodiversity declines. In contrast, under the Current Trends scenario biodiversity continues a steady decline towards the “sixth extinction” at a speed similar to that of the last 40 years, reaching 3.2 percent loss in BII between 2010 and 2050.

As demand and production methods change, the advantages of high intensity agriculture erode, reducing overuse of fertilisers and herbicides/pesticides.

By 2030 sufficient food is produced to feed everybody on the planet nutritious diets, while protecting affordability. A number of actions, such as ongoing agricultural productivity gains, reductions in food loss and waste and shifts in diet towards less-resource intensive foods, contribute to making this food affordable and accessible to the full global population. This could yield dramatic gains in the battle against poverty.

Shifting to healthier diets has the potential to more than halve by 2050 the number of people dying prematurely due to diet-related non-communicable diseases caused by high body mass index, from ten million to around five million.

2. **The economic gains to society from reducing the current “hidden costs” of food and land use systems** would sum up to \$5.7 trillion annually by 2030 and \$10.5 trillion annually by 2050. These numbers are almost certainly under-estimates, since they do not properly price in the benefits of reducing tail risks.
3. **Rural incomes grow twice as fast over those under the Current Trends scenario, and over 120 million more decent jobs are created in the countryside.**
4. **Financing the food and land use transformation agenda requires significant reallocation of capital** to new assets across food and land use systems, combined with an estimated annual \$300 – 350 billion increase in total capital investment – less than 0.3 percent of global GDP during the period. We need to invest more wisely, reducing systemic inefficiencies and redeploying capital in line with a more honest account of risk-adjusted returns.

The scale and extent of these results are impressive. They may even seem over-optimistic. However, the modelling of the Better Futures scenario has incorporated a large degree of caution and flexibility. In particular, the assumptions are based on the scaling-up of existing technologies, while in many areas there are signs that entirely disruptive change is within reach.

Thus, while some aspects of the recommended transformation are likely to turn out less positively than modelled, others might be more positive, for example;

- Mariculture production of seafood is primarily constrained by the availability of feed in the form of fish meal and fish oil. If it were possible to remove this constraint by sourcing these proteins from molluscs, the productive potential of oceanic aquaculture would become almost unlimited. If such a technological breakthrough were achieved, consumption of poultry and pork could be replaced by consumption of farmed carnivorous fish such as salmon, and about 200 million hectares of cropland would be saved in the process.
- The model allows for significant reforestation over 800 million hectares, but the theoretical potential under the hypothesis of agricultural intensification is more than twice as large. Even if only half of the additional potential were leveraged, almost four additional GtCO₂e would be removed from the atmosphere annually by 2050, for a value to society of \$400 billion.
- Scientific consensus indicates that a range of five to 13 GtCO₂e a year of additional sequestration from forests could be achieved, depending on tree species' growth differences and what happens to the timber afterwards. However, these differences cannot currently be captured by the model in its calculations.
- Assuming that the appropriate measures were put in place by governments to support such activity, re-wetting deforested peatlands could result in a two thirds reduction of ongoing emissions from deforested land from 2025 onwards, resulting in a net negative emissions from the pre-farmgate food and land use sector by 2050 (up to one GtCO₂e per year). That seems, for now, a likely scenario, given the impressive progress the Government of Indonesia is currently making in this area.
- While modelling for this report assumes a 25 percent reduction in food loss and waste, the potential is clearly larger if sufficient capital, regulatory action and innovation is targeted at the problem, yielding the potential for additional economic gains and reductions in greenhouse gas emissions as well as in biodiversity and ecosystem loss.

In other words, there is significant potential upside in the Better Futures scenario beyond the encouraging outcomes described above, if the ten critical transitions are fully implemented. As so often, the essential variable is political will.

