

A HOLISTIC APPROACH TO **FOOD SYSTEMS**

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Acknowledgements

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EXECUTIVE SUMMARY



Understanding food systems: Need, types and drivers

A food system is a holistic set of practices that contribute towards food production and consumption to meet dietary requirements of the population. Food production, distribution, processing and consumption form the backbone of food systems which require access to resources like labour, finance, inputs and knowledge with an interconnectedness of social and natural elements. These elements have cause-and-effect relationships based on certain drivers in food production and consumption. Shifts in aspects such as climate change, global migration, increasing population and consumer preferences influence production and consumption patterns, exposing actors in each component of a food system to vulnerabilities, ranging from loss of livelihood for producers to food and nutritional insecurity for consumers. There is a need, therefore, to develop sustainable food systems, eventually achieving sustainable development goals (SDG) through economic, environmental and social impacts.

Global trends in food systems

As the global population is expected to reach 8.6 billion by 2030, food production needs to be ramped up to fulfil its demands. Factors affecting food systems, like climate change, increasing urbanisation, increased migration, and change in food patterns are adding stress on the global landscape. Measurable actions are required to address these factors which affect food systems adversely.

Indian trends in food systems

Food systems have been traditionally complex. The complexity increases with the growth in the Indian population, expected to reach 1.66 billion by end of 2050. Even though there is an increase in food production, the traditional approach has led to food systems being more staple crop-focused than nutrition-focused. This has led to a higher saturation of a few crops in the market. These crops do not contribute adequately towards nutrition sufficiency. Therefore, existing approaches need an overhaul.

Key themes and recommendations

Building sustainable and resilient food systems necessitate the identification of themes that inform actionable recommendations. This primer identifies five major themes, which are as follows:

1. Reinvigorating sustainable food production
2. Inclusion of technology for higher farm and processing efficiencies
3. Strengthening market infrastructure across supply chains
4. Strengthening food productions and innovations
5. Enabling customer centricity in food systems across supply chains.

To implement recommendations across these themes, the ecosystem needs strong support from the government, philanthropy and private sector. Policy-level interventions by the government, as well as the introduction of regulations and monitoring can facilitate production and distribution. Philanthropy could invest in training and development of producers, enabling technology adoption and practical application of knowledge. Philanthropic capital could also be directed towards technological inclusion of collective farming programmes. The private sector could contribute by enabling customer-centricity in food systems, supporting the necessary research and innovation for scaling up interventions.



UNDERSTANDING FOOD SYSTEMS: NEEDS, TYPES, DRIVERS



Globally, agricultural food systems are at the cusp of transformation, adapting to newer challenges posed by COVID-19. Global unrest is causing further stress to supply chains.

Nearly 670 million people, or 8 percent of the world population, will still be facing hunger in 2030 – which is the same number as that in 2015 when the 2030 SDG Goals were announced (FAO 2022).

In 2021, an estimated 29.3 percent of the global population – 2.3 billion people – were moderately or severely food-insecure, and 11.7 percent (923.7 million people) faced severe food insecurity (FAO 2022).

Lack of continuous social security measures post-pandemic have further widened the inequalities, highlighting the need for recalibration of food systems and supply chains in order to meet SDG 2: Zero Hunger by 2030.

Food Systems (FS) encompass the entire range of actors and their interlinked value-adding activities involved in the production, aggregation, processing, distribution, consumption and disposal of food products that originate from agriculture, forestry or fisheries, and parts of the broader economic, societal and natural environments in which they are embedded.

