

XIAMUN XI

United Nations Environment Programme

Developing eco-friendly agricultural technologies to address food shortages

Chair Report

XIAMUN XI

FORUM: United Nations Environment Programme (UNEP)
ISSUE OF: Developing eco-friendly agricultural technologies to address food shortages
STUDENT OFFICER: Justin Zheng
POSITION: Deputy President

Introduction to Committee:

The United Nations Environment Programme (UNEP) is the main international authority responsible for addressing global environmental issues. Established in 1972 following the United Nations Conference on the Human Environment in Stockholm, UNEP was created to coordinate environmental activities within the UN system and assist developing countries in implementing environmentally sound policies and practices. Its central mission is to provide leadership, deliver science-based solutions, and encourage international cooperation to protect the planet for present and future generations.

In Model United Nations (MUN) and real-world diplomacy, the UNEP committee focuses on finding practical solutions to critical global challenges. The committee regularly addresses issues such as climate change, biodiversity loss, pollution, deforestation, and sustainable resource management. Delegates in UNEP analyze environmental data, evaluate national policies, and negotiate international agreements aimed at promoting sustainable development. Through resolution writing and debate, the committee works to balance economic growth with environmental protection, ensuring that nations can develop while preserving natural ecosystems.

Introduction to Topic:

The world faces a growing challenge: providing enough food for a rapidly increasing global population while protecting the planet's ecosystems. Traditional farming methods have often relied on heavy chemical use, overworking the soil, and massive water consumption. These

practices contribute to soil degradation, water scarcity, and environmental pollution. At the same time, climate change—marked by rising temperatures, severe droughts, and unpredictable weather—is reducing crop yields around the globe. This combination of environmental damage and extreme weather threatens food security, especially in vulnerable developing nations.

To solve this crisis, delegates in the UNEP committee must focus on developing and implementing eco-friendly agricultural technologies. Solutions such as precision farming, drip irrigation, renewable energy-powered machinery, and bio-based fertilizers allow farmers to grow more food using fewer natural resources. These innovations help protect soil health, conserve clean water, and reduce greenhouse gas emissions. However, many developing countries face significant financial and technical barriers to adopting these tools. The main goal for delegates is to create policies that promote green technological innovation, support technology sharing, and ensure affordable access to sustainable farming methods worldwide.

History of Topic:

---

1. The 1950s–1960s: The Dawn of the Green Revolution

In the mid-20th century, rapid population growth led to widespread fears of global starvation. In response, scientists and governments introduced the Green Revolution. This movement brought high-yielding crop varieties, chemical fertilizers, synthetic pesticides, and large-scale irrigation systems. Food production grew dramatically worldwide, saving millions from famine and helping countries like India achieve food self-sufficiency.

2. The 1970s–1980s: Emerging Environmental Failures

By the 1970s and 1980s, the negative impacts of high-input farming became clear. Heavy chemical reliance degraded soil quality, polluted local waterways, and reduced crop diversity. Excessive groundwater pumping led to water scarcity and soil salinization in many agricultural

regions. The period demonstrated that boosting short-term food yields with heavy chemical use caused long-term environmental damage.

3. 1992: The Rio Earth Summit and the Push for Sustainable Farming

Recognizing these environmental threats, world leaders gathered at the United Nations Conference on Environment and Development (the Rio Earth Summit) in 1992. Agenda 21, adopted at the conference, formally called for a shift toward sustainable agriculture. It urged nations to adopt techniques that protect natural resources while maintaining adequate crop yields, setting the foundation for global green farming policies.

4. The 2000s: Innovation in Precision Agriculture and Water Conservation

During the 2000s, technological advances created practical tools for eco-friendly agriculture. The widespread introduction of precision agriculture—using satellite data, soil sensors, and GPS-guided equipment—allowed farmers to apply fertilizer and water with exact precision. Additionally, low-cost drip irrigation systems expanded globally, drastically reducing water waste while improving crop yield in dry regions.

