Cultivating Coherent Climate Action

Why agroecology and pesticides reforms should underpin action on agriculture and food systems in support of the Paris Agreement

October 2024

Key Messages

- National support for agroecology, and implementing pesticides reforms, are integral to climate action, and must be reflected in national reporting under the Paris Agreement of the UNFCCC in 2025.
- 160 Parties to the UNFCCC have signed the COP28 UAE Declaration on Sustainable Agriculture, Resilient Food Systems, and Climate Action, committing to *'integrate agriculture and food systems into National Adaptation Plans, Nationally Determined Contributions, Long-term Strategies, National Biodiversity Strategies and Action Plans, and other related strategies before the convening of COP30'* in 2025.[i]
- Most Parties to the UNFCCC have already committed to relevant and specific agriculture-sector reforms in other related UN policy instruments, including
  - the phase out of Highly Hazardous Pesticides (HHPs) in agriculture under Target A7 of the Global Framework on Chemicals (GFC),
  - an at least half reduction in risk to biodiversity from pesticides under Target 7 of the Global Biodiversity Framework (GBF), and,
  - commitments to increase support for agroecology under GFC Target D5 and GBF Target 10.
- The IPCC reports that agroecological farming – which helps reduce reliance on and risks and impacts from pesticides - could cut emissions by 2.8 - 4.1 GtCO2e per year while maintaining productive and equitable food systems underpinning adaptation.[ii] This is equivalent to between 6.8% and 10% of global energy related CO2e emissions in 2021.[iii]
- The UN Environment Assembly (UNEA) has explicitly encouraged member states to enhance implementation synergies across different multilateral environmental agreements and other relevant environmental instruments, and to phase out HHPs in agriculture.
- Delivery of these complementary commitments should be central to efficient climate action under the COP28 UAE Declaration on Sustainable Agriculture and prioritized by Parties in national planning and reporting under the UNFCCC, the GBF, and the GFC.

Recommended Action

- Parties to the Paris Agreement and the COP28 UAE Declaration on Sustainable Agriculture should ensure that, by COP30 in 2025, their NDCs and NAPs integrate action to:
  - phase out Highly Hazardous Pesticides (HHPs) as mandated under GFC Target A7;
  - reduce the risk to biodiversity from pesticides as mandated under GBF Target 7;
  - increase structural support for agroecological practices mandated under GFC Target D5, and GBF Target 10, and,
  - reflect and reinforce credible measures to support these agroecology and pesticides reforms in a ***whole of government approach***.
- Parties to the CBD and the COP28 UAE Declaration on Sustainable Agriculture should also ensure the above actions are also integrated into their revised NBSAPs as soon as possible, including in relation to GBF Targets 7, 10, 14, 15, 16, and 18.
- The Presidencies of COP28 and COP29, and the UN FAO, should ensure that initiatives linked to the COP28 Food Systems and Agriculture Agenda, including the Technical Cooperation Collaborative (TCC), and the Baku Harmoniya Climate Initiative for Farmers, integrate action to deliver international commitments on agroecology and pesticides reforms, including through the direct involvement of FAO's Scaling up Agroecology Initiative.
- Companies and other entities committing to drive agriculture and agri-business action under the COP28 Action Agenda on Regenerative Landscapes must ensure those measures reduce the risk to biodiversity from pesticides and phase out Highly Hazardous Pesticides in the global agri-food production and value chains they influence.

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Agriculture, Food Systems, and Climate Action

Global food systems produce over one-third of all greenhouse gas (GHG) emissions, with 31% of those resulting from industrial agricultural production, including through the production and use of agrochemical inputs including pesticides (See box: The Climate Footprint of Pesticides).[iv]

The COP28 Food Systems and Agriculture Agenda formalized a range of high-level initiatives and announcements committing countries and the private sector to targeted action in the context of the UNFCCC and Paris Agreement, including:

- **The COP28 UAE Declaration on Sustainable Agriculture**

Signed by 160 countries, the **COP28 UAE Declaration on Sustainable Agriculture, Resilient Food Systems, and Climate Action,** recognizes that *'any path to fully achieving the long-term goals of the Paris Agreement must include agriculture and food systems'.*

Signatories committed to *'expedite the integration of agriculture and food systems into our climate action',* including in National Adaptation Plans (NAPs), Nationally Determined Contributions (NDCs), and National Biodiversity Strategies and Action Plans (NBSAPS), *'before the convening of COP30'* in 2025.