Annex A:

FOLU partners, supporters and Ambassadors

FOLU partners:

African Green Revolution Alliance (AGRA): Growing Africa's Agriculture
EAT
Global Alliance for Improved Nutrition (GAIN)
International institute for Applied Systems Analysis (IIASA)^{xiv}
Sustainable Development Solutions Network (SDSN): A Global Initiative for the United Nations
SYSTEMIQ
World Business Council for Sustainable Development (WBCSD)
World Resources Institute (WRI), including the New Climate Economy: Global Commission on the Economy and Climate

FOLU is supported by:

Gordon and Betty Moore Foundation
MAVA Foundation
Norway's International Climate and Forests Initiative (NICFI)
UK Department for International Development (DFID)

FOLU acknowledges the invaluable contribution of Unilever, Yara International and the Business and Sustainable Development Commission in nurturing our initial development.

FOLU Ambassadors:

Sri Adiningsih, Chairperson, Indonesian Presidential Advisory Council; Professor of Economics, University of Gadjah Mada
Assefa Admassie, Director, Ethiopian Economic Policy Research Institute; Professor of Economics, Addis Ababa University
Rina Agustina, Chair, Human Nutrition Research Center of the Indonesian Medical Education and Research Institute; University of Indonesia
Bethlehem Tilahun Alemu, Founder and Executive Director, Sole Rebels, Republic of Leather, Garden of Coffee
Sharan Burrow, General Secretary of the International Trade Union Confederation
Helen Clark, Former Prime Minister of New Zealand; Former Administrator, United Nations Development Programme
Nicolás Cock, Co-founder, EcoFlora and President Bio-protection Global
Sebsebe Demissew, Executive Director, Gullele Botanic Garden; Professor of Plant Systematics and Biodiversity, Addis Ababa University
Wiebe Draijer, Chairman of the Board, Rabobank
Shenggen Fan, Director General, International Food Policy Research Institute
Jessica Fanzo, Professor of Food Policy & Ethics, Johns Hopkins University; Co-chair, Global Nutrition Report
Meaza Biru Gebrewold, Founder, General Manager, Producer & Owner of Sheger 102.1 FM, Ethiopia
Rosario Córdoba Garcés, President, Private Council for Competitiveness, Colombia
Alejandro Gaviria, President, Universidad de Los Andes, Colombia
Marion Guillou, President of the Board of Directors, Agreenium
Lawrence Haddad, Executive Director, Global Alliance for Improved Nutrition
Kurniatun Hairiah, Professor, University of Brawijaya, Indonesia; Partner, World Agroforestry Centre
André Hoffmann, Board Director, MAVA Foundation
Naoko Ishii, Chief Executive Officer and Chairperson, Global Environment Facility
Ajay Vir Jakhar, Chairman, Bharat Krishak Samaj
Agnes Kalibata, President, Alliance for a Green Revolution in Africa
Sam Kass, Founding Partner, Trove Worldwide
Segenet Kelemu, Director General and Chief Executive Officer, International Centre of Insect Physiology and Ecology

^{xiv} Note that SDSN and IIASA convene the FABLE Consortium (Food, Agriculture, Biodiversity, Land Use and Energy)

Marco Lambertini, Director General, WWF International
David W. MacLennan, Chairman and CEO, Cargill Limited
Strive Masiyiwa, Board Chair, Alliance for a Green Revolution in Africa; Panel Member, Africa Progress Panel
Sara Menker, Founder and Chief Executive Officer, Gro Intelligence
Divine Ntiokam, Founder and Managing-Director, Climate Smart Agriculture Youth Network
Ndidi Nwuneli, Founder and Director, Leadership Effectiveness, Accountability and Professionalism (LEAP) Africa
José Antonio Ocampo, Co-Director, Bank of the Republic of Colombia
Ngozi Okonjo-Iweala, Former Minister of Finance, Nigeria
Cristiana Paşca Palmer, Executive Secretary, Secretariat of the Convention on Biological Diversity
Ángela Penagos, Director, Rimisp Colombia
Paul Polman, Co-founder & Chair, IMAGINE; Chair of the International Chamber of Commerce (ICC)
Vineet Rai, Chief Executive Officer & Managing Director, Aavishkaar; Co-founder & Chairman, Intellect Group
Juan Lucas Restrepo, Director General of Bioversity International; Co-Director, Bank of the Republic of Colombia
Felia Salim, Vice Chief Executive Officer, PT Bank Negara Indonesia
Cristián Samper, President, the Wildlife Conservation Society
Jaidev Shroff, Global Chief Executive Officer, UPL
Feike Sijbesma, Chief Executive Officer, Royal DSM
Erik Solheim, Ex-Minister of Development and Environment, Government of Norway
Budiman Sudjatmiko, Coordinator of Advisory Board, PAPDESI (Perkumpulan Aparatur Pemerintah Desa Seluruh Indonesia/Association of the Village Governments in Indonesia)
Ishmael Sunga, Executive Director, Southern African Confederation of Agricultural Unions
Getachew Gebru Tegegn, President, Ethiopian Society of Animal Production; Deputy Director, MARIL Ethiopia
Izabella Teixeira, Co-chair, International Resource Panel
Svein Tore Holsether, President and Chief Executive Officer, Yara International
Laura Tuck, Vice President for Sustainable Development, World Bank

