Promotion of a multi-stakeholder model and civil society organization (CSO) participation, for the implementation of SAICM - Africa

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Briefing Notes Pillar 1.3: Agroecology as an alternative to HHPs and chemical fertilizers

Until recently the most well-known approach to replacing hazardous pesticides in agriculture has largely been to promote Integrated Pest Management (IPM). But IPM is a term that has been somewhat abused: in its true form it is ecosystem-based and focuses on agroecological practices, using pesticides as a last resort. However, it has also been massaged into a form of 'business-as-usual' application of chemicals, in which pests are monitored and thresholds applied before spraying begins. Regard may or may not be taken of the impacts on beneficial insects of the pesticides used, but scant regard is paid to agroecological approaches. This is the type of IPM promoted by the pesticide industry, with the underlying assumption that chemical pesticides will be used.[2]

However, there is now a global move away from IPM. In 2015, the International Conference on Chemicals Management (ICCM5) adopted a resolution supporting concerted action on HHPs and encouraging "emphasis on promoting agroecologically based alternatives ….". Following that resolution, the Stockholm Convention's POPs Review Committee placed emphasis on agroecology in replacements for the POP pesticide dicofol; and agroecologically-based alternatives are now included in the Rotterdam Convention's *Handbook of working procedures and policy guidance for the Chemical Review Committee*. FAO has hosted multiple international and regional, symposia[3] on agroecology. It also hosts an Agroecology Knowledge Hub[4] and publishes agroecology newsletters.[5]

What is agroecology?

Agroecology is based on applying ecological concepts and principles to optimize interactions between plants, animals, humans and the environment.[6]

[1] PAN International http://pan-international.org/resources/
[2] See Watts & Williamson. 2015. *Replacing Chemicals with Biology: Phasing out highly hazardous pesticides with agroecology*. PAN International, Penang. http://files.panap.net/resources/Phasing-Out-HHPs-with-Agroecology.pdf
[3] FAO. 2018. Second International Symposium on Agroecology: Scaling up Agroecology to Acheive the SDGs. http://www.fao.org/about/meetings/second-international-agroecology-symposium/en/
[4] FAO. Agroecology Knowledge Hub. http://www.fao.org/agroecology/home/en/
[5] FAO Agroecology Newsletter October 2020 / Issue #40. http://newsletters.fao.org/q/13YlbNmUuppEBtSjvg81S/wv
[6] FAO. Agroecology Knowledge Hub. http://www.fao.org/agroecology/home/en/

It 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.[7]

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.[8] 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.

Why agroecology?

Agroecology supports farmers, farm workers, communities, countries and the environment.

Agroecology contributes to all the Sustainable Development Goals (SDGs)[9]:

- ***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 removing the need for 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

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[7] Agroecology: The Solution to Highly Hazardous Pesticides. A PAN International Position Paper. http://files.panap.net/resources/Agroecology-PAN-International-Position-Paper-en.pdf

[8] 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.

[9] More information on the 17 Sustainable Development Goals (DSDG) can be found at https://sdgs.un.org/goals

- ***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
- ***SDG16 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

FAO on Agroecology

According to FAO, *'Agroecology is based on applying ecological concepts and principles to optimize interactions between plants, animals, humans and the environment while taking into consideration the social aspects that need to be addressed for a sustainable and fair food system. By building synergies, agroecology can support food production and food security and nutrition while restoring the ecosystem services and biodiversity that are essential for sustainable agriculture. Agroecology can play an important role in building resilience and adapting to climate change'*[10]

How to do 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.