Why we need a sustainable food systems approach



Efficient food production, supply and distribution



Prevention of food waste and losses



Proper storage practices and processing infrastructure



Access to resources across supply chains



Access to nutritional, safe and affordable food

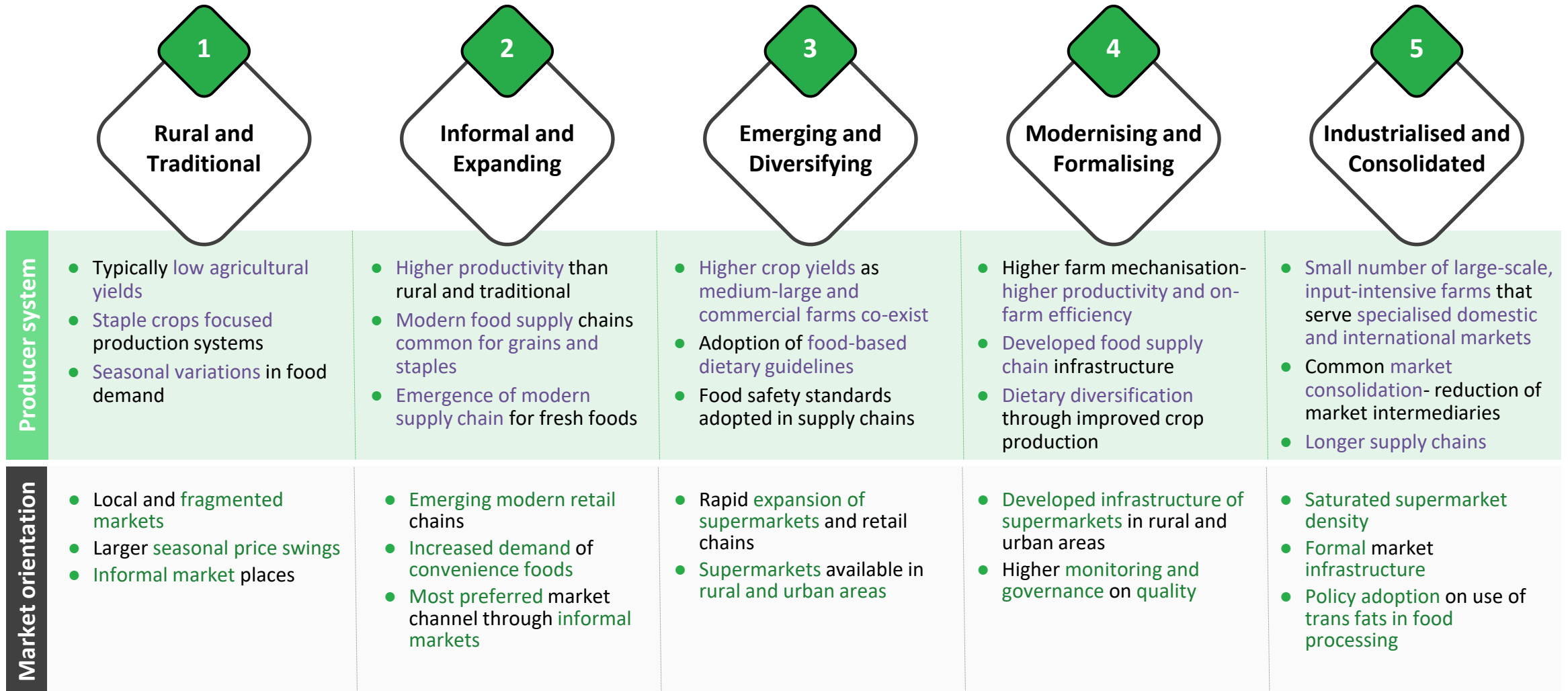


Ecological balance through adoption of sustainable practices

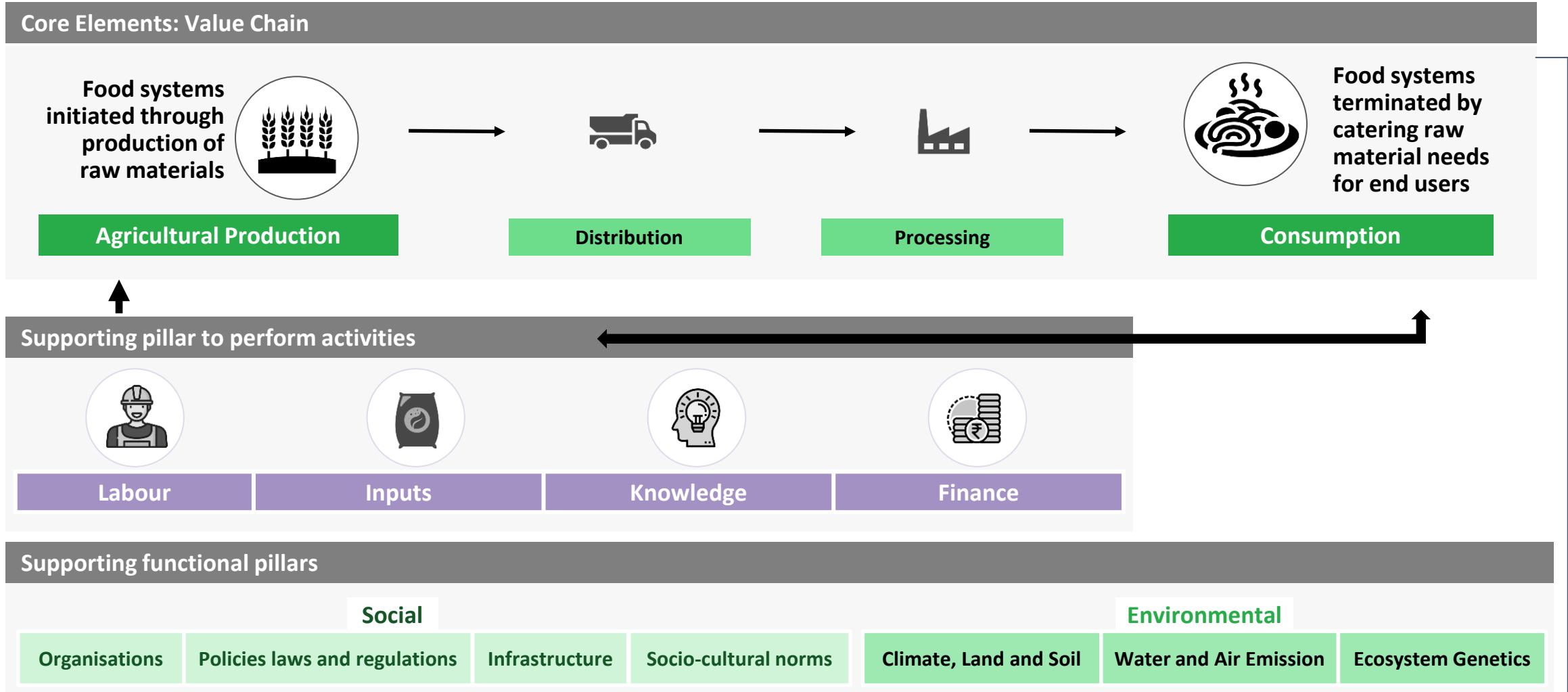


Economic and efficient infrastructural drivers influence the outcomes of food systems.

Countries have been categorised into five types of food systems. Each of these types is also characterised by distinct producer systems and market orientation. It should be noted however that countries within one food system may still be very different from each other. Many types of food systems that can exist within a single country.



Components of food systems are based on a core value chain understanding as well as complementary focus on social and environmental elements.



Sustainable food systems also contribute toward achieving 17 Sustainable Development Goals (SDGs) by enabling economical, eco-friendly and inclusive growth across food chains.