Ann Tutwiler, Senior Fellow, Meridian Institute; Senior Advisor, SYSTEMIQ
Gerda Verburg, Coordinator, Scaling Up Nutrition Movement
Sunny Verghese, Co-Founder and Group Chief Executive Officer, Olam International
Dominic Waughray, Managing Director, Head of the Centre for Global Public Goods, World Economic Forum
Kathy Willis, Professor of Biodiversity, Oxford University

The FOLU Ambassadors network is co-chaired by Shenggen Fan, Agnes Kalibata and Paul Polman.

FOLU Global Report Reference Committee:

Per Pharo, Co-Chair of FOLU Global Report Reference Committee & Lead Author
Lawrence Haddad, Co-Chair of FOLU Global Report Reference Committee & Executive Director, Global Alliance for Improved Nutrition
Mari Elka Pangestu, Professor of Economics, University of Indonesia
Johan Rockström, Director, Potsdam Institute for Climate Impact (PIK)
Bernice Lee, Research Director for Global Economy & Finance and Executive Director of the Hoffmann Centre for Sustainable Resource Economy at Chatham House
Jianguo "Jack" Liu, Rachel Carson Chair in Sustainability, University Distinguished Professor at MSU and Director of the Centre for Systems Integration and Sustainability
Ruth Oniang'o, Editor and founder of the African Journal of Food, Agriculture, Nutrition and Development (AJFAND), Professor of Food Science and Nutrition
Louise O. Fresco, President of Wageningen University & Research
Juliano Assunção, Associate Professor in the Department of Economics at the Pontifícia Universidade Católica do Rio de Janeiro (PUC-Rio) and Executive Director at the Climate Policy Initiative Brazil
Frances Seymour, World Resources Institute Distinguished Senior Fellow
Zhang Linxiu, UN Environment's International Ecosystem Management Partnership (UNEP-IEMP)
Charles Godfray, Hope Professor of Zoology at Jesus College, Oxford, and Director of the Oxford Martin Programme on the Future of Food



Annette Rypalski, Biodiversity director at Odonata in Mount Rothwell research and conservation centre in Victoria, Australia.

