

FAO contribution to the Nature Based Solutions workstream for the Climate Action Summit

Climate Change and Plant Health: Biodiversity to the Rescue

1. Context and rationale

Changes in seasonality, climate extremes and climate-driven pest and disease are negatively impacting global agricultural production and rural livelihoods. Global yield losses of major staple crops, such as wheat, rice and maize, due to insects, are projected to increase by 10 to 25% for each degree of global mean surface temperature in some regions. Currently, plant diseases are estimated to cost the global economy USD 220 billion annually.

Farmers and rural dwellers, who tend to have the least means to adapt to change, are vulnerable to these detrimental impacts on agriculture. As a response, farmers often apply more insecticides as a means to prevent losses. Application of broad-spectrum pesticides reduces biodiversity by killing beneficial insects and microorganisms that are fundamental to ecosystem services and nature based management. Advanced and coordinated pest management strategies are needed to avoid panic resulting in unnecessary and unsustainable misuse of hazardous pesticides.

As technology for monitoring and dissemination of information advances, now is the time to harness these advances to support management and services in the agriculture sector. The Food and Agriculture Organization has developed tools, built up the relationships and earned the trust of countries that could be leveraged to deliver these services to the farmers and rural dwellers that depend on them.

2. Contribution overview

Nature based solutions need to be put in place in a replicable and scalable manner to combat the negative effects of climate change. Our proposed programme will strengthen the global resilience of agro-ecosystems to climate-induced crop and pest impacts by applying a holistic approach aligning interventions at national and local level, implemented in synergy with all relevant institutions and employing new technologies for information dissemination. The program will encompass:

- *Development of global guidelines and a roadmap for tackling plant health in a changing climate and establish mechanism(s) for global and regional collaboration.*
- *Surveillance of presence and impact of pests and diseases and introduce appropriate diagnostic methods and services plus reporting mechanisms.*
- *Support increased network of agrometeorological stations and increase national and global capacities to produce and dissemination agromet information and early warning systems.*
- *Genetic resources with increased pest and disease resistance and abiotic stress resilience, including deployment of available seeds and propagation material of species and varieties of crops with resistance to predominant and emerging pests and adapted to changing, harsher conditions. Unlock the potential to utilize crop wild relatives as well as neglected or underutilised species are a rich reservoir of novel traits and genes.*

- Diversify production systems - FAO's policy guidance on sustainable crop production intensification, *Save and Grow*, enunciates means towards an intensive but sustainable crop production. Many of the crop pest and disease problems are caused or exacerbated by biodiverse-poor cropping systems.
- *Best crop management practices and utilization of FAO's farmer field school networks for information dissemination.* Employ practices such as agroforestry, crop rotation and intercropping to reduce pest and disease build up; minimal tillage and permanent soil cover through living and organic mulches; deploy biological based solutions to pests and diseases such as use of trap crops, pheromones and biological control agents.

3. Leveraging living natural systems as a solution

Biodiverse systems have greater probability of being resilient in the face of more frequent and intense climate shocks to crop-based production systems. The promotion of biodiverse cropping systems, including agro-silvo-pastoral systems, is one of the keys to mitigating climate change impacts on cropping systems. Biodiverse systems also have a positive impact on nutrition by broadening the nutritional base that has been withered away by the overuse of monoculture cropping systems.

4. Key outcomes: Supporting climate mitigation and adaptation as well as other important co-benefits

Reduction in carbon emissions

A number of practices contribute to increased soil organic matter, for example, minimal mechanical soil disturbance, organic fertilization from animal manure and plant residues, permanent soil cover (organic matter supply through the preservation of crop residues, cover crops or multi-purpose leguminous trees), crop rotation and minimal soil compaction.

Social impact

Agro-ecosystem based innovative approaches can provide a promising solution as a source of decent jobs, by offering rural employments opportunities that meet the aspirations of rural youth and contribute to decent work. In addition, the introduction of new technologies into the systems attracts youth, including via initiatives such as hack-a-tons.

Net economic impact

Improving productivity through the enhancement of biological processes and reduction of costs can increase net income of producers and create more inclusive and innovative markets that reconnect producers and consumers in a circular economy. Reducing dependence on external inputs can also reduce producers' vulnerability to economic risk. Integrated Pest Management (IPM) programmes have demonstrated that the use of pesticides can be significantly reduced (in regional programme reduction of 70% has been achieved on rice, cotton and vegetables) without reducing crop yield or farmer profit. A focus on public-private partnerships, i.e. telecom and information companies, will engage the local economy.

Just transition

The program will catalyse the global adoption of more sustainable practices in key cropping systems, embracing indigenous farmer knowledge and experiential learning.