The 5 guiding principles of agroecology

Drawing deeply on the collected wisdom of those who have worked for a long time in the field of agroecology, PAN put together five guiding principles for agroecology:[11]

1. Put 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. 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.

2. Promote 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,

[10] FAO Agroecology Knowledge Hub, http://www.fao.org/agroecology/overview/en/ (download 25.11.2020)

[11] PAN International (2019). Agroecology. The Solution to Highly Hazardous Pesticides. A PAN International Position Paper http://files.panap.net/resources/Agroecology-PAN-International-Position-Paper-en.pdf

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. Integrate 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. Promote 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. Minimise waste and optimises energy use

Agroecology optimises system efficiency by enhancing biological processes and the recycling of biomass, nutrients, water and energy. It conserves resources, reduces dependency on costly non-renewable 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.

These principles, although different in form, reflect the 10 elements of agroecology put together by FAO: diversity, synergies, efficiency, resilience, recycling, co-creation and sharing of knowledge (describing, human and social values, culture and food traditions, responsible governance, and circular and solidarity economy.[12]

Practices

There are many agroecological practices and they vary depending on the climate, soil, crop and a host of other factors, the key being to apply or develop the practices that best fit the needs of the agroecosystem, including the farmer. Whilst any of these practices are more easily adopted on small-scale farms than medium- or large industrial-scale farms where labour is in short supply, nevertheless the principles can be applied and many practices adopted on farms of any size. Additionally, HHPs can be replaced by less damaging external inputs such as biopesticides, biological controls, mating disruption and other such nonchemical approaches.

- Agroforestry to improve soil fertility and health**.** Building healthy soil is perhaps the single most important element of agroecology. It cannot be done by adding synthetic chemical fertilizers, which may give a short-term boost (if there is sufficient water in the soil for plant roots to be able to take them up), but at the expense of longer-term health of important soil biota. More than a quarter of a million households in Malawi have adopted agroforestry with *Gliricidia* and other nitrogen fixing trees, after trials showed that interplanting these with maize brought record-breaking yields. Trials in Zambia and Malawi found that when *Gliricidia* is intercropped in this way, the maize yields doubled in comparison with use of commercial fertilizers, and increased seven times in comparison with maize grown without fertilizer.[13]

- Water harvesting combined with soil improvement. The traditional practice of digging zai pits in rock-hard barren land helps with growing crops in times of drought. This age-old water harvesting method has been successfully revived in Burkina Faso and Mali. The pits are filled with organic matter and attract termites; the channels they dig improve soil structure and increase water-retention capacity.[14]

- No-till or reduced till farming / conservation tillage**.** There are times and places tillage is helpful. Tillage can be favourable e.g to mechanically manage weeds, to disrupt soil pore continuity to minimise evaporation and retain soil moisture or to turn up pest beetles for the birds to eat. However, no-till or reduced till farming carried out without herbicide input, can reduce the number of field operations, farmers can save on work time and fuel or costs for draught animals the while building up their soil. No - or reduced - till farming involves sowing seed, or planting out seedlings, directly into untilled soil in which a narrow slot or trench has been opened. No ploughing or other tillage is done. This practice decreases erosion, breakdown of soil structure, and water losses, and increases carbon sequestration in the soil. It also hugely benefits the beneficial soil biota, as long as herbicides are not used to burn down vegetation before sowing, as is commonly done in industrial farming. That practice is detrimental to soil

[12] FAO: The 10 elements of agroecology guiding the transition to sustainable food and agricultural systems http://www.fao.org/3/I9037EN/i9037en.pdf

[13] Jiggins J. 2014. Adaptation and mitigation potential and policies for climate change: the contribution of agroecology. Chpt 123 in: Freedman B (ed), Global Environmental Change, Springer, Dordrecht.

