

## PREVENTING NATURAL ECOSYSTEM DEGRADATION BY SUPPORTING AGROECOLOGY

### Problem Statement

Conventional agricultural production has resulted in diverse environmental problems as the use of enormous quantities of agrochemicals over the past couple of decades have disrupted the delicate, but at the same time a very complex, self-sustained ecosystem[1]. Agrochemicals mainly include plant protection chemicals (pesticides), and synthetic fertilizers. These chemicals are widely used in agriculture across the globe and acknowledged to have adverse effects on human health, as well as environmental well being. The quality and health of ecosystems determine agriculture sustainability, environmental quality and, as a consequence, plant and animal as well as human health[2].

The Intergovernmental Panel on Climate Change (IPCC) has pointed out that climate change would have a profound impact on crop yields, sometimes resulting in total crop failures for certain crops, and reduced yields for some other crops, with varying regional effects. Proliferation of pests, disease and weeds would demand application of more and more pesticides to manage climate change induced pest pressures, which will further aggravate biodiversity loss as extreme weather events could reduce the efficacy of plant protection chemicals, but create more injury to the ecosystem<sup>1</sup>. Climate change and extreme events have “*adversely affected food security, terrestrial ecosystems as well as contributed to desertification and land degradation*”<sup>2</sup>. It further noted that “*Climate change creates additional stresses on land, exacerbating existing risks to livelihoods, biodiversity, human and ecosystem health, infrastructure, and food systems*”.

Agriculture contributes about 30% of total greenhouse gas (GHG) emissions due to the application of pesticides and fertilizers, as well as due to animal wastes; this is expected to further increase due to increased demand and agricultural intensification, and also due to the promotion of genetically modified crops. The resulting GHG emissions will contribute to worsen global warming and accelerate climate change affecting sustainability of agriculture[5] as it consequently results in biodiversity loss.

GHG emissions associated with pesticide use and impacts are largely remaining unrecognized in policy discussions. Pesticides contribute to GHG emissions throughout their lifecycle, right from manufacturing through packaging, distribution/transportation, application and resultant environmental degradation. The resultant GHG emission is estimated to be many fold higher to that from synthetic fertilizers.

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<sup>1</sup> <https://archive.ipcc.ch/ipccreports/tar/wg2/index.php?idp=563>

<sup>2</sup> IPCC, 2019: Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems [P.R. Shukla, J. Skea, E. Calvo Buendia, V. Masson-Delmotte, H.-O. Pörtner, D. C. Roberts, P. Zhai, R. Slade, S. Connors, R. van Diemen, M. Ferrat, E. Haughey, S. Luz, S. Neogi, M. Pathak, J. Petzold, J. Portugal Pereira, P. Vyas, E. Huntley, K. Kissick, M. Belkacemi, J. Malley, (eds.)]. In press.

Apart from the significant contribution to GHG emissions that accelerate climate change, agrochemicals has been contributing to polluting the ecosystem both terrestrial and aquatic, contaminating food resources with toxins, diminishing biodiversity, to cause deleterious public health issues, to affecting environmental sustainability and resilience, and thus consequently leading to degrading the ecosystems as a whole. Studies pointed out that about 99 % of agrichemicals, especially pesticides applied, are finding their way to soil, air and water thus polluting the ecosystem[3]. A paradigm shift, at a significantly larger scale, is needed to reduce and gradually eliminate the use of agrochemicals, both in terms of policy and practice to address the multidimensional chaos caused by agrochemicals. The grass root solution to this is rooted deeply in agroecology, “which is a holistic and integrated approach that simultaneously applies ecological and social concepts and principles to the design and management of sustainable agriculture and food systems”[4].

### **Current Status and Solutions**

Over the past years, the term agroecology has gained more acceptances in the discourses on sustainable agriculture. Examples of successful agroecological practices can be seen locally, nationally and globally, a greater adoption in the national agriculture development plans is meager. The recent IPCC report has noted that agroecology and diversification is an effective way to achieve adaptation to changing climate as it increases resilience of the food systems. Diversified crop production systems as in the traditional systems are less vulnerable to climate change impacts. It further noted that agroecology based adaptation measures can enhance agrobiodiversity, improve ecological processes and ensure delivery of ecosystem services, and strengthen local communities. Moreover, it has been noted that such practices would enhance sustainability and resilience of agriculture systems, reduce soil degradation, check unsustainable use of resources, prevent pest and disease outbreaks, increase yield and enhance biodiversity[6].

