

Water for Sustainable Agriculture and Food Security

[Water](#) is essential for every form of life, for all aspects of socio-economic development, and for the maintenance of healthy ecosystems. While there are enough freshwater resources available on a [worldwide scale](#) to support continuing [industrial](#) and [agricultural expansion](#), concerns about the long-term [sustainable use of water](#) resources are developing. This is especially true when taking regional differences in the availability and [quality of water](#) into account. [Farmers](#) would not be able to raise crops and provide food for their animals without water, a necessary component of [agricultural production](#). [Food insecurity](#) is a direct result of [water scarcity](#). So, how can we gain access to water for sustainable agriculture and food security?

Fortunately, the Paris Agreement under the United Nations Framework Convention on Climate Change ([UNFCCC](#)), and the [2030 Agenda](#) for [Sustainable Development \(SDGs\)](#) offer framework and objectives that should direct global efforts toward more inclusive growth and [sustainable livelihoods](#). Consequently, [agriculture](#) is a key factor in achieving these goals, due to its connections to [food security](#), [nutrition](#), [health](#), [rural development and growth](#), and the [environment](#).



Water is essential for sustainable agriculture and food production.

Source: [Freepik.com](https://www.freepik.com)

What is sustainable agriculture?

Over the past forty years, there was a growing movement to challenge the need for exorbitant prices and to propose creative solutions ([Röling, N., Pretty, J., 1997](#)). Today, the movement for sustainable agriculture is gaining acceptance and support within the systems we use to produce food.

Sustainable Agriculture is:

- **Economically Viable**: If it is not profitable, it is not sustainable.
- **Socially Supportive**: A positive quality of life for farmers, farmers' families and farm communities is essential.
- **Ecologically Sound**: We must preserve the resource base that sustains us all.

Interestingly, these objectives have been influenced by various ideologies, laws, and practices. Most definitions of [sustainable agriculture](#) have a few [fundamental themes and tenets](#). Sustainable agriculture is the production of [food](#), fibre, plant

or animal products using [farming techniques](#) that protect the environment, public health, and human and animal welfare. Sustainable farming systems are those that are least toxic and least [energy](#) intensive, and yet, maintain productivity and profitability. [Organic farming](#) is a great example of this.

The [foundation of agricultural sustainability](#) is the idea that we must satisfy our needs today without affecting the ability of [future generations](#) to satisfy needs. Therefore, short-term economic gain is just as important as long-term stewardship of both [natural](#) and human resources.



[Smart Farming with Agricultural Internet of Things \(IoT\).](#)

Source: [Freepik.com](#)

How can we push for sustainable agriculture?

There is no single method for quickening the switch to sustainable agriculture due to the scale and complexity of the problem. Collaboration is essential, and there are a number of strategies that may be used to improve the sustainability of farming. The following 5 important strategies will help quicken the shift to sustainable agriculture:

- [Encourage innovation and research](#)

- Utilise [regenerative techniques](#) and [nature-based approaches](#)
- EditSign
- ditSignEditSign
- From [farm to fork, provide education and training](#)
- Enhance [transparency and traceability](#)
- Encourage [cross-sector collaboration](#)

Unfortunately, agriculture faces a significant problem as a result of the [world's chronically high rates of hunger and malnutrition](#) from 2015 onwards. By 2050, there will be nine billion people on the planet, so we need to begin advocating for and endorsing [sustainable agriculture](#) if we want to feed the growing population. Importantly, a necessary adaptation to anticipated dietary changes is needed. At any rate, coping with growing demand means agricultural practices would need to produce [60 per cent](#) more [food](#) than they do now, globally. Significantly, a third of the food produced, or around [1.3 billion tonnes annually](#), is lost or [wasted](#) across the supply chain, creating significant financial and [environmental](#) impacts.

