

# Agroecology

## The Solution to Highly Hazardous Pesticides

A PAN International Position Paper



### Highly Hazardous Pesticides: A persistent problem

Input-intensive chemical-based agricultural systems have pervaded communities across the globe. Pesticides contaminate every environmental medium, travelling through air and by rivers and seas to distant locations. They are endangering biodiversity and disrupting the agroecosystem by decimating beneficial insects and soil microbes. They injure or kill an unknown number of farmers, workers, children and animals. Recent studies in seven countries in Asia found more than 60% of farmers suffer acute pesticide poisoning each year.<sup>1</sup> Beyond these poisonings are the chronic health effects and the human tragedy of communities suffering the irreversible and intergenerational impacts of pesticides.

Corporate influence over markets, policy agendas and regulations drives pesticide dependence and farmers' loss of sovereignty over their land, the food they grow and even the seeds they use. Those that still have land are often caught in a spiral of debt from costly inputs. Meanwhile, the worldview that elevates human beings over other species and elements of nature has eroded respect for biodiversity, natural cycles and the relationships between living beings, undermining the sustainability of our farming systems.

With increased understanding of the adverse effects of highly hazardous pesticides (HHPs) has come global recognition

of the need to replace chemical-intensive agriculture with agroecology. In 2015, the 4th International Conference on Chemicals Management (ICCM4) emphasised replacing HHPs with agroecological alternatives. The Stockholm and Rotterdam Conventions support agroecology as a primary approach for replacing listed pesticides. FAO has recognised that “business as usual farming” is not an option for meeting the world’s food needs<sup>2</sup> and has hosted multiple international and regional symposia on agroecology as the way forward to nourish the world.

### Foundations of Agroecology

A long history exists behind the concept of agroecology, which is rooted in traditional Indigenous, peasant, pastoralist and forest-dwelling communities' sophisticated approaches to land use, frequently based on an understanding of our reciprocal relationship with the earth. Academic contributions emerged in the 1940s led by Mexican scholars, and were subsequently developed by Latin American, European and North American ecological scientists, often benefiting from ongoing collaboration with farmer-scientists.<sup>3</sup> As social movements emerged to challenge the devastating health and environmental harms of industrial agriculture, these movements embraced agroecology as the path towards food sovereignty and the right of peoples to healthy and culturally appropriate food. Agroecology today thus reflects the results of ongoing dynamic dialogue between farmers, scientists and social movements.



Credit: CEDAC

Agroecology — a productive, profitable, resilient and sustainable approach to farming — integrates cutting edge science with local and Indigenous knowledge and practice.

### Agroecology: Farming for the Future

Agroecology is an economically viable and socially just approach to sustainable agriculture and food systems, grounded in ecological and social principles and the integration of science with local and Indigenous knowledge and practice, emphasising farming in harmony with natural cycles and processes, and the political approach of food sovereignty — including the right to produce and access nutritious and culturally appropriate food.

By taking a holistic approach to farming, agroecology encompasses not only its biophysical and ecological, but also its social, economic, political, cultural and spiritual dimensions, where farmers, agricultural workers, community-based processors and consumers are at the centre of decisions. People and communities are thus recognised as part of the agroecosystem. Agroecology also seeks to establish system equilibrium by supporting reciprocal relationships among the agroecosystem's components, the natural world and the society in which we live.

# Principles of Agroecology

Agroecology provides an established framework for sustainable farming, with a set of guiding principles and a diversity of practices and approaches, supported by scientific research and empirical evidence, that continue to evolve through experimentation and adaptation to new and changing conditions.

Agroecology is based on these five guiding principles:

## 1. Puts farmers first

Farmers' knowledge of their landscape and their skills in adapting to local conditions have been honed over many generations. Agroecology centres farmers as key decision-makers with the capacity and responsibility to provide nutritious and affordable food for themselves, their communities and beyond. Women farmers in particular often bring considerable knowledge based on their expertise in producing food, fibre and medicinal crops, saving and selecting seeds, protecting biodiversity, ensuring dietary health and household food security, and processing food for added value. Small-scale farmers collectively produce the majority of food that nourishes communities throughout Latin America, Asia and Africa.<sup>4</sup>

Putting farmers first means ensuring that women, family and peasant farmers, small to medium scale producers, agricultural workers as well as Indigenous and community-based organizations are at the centre of agricultural decision-making processes, whether local, national or international, relating not only to on-farm production but also to access to and control over resources and the direction, priorities and investments of agricultural extension, research, public policies and programs. Governance with commitment to justice and equity is thus a foundational component of agroecology.