FOLU Australia

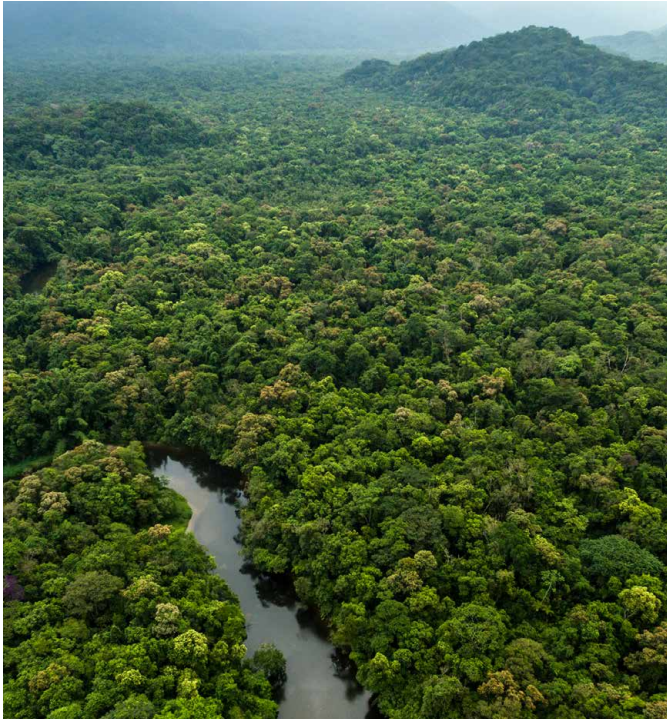
ClimateWorks Australia, CSIRO and Deakin University are participating in FOLU through the Land Use Futures project, which resources and convenes a highly participatory, evidence-based process centred on developing integrated land use pathways and action roadmaps for sectors, including national, state and local government. In early 2019, ClimateWorks hosted a Natural Capital Summit, hosting 150 leaders from diverse sectors. The Summit identified key areas for action including fit-for-purpose systems for measuring and valuing natural assets, mainstreaming innovative sustainable land management practices, accelerated demonstration of blended finance and investment models, and introduction of government incentives and support.



Liu Guiyan, from Heilongjiang province, China, left her hometown to work on a farm in Beijing in 2014. Last year she joined Shared Harvest, an organic farm promoting the Community Shared Agriculture model.

FOLU China

In China, FOLU has established a national FOLU platform to support domestic and international approaches that strengthen ecological protection, alongside improved health and rural prosperity outcomes. The national platform seeks to strengthen the evidence base for action, and to support efforts in China to ensure responsible commodity sourcing. It also provides a bridge to the larger FOLU network, enabling China to share its rich development and environmental experience with other countries. Core partners in the platform include WRI China, China Agricultural University and Tsinghua University. A crucial component of the FOLU work in China is to support the development of the data and modelling infrastructure needed to produce long-term pathways towards sustainable food and land use systems, led by the FABLE Consortium.



Anteggn Wunetu (pictured here) and his wife Mekle farm on a watershed restoration and homestead development project in Bahir Dar, the Amhara Region of Ethiopia. They have just bought 24 chickens.

FOLU Colombia

FOLU in Colombia is a vibrant national platform, comprising over 100 actors from national and local government, the private sector and civil society. FOLU Colombia has initiated a number of action coalitions, including on the sustainable use of pesticides and fertilisers, the promotion of jurisdictional approaches to better food and land use in two regions (Quindío and Urabá), the measurement of food loss and waste, supporting healthy school diets and action on the ocean. The Coalition is also working with partners to pursue behavioural change and more effective communications, as well as in a series of value chains – including milk, meat and a cocoa and forest initiative – to bring about more sustainable outcomes. Across these areas, FOLU brokers strategic alliances between universities, governments, civil society organisations and the private sector. Colombian research institutions also participate in the work of the FABLE Consortium, where they advance analytical and modelling capacities to assess long-term sustainable development pathways in land use.

FOLU Ethiopia

FOLU in Ethiopia comprises a vibrant network of partners and experts working together to provide support to policymakers and other influential stakeholders at the national and local level. These include the Agricultural Transformation Agency, the Ministry of Agriculture, the Environment, Forest and Climate Change Commission, and the National Planning and Development Commission. The Coalition is also supported by a diverse and proactive group of “Goodwill Ambassadors” – prominent figures who advance and champion the vision and objectives of the Coalition. To catalyse action, the Coalition partners have prepared an Action Agenda with broad stakeholder engagement including diverse development actors, government, private sector, and experts. The Action Agenda outlines a vision and proposes innovative actions on food and land use for incorporation into the country’s forthcoming five- and ten-year plans. FOLU Ethiopia partners are also working with the FABLE Consortium to develop long-term science-based targets and pathways that set out what sustainable food and land use systems could look like in Ethiopia.



Workers in the R&D fields of the Jain Irrigation in the Jalgoan facility in Jalgoan, India.