[14] Li Ching L, Edwards S, Scialabba NE. 2011. Climate Change and Food Systems Resilience in Sub-Saharan Africa. FAO, Rome. p192.

health and unsustainable, especially when followed by chemical fertilizers. In an agroecological approach, no-till can be combined with natural control mechanisms for managing pests, pathogens and weeds, reducing the need for further interventions. In Santa Catarina in southern Brazil, many hillside family farmers have developed an innovative organic minimum tillage system that relies on the use of mixtures of summer and winter cover crops, which leave a thick residual mulch layer that suppresses weeds. After these cover crops are rolled flat using adapted equipment, traditional crops (maize, beans, wheat, onions, tomatoes, etc) are directly sown or planted into the mulch layer. Repeated application of fresh biomass to the soils has resulted in improved biomass content, minimized erosion and weed growth. During the severe drought of 2008-09, these farmers experienced only a 20 percent loss of maize yield compared with the 50 percent loss suffered by conventional maize producers.[15] Nevertheless, tillage can have positive effects on pest, weed, disease, water and nutrient management and it should not be abolished from a cropping system until these aspects are being addressed by other agroecological techniques.[16]

- Locally adapted seeds. Farmer-led rice seed breeding by MASIPAG, a nationwide network of small-scale farmers, scientists and NGOs in the Philippines, has resulted in the development of more than 580 rice cultivars. The network maintains almost 3,000 traditional varieties, MASIPAG and farmer-bred cultivars These seeds are well adapted to local conditions, and give the farmers the potential to adapt them further to future climate challenges. As a result of their seed breeding and other crop variety developments, together with agroecological techniques, the farmers have achieved higher incomes, better food security and a more varied and nutritious diet.[17]
- Agroforestry to manage pests and diseases**.** The manipulation of tree canopy density and diversity in the growing of crops such as cocoa and coffee has proven highly successful in managing pests and diseases. In cocoa cultivation, tree shading can be manipulated to control the incidence of frosty pod rot caused by the fungus *Moniliophthora roreri*. In coffee plantations, shade trees can be managed to provide optimal light conditions to minimize diseases such as leaf splotch and berry blotch (*Cercospora coffeicola*) and coffee rust (*Hemileia vastatrix*). Agroforestry can also help farmers manage citrus mealy bug pests (*Planococcus citri*) and maximize conditions for beneficial fauna and microflora; predation of insect pests by birds is greatest when the canopy is not intensively managed. Shade trees also provide habitat for beneficial insects that pollinate cocoa. Shade trees can reduce phorid flies which negatively affect ant populations, reducing their ability to control coffee berry borer.[18]

- Biological control of pests. Natural enemy is the term given to any living organism that helps keep pests under control by feeding on them, parasitizing or infecting them. Ladybird beetles that eat aphids (greenfly) are a familiar garden example of a useful

[15] Parmentier 2014, op cit.
[16] See Watts & Williamson. 2015. *Replacing Chemicals with Biology: Phasing out highly hazardous pesticides with agroecology*. PAN International, Penang. http://files.panap.net/resources/Phasing-Out-HHPs-with-Agroecology.pdf
[17] Watts & Williamson. 2015. *Replacing Chemicals with Biology: Phasing out highly hazardous pesticides with agroecology*. PAN International, Penang. http://files.panap.net/resources/Phasing-Out-HHPs-with-Agroecology.pdf
[18] Leakey 2014, op cit

predatory natural enemy. Many species of spiders, lacewings, beetles, wasps, birds and frogs are effective predators of insect pests. Different types of parasitic wasp lay their eggs in or on caterpillars, aphids and other soft-bodied insect pests; when the wasp larvae hatch they feed on the paralysed host, eventually killing it. Several groups of bacteria, viruses and fungi cause fatal disease in certain insects, without harming other types of animal. Other microorganisms can help control crop diseases by competing with the disease-causing organisms.[19] Control of the coffee berry borer in Mexico's organic coffee production systems includes the use of the entomopathogenic fungus *Beauveria bassiana*, the parasitic wasps *Prorops nasuta*, *Phymastichus coffea*, and *Cephalonomia stephanoderis*, attractant traps, removing dried berries from the plants (sanitary harvesting) to interrupt the pest's life cycle and spraying the botanical pesticide neem.[20]

- Botanical extracts. A number of plant extracts are used as alternatives to synthetic insecticides; neem is perhaps one of the most well-known. Both leaves and seeds of the neem tree, *Azadiracta indica*, have insecticidal properties, and is said to be effective on over 200 pests including species of whiteflies, thrips, leaf miners, caterpillars, aphids, scales, beetles, true bugs and mealybugs.[21] Neem is a useful natural pesticide, but as with all pesticides, it should only be used as a last resort as it affects beneficial insects as well as pests, and this undermines agroecological systems.