5. 2015: The UN Sustainable Development Goals (SDGs)

In 2015, the UN established the 17 Sustainable Development Goals, specifically highlighting the intersection of agriculture and environmental preservation. SDG 2 (Zero Hunger) and SDG 12 (Responsible Consumption and Production) set clear targets for implementing resilient, eco-friendly farming practices. This global commitment encouraged increased funding for bio-pesticides, organic soil treatments, and climate-smart seeds.

6. Present Day: The Technology Gap and Climate Adaptation

Today, modern innovations like vertical farming, solar-powered agricultural tools, and AI-driven pest management offer clear solutions to global food shortages. However, a major failure remains: the growing technology gap between wealthy and developing nations. Developing countries often lack the money, infrastructure, and technical training to adopt these green technologies, leaving them vulnerable to climate change and food insecurity.

Key Terms:

Eco-Friendly Agricultural Technology

Referencing modern farming tools and techniques designed to increase food production while minimizing environmental damage. Examples include precision agriculture, drip irrigation, bio-fertilizers, and solar-powered farm machinery. These technologies aim to protect soil, conserve water, and reduce greenhouse gas emissions without compromising crop yields.

Food Insecurity

The state in which individuals or communities lack consistent, reliable access to sufficient, safe, and nutritious food required for an active and healthy life. Food insecurity is caused by factors such as climate change, poor soil quality, conflict, economic instability, and extreme weather events.

Precision Agriculture

A farming management concept that uses digital tools—such as satellite imagery, GPS, soil sensors, and drones—to monitor and manage crops. By analyzing data, farmers can apply water,

fertilizers, and pesticides in exact amounts only where needed, reducing waste, lowering costs, and preventing environmental pollution.

Climate-Smart Agriculture (CSA)

An integrated approach to managing farmland, livestock, forests, and fisheries that addresses the twin challenges of food security and climate change. CSA aims to sustainably increase agricultural productivity, adapt and build resilience to climate change, and reduce greenhouse gas emissions where possible.

Sustainable Development Goals (SDGs)

A set of 17 global goals established by the United Nations in 2015 to achieve a better and more sustainable future for all by 2030. Key goals relevant to this topic include SDG 2 (Zero Hunger), SDG 12 (Responsible Consumption and Production), and SDG 13 (Climate Action).

Technology Transfer

The process of sharing and transferring skills, knowledge, technologies, and manufacturing methods from developed nations or institutions to developing countries. In UNEP debates, technology transfer is critical to ensuring that low-income nations can afford and implement green agricultural innovations.

Major Parties Involved:

---

1. Supranational Organizations

Food and Agriculture Organization (FAO)

The FAO coordinates international initiatives to end hunger, improve nutrition, and advance sustainable agricultural systems globally. It provides technical expertise, establishes safety and quality standards, and conducts research on climate-resilient farming techniques.

As the leading international body for food security, the FAO bridges technical scientific research and policy implementation, ensuring that member states adopt sustainable, eco-friendly farming practices.

World Bank Group

The World Bank provides major financial loans, grants, and technical assistance to low- and middle-income nations to fund sustainable agricultural infrastructure, precision agriculture initiatives, and climate-resilient farming projects.

Financial barriers prevent many developing countries from adopting modern green technology. The World Bank offers the large-scale funding and economic guidance necessary to scale eco-friendly innovations globally.

2. National Governments and Government Agencies

United States Department of Agriculture (USDA)

The USDA oversees national agricultural policy, conducts advanced research on crop health and sustainable farming techniques, and provides subsidies and grants to farmers implementing conservation practices.

Representing one of the world's largest agricultural exporters, the USDA's policies and research set major global benchmarks for agricultural innovation, technology adoption, and food safety standards.

Ministry of Agriculture and Farmers Welfare (India)

This ministry formulates policies to manage India's massive agricultural sector, promoting organic farming, soil health management, and efficient irrigation schemes for millions of smallholder farmers.