National action pledged under the Declaration should contribute to *'conserving, protecting and restoring land and natural ecosystems, enhancing soil health, and biodiversity, and shifting from higher greenhouse gas-emitting practices to more sustainable production and consumption approaches'.*[v]

- **The COP28 Action Agenda on Regenerative Landscapes**

COP28 also formalised commitments from major private sector actors to catalyse the *'widespread adoption of regenerative agriculture',* through the Action Agenda on Regenerative Landscapes. The initiative is led by the COP28 Presidency, the World Business Council on Sustainable Development (WBCSD), and the Boston Consulting Group, and supported by an array of major multinational companies, the World Farmers' Organization (WFO), and others.[vi]

This Action Agenda recognises reduced use of chemicals and enhanced soil health, resilience and biodiversity as components of its vision of regenerative landscapes.

The COP28 Action Agenda on Regenerative Landscapes is now listed as the biggest of the *'innovation sprints'* featured by the United States and UAE governments' Agriculture Innovation Mission for Climate (Aim4Climate), backed by a reported $2.2 billion investment package.[vii]

The scale of ambition and its potential to influence de-facto outcomes in agriculture and food system transformation over the coming decades are unparalleled. But this huge opportunity will be wasted without concrete and measurable steps to reduce pesticide use, eliminate Highly Hazardous Pesticides and support farmers to adopt agroecological approaches.

At COP16 in 2021, the WBCSD and 12 partners launched REGEN10, which is also a participant in the Action Agenda on Regenerative Landscapes.

The WBCSD outlined how REGEN10 is a farmer-led initiative to define a Regenerative Outcomes Framework to cement consensus on the definitions and metrics used to measure the positive impacts of regenerative farming and apply this to develop supply chain and financing pathways. It aims to influence over 50% of global agricultural land and food production, via 500 million farmers, supported by $60 billion per year.[viii]

REGEN10 launched its Zero-Draft Outcomes Framework for consultation at COP28[ix], and plans to release its adopted framework in 2025.

It is critical that REGEN10 and the wider work of participants in the Action Agenda on Regenerative Agriculture reinforces progress against global commitments to phase out Highly Hazardous Pesticides in agriculture (GFC Target A7), reduce pesticide risk to biodiversity by at least half (GBF Target 7), and increase the uptake of agroecological practices (GFC Target D5 and GBF Target 10).

- **The Technical Cooperation Collaborative (TCC)**

Launched by the COP28 Presidency in June 2024, the Technical Cooperation Collaborative (TCC) aims to support implementation of the COP28 UAE Declaration on Sustainable Agriculture.

Founding members include COP28 UAE, Italy, the United States, the United Kingdom, the World Bank, the Food and Agriculture Organisation of the United Nations (FAO), the International Fund for Agricultural Development (IFAD), AGRA, CGIAR, GAIN, the Global Green Growth Institute (GGGI) and the Inter-American Institute for Cooperation on Agriculture (IICA).[x]

Members of the TCC have pledged to offer quality technical cooperation to help nations deliver on the objectives of the Declaration, with support targeted particularly to developing and climate vulnerable countries.[xi]

- **The Baku Harmoniya Climate Initiative for Farmers**

The government of Azerbaijan has announced plans to launch the Baku Harmonia Climate Initiative for Farmers, at COP29, in partnership with the UN Food and Agriculture Organization (FAO)[xii], which will host the initiative.[xiii]

Three main aims of the initiative include: a) improving coherence and collaboration between disparate initiatives; b) catalysing investment in climate resilient agri-food systems; and c) empowering farmers to access funds. The initiative is supported by FAO's Food and Agriculture for Sustainable Transformation (FAST) Partnership.[xiv]

Cultivating Credibility

Combined, these high-profile political and corporate commitments are an important signal that agriculture and food system transformation is finally being given the attention it deserves in the UNFCCC process.