- Pest attractants. There are a number of methods of attracting pests away from crop plants, thereby removing or reducing the need for insecticides. These include planting attractive plants at the borders of crops, and use of mechanical devices such as sticky traps, light traps and attractant traps, such as those used for coffee berry borer. In China, the Jiaduo Frequoscillation Pest- killing Lamp traps use a combination of light, colour and wave length to attract pests, which are then electrocuted and fall into a pest-collecting bag. These devices are widely used in agriculture, forestry, vegetable and tobacco growing, gardens and orchards, urban amenity plantings, warehouse storage, and aquaculture. They were used on over 15 million hectares of rice alone between 2004 and 2011. A study of their use in rice found that they attracted, on average, 42 species of rice pests.[22]

- Mating disruption. The female sex hormones of moth pests can be used to dramatically reduce pest populations. Generally, lures impregnated with a synthetic version of a pest's female sex hormone are deployed amongst crops such as cotton, fruit or nut trees, or in warehouses. The odour emitted masks the pheromone produced by the female pest

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[19] See Watts & Williamson. 2015. *Replacing Chemicals with Biology: Phasing out highly hazardous pesticides with agroecology*. PAN International, Penang. http://files.panap.net/resources/Phasing-Out-HHPs-with-Agroecology.pdf pp79-81.

[20] Bejarano et al. 2009. Alternatives to Endosulfan in Latin America. International POPs Elimination Network (IPEN) and Pesticide Action Network in Latin America (Red de Acción sobre Plaguicidas y sus Alternativas en América Latina, RAP-AL). http://www.ipen.org/ipenweb/documents/ipen%20documents/summary%20endosulfan%20alternatives_english.pdf

[21] UNEP 2012, op cit.

[22] Huang S, Wang L, Liu L. Fu Q. 2014. Nonchemical pest control in China rice: a review. Agron Sustain Dev 34:275-291.

and confuses males trying to find a female mate. Males follow false scent trails, and as a result successful mating is reduced, females lay fewer fertilized eggs and there are fewer larvae to cause crop/fruit damage. This technology works very successfully in medium to large (>2 hectare) orchards and crops, but may be too expensive and less effective on smaller holdings, unless farmers work together cooperatively. Mating disruption is widely deployed in both organic and non-organic orchards and crops in a number of countries.[23]

- Cultivational control of weeds. This is a commonly used agroecological technique. One example is weed management on organic rice in Japan based on pre-planting soil management. The land is ploughed and irrigated a month before transplanting rice seedlings in order to bring weed seeds and bulbs to the surface to germinate. After the weeds have germinated the land is ploughed lightly to remove the weeds and bury remaining seeds in the mud. Transplanting takes place within three days of the second ploughing; at the same time organic fertilizers such as rice bran, soybean trash or oil cake are added. The paddy is irrigated just after transplanting and water kept at 7cm depth for 30 days.[24]

Successful implementation of agroecology in Africa

In Africa, there are already a number of agroecological cultivation projects in place, proving that agroecology can be successfully implemented in Africa - for the benefit of people and their environment.[25] Whether in dryland farming area with inconsistent rainfall in the Upper east region of northern Ghana or Permaculture agriculture in Malawi or in a region in Zimbabwe that faced constant food insecurity due to a number of factors which include the loss of biodiversity and traditional food crops – agroecology adapts to the given soil and climate conditions, meets the needs of people.