The Food and Agriculture Organisation of the United Nations states that, “the 2030 Agenda for Sustainable Development calls for a new agricultural approach to ensure sufficient, safe and nutritious food respecting human rights. FAO Members have a common vision for sustainable food and agriculture, and agroecology is a key response to guide the sustainable transformation of our food systems”[7]. Agroecology significantly contributes to and brings solutions to many of the sustainable development goals as well[8]. Biodiversity based agroecology practices can really contribute to improved yields, greater profitability for farmers, improved nutritional/food security, and thereby improved health, greater resilience to extreme climate events, and improved ecosystem services[9]. The UN Special Rapporteur on the right to food has noted that, “...agroecology also puts agriculture on the path of sustainability by delinking food production from the reliance on fossil energy (oil and gas). It contributes to mitigating climate change, both by increasing carbon sinks in soil organic matter and above-ground biomass, and by avoiding

carbon dioxide or other greenhouse gas emissions from farms by reducing direct and indirect energy use”[10].

Historically, farming communities have been responding to environmental changes and changes in weather/climatic patterns by gradually changing and adapting to new practices to maintain productivity. This resilience, which is drawing on the indigenous knowledge and experience, needs to be strengthened manifold with adequate support in terms of policy, knowledge and practice, incentives and compensation to loss and damages, rather than exploring options of technological fixes such as carbon trade, and destructive technology driven agriculture practices including promotion of genetic modification of crops, and practices based on agrochemicals.

Knowledge on the adverse effects caused by agrochemicals since a few decades have paved the way to several global policies, conventions and treaties to regulate their production, usage, and also monitor impacts. Discussions have been happening related to climate change since the last two decades and global negotiations are happening under the framework of the United Nations Climate Change conference. This discussion addresses several topics and issues including adaptation and mitigation; however, it largely ignores chemical pesticides and fertilizers, a major sector that significantly contributes to global warming and climate change.

### **Conclusion And Recommendations**

The former FAO Director- General, noted in 2015, that “the model of agricultural production that predominates today is not suitable for the new food security challenges of the 21<sup>st</sup> century. Since food production is not a sufficient condition for food security, it means that the way we are producing is no longer acceptable”[11]. Olivier de Schutter, the UN Special Rapporteur on the right to food, has noted in 2011, that “scaling up agro ecological practices can simultaneously increase farm productivity and food security, improve incomes and rural livelihoods, and reverse the trend towards species loss and genetic erosion”[12]. He further noted, “...agriculture must not compromise its ability to satisfy future needs. The loss of biodiversity, unsustainable use of water, and pollution of soils and water are issues which compromise the continuing ability for natural resources to support agriculture.”

Agroecology can galvanize agricultural production systems while helping to boost human well-being, tackle climate change and protect our living planet[13]. But, a greater adoption and scale up needs strong backing from global and national leaders, policymakers, scientists; with specific, targeted schemes and programmes or upgrading agriculture institutions, extension systems and awareness creation among stakeholders.

Concerted efforts are needed to reduce production and use of synthetic agrochemicals- both fertilizers and pesticides, at the same time more support in terms of policy and finance is needed towards a massive adoption of agroecology based practices to reduce soil degradation, prevent unsustainable use of resources as well as assuring agriculture sustainability. In light of this, following recommendations are placed for consideration.

- ❖ Policies addressing climate change and its adverse effects need to have clear-cut, time bound goals to significantly reduce agrochemicals- pesticides and fertilizers - as a key strategy to reduce GHG emissions and advance resilience and mitigation.
- ❖ The G20 members should not allow production, formulation, trade and use of pesticides that are banned in any of the member countries and end double standards on pesticides at the earliest. This can ease agriculture trade among the member countries, which otherwise would invite trade restrictions/barriers related to residues of pesticides in agri produce.
- ❖ Bring policies to bring agroecology as a central key approach to farming and food production and promote climate resilient practices drawing from indigenous knowledge and experience.
- ❖ Strengthen economic policies to support local food systems, supply chains and marketing, reduce food miles and wastages, and assure fair price for farm produce. More support be given to small/medium diversified agro ecologically managed production systems rather than supporting monocultures.
- ❖ Agriculture development and sustainable land use policies should be framed to achieve gradual reduction leading to a phase out of production and use of synthetic pesticides and fertilizers, starting with immediate halt for highly hazardous pesticides.
- ❖ Agriculture Development Framework needs to have a program to substitute alternatives for industrial/conventional inputs and practices to replace external input-intensive and environmentally degrading products and practices with those that are more renewable, based on natural products, and that are more environmentally sound.
- ❖ Ensure sizable transition rates towards adoption of agroecology and considerable increase (30-50%) in areas of farms that follow agroecology based practices by 2030.
- ❖ Further, G20 to put pressure on the, UNFCCC and other global frameworks/ UN agencies /policies addressing climate change and agriculture to have an overarching global approach and time bound plans to significantly reduce production and use of agrochemicals and wider adoption of agroecological practices, as a strategy to deal with global hunger and malnutrition, preventing destruction of ecosystems and improve environmental quality.

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