SDG contributing to economic impact

Contributing in socio-economic progress



SDG contributing to environmental impact

Contributing in sustainable growth

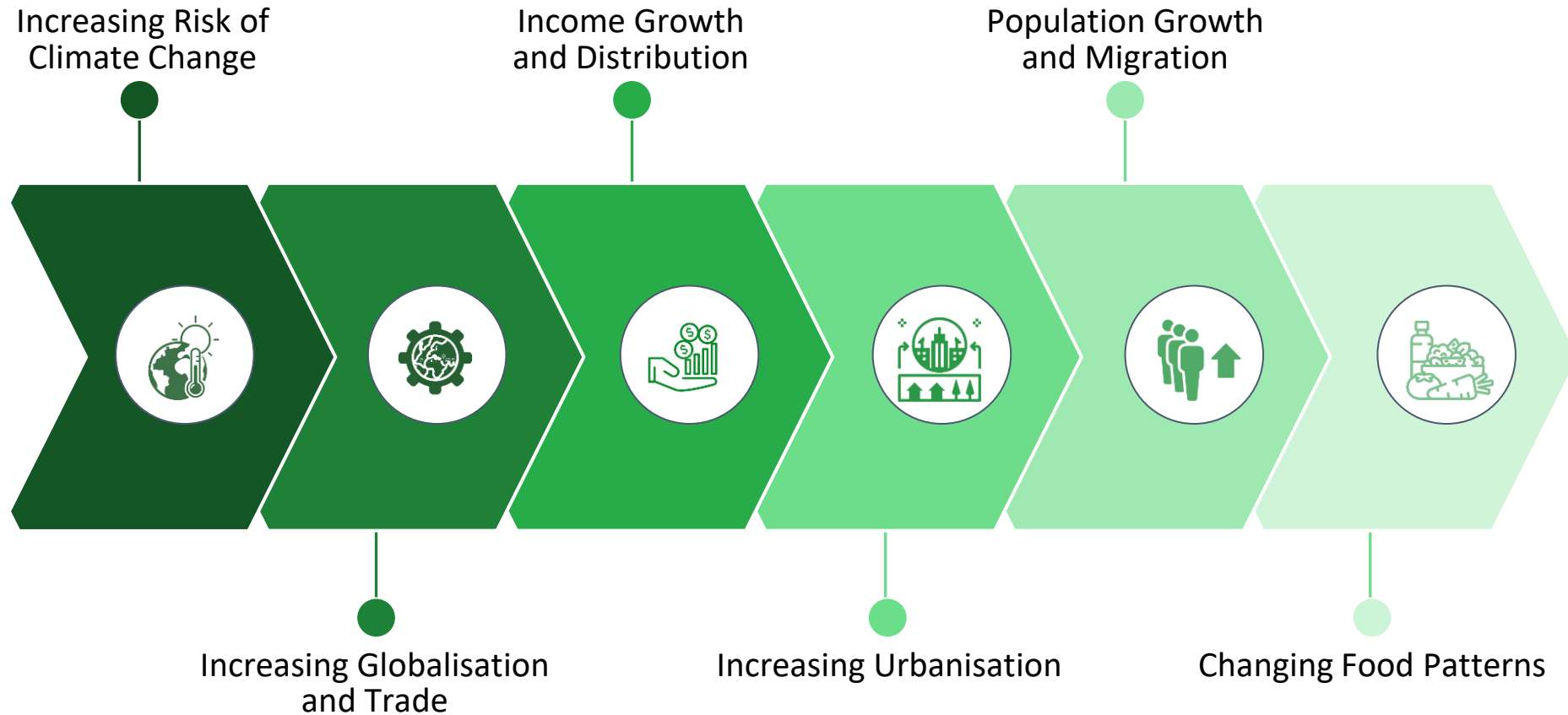


SDG contributing to social impact

Contributing in inclusive growth



Evolution of food production and consumption patterns are dependent on six major driving factors.



Source: Sattva Research



GLOBAL TRENDS IN FOOD SYSTEMS

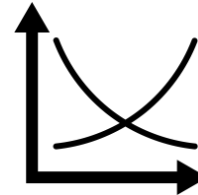


Food systems are becoming increasingly complex with variations in global agricultural production and wild extraction systems often driven by a few actors from developed economies.



1 Scattered and Heterogenous Players

A small number of actors across developed economies control the production, processing and retail chains using half of cultivable and 70% of extracted water (FAO 2022).



2 Increasing Supply-Demand Gaps

Out of 1.5 billion hectares of agricultural land worldwide, only a third is used for the production of food crops. The rest is primarily dedicated to livestock rearing. Small farms with less than two hectares of land represent 84% of farms globally, but produce only one-third of global crop production. Feeding a world population of 9.1 billion people in 2050 would require raising overall food production by nearly 70 percent as 2050 approaches (FAO 2022).






3 Increasing volatility and risks

Total production of primary crops increased by almost 50 percent between 2000 and 2018 to a total 9.1 billion tonnes. However, the pandemic led to a 20% increase over the 795 million people already undernourished due to severe disruption of food supply chains and indirect impact of increased unemployment on increased hunger (FAO 2022).






Global food production systems susceptible to man-made shocks or continued political unrests are resulting in further inequalities.

	Challenges	Need
<p>Increasing risk of climate change</p> <p>The rate of global warming has been doubling every decade since 1981 (Lindsey 2022).</p>	 <ul style="list-style-type: none"> • Food supply chains contribute to 1/3rd of overall GHG emissions. • Only 4% of climate finance is towards Agriculture & Forestry (Our World in Data 2019). 	<ul style="list-style-type: none"> • Focus on adoption of regional policy guidelines that minimising food losses. • Create an ecosystem for green innovation while ensuring nutrition.
<p>Increasing globalisation and trade</p> <p>Globalisation has led to increased trade, but also increased dependence on food imports.</p>	 <ul style="list-style-type: none"> • Agricultural exports are dominated by a few countries. • Most countries rely on imports to feed the growing population. 	<ul style="list-style-type: none"> • Promote diversity and usage of agricultural commodities based on nutrition requirements.
<p>Income growth and distribution</p> <p>Overall incomes have been growing across countries, but so have inequalities.</p>	 <ul style="list-style-type: none"> • Inflation projections among OECD countries are to remain constant around 3%-4%, around 6%-8% for emerging economies, as compared to double-digit rates across sub-Saharan countries (OECD 2019). 	<ul style="list-style-type: none"> • Design social security programmes promoting diversification of livelihoods. • Build adaptive capacity of the producers in low-income countries.



Global food consumption patterns are influenced by macro factors and increasing consumer awareness across developed economies, stressing supply chains.