As an example, OBEPAB[26] works with PAN-UK to deliver high quality training in agroecological practices to over 4200 certified organic cotton farmers in Benin. In 2018 and 2019 they conducted surveys to compare the impact on participating farmers compared to conventional growers in the same area. The results show that, while there was little difference between the two groups in terms of yield, the organic farmers were enjoying much higher net income due to lower production costs. They were also avoiding the very common incidence of acute pesticide poisoning (44-52%) suffered by the conventional producers. Organic farmers were doing significantly better from their non-cotton crops, too, with an **average net income / ha 53% higher than conventional farmers** from a variety of crops including soya and cashew. Because they were not spraying toxic pesticides they were also able to grow food crops in or adjacent to the cotton without worrying about contamination with hazardous pesticides.

[23] (i) Hassan NM, Alzaidi S. 2009. Mating disruption – an alternative bio-rationale control for stored pests. International Pest Control. http://www.international-pest-control.com (ii) Mating Disruption for Management of Insect Pests. Ontario Ministry of Agriculture, Food, and Rural Affairs. http://www.omafra.gov.on.ca/english/crops/facts/03-079.htm

[24] Mitsukuni I. undated. Part 1 Thematic report 4. Rice Farming Technique Creating Environment for Biodiversity and Human Beings and Restoration of Environment in Japan.

[25] AFSA 2016. Agroecology: The Bold Future of Farming in Africa. AFSA & TOAM. Dar es Salaam. Tanzania. https://afsafrica.org/wp-content/uploads/2019/05/agroecology-the-bold-future-of-farming-in-africa-ebook1.pdf

[26] Organisation Béninoise pour la Promotion de l'Agriculture Biologique' (OBEPAB)

Table 1. Summary results from surveys of conventional and organic cotton producers in Benin

	2018			2019		
	Organic	Conven-tional	% difference	Organic	Conven-tional	% difference
Yield seed cotton kg/ ha	1223	1169	4%	1038	1025	1%
Production costs cotton per farmer (CFA)	170158	484665	-185%	80944	329349	-307%
Net income / ha cotton (CFA)	285250	152512	47%	300947	156258	48%
% farmers experienced acute pesticide poisoning in previous 12 months	-	52%		0%	44%	

Mme Rosaline Okou lives in Wogbayé, South of Benin and is a successful organic cotton farmer with 5ha under cultivation. She also grows maize, soya, cashew nuts, cassava and peppers. She is a widow and a mother of four children and she manages a cooperative of 30 cotton farmers. She is proud that her food crops are safe from hazardous pesticide residues and thinks that the secret of her success has been to invest a lot of work in ensuring she has healthy soils in which to grow her crops.

Agroecology provides multifunctional benefits:

- Improved health and nutrition through diverse, nutrient-rich, fresh and culturally appropriate diets, and dramatic reductions in pesticide poisoning
- Improved food and livelihood security by diversifying sources of food and income, spreading labour requirements and production benefits over time.
- Conservation of biodiversity and natural resources and sustaining 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
- Increased 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
- Mitigation of climate change by reducing reliance on fossil fuel-based agricultural inputs, including fertilisers, 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)
- Increased social resilience and community capacity by fostering farmer-to-farmer knowledge sharing networks, producer cooperatives, and direct producer-consumer relationships based on mutual trust.

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.

Necessary policy approaches

- SAICM, FAO, UNEP, UNDP and GEF should increase their engagement for agroecology and promote, take action on and fund the replacement of HHPs and chemical-intensive farming with agroecology.
- Local and national capacity in agroecological research, extension and innovation needs to be built, including encouraging farmer-to-farmer learning and horizontal collaboration among farmers, Indigenous peoples and scientists; and prioritising participatory research and farmer-led innovation in agroecological practices. Agroecology is knowledge-intensive and farmers need better access to practical, discovery learning.
- Small and medium scale farmers and their organizations should be supported.
- Economic policies, financial incentives and market opportunities supporting agroecology should be established and investments in chemical-intensive farming redirected.