However, these initiatives are, to date, very light on detail particularly in relation to pesticides and other petrochemical-derived inputs that drive many of the climate, biodiversity, pollution, and human health problems generated by unsustainable agricultural systems.

It is critical that these new initiatives – whether private or public sector led – embrace agroecological principles that enable targeted agrochemical input reductions and build resilient and sustainable farming systems, rather than promoting techno-fixes that prolong rather than transform existing harmful industrial models.[xv]

Yet none of these overarching initiatives explicitly mention agroecology, or specify concrete pesticides reforms.

This is despite concrete commitments in both the Global Framework on Chemicals, and the Global Biodiversity Framework to increase support to and the practice of agroecological farming systems and significantly reform global pesticide use (see: Capitalising on Complementary Commitments) – and the evidence from the Intergovernmental Panel on Climate Change (IPCC) of agroecology's significant climate mitigation and adaptation potential (see: The promise of Agroecology, below).

It remains to be seen whether the vision of regenerative agriculture that underpins these high-level climate initiatives will actually de-toxify agriculture or will instead perpetuate reliance on costly and polluting old chemistry, thereby protecting agrochemical industry interests at the expense of farmers, rural communities and global objectives on climate, pollution and biodiversity.

Capitalising on Complementary Commitments

Most Parties to the Paris Agreement and signatories to the COP28 UAE Declaration on Sustainable Agriculture, Resilient Food Systems, and Climate Action have already committed to concrete actions commensurate with the agricultural system transformation required to mitigate and adapt to climate change.

These include commitments in other UN agreements to significantly increase investment in and the uptake of agroecology at scale, reduce pesticide and fertiliser pollution by at least half, and phase out the use of highly hazardous pesticides (HHPs).

Incorporating the implementation of these commitments into Nationally Determined Contributions (NDCs) and National Adaptation Plans (NAPs) under their Paris Agreement obligations would provide efficient co-benefits to Parties across multiple international environmental and pollution reduction policy instruments. This must be done by COP30 in 2025.

Such developments are clearly envisioned, if not explicitly specified, in the COP28 Food Systems and Agriculture Agenda and COP28 UAE Declaration on Sustainable Agriculture.

Existing commitments of note include:

Target 7 of the Global Biodiversity Framework (GBF) commits Parties to reduce risk from pesticides and highly hazardous chemicals, and excess nutrients lost to the environment through fertiliser application, by at least half by 2030, with the vast majority of these reductions to occur in agriculture.[xvi] In the case of pesticides, this needs to involve an at least half reduction in the total applied toxicity of pesticides applied nationally, measured as a combination of pesticide toxicity and volume of use.[xvii]

Target A7 of the Global Framework on Chemicals (GFC) - an international policy instrument agreed at the UN-convened 5th **International Conference on Chemicals Management (ICCM)** in Bonn in September 2023 - commits governments and other stakeholders, including industry, to have taken, by 2035, "effective measures to phase out highly hazardous pesticides in agriculture, where the risks have not been managed and where safer and affordable alternatives are available; and to promote transition to, and make available those alternatives."[xviii] Phasing out HHPs will be the single most effective step in delivering risk reduction GBF Target 7.[xix]

Target 10 of the GBF commits Parties to "ensure that areas under agriculture, aquaculture, fisheries and forestry are managed sustainably … through a substantial increase of the application of biodiversity friendly practices … such as agroecological and other innovative approaches".[xx]

Target D5 of ICCM's GFC similarly commits its Parties to implement, by 2030, "policies and programmes to increase support to safer and more sustainable agricultural practices, including agroecology, integrated pest management and the use of non-chemical alternatives".[xxi]

ICCM in Bonn also agreed the formation of a **Global Alliance on HHPs**, as a coalition of stakeholders (countries, civil society, business, and citizens) working to implement the HHP phase out mandated by GFC Target A7.[xxii] Both governments and companies that have committed to initiatives under the COP28 Food Systems and Agriculture Agenda would benefit from membership of this strategic Alliance.