		Challenges	Need
<h3>Increasing Urbanisation</h3> <p>By 2050, 7 billion people are expected to live in urban areas (Our World in Data 2018).</p>		<ul style="list-style-type: none"> Changes in dietary patterns pose risks leading to an increased malnutrition burden. Nearly 768 million people were undernourished in 2020 (FAO et al. 2021). 	<ul style="list-style-type: none"> Developing fiscal measures that regulate consumption, create awareness around safe and permissible limits.
<h3>Population growth and migration</h3> <p>By 2050 there is a need to produce 60% more food to feed a world population of 9.3 billion (FAO 2022).</p>		<ul style="list-style-type: none"> Pressures on existing food systems to constantly increase supply to meet the demands of growing population. Per capita food consumption is projected to level off for high income countries as compared to 4%-8% increase for others over the next five years (OECD 2022). 	<ul style="list-style-type: none"> Balanced hyperlocal food systems that shift to nutrition, rather than calorie consumption, as the driver.
<h3>Changing demand and food usage</h3> <p>By 2050, global protein consumption is expected to hike by 60% to a total of 464 million tonnes (Revell 2015).</p>		<ul style="list-style-type: none"> In 2019-21, about 1.7 billion tonnes of cereals, protein meals and processing by-products (e.g. cereals bran) were used as animal feed (FAO 2022). 	<ul style="list-style-type: none"> Food systems that balance commercial livestock production.



INDIAN TRENDS IN FOOD SYSTEMS



Indian food production has been steadily growing in quantity, but still needs to focus on distribution systems and quality to cover the hunger and nutritional requirements of the growing population.

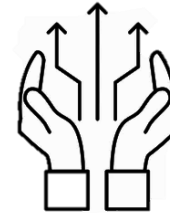


1

Resource intensive and skewed production

Agriculture in India has achieved grain self-sufficiency but the production is resource-intensive, skewed towards cereal crops with more than 50% consumption driven by wheat and rice, and very regionally biased.

This calls for more sustainable measures across agricultural supply chains (FAO 2022).



2

Major competitive advantage in raw products

Even with large production capabilities, India is able to export only 7% of its agricultural produce.

Even in terms of quality and value addition, India has great scope to improve in the areas of inadequate private sector incentives and insufficient infrastructure to support post-harvest activities (High Level Expert Group 2020).



3




Increasing nutritional insecurity

The focus on quality of food is low. The lowest 30% of the population spending on food is undernourished.

This is also due to the procurement of cereals (rice, wheat and maize) at minimum support prices being heavily skewed towards Punjab, Haryana, Western UP and Andhra Pradesh which occupy 80% of this share (Radhakrishna & Reddy 2020).