India represents a major developing nation balancing high population demand with severe climate threats. The ministry's efforts demonstrate how large-scale green technological transitions can be managed in low- and middle-income agricultural economies.

Ministry of Agriculture and Rural Affairs (MARA) of the People's Republic of China

MARA manages national agricultural policies, promotes high-tech farming innovations (such as drone-assisted farming and automated irrigation systems), and implements sustainable rural development projects across China.

Feeding nearly 20% of the global population on limited arable land requires intense technological efficiency, making China's state-led push for green agriculture a model for land-efficient tech deployment.

3. Independent Entities and Non-Governmental Organizations (NGOs)

CGIAR (Consultative Group on International Agricultural Research)

CGIAR is a global network of independent research centers that develops high-yield, drought-resistant crop varieties, bio-fortified seeds, and sustainable farming systems tailored to developing regions.

CGIAR serves as a vital bridge between scientific innovation and resource-poor farmers, offering open-access research and open-source agricultural technologies to regions struggling with severe food shortages.

World Wildlife Fund (WWF)

WWF works with agricultural communities, food companies, and governments to reduce the environmental footprint of farming by preventing deforestation, restoring degraded soil, and protecting local water sources.

WWF advocates for ecological preservation within agricultural policies, holding governments and corporations accountable to ensure that food production expansion does not destroy critical natural habitats.

XIAMUN XI

Problems Raised:

Problem 1. High Financial Barriers and Limited Access to Credit

Advanced eco-friendly agricultural tools—such as solar-powered irrigation systems, precision farming sensors, and bio-technological seeds—require significant upfront investment. Smallholder farmers, who produce a major portion of the food supply in developing nations, often operate on low incomes and lack access to formal banking systems or affordable credit lines.

Smallholder farmers are unable to afford modern green farming technology and remain stuck using older, resource-heavy practices. For governments in low-income nations, the inability to subsidize these costly technologies leads to stagnant agricultural productivity, making national food security difficult to maintain without relying on expensive foreign food imports.

Problem 2. Infrastructure Gaps and Digital Divide

Many modern sustainable farming methods rely heavily on digital infrastructure, including high-speed internet, GPS tracking, and reliable electricity grids to run sensors, drones, and automated data analytics. However, rural regions across developing countries frequently lack basic power networks and stable internet connectivity.

Farmers in remote areas cannot utilize data-driven green tools, which leaves them unable to optimize their water and fertilizer usage. This digital divide isolates rural agricultural communities from global tech advancements and places heavy pressure on regional governments, which must fund massive infrastructure projects before eco-friendly farming tools can function effectively.

Problem 3. Technical Knowledge Deficits and Resistance to Change

Implementing eco-friendly technologies requires technical skills, data literacy, and specialized training. In many farming communities, agricultural workers have relied on traditional methods passed down over generations. A lack of local training programs and extension services makes it hard for farmers to learn how to operate and maintain high-tech equipment.

Without proper technical education, farmers may mismanage new green tools or reject them altogether due to skepticism and fear of crop failure. For non-governmental organizations (NGOs) and international agencies, this creates a major obstacle where funded machinery goes unused or broken due to a lack of local technical capacity.

Problem 4. Land Tenure Insecurity and Long-Term Investment Disincentives

Soil restoration, agroforestry, and the installation of eco-friendly irrigation infrastructure require long-term financial and physical commitments to the land. However, a significant portion of farmers in developing nations do not legally own the land they work on due to informal land rights, tenant farming systems, or weak legal protections.

Tenant farmers are hesitant to invest their limited savings in long-term eco-friendly technology or land restoration when they face the risk of losing access to the property at any time. For governments, land tenure insecurity creates a systemic barrier that slows down national adoption of long-term sustainable agriculture policies.