Both of these complementary multilateral policy frameworks – the CBD's GBF and the ICCM's GFC – also mandate countries to take specific policy action to ensure the private sector and investors contribute to rather than undermine the implementation of these transformative outcomes.

Food system transformation is relevant to **GBF Target 15 on corporate practices, and Target 18 on financial and other incentives.**[xxiii] Similarly, Targets D2 and D7 of the ICCM's GFC, mandate policies to bring about corporate reforms to value chains in support of wider GFC implementation.

The climate mitigation and adaptation benefits of these agriculture-relevant policy commitments are as clear as the biodiversity human health, and pollution benefits central to the GBF and GFC respectively.

For countries to maximize the co-benefits 'bang for buck' from such policy coherence they must reflect these commitments across national plans and reports, including NBSAPs and NDCs and NAPs, by COP 30 in 2025.

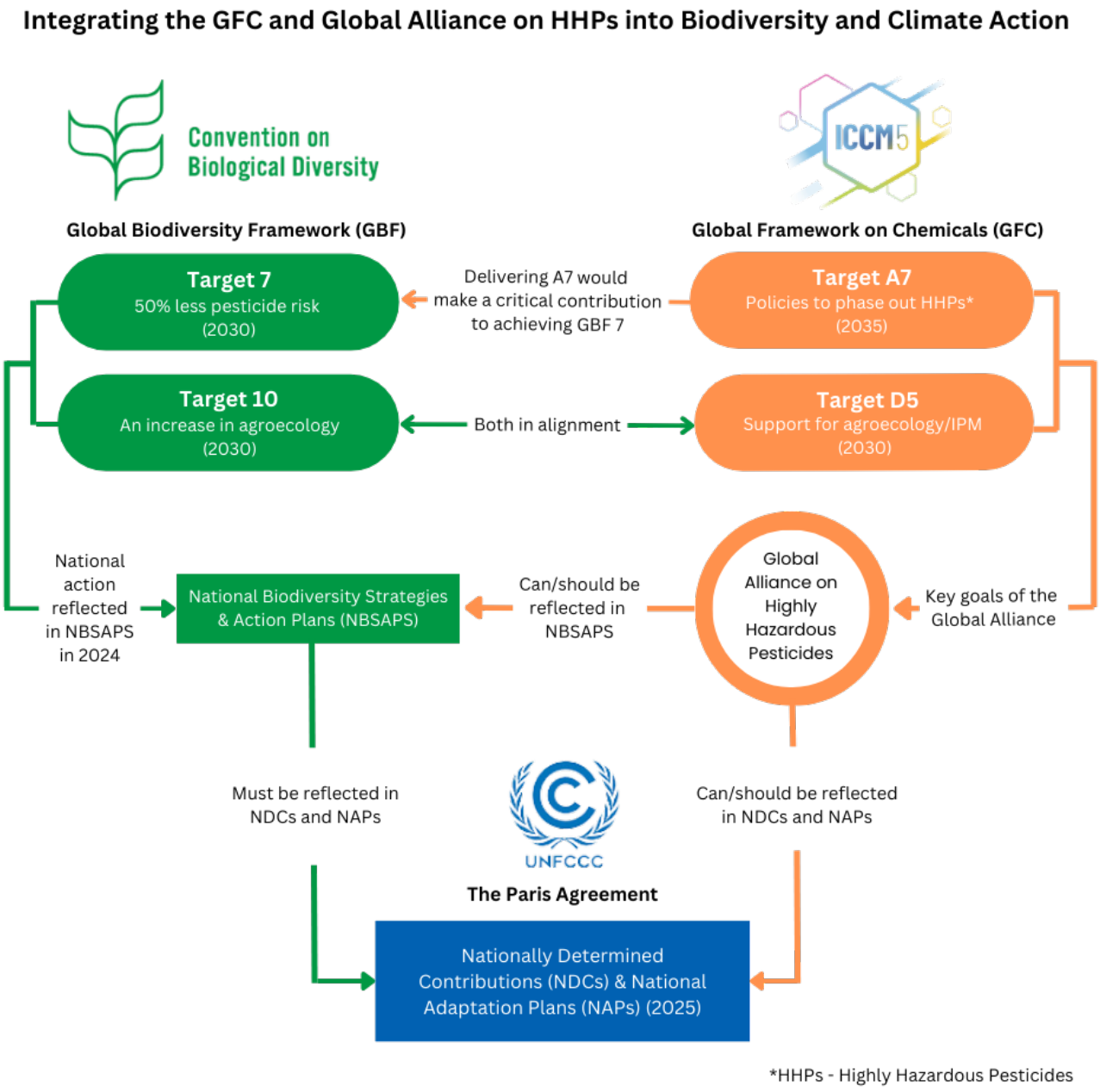

Figure 1: Synergies & complementarities on pesticides and agroecology across critical global Policy Frameworks

Building on Bern

Enhancing cooperation between multilateral environmental agreements (MEAs) and other environmental instruments, and capitalising on national and international implementation efficiencies presented by synergies across related agreements is a central thrust of the Bern Process, which held its third meeting in January 2024.[xxiv]

A report of the meeting identifies some of the synergies between targets and desired outcomes across a range of MEAs and agreements. While that mapping was incomplete, and it did not include analysis of the Global Framework on Chemicals (which was only agreed months prior to the Bern III meeting), the report does acknowledge the need to further integrate the GFC into the process, and to further develop mapping across MEAs, to enhance implementation across the board.[xxv]