Indeed, growth in [agriculture](#) and the abolition of [poverty](#) and [world hunger](#) are strikingly related. Subsequently, the majority of people who are currently living in poverty rely on broadly defined agriculture. This includes [crop](#) and animal production, [fisheries](#) and [forestry](#) for income, employment, food, and other commodities and global entities. Unquestionably, this is a result of low-income nations with limited resources. Overall, GDP growth that comes from the agricultural sector is, on average, up to five times more effective than growth from other sectors in eliminating poverty.

sustainable agriculture and Food Security

Sustainable agriculture incorporates many environmentally safe agricultural practices, offering innovative and economically viable opportunities for farmers, labourers, consumers, and policymakers. Currently, the trajectory of agricultural production and development is unsustainable due to its detrimental effects on the environment and natural resources. [Up to 75% of crop genetic variety has been lost](#). Unfortunately, one-third of farmland has been destroyed, and [22% of animal breeds are in danger](#).



Sustainable agriculture by 2030 is the ultimate goal.

Source: [AGRIVI](#)

Over the previous ten years, almost [13 million hectares](#) of [forests](#) were converted into land for human development. Frustratingly, we're at a time when there is a rising demand for food, feed, fibre, and commodities and services from agriculture (including crops, livestock, forestry, [fisheries](#), and aquaculture). Unfortunately, there is also a rising scarcity of [natural](#) resources and a rapid deterioration of those resources. Some of the biggest population increases are anticipated in regions with a high rate of food insecurity and a heavy dependence on agriculture. Obviously, sustainable agriculture and food security are an unequivocal must.

strategic development of new approaches and the transition to sustainability

These challenges give rise to [five fundamental principles](#)

EditSign

that should direct the strategic creation of fresh ideas and the move toward [sustainability](#):

- Improving resource utilisation efficiency
- Proactive measures to preserve, protect, and improve natural resources
- Safeguards and the enhancement of rural lives and social [well-being](#)
- Environmental, community, and human resilience, particularly in the face

- of [climate change](#) and market instability
- Good governance of both natural and human systems

Significantly, in order to cope with the rapid pace of change and increased uncertainty, sustainability must be seen as a process, rather than a singularly defined endpoint to be achieved.

the development of technical, policy, governance and financing frameworks that support agricultural producers

Technical, policy, governance and financing frameworks can be supported by resource managers and agricultural producers. They can actively engage in a dynamic innovation process.

- [Policies and institutions](#)

EditSign

are required to encourage the use of sustainable practices. We should be establishing rules and penalties for behaviour that depletes or degrades natural resources. In turn, this will make it easier for people to obtain the information and resources they need.

- [Utilising technology, research, and development](#) to its fullest extent is necessary for sustainable agricultural practices. Far better integration of local knowledge would be ideal, calling for fresh, stronger collaborations between technical and investment-focused groups.
- [Appropriate statistics, geographical data and maps](#), as well as qualitative data and knowledge are necessary for the planning and management of agricultural sectors. Production systems and the underlying natural and socioeconomic resources should be the focus of analysis.

sustainable agriculture and sustainable food systems

Indeed, there are many practices commonly used by people working in sustainable agriculture and [food](#) security systems. Growers may use methods to

promote [soil health](#), minimise [water use](#), and lower [pollution levels](#) on farms. Understandably, consumers and retailers concerned with sustainability can look for “[values-based](#)” foods that are grown using methods promoting [farmworker well-being](#). These are [environmentally friendly](#) and strengthen the local [economy](#).

In this case, researchers in sustainable agriculture often cross-disciplinary lines with their work. Many combine biology, economics, engineering, chemistry, and community development. However, sustainable agriculture is more than a collection of practices. It is also a process of negotiation. There's a push and pull between the competing interests of individual farmers and people in communities. They work hard to solve complex problems involving the ways in which we produce, grow and nourish food sources.

Practices that support Sustainable agriculture and Food security

The [Union of Concerned Scientists](#) is a nonprofit science advocacy organisation based in the United States. Following [agricultural practices](#), they've demonstrated successful initiatives, achieving sustainability over decades of science and practice, particularly when used in combination with several methods.

[Rotating Crops and Embracing Diversity](#)

Numerous advantages, such as healthier soil and better pest control can result from planting a diverse line of crops. Significantly, intercropping (growing a variety of crops in the same place) and intricate multiyear crop rotations are examples of crop diversity methods.