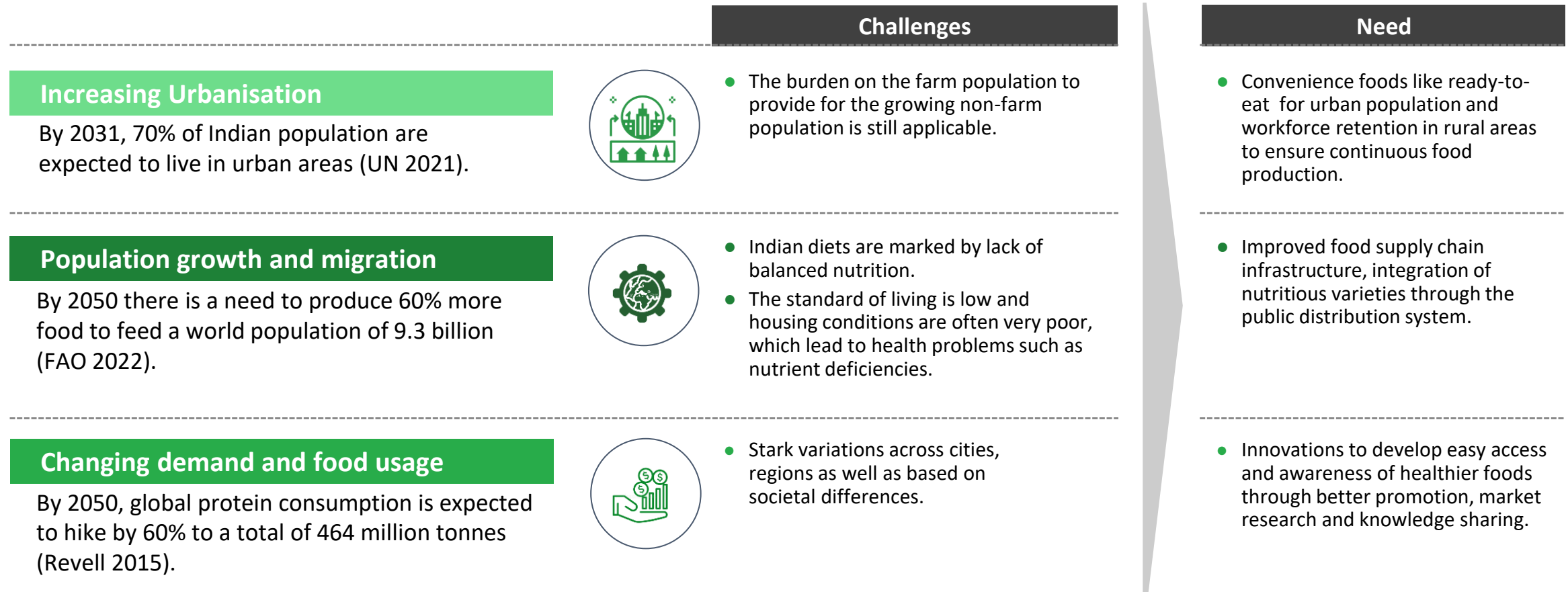


Indian food production is susceptible to high risk of climate change, growing trade and inequalities. It also needs to focus on research, technology and infrastructure to increase food quality.

	Challenges	Need
<p>Increasing risk of climate change</p> <p>The rate of global warming has been doubling every decade since 1981 (Lindsey 2022).</p>	 <ul style="list-style-type: none"> • Climate change is expected to have major health impacts in India- increasing malnutrition and related health disorders. • Child stunting is projected to increase by 35% more by 2050 compared to a scenario without climate change (World Bank 2013). 	<ul style="list-style-type: none"> • Nutrition-rich food production rather than production-rich food systems.
<p>Increasing globalisation and trade</p> <p>Globalisation has led to increased trade, but also increased dependence on food imports.</p>	 <ul style="list-style-type: none"> • Food markets are marked by price volatility, which results from the perishability of commodities. 	<ul style="list-style-type: none"> • Strengthening food system infrastructure with technology inclusion for easy transportation. • Credit facilities for exports and critical focus on quality food production.
<p>Income growth and distribution</p> <p>Overall incomes have been growing across countries, but so have inequalities.</p>	 <ul style="list-style-type: none"> • In India, the national income share of the top 10% of households in 2016 far exceeds that in any other country (World Inequality Report 2018). 	<ul style="list-style-type: none"> • Systematic food systems need nutritious food supply through government bodies to underprivileged and low-income areas. • More options for ready-to-eat foods and high-quality produce at a premium price.



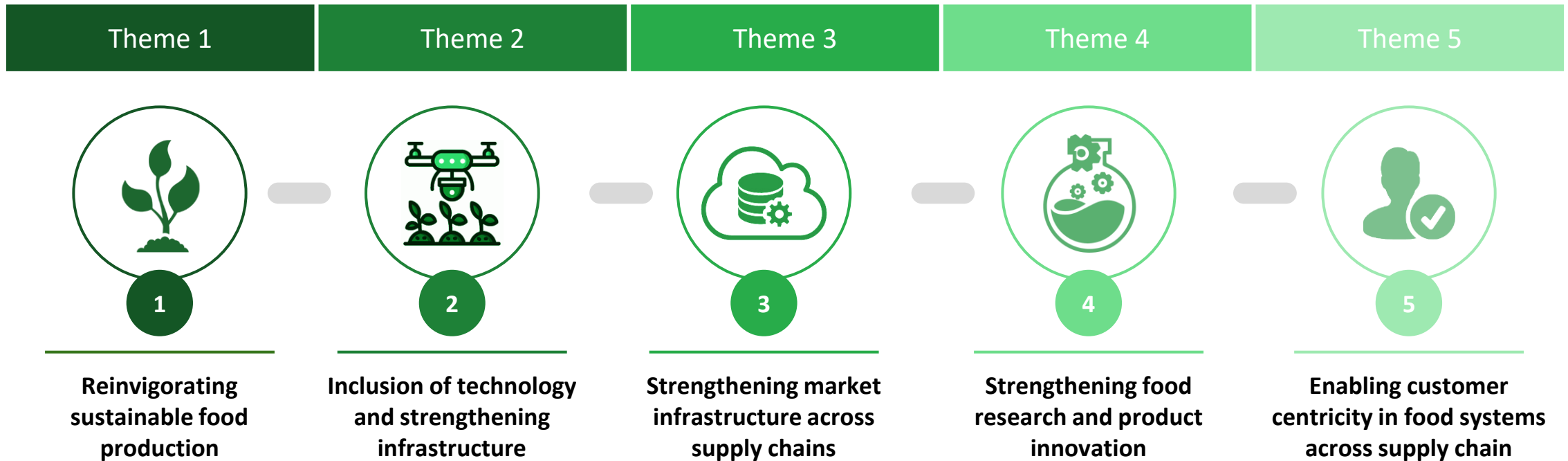
Indian food consumption is affected by increasing population, urbanisation and demand diversification, creating a need to enable food innovation, diversification and stronger distribution infrastructure.