In March 2024, the sixth meeting of the United Nations Environment Assembly (UNEA-6) – adopted **Resolution 6/4, on Promoting synergies, cooperation or collaboration for national implementation of multilateral environmental agreements and other relevant environmental instruments.**

The Resolution explicitly encouraged member states to *'enhance synergies, cooperation or collaboration, as appropriate, when implementing their respective obligations and commitments under multilateral environmental agreements and other relevant environmental instruments'.* [xxvi]

UNEA-6 also adopted **Resolution 6/9 on the Sound management of chemicals and waste,** which acknowledged the agreement of the Global Framework on Chemicals[xxvii], and **Resolution 6/11 on Highly hazardous pesticides**, which 'encourages stakeholders, including Member States, in accordance with target A7 … of the Global Framework on Chemicals – For a Planet Free of Harm from Chemicals and Waste, to take effective measures to phase out highly hazardous pesticides in agriculture…'[xxviii]

The international community's highest level decision making body on the environment, UNEA, has called for a joined up approach across MEAs, including under the UNFCCC, the GBF, and the GFC, and for that to include action on Highly Hazardous Pesticides.

What are HHPs?

Highly hazardous pesticides (HHPs) are a group of the most harmful pesticides that meet one or more of eight internationally agreed criteria set out by the FAO and WHO in 2016.[xxix] HHPs are deemed by the international community as an issue of concern warranting international action.[xxx]

The FAO and WHO find that the use of HHPs undermines the attainment of several Sustainable Development Goals (SDGs) because of their adverse effects on health, food security, biodiversity and pollution.[xxxi] SDG Indicator 2.4.1 classifies use of HHPs in agriculture as 'unsustainable'.

The promise of Agroecology in mitigation and adaptation

Agroecology and pesticides reforms need to be central to the actions taken by governments and the private sector in light of relevant commitments to address important agricultural drivers of climate change while supporting farmers to establish resilient and productive farming systems.