Previous Attempts to Resolve the Issue:

- 2015 UN Sustainable Development Goals (SDGs): Established by the UN General Assembly in 2015, the SDGs set global targets to promote eco-friendly agriculture under SDG 2 (Zero Hunger) and SDG 12 (Responsible Consumption and Production). The core goal of these frameworks is to encourage member states to shift national agricultural

funding away from harmful chemical inputs and toward soil conservation, water efficiency, and climate-resilient farming techniques. They outline key policy objectives for governments to reduce environmental degradation while maintaining adequate crop production. However, because the SDGs serve as non-binding guidelines rather than enforceable treaties, compliance varies greatly across nations. Low-income countries often struggle to implement these targets due to a lack of national funding and infrastructure.

- FAO "Save and Grow" Action Framework: Launched in 2011 by the Food and Agriculture Organization (FAO), this initiative provides a practical roadmap for sustainable crop production targeted at smallholder farmers. It emphasizes environmental farming technologies such as drip irrigation, conservation tillage, organic soil management, and targeted biopesticides. By integrating science-based techniques into local agriculture, the program aims to help nations increase crop yields without overusing natural resources or polluting local ecosystems. While the framework has successfully guided regional agricultural policies, its global reach remains limited by a lack of international enforcement mechanisms and localized technical training programs.

- UNDP Cultivate Innovation Initiative: Introduced in 2019 by the United Nations Development Programme (UNDP), this initiative was established to bridge the technology gap between agritech startups and resource-poor farmers in developing countries. The program piloted digital eco-friendly farming solutions, including mobile micro-climate tracking systems, automated soil sensors, and low-cost irrigation technologies across regions in Africa, Asia, and Latin America. It focused on making advanced, data-driven agriculture accessible to communities severely impacted by climate change. Despite positive results during the pilot phases, expanding these projects globally has proven difficult due to weak rural energy grids, high equipment costs, and limited internet connectivity in remote regions.

- CGIAR Open-Source Biotechnology Research: Spearheaded by the Consultative Group on International Agricultural Research (CGIAR) starting in the early 2000s, this ongoing global initiative focuses on developing and distributing eco-friendly crop varieties. Scientists created high-yielding, drought-tolerant, and pest-resistant seeds—such as bio-fortified rice and heat-tolerant maize—without imposing commercial patent restrictions. This allows developing nations and low-income farmers free access to advanced agricultural biotechnology. While these climate-resilient seeds have significantly reduced reliance on chemical pesticides and improved crop survival, distribution networks remain underfunded, preventing many remote farming communities from receiving seed shipments.

- National Green Technology Subsidies (e.g., India's PM-KUSUM Scheme): Launched nationally by the Indian government in 2019, this policy provides major financial subsidies to help farmers adopt solar-powered agricultural technologies. Under the program, the government covers up to 60% of the cost for installing solar-powered water pumps, allowing rural farmers to replace carbon-heavy diesel engines with renewable energy systems. This reduces greenhouse gas emissions, lowers fuel costs, and improves access to reliable irrigation in off-grid rural areas. However, these national subsidy programs often face administrative delays, and smallholder farmers frequently lack the remaining capital needed to cover their portion of the initial investment.

- NGO-Led Micro-Lending and Equipment Financing: Developed throughout the 2010s by international non-governmental organizations such as One Acre Fund and Heifer International, this financial model aims to make sustainable farming tools affordable for rural smallholders. Operating in parts of Sub-Saharan Africa and South Asia, these programs partner with local credit institutions to provide low-interest micro-loans and asset financing. This enables farmers to purchase drip irrigation kits, biofertilizers, and

solar-powered tools without needing traditional bank loans or upfront cash deposits. While effective at the local level, these NGO-led efforts suffer from limited financial capital and cannot replace comprehensive, state-funded agricultural support systems.