FOLU India

In India, the work of FOLU is being spearheaded by a core group of four organisations: Council on Energy, Environment and Water (CEEW), the Indian Institute of Management, Ahmedabad (IIMA), The Energy and Resources Institute (TERI), and WRI India. A key component of the FOLU work is the development of decision-support tools by the FABLE Consortium, led by IIMA, which can inform policy decisions in rigorous ways, beginning with a test case on the impacts of biofuels on India's food and land use systems.



Portrait of an ilipe nut farmer at the forest in Sintang regency, West Kalimantan, Indonesia.

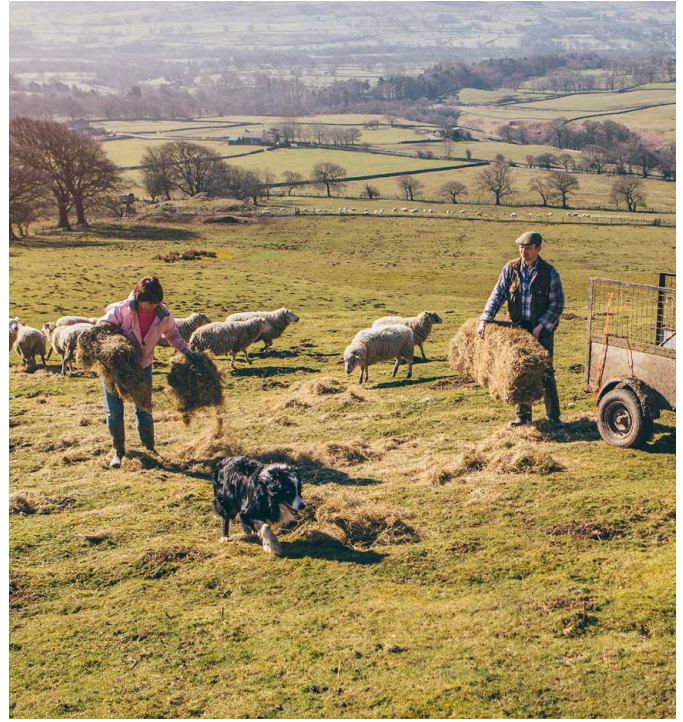
FOLU Indonesia

FOLU in Indonesia is housed in the National Planning Ministry BAPPENAS' signature Low Carbon Development Initiative, where it contributes to the formulation of Indonesia's next mid-term national development plan (the RPJMN for 2020-2024). FOLU Indonesia's Action Agenda, Ambassadors, partners, studies, research and convening have played a critical role in support of the LCDI as well as other relevant national policy (e.g. EAT's work on sustainable and healthy diets with the Ministry of Health). Indonesian research institutions are involved in the FABLE Consortium's scenario and development pathway planning exercises. FOLU has also worked at the regional level, including in the provinces of East Kalimantan and Papua and West Papua, in areas including food security, sustainable aquaculture, eco-tourism and mobilising finance for forest protection and restoration.



FOLU in the Nordics

FOLU has an active and growing network across the region with a strong set of civil society organisations and innovative private sector players, led by the Stockholm Resilience Centre of Stockholm University and the EAT Foundation. The role of the Coalition includes coordinating the Nordic Modeling Network (a group of over 15 modelers representing Sweden, Finland, Norway and Denmark, engaged in the FABLE Consortium) and progressing stakeholder dialogues with critical actors across the food system.



FOLU UK

FOLU has entered into a partnership with The Royal Society of Arts' "Food, Farming and Countryside Commission". The Commission is an independent inquiry, chaired by Sir Ian Cheshire, involving 15 Commissioners from farming and food businesses, public health and citizens' groups, think tanks and universities, all committed to tackling the challenges faced by the sector. The Commission recently published flagship reports, "Our Future in the Land" and "Field Guide for the Future" which draw on their national consultations.

FOLU is also contributing to the National Food Strategy, led by Leon restaurant founder Henry Dimbleby, and is involved in the FABLE Consortium through research organisations in the UK.

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