## 2. Promotes soil health, biodiversity and natural ecosystem function

Agroecology prioritises soil health as the basis of healthy agroecosystems. By returning organic matter to the soil, agroecology promotes biological activity, improves its structure, increases fertility and minimises nutrient losses. This favours the growth of healthy plants resistant to pests and diseases, and nutritious food. Agroecology also supports biodiversity—above and below ground, providing critical resources for a diversity of life to flourish—and maintains the healthy functioning of surrounding natural ecosystems and important ecosystem services such as pollination and biological control of pests.

Agroecological practices include genetic, crop and system diversification through intercropping, green manures, cover cropping, multi-year crop rotations with nitrogen-fixing plants, agroforestry and integrated crop-animal systems.

## 3. Integrates science with knowledge and practice

Agroecology integrates sciences and ecological principles with local and Indigenous knowledge and practice. It combines scientific inquiry by farmers and professional scientists, with community-based experimentation and investigation using formal and informal methods, while creating space for alternate ways of knowing and understanding the agroecosystem and people's relationship within it.

Examples include Farmer Field Schools, farmer-scientist-NGO networks such as SOCLA and MASIPAG, approaches of the Latin American Agroecological Institutes, plant health clinics, farmer-to-farmer extension and community-based, on-farm agroecological studies.

## 4. Promotes complexity over simplicity

Agroecology embraces the complexity of different sources of knowledge, system processes and flows, and ecological as well as social relationships. This complexity provides a high degree of resilience to system stresses such as extreme or variable weather, market fluctuations, or other perturbations—in contrast to monocultural systems that are inherently unstable and easily disrupted by such perturbations.

Examples include duck-fish-rice systems producing meat, fish, grain and straw, while providing weed and pest control and recycling nutrients, and systems that provide multiple agricultural products for farmers and consumers connected through direct market or other social linkages.

## 5. Minimises waste and optimises energy use

Agroecology optimises system efficiency by enhancing biological processes and the recycling of biomass, nutrients, water and energy. Agroecology conserves resources, reduces dependency on costly nonrenewable external inputs, enhances synergies and maintains the integrity and resilience of the system. Agroecological systems consistently demonstrate higher land use efficiency than monocultures, when comparing output from the multiple components produced together (e.g. crops, animals, fibre, honey, medicinal products, etc.) with the output from single-commodity systems.

Examples include integration of deep-rooted perennial plants that capture water and nutrients below the root zone of annual crops; crop-livestock systems that recycle organic matter; and integrated rural-urban food and farming systems in which urban "green waste" is recycled as compost for nearby farms that in turn deliver healthy nutritious food with social and cultural value back to consumers.

# Multifunctional Benefits of Agroecology

Agroecology provides multifunctional benefits to agriculture, which include not only food, jobs and economic well-being, but also cultural, social and environmental benefits and ecosystem services. In every food-producing region of the world, studies show that agroecology can:

- **Improve health and nutrition** through diverse, nutrient-rich, fresh and culturally appropriate diets, and dramatic reductions in pesticide poisoning;
- **Improve food and livelihood security** by diversifying sources of food and income, spreading labour requirements and production benefits over time.
- **Conserve biodiversity and natural resources and sustain critical ecosystem services** through maintenance of a healthy soil biology rich in organic matter, efficient nutrient cycles, water management that secures a clean and sufficient water supply, habitat and food to support pollinators and other beneficial organisms, and genetic and species diversity;
- **Increase economic stability and ecological resilience** to changing conditions through complex agroecosystems capable of resisting environmental stresses associated with climate change (e.g. extended drought, persistent rainfall, etc.) and economic stresses such as rising costs of inputs or commodity price swings in unstable global markets;
- **Mitigate climate change** by reducing reliance on fossil fuel-based agricultural inputs that contribute to greenhouse gas emissions, while increasing carbon capture through soil carbon sequestration (e.g. integrating trees and deep-rooted perennial plants into the system);
- **Increase social resilience and community capacity** by fostering farmer-to-farmer knowledge sharing networks, producer cooperatives, and direct producer-consumer relationships based on mutual trust.

## Agroecology contributes to the following Sustainable Development Goals:

- SDG 1** End poverty: improves incomes and economic resilience
- SDG 2** End hunger: provides safe nutritious food for all
- SDG 3** Healthy lives and well-being: ends pesticide poisoning by phasing out HHPs
- SDG 4** Life-long learning: stimulates farmer-to-farmer learning
- SDG 5** Empower women and girls: makes visible and values their contribution in food systems
- SDG 6** Sustainable water management: keeps clean and captures, conserves and stores in soil
- SDG 7** Sustainable energy: supports efficient energy flows within the agroecosystem
- SDG 8** Decent work for all: fosters skills, improved incomes, avoiding hazardous chemicals
- SDG 9** Foster innovation: encourages farmer-scientist partnerships
- SDG 10** Reduce inequality: reduces corporate control over seeds, land and livelihoods
- SDG 11** Make settlements safe, sustainable: safeguards Indigenous and peasant agriculture
- SDG 12** Sustainable consumption & production: conserves natural resources, stimulates local markets
- SDG 13** Combat climate change: reduces use of fossil fuels, captures carbon and improves resilience
- SDG 14** Conserve marine resources: reduces pollutants flowing to oceans
- SDG 15** Protect terrestrial ecosystems: conserves biodiversity, natural cycles and relationships
- SDG 16** Peaceful societies: enhances Indigenous and peasant communities' self-determination
- SDG 17** Strengthen global partnership for sustainable development: empowers farmers, workers and communities, with respectful engagement by private and public sector institutions