Timeline:

Date	Event
1950s–1960s	The Green Revolution begins worldwide, introducing high-yielding crop varieties, chemical fertilizers, synthetic pesticides, and expanded irrigation to dramatically increase food production.
June 5, 1972	The United Nations Conference on the Human Environment opens in Stockholm, Sweden, leading directly to the founding of the United Nations Environment Programme (UNEP) to oversee global environmental governance.
1970s–1980s	Environmental damage caused by intensive Green Revolution practices becomes evident, including severe soil degradation, water scarcity, and agricultural runoff pollution.
June 3, 1992	The UN Conference on Environment and Development (Rio Earth Summit) opens in Rio de Janeiro, Brazil, establishing *Agenda 21* to formally integrate environmental protection with sustainable agricultural development.
1990s–2000s	Precision agriculture technology, utilizing satellite data, GPS mapping, and soil sensors, and drip irrigation systems expand into commercial farming markets to optimize resource conservation.
May 19, 2008	The UN Food and Agriculture Organization (FAO) warns of severe global food insecurity during the 2007–2008 World Food Price Crisis, prompting increased international investment into climate-resilient agricultural research.

June 13, 2011	The FAO officially launches the "Save and Grow" action framework, offering policymakers an ecosystem-based strategy for sustainable crop production.
September 25, 2015	The UN General Assembly formally adopts the 2030 Agenda for Sustainable Development, establishing SDG 2 (Zero Hunger) and SDG 12 (Responsible Consumption and Production).
March 8, 2019	The Indian government launches the PM-KUSUM scheme to provide subsidies covering up to 60% of the cost for farmers installing solar-powered irrigation pumps.
November 12, 2019	The UNDP launches the Cultivate innovation initiative to connect agritech startups with smallholder farmers across Africa, Asia, and Latin America.
November 1, 2021	At the UN Climate Change Conference (COP26) in Glasgow, world leaders launch the *Breakthrough Agenda*, establishing specific international goals to make climate-smart, eco-friendly farming tools affordable and accessible globally by 2030.
Present Day	Developing nations face an ongoing technological gap, struggling with infrastructure deficits and high financial costs to implement modern green agricultural tools amidst worsening climate change threats.

Possible Solutions:

While previous international initiatives have laid important groundwork, global food shortages continue to escalate alongside environmental degradation and climate change. Addressing this dual crisis requires delegates to propose innovative, actionable, and collaborative solutions. Committee resolutions must move beyond simple policy recommendations to establish clear

financial frameworks, facilitate technological exchange, expand rural infrastructure, and empower local agricultural communities:

- **Establishment of International Green Agritech Transfer Frameworks:** Creation of international mechanisms to accelerate technology transfer from developed nations to developing countries without creating severe financial or legal burdens. Resolutions can call for open-access research sharing, patent-pooling for climate-resilient crop varieties, and public-private partnerships (PPPs) that subsidize the export of precision farming tools, solar irrigation pumps, and biofertilizers to low-income nations.

- **Repurposing Agricultural Subsidies Toward Sustainable Practices**: Nations should consider restructuring national agricultural funding models to incentivize eco-friendly technologies rather than environmentally harmful inputs. Resolutions could urge governments to redirect subsidies away from synthetic chemical fertilizers and over-irrigation practices toward climate-smart farming, organic soil restoration, drip irrigation systems, and renewable energy-powered farm machinery.

- **Creation of Rural Agritech Microfinance and Blended Finance Mechanisms**: To address the high upfront costs that prevent smallholder farmers from adopting green technologies, delegates should propose targeted financial instruments. Resolutions could suggest expanding climate funds (such as the Green Climate Fund and AGRI3 Fund) to provide low-interest micro-loans, equipment leasing programs, and crop insurance models specifically tailored for resource-poor farmers investing in sustainable technologies.

- **Expansion of Rural Infrastructure and Digital Connectivity**: Recognizing that modern precision agriculture relies heavily on digital technology, delegates are advised to draft clauses focused on closing the agricultural digital divide. Proposals should address

building off-grid renewable energy networks, expanding rural satellite and mobile internet coverage, and constructing local clean water storage infrastructure necessary to support automated irrigation and smart-sensor data collection.