KEY THEMES AND RECOMMENDATIONS



Innovations and a strategic approach towards major themes in Indian agriculture could sustainably bridge existing gaps in food systems.



A systemic and holistic intervention from the government can strengthen the food system with intense regulations and monitoring.



Reinvigorating sustainable food production

- Formulating coherent policies that tap the synergies and resolve conflicts in production practices.
- Evidence or Impact Assessment-based policy formulation around import tariffs or production-linked subsidies.



Inclusion of technology and strengthening infrastructure

- Strengthening subsidy for precision technologies and better access of technology for producers.
- Mandatory inclusion of blockchain technologies on farms to ensure traceability of food and enabling constant monitoring.



Strengthening market infrastructure across supply chains

- Providing financial incentives and planning regulations to drive the establishment of new supermarkets.
- Repurposing market infrastructure through availability of cold storages and providing subsidies as per geographic needs of these cold storage units.



Strengthening food research and product innovation

- Developing programmes focused on consumer behaviour change towards diet and innovations across the food sector.
- Formulation of national or regional level food policies that enable public participation.



Enabling customer centricity in food systems across supply chain

- Implementing biofortification programmes including breeding, support for adoption, market development and public awareness campaigns.
- Repurposing fiscal subsidies to increase the availability of convenient and nutrition-rich foods.



Investments and implementation through philanthropy can drive change towards sustainable development.



Reinvigorating sustainable food production

- Investments in training and capacity-building programmes that focus on nutrition sensitivity, crop diversification and limiting food losses.
- Investments in adaptation measures to tackle climate-related disasters.



Inclusion of technology and strengthening infrastructure

- Investment in learning programmes to train producers for technology adoption and practical implementation of knowledge.
- Collective farming programmes to be tied with technology inclusion as major drivers.



Strengthening market infrastructure across supply chains

- Investment and technical support for small and medium-sized food processing businesses to promote nutritious foods among low-income consumers.
- Strengthening value chain programme design aimed towards reducing on-farm food losses, and creating trade channels through experimental interventions and testing innovation modules.



Strengthening food research and product innovation

- Implementing comprehensive food programmes, incorporating food and nutrition standards, nutrition education, food personnel training across biofortification and innovation in smart food systems for the benefit of vulnerable communities.



Enabling customer centricity in food systems across supply chain

- Incorporating nutrition profile assessments in food systems, implementing programmes, monitoring developments and enabling standardisation of health monitoring indicators.



Scale-up interventions can be supported by private players through a focus on increased productivity and achievability of outcomes.



Reinvigorating sustainable food production

- Supporting innovative post-harvest storage technologies and infrastructure to retain nutrients and minimise food wastage.
- Driving collaborative action towards regenerative practices through public-private-community partnerships towards an inclusive, climate positive economy.



Inclusion of technology and strengthening infrastructure

- Establishing a system to enable affordable solutions by achieving economies of scale in technology production, resulting in lower access costs for producers.
- Enabling blockchain integration as a process to ensure end-to-end traceability of processed foods.



Strengthening market infrastructure across supply chains

- Establishing a rigorous monitoring and evaluation system to strengthen market infrastructure, capture the market for nutrient-rich products and gauge consumer needs by evaluating business performance indicators on nutrient availability for consumers.



Strengthening food research and product innovation

- Developing understanding of consumer perceptions and scaling pilots for biofortified food adoption among consumers.
- Researching and developing alternative protein products, and optimising supply chains for increased production through innovative sustainable food options like plant-based protein.



Enabling customer centricity in food systems across supply chain

- Developing data-driven product requirement assessments and including traceability as a mandate in all food produced, by incorporating data intelligence systems.
- Food standards and food reformulation implementation, with mandatory limits or closely monitored voluntary targets, aiming to improve the nutritional quality of processed food.



ANNEXURE



Sustainable food systems do not just help to end hunger and improve food supply chains. They can help the world achieve critical progress on all 17 Sustainable Development Goals (1/4).

SDG Goals



Quantum of development issues

It is projected that around 600 million people will still be living in poverty by 2030.