[Planting Cover Crops and Perennials](#)

Cover crops such as clover, rye, or hairy vetch are planted during off-seasons. When soils might otherwise be left bare, perennial crops keep the soil covered. This maintains living roots in the ground year-round, preventing erosion, replenishing soil's nutrients, and controlling weeds. These crops safeguard and improve [soil](#) health, lowering the need for fertilisers and herbicides.

Reducing or Eliminating Tillage

Traditional tillage, or ploughing, prepares fields for planting and eliminates weed issues, although it can, sometimes, result in soil loss. Directly planting seeds into undisturbed soil using no-till or reduced-till techniques can lessen soil erosion and enhance soil health.

Applying Integrated Pest Management (IPM)

The regular application of a variety of techniques such as mechanical and biological controls can keep pest populations under control, reducing the need for chemical pesticides.

Integrating Livestock and Crops

Industrial agriculture tends to keep [plant](#) and [animal](#) production separate. Animals commonly live far from where their feed is produced and crops grow far away from abundant manure fertilisers. An increasing body of research demonstrates that effective [integration of crop and livestock production](#) can increase farm productivity and profitability.

Adopting Agroforestry Practices

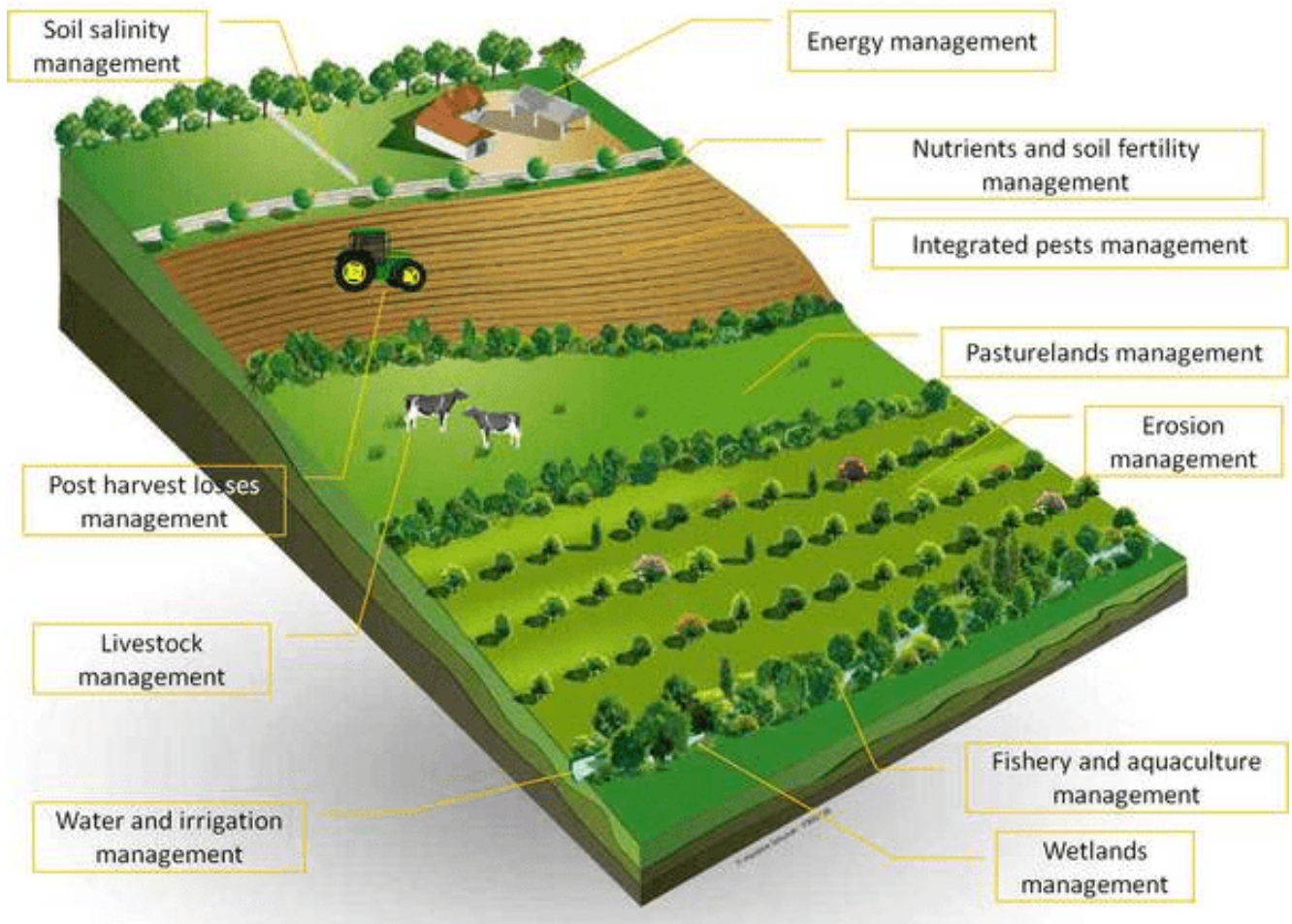
Farmers can conserve plants, [wildlife](#), and water resources by incorporating trees and shrubs into their operations. They may also be able to generate additional income from fruit or nut crops.