Increased climate resilience

Examples of increase climate resilience include:

- The Water Efficient Maize for Africa endeavour is a successful multi-stakeholder engagement to breed well-adapted maize varieties, which are drought and insect pest tolerant, and to make their quality seeds available to farmers. To date, over 110 improved varieties of maize have been released.
- Use of pest- and disease- resistant varieties has been very effective for the management of cassava viral diseases in Eastern Africa and that of wheat rust diseases in Eastern Africa and the Near East.

Food security

The diversity of farmers' varieties/landraces is particularly relevant in the context of food security, rural development and resilience of farming communities. A recently concluded GEF-funded project in Ecuador enabled 4160 smallholder farmers to incorporate an increased diversity of indigenous crops in their crop production systems spanning over 1790 hectares.

Minimising species extinction and ecological losses, and fostering an increasing of biodiversity

Through *in situ* conservation of crop wild relatives and wild food plants in reserves, supporting on-farm management of farmers' varieties/landraces and neglected underutilized species, and *ex situ* conservation in gene banks and community seed banks, and reducing impacts of pesticides on wildlife, pollinators and natural enemies.

5. Countries and organizations involved

FAO has a strong global network of partners including research institutions, civil society and producer organizations. FAO has a unique interface and experience working with governments and policymakers with its presence on the ground through FAO Country Offices. FAO also hosts the Secretariat to Rotterdam Convention (FAO and UNEP jointly provide the Secretariat) on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade. The programme will build on on-going activities such as a regional programme in Asia and the Pacific.

6. Stakeholder consultation

FAO has a large portfolio of projects and activities under GEF, European Community and other bilateral donors under which, on different occasions, key stakeholders such as civil society, private sector and ministerial institutions have been involved in cross-cutting discussions on sustainable agriculture, climate resilience and pest and pesticides management. Since 2014, FAO has played a leading role in facilitating global and regional dialogues on agroecology, including the second International Symposium on Agroecology in 2018. Indigenous people typically use biodiverse-cropping systems. FAO leads efforts to highlight these ecologically complex systems, so that research can be done to more deeply understand the agroecological basis of these systems, leading to a broader acceptance of such diversified, resilient systems and to more reliable recommendations.

7. Where can the contribution be put into action?

Regional programmes in Latin America, Africa and Asia are foreseen with large scope for national-level scale-up by Ministries of Agriculture, Hydrometeorological Institutions, Ministries of Environment and Health, research institutions etc.

8. How will the contribution be delivered?

The programme will be rolled out through building on upon regional projects and developing links to country offices and national governments to feed the regional knowledge into country-specific programmes. There will be a feedback loop to informing regional initiatives with lessons learned at country level. FAO will act to coordinate and foster these linkages but the outputs will be country-owned.

9. Building upon experience and linking with ongoing initiatives

With OIE and WHO, FAO already takes a One Health approach to mobilizing and enhancing the capacity of all stakeholders to promote the surveillance and monitoring of, and collective response to human, animal and plant pests and diseases. FAO has more than 25 years' experience in managing and controlling transboundary animal and plant pests and diseases. It has been supporting countries worldwide in combatting locust threats and has responded to a number of pest challenges in the regions such as cassava virus diseases in Africa, banana Fusarium wilt disease in Southeast Asia, and Red Palm Weevil in the Near East and wheat rust diseases in Asia and Africa. Most recently, FAO's fall armyworm programme has nature based solutions to control this spreading pest at the heart of its recommendations and applied research. FAO convenes the Global Partnership Initiative for Plant Breeding Capacity Building as a multi-stakeholder platform aimed at improving institutional capacity for effective crop variety development and their distribution through seed systems.

10. How does this contribution build upon this experience? How does the contribution link with different ongoing initiatives

This contribution builds on the GEF 7 programming and sustainable agriculture regional initiatives. It also builds on the Scaling up Agroecology Initiative that was launched in 2018 by FAO together with major UN partners, currently being piloted in Mexico, Senegal and India.

11. Mechanisms for funding

Several other major funds are coordinating efforts at the global and inter-regional levels. This contribution provides the opportunity to link GEF activities with other development partners coordinating the work at the global level, facilitating alignment of workflows and achieving economies of scale. The Green Climate Fund is also supporting initiatives at national level.

12. Means of stewardship, metrics for monitoring

A Global Analytical Framework and a supporting database are currently being developed to assess the multi-dimensional performances of agroecology. The Second Global Plan of Action for Plant Genetic Resources for Food and Agriculture is the main reference for national, regional and global efforts to conserve and use PGRFA sustainably. Select SDG indicators (for example 2.4.1, 2.5.1 and 12.4.1) will be used for monitoring purposes.

13. Communication strategy

A targeted communication strategy will be developed. Existing brochures, factsheets, websites and other portals will be utilized. Farmer field schools and various networks with relevant organizations and institutions in agriculture will also be utilized.

14. Contact details of proponents (indicating the degree of commitment among the countries and organizations that are named).

Hans.Dreyer@fao.org Alexander.Jones@fao.org