The prevalence of undernourishment increased to around 9.9 per cent in 2020, with estimates of hungry people reaching between 720 and 811 million globally in 2020.

In 2020, 45.4 million children under five were affected by wasting.

It is estimated that an additional 101 million children and youth fell below the minimum reading proficiency level because of the pandemic.

Globally, women make just 13 percent of agricultural landholders. Women are up to 11 percentage points more likely than men to face food insecurity.

How food systems can help achieve SDG

Sustainable food systems can contribute to the fight against poverty by creating good jobs, improving access to food, and supporting healthy communities.

Rebuilding our food systems to make them more sustainable, productive, and resilient is essential for solving long-term hunger challenges and managing acute shocks, like disease outbreaks and climate extremes.

Sustainable food systems will support adequate nutrition, which helps people of all ages to achieve good health, resulting in higher life expectancy.

Recovery from the negative effects of the pandemic requires sustainable food systems that enable students to have a healthy and balanced diet, which is critical for success at school.

Sustainable food systems can empower and support women, and bolster their livelihoods around the world.



Sustainable food systems do not just help to end hunger and improve food supply chains. They can help the world achieve critical progress on all 17 Sustainable Development Goals (2/4).

SDG Goals



Quantum of development issues

In 2020, 2 billion people still lacked safely managed drinking water, of which 771 million had no access to basic drinking water.

759 million people lack access to electricity worldwide.

The productivity and incomes of small-scale producers are lower than those of larger food producers on average.

From 2006 to 2020, almost one in three small industrial enterprises required and benefited from a loan or line of credit. Access to credit remains uneven across countries of the world.

25 percent of the population lives on less than half the median income, and 1.6 billion workers in the informal economy are in danger of losing their livelihoods.

How food systems can help achieve SDG

Sustainable food systems can ensure the sustainable use of this precious resource and increase access for those who do not have drinking water, while also reducing the amount of pollution in our natural water systems.

Investing in sustainable food systems that maximise the use of clean and renewable sources of energy will reduce the food sector's environmental impact and improve people's access to clean and affordable energy.

Sustainable food systems can create decent jobs and support the incomes of billions of people around the world.

By scaling up innovations and investing in infrastructure, sustainable food systems can deliver widespread benefits to people and the planet.

Sustainable food systems can reduce poverty by providing decent work and a good income.



Sustainable food systems do not just help to end hunger and improve food supply chains. They can help the world achieve critical progress on all 17 Sustainable Development Goals (3/4).

SDG Goals



Quantum of development issues

Inequalities in accessing basic services are seen in urban areas, with over 800 million people living in slums. The urban poor are particularly vulnerable to financial crises or food price hikes.

By 2020, 83 countries and the European Union reported a total of 700 policies and implementation activities under the 10-Year Framework of Programmes on Sustainable Consumption and Production.

Greenhouse gas concentrations reached new highs in 2020, with globally averaged mole fractions of CO₂ exceeding 410 parts per million.

More than 3 billion people rely on the ocean for their livelihoods, and over 80 percent of world merchandise trade is carried out by sea.

How food systems can help achieve SDG

Sustainable food systems can help ensure that city dwellers everywhere have purchasing power and are adequately nourished.




Sustainable food systems reduce waste and spoilage and empower consumers to make smart choices in their food shopping.

Sustainable food systems can reduce this impact by lowering emissions of critical greenhouse gases, including methane and CO₂.

Sustainable food systems can ensure the long-term viability of the world's fisheries, while also protecting the health of the ecosystems that host them.



Sustainable food systems do not just help to end hunger and improve food supply chains. They can help the world achieve critical progress on all 17 Sustainable Development Goals (4/4).

SDG Goals	Quantum of development issues	How food systems can help achieve SDG
	<p>The proportion of forest area fell from 31.9 percent of the world's total land area in 2000 to 31.2 percent in 2020. This translates to a net loss of almost 100 million hectares.</p>	<p>Sustainable agriculture can reduce deforestation and support healthy terrestrial ecosystems, while also providing sustenance to people around the world.</p>
	<p>At the end of 2020, about 1 percent of the global population – 82.4 million people – had been forcibly displaced because of persecution, conflict or generalised violence.</p>	<p>Sustainable food systems can reduce critical stresses facing families, communities, and nations around the globe, preparing the ground for peace and strong institutions to take hold.</p>
	<p>Agriculture, a particular concern for developing countries, accounted for the highest tariff imposed by developed countries in 2019 at 7.9 percent.</p>	<p>Sustainable food systems can deliver tangible benefits to communities around the world.</p>



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