Managing Whole Systems and Landscapes

Uncultivated or less intensively farmed lands are as essential to the farm in sustainable farming practices. For instance, strips of prairie plants inside or surrounding crops or natural vegetation alongside streams can help limit erosion, reduce nutrient runoff, and sustain [bees](#) and other pollinators as well as [biodiversity](#) more generally.

Interestingly, these techniques share an emphasis on soil. Many of the issues connected to industrial agriculture can be resolved by maintaining farms as protected environments, teeming with life. Healthy, active soil supports strong

crops, [absorbs water like a sponge](#), reduces [pollution](#), and ensures the prosperity of farmers and their communities.



Sustainable agricultural farming.

Source: [PMF IAS](#)

Everyone plays a role in creating a sustainable food system

Concurrently, interdisciplinary activities in research and teaching are also implied by a systems perspective. Researchers from a variety of fields must contribute to this, but so must farmers, farmworkers, consumers, policymakers, and other stakeholders. Sustainable agriculture and food security transitioning take time. Importantly, the move to sustainable agriculture typically necessitates a series of modest actions from farmers. How quickly and how far participants can progress in the transition depends on family economics and personal objectives. It is crucial to understand that every minor choice counts and helps move the system along. Obviously, we must advocate for a '[sustainable agriculture continuum](#)', as

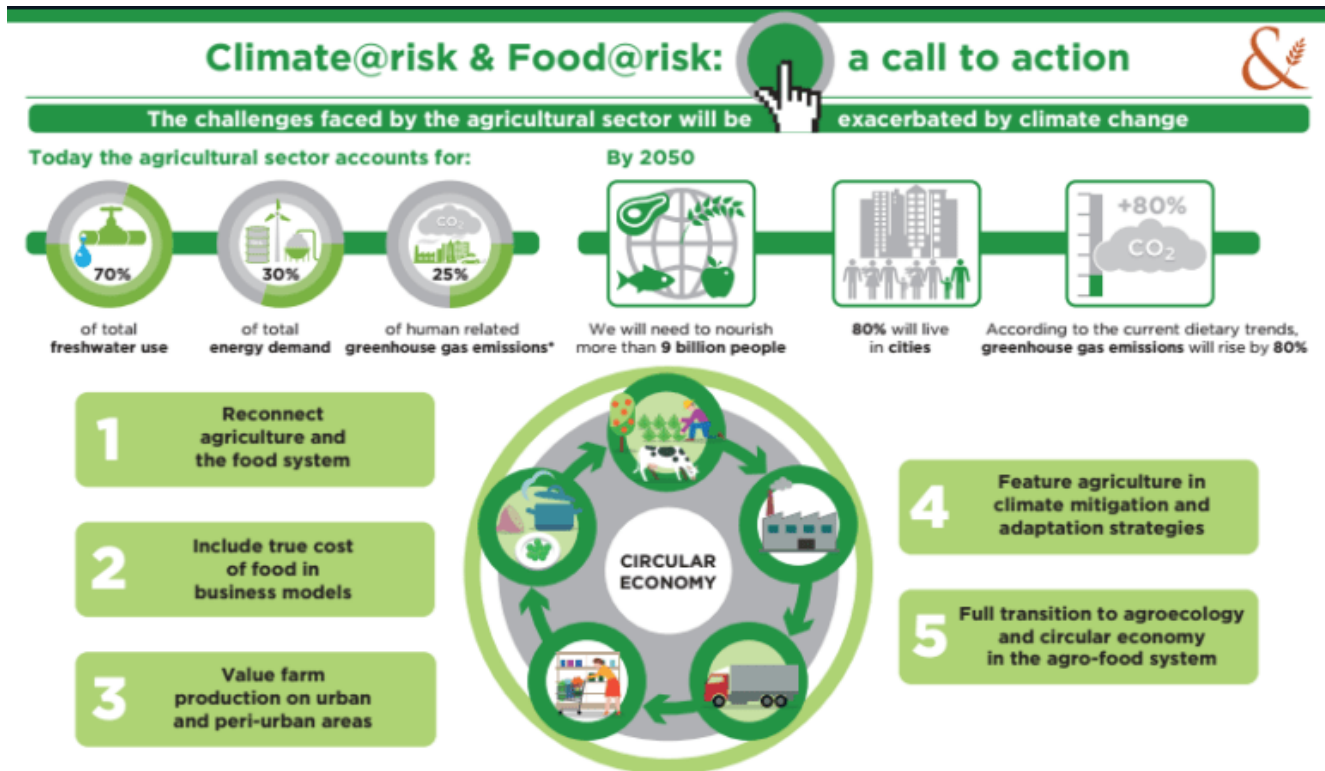
the key to progress.