- **Implementation of Farmer Field Schools and Local Technical Capacity Building**: To resolve the technical knowledge deficit surrounding new farming tools, resolutions should prioritize local education and training programs. Delegates can recommend establishing regional UNEP- and FAO-supported "Farmer Field Schools," where agricultural workers receive hands-on training in operating digital tools, reading soil analytics, managing biopesticides, and maintaining renewable energy equipment.

- **Securing Land Tenure Rights for Smallholder Farmers**: Because farmers are unlikely to invest in long-term eco-friendly infrastructure without legal land security, resolutions should encourage policy reforms regarding land tenure. Delegates could urge member states to enact legal frameworks that protect tenant farmers and smallholders from arbitrary eviction, thereby creating stable economic conditions that incentivize long-term investments in soil conservation, drip systems, and agriforestry.

Works Cited:

"Agriculture, Forests and Other Land Use." *UNEP - UN Environment Programme*, United Nations Environment Programme, 2026, www.unep.org/en/what-we-do/climate-action/mitigation/agriculture-forests-and-other-land-use. Accessed 16 Oct. 2026.

"Agriculture | International Development Association - World Bank." *Worldbank.Org*, 2018, ida.worldbank.org/en/topics/results/agriculture. Accessed 16 Oct. 2026.

Bray, Francesca. "Agriculture for Developing Nations." *Scientific American*, vol. 271, no. 1, 1994, pp. 30–37. *JSTOR*, https://doi.org/10.2307/24942764. Accessed 17 Oct. 2026.

"Food Services - Agricultural Utilization Research Institute." *Agricultural Utilization Research Institute*, 30 Oct. 2025, www.auri.org/services/food/. Accessed 19 Oct. 2026.

Forum, Kole Intellectual. "Sustainable Agriculture NGOs and Nonprofits - GlobalGiving." *Globalgiving.Org*, GlobalGiving, 2024, www.globalgiving.org/themes/sustainable-agriculture/. Accessed 19 Oct. 2026.

Max Planck Encyclopedia of Public International Law. Oxford University Press, 2008.

National Geographic Society. "The Development of Agriculture." *Education.Nationalgeographic.Org*, National Geographic, 8 July 2022, education.nationalgeographic.org/resource/development-agriculture/. Accessed 17 Oct. 2026.

"Overview." *Pops.Int*, 2026, www.pops.int/partners/unep/overview/tabid/255/default.aspx. Accessed 19 Oct. 2026.

"Please Wait." *Fundsforngos.Org*, 2026, www2.fundsforngos.org/articles-searching-grants-and-donors/top-25-ngos-offering-grants-for-community-farming-and-agribusiness/. Accessed 19 Oct. 2026.

Sergieieva, Kateryna. "Agriculture Problems and Technology Solutions to Them." *EOS Data Analytics*, 27 Nov. 2024, eos.com/blog/agriculture-problems/. Accessed 15 Oct. 2026.

"The Big Ratchet by Ruth DeFries - the Human Journey." *The Human Journey*, 2 May 2017, humanjourney.us/book-reviews/the-big-ratchet/. Accessed 16 Oct. 2026.

TheCreats. "Center for Rural Empowerment, Agricultural Transformation." *Thecreats.Org*, 2025, thecreats.org. Accessed 15 Oct. 2026.

University of California. "Developing Countries and the Future of Small-Scale Agriculture | Feed the Future Innovation Lab for Markets, Risk and Resilience."

Basis.Ucdavis.Edu, 1 May 2023, basis.ucdavis.edu/developing-countries-and-future-small-scale-agriculture. Accessed 15 Oct. 2026.

WCMC. “Sustainable Agricultural Systems - UNEP-WCMC.” *Unep-Wcmc.Org*, 2026, production-wordpress.unep-wcmc.org/nature-restored/agriculture/. Accessed 15 Oct. 2026.

WeForest. “Climate-Smart Agriculture in Sub-Saharan Africa.” *WeForest*, 20 Aug. 2019, www.weforest.org/blog/news/climate-smart-agriculture-sub-saharan-africa/. Accessed 15 Oct. 2026.