# Avoiding Future Famines:

## Strengthening the Ecological Foundation of Food Security through Sustainable Food Systems

**A UNEP Synthesis Report**

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# GLOSSARY

**Abiotic components** – Non-living chemical and physical components of an ecosystem responsible for the shaping of the ecosystems.

**Anadromous** – The migratory patterns of certain fish (salmon, smelt, shad, striped bass and sturgeon) that are born in freshwater, spend most of their lives in sea water and then return to freshwater or estuarine water to spawn.

**Benthic zone** – The ecological region at the lowest level of a water body such as an ocean, including the sediment surface and some sub-surface layers. Organisms living in this zone are called benthos.

**Biological corridor** – Also referred to as an ecological corridor or corridor of conservation, this is the designation for a continuous geographic extent of two or more ecosystems, either spatially or functionally, with the aim of restoring or conserving their connectivity.

**Biotic components** – The living organisms that exist in an ecosystem and are responsible for shaping it.

**Bottom trawling and dredging** – An industrial fishing method that involves the dragging of large heavy nets along the sea floor or midway between the floor and the surface. These fishing methods usually lead to the modification or destruction of fish habitats.

**By-catch** – Fish that are caught unintentionally, while intending to catch other fish. By-catches are unwanted and often unused.

**Carbon sequestration** – The capture and secure storage of carbon dioxide ($CO_2$) in order to mitigate global warming.

**Close-looped multi-species systems** – Farming different aquaculture species such that wastes from one species serve as feed for another.

**Demersal species** – An aquatic species that lives on or near the bottom of the sea or lakes.

**Ecological footprint** – A measure of the amount of resources required to make a product, as well as its environmental impacts.

**Ecosystem services** – The benefits obtainable from the complex interactions between living organisms and their environment.

**Environmental flow** – The quantity, quality and timing of water flows required to sustain specific valued features of a freshwater ecosystem or to protect the species of interest for fisheries and for conservation of the ecosystem on which fisheries depends.

**Eutrophication** – The over-fertilization of an aquatic ecosystem by inorganic nutrients (e.g. nitrate, phosphate). This may occur naturally or through human activity (e.g., from fertilizer runoff and sewage discharge). It typically promotes excessive growth of algae, which could result in the depletion of available dissolved oxygen.

**Evapotranspiration** – The transport of water into the atmosphere from surfaces, including soil (soil evaporation), and vegetation (transpiration).

**Feed conversion ratio** – A measure of the efficiency of how animals (livestock or fish) convert feed mass to body mass. It provides an indication of how much feed will be required. A low feed conversion ratio is important for profitability and reduced demand on resources.

**Hydroponics** – A technique for growing plants using mineral nutrient solutions without soil.

**Leguminous trees** – Trees that fix nitrogen in their roots.

**Microclimate** – The specific weather conditions of a small area within a region.

**Monoculture** – The cultivation of a single crop within a given area over a period of time.

**No-net-loss** – The no-net-loss approach strives to balance unavoidable habitat, environmental and resource losses due to economic development with compensating actions aimed at ensuring that there is no overall net loss in these resources.

**Pelagic species** – Aquatic species that live near the surface of coastal, ocean or lake waters.

**Permaculture** – The conscious design and maintenance of agriculturally productive ecosystems which have the diversity, stability, and resilience of natural ecosystems.

**Re-vegetating** – The process of replanting and rebuilding the soil of disturbed land.

**Salinisation** – The build-up of salts in soil, sometimes to levels that are toxic for plants.

**Siltation** – Often caused by soil erosion or sediment spill, siltation refers to the pollution of water by fine particulate materials. It results in increased accumulation of sediments in a water body.

## ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| **CA** | Conservation Agriculture |
| **CBD** | Convention on Biological Diversity |
| **CFN** | Centre for Food and Nutrition |
| **EAA** | Ecosystem Approach to Aquaculture |
| **EAF** | Ecosystem Approach to Fisheries |
| **EBA** | Ecosystem-Based Adaptation |
| **FAL** | Chilean Fishery and Aquaculture Law |
| **FAO** | Food and Agriculture Organization of the United Nations |
| **FIP** | Fishery Improvement Programmes/Projects |
| **GAP** | Good Agricultural Practice |
| **GDP** | Gross Domestic Product |
| **GLASOD** | Global Assessment of Soil Degradation |
| **HLPE** | High-Level Panel of Experts on Food Security and Nutrition |
| **IAA** | Integrated Agriculture-Aquaculture |
| **IAASTD** | International Assessment of Agricultural Knowledge, Science and Technology for Development |
| **IDF** | International Diabetes Federation |
| **IFAD** | International Fund for Agricultural Development |
| **INM** | Integrated Nutrient Management |
| **IPCC** | Intergovernmental Panel on Climate Change |
| **IPM** | Integrated Pest Management |
| **ISEAL** | International Social and Environmental Accreditation and Labelling |
| **ISRIC** | International Soil Reference and Information Centre |
| **ITQs** | Individual Transferable Quotas |
| **IUCN** | International Union for Conservation of Nature |
| **IUU** | Illegal, Unreported and Unregulated fishing |
| **IWRM** | Integrated Water Resources Management |
| **LCA** | Life Cycle Analysis/Assessment |
| **MPA** | Marine Protected Areas |
| **MSC** | Marine Stewardship Council |
| **MSY** | Maximum Sustained Yield |
| **NAMAs** | Nationally Appropriate Mitigation Actions |
| **NAPAs** | National Adaptation Programmes of Action |
| **NRM** | Natural Resource Management |
| **OECD** | Organisation for Economic Co-operation and Development |
| **PES** | Payments for Ecosystem Services |
| **RFMOs** | Regional Fisheries Management Organisations |
| **SAI** | Sustainable Agricultural Initiative |
| **SDC** | Sustainable Development Commission |
| **SMEs** | Small and Medium Enterprises |
| **SRI** | System of Rice Intensification |
| **SRP** | Sustainable Rice Platform |
| **TAC** | Total Allowable Catch |
| **UNEP** | United Nations Environment Programme |
| **WFP** | World Food Programme |
| **WHO** | World Health Organization |
| **WRI** | World Resources Institute |

# FOREWORD

If the world is to feed seven billion people, rising to over nine billion by 2050, then producing sufficient, quality food in a way that also keeps humanity's footprint within planetary boundaries will be central.

There are several factors or 'pillars' that underpin food security, including access to food and availability – but increasingly scientists are seeing the environment as perhaps the missing, underpinning fifth pillar.

The environment supports agriculture in two fundamental ways. Natural resources such as fertile land and adequate supplies of freshwater are one domain; the other is the planet's ecosystem services such as the nutrient recycling and soil stabilization provided by forests and biodiversity, including pollination services by insects such as bees.

This report – ***Avoiding Future Famines: Strengthening the Ecological Foundation of Food Security through Sustainable Food Systems*** – is the result of a unique collaboration between

These options depart from the 'silver bullet' approach that so often reduces the food security debate to a small handful of answers: instead they embrace the complexity of food production and agricultural systems including the ecological foundation.

They include building centralized storage and cooling facilities for small-scale farmers to help them reduce food loss caused by delays in getting produce to market alongside new quality standards that can reduce food waste at the level of the retail outlet and household, especially in developed economies.

Other proposals focus on the promotion of more sustainable and healthier diets in order to counter some of the trends in increasingly affluent societies; better placement and management of agricultural systems within natural landscapes; and addressing the coastal water pollution that creates 'dead zones' and threatens some fish stocks.

The underlying message is that the security of our food supply