Agroecology provides multifunctional benefits to agriculture, which include not only food, jobs and economic well-being, but also cultural, social, health and environmental benefits, and support for critical ecosystem services.

# Policy Recommendations

*Transitioning towards sustainable agriculture in the 21st century requires a decisive shift of institutional and policy support towards agroecology*—made urgent by new evidence that many ecosystems are verging on collapse, the effects of climate change are intensifying, and reliance on HHPs continues to destroy the health, lives and livelihoods of communities around the world.

**PAN calls for strong and enforceable regulatory frameworks to reverse the damaging effects of chemical-intensive, resource-extractive agriculture, along with global commitment to support the transition towards agroecology.** We urge redirection of investments towards agroecological research, extension and education that centres the leadership of farmers, workers and rural communities. We call for national and international commitment to uphold the rights of women, farmers, workers, Indigenous peoples, environmental and social movements, as they organise in support of agroecology.

Concrete actions towards these goals include:

## **Establish global policy mechanisms to replace HHPs with agroecology**

- Establish a global legally binding treaty for the life-cycle management of pesticides, including the replacement of HHPs with agroecology.
- SAICM, FAO, UNEP, UNDP and GEF should promote, take action on and fund the replacement of HHPs and chemical-intensive farming with agroecology.

## **Build local and national capacity in agroecological research, extension and innovation**

- Encourage farmer-to-farmer learning and horizontal collaboration among farmers, Indigenous peoples and scientists in problem-identification, experimentation and innovation to strengthen capacity in agroecology.
- Prioritise participatory research and farmer-led innovation in agroecological practices that reduce reliance on HHPs, support adaptation to and mitigation of climate change, and integrate locally adapted seeds, cultivars and livestock breeds.

## **Support small and medium scale farmers and their organizations**

- Strengthen women's, farmers', Indigenous and community-based organizations' capacity to develop and adapt agroecology to meet their priorities, particularly for food, land, seeds, water, health, livelihood, self-determination and the right to organise.
- Bring women, farmer and Indigenous leaders into national and international decision-making processes.

## **Establish supportive economic policies, financial incentives and market opportunities**

- Provide financial incentives and supports (credit, crop insurance, payment for ecosystem services) and expand market opportunities for farmers adopting agroecological practices.
- Remove perverse incentives (e.g. government subsidies for chemical inputs) that favour continued dependence on hazardous inputs.
- In accord with the Polluter Pays Principle, establish independent funding mechanisms to support widespread adoption of agroecology, funded in part by contributions from polluting industries, e.g. agrochemical companies.

## **Strengthen institutional supports**

- Implement comprehensive agrarian reform that ensures equitable access to and ownership by small-scale farmers, revise intellectual property rights to uphold farmers' rights to save, breed and exchange seed, and disallow land, genetic and water grabs by corporations.
- Establish fair local, regional and global trade arrangements that enable farmers to meet food and livelihood security needs and build relationships between producers and consumers in local markets.
- Manage the private sector to ensure alignment with equitable and sustainable development goals: reward private investment in safe, sustainable products and technologies; implement and enforce anti-trust and competition regulations to reverse current trends in agribusiness consolidation of market share.
- Evaluate and internalise the social, health and environmental costs of input-intensive production systems, to assist implementation of agroecology.

### **Notes**

- 1 Rengam, S. et al. 2018, *Of Rights and Poisons: Accountability of the Agrochemical Industry*. PANAP, Penang.
- 2 IAASTD, 2009. *IAASTD Global Report: Summary for Decision Makers*. Island Press, Washington DC.
- 3 Pimbert, M. 2018. "Global status of agroecology: a perspective on current practices, potential and challenges." *Econ Pol Weekly* Vol LIII No 41, 13 October 2018.
- 4 UN FAO, 2014. *The State of Food and Agriculture In Brief*. FAO, Rome.

PAN International 2019



Pesticide Action Network (PAN) is a network of over 600 participating nongovernmental organizations, institutions and individuals in over 90 countries working to replace the use of hazardous pesticides with ecologically sound and socially just alternatives. PAN was founded in 1982 and has five independent, collaborating Regional Centers that implement its projects and campaigns.

For more information, visit [www.pan-international.org](http://www.pan-international.org).