Finally, it is crucial to emphasise that every stakeholder, including farmers, workers, legislators, academics, retailers, and customers, must work toward the [objective of sustainable agriculture](#). Each entity can further extend the [sustainable agricultural community](#) by contributing individually.

Why must we focus on water for Sustainable Agriculture and Food Security?

Water for agriculture is in short supply and this factor is worsening in numerous regions globally. Overdraft of groundwater supplies [jeopardises future irrigation capacity](#), while overdraft of surface waters disturbs important riparian zones. Seemingly, [water quality problems](#) such as salinisation, nutrient overload, and pesticide pollution are very common. Efficiently utilising reduced-volume irrigation methods, choosing and developing more salt and drought-tolerant crop species, and managing soils and crops to minimise water loss are all strategies to use water more effectively in sustainable agroecosystems.

Conversely, modern [agriculture](#) is heavily dependent on non-renewable energy sources, especially petroleum. Unfortunately, the usage of non-renewable resources cannot be sustained continuously. A sudden end to our reliance on them would have disastrous economic effects. In order to practice sustainable agriculture, less external energy must be used. Undoubtedly, non-renewable energy sources must be replaced with renewables such as [solar](#) and [wind energy](#), including biofuels made from agricultural waste.



Barilla Center Call-to-Action Focuses on Change, Now.

Source: [Foodtank](#)

achieving the United Nations Sustainability Development Goals (SDGs)

Unfortunately, sustainable agriculture does not have a single, clear endpoint. It is hard to mitigate the future without an understanding of what defines sustainability in terms of the environment, society, and the economy. Earth is constantly changing and is influenced by a myriad of different concerns, viewpoints, and beliefs. Conversely, sustainable agriculture and food security weren't regarded as pressing issues 20 years ago. The environmental capacity to adapt to climate change is now receiving more attention.

Furthermore, the specifics that make up a sustainable system vary depending on a variety of factors (such as soil types, climate, and labour expenses). Additionally, from one cultural and ideological standpoint to another, making the term "[sustainable](#)" itself a contentious one. There is much more to learn about [sustainable water management](#), [water purification](#), [recycled water](#), [sustainable agriculture](#), [food insecurity](#), and [poverty](#).

A thriving framework

THRIVE examines issues and evaluates potential solutions in relation to this overarching goal of [thrivability](#). It is about making predictive analyses using modern technology that supports [environmental](#) and [social sustainability](#) transformations.

To learn more about how [The THRIVE Project](#) is researching, educating and advocating for a future beyond sustainability, visit our [website](#). Discover our interesting and informative [blog](#) and [podcast series](#) and learn about our regular live [webinars](#) featuring expert guests in a diverse range of fields. Why not [sign up for our newsletter](#) for regular updates!