The Intergovernmental Panel on Climate Change (IPCC) makes clear that agroecology needs to play a major role in both mitigating and adapting to climate change and transforming food and farming systems.

The 6th IPCC Assessment Report concluded with high confidence that "agroecologically improved cropland and grazing land management have significant mitigation potential, estimated at 2.8- 4.1 GtCO2e per year".[xxxii]

This is equivalent to between 6.8% and 10% of global energy related CO2e emissions in 2021.[xxxiii]

It reported global studies indicating that Agro-forestry stores 20–33% more soil carbon than conventional agriculture. Other systemic reviews show that agricultural diversification practices that are key components of agroecology improve water regulation, soil fertility, nutrient cycling and carbon sequestration.[xxxiv]

The IPCC is also confident that agroecological farming "enhances adaptation to climate change, including resilience to extreme events", and concludes that "adoption of agroecology principles and practices will be highly beneficial to maintaining healthy, productive food systems under climate change".[xxxv]

Agroecology is recognised as a key food transformation approach by the UN Food and Agriculture Organization (FAO) and its members. The FAO's Scaling up Agroecology Initiative aims to catalyse cooperation on agroecology within the UN System and by supporting national agroecology policy and technical capacity and building synergies between countries.[xxxvi]

The Climate Footprint of Pesticides

Pesticides play a significant yet insufficiently recognised role in emissions from agriculture.

- Emissions in manufacture distribution and application

99% of all synthetic chemicals — including pesticides — are derived from petrochemcials.[xxxvii] Most pesticide active ingredients generate from 11.94 to 29.19 kilograms of CO2e per kilogram produced, while some produce over 40 kilograms CO2 e per kilogram.[xxxviii]

Beyond their manufacture, pesticides generate more emissions still, with one study estimating that global pesticide production, distribution and application generated emissions of 73.2 MtCO2e, equivalent to 3.1% (range 1.0–5.8%) of global cropland emissions.[xxxix]

- Pesticides turn soils from carbon sinks to sources

The post-application effects of pesticides generate potentially far larger emissions.

Pesticides have a detrimental effect on soil microorganisms crucial for soil health and productivity, and which play a critical role in the carbon and nitrogen cycles that control emissions of carbon dioxide, methane, and nitrous oxide from soils.[xl]

Studies have shown that optimising carbon sequestration and storage in soil depends on reducing pesticides[xli], with one study concluding that glyphosate-based herbicide residues in soils "greatly decreased the carbon sequestration potential".[xlii]

In addition, pesticide applications emit volatile organic compounds (VOCs) which react with nitrogen oxides and UV rays to produce ground-level ozone[xliii] - a significant greenhouse gas that the U.S. Department of Agriculture reports to cause more damage to plants than all other air pollutants combined.[xliv] 80 to 90% of applied pesticides may volatilize within a few days of application.[xlv]

Some commonly used pesticides have also been shown to dramatically increase emissions of nitrous oxide from soils[xlvi]. Nitrous oxide is a greenhouse gas 300 times more potent than carbon dioxide.

Soil organic matter is important for climate adaptation, too. Healthier soils grow healthier crops and retain more water, thereby reducing the impact of droughts and floods.

There is a clear need to reduce the effects of pesticides on soil carbon and secure significant co-benefits in terms of soil health and climate adaptation.

Conclusions

New international commitments to integrate agriculture and food system transformation into targeted national climate action under the UNFCCC and Paris Agreement are welcome and urgently needed.

The COP28 UAE Declaration on Sustainable Agriculture, Resilient Food Systems, and Climate Action establishes clear obligations and timelines for at least 160 countries to detail their plans in NBSAPs under the CBD, and NDCs and NAPs under the Paris agreement, during 2024 and 2025.

The Baku Harmoniya Climate Initiative for Farmers, stemming from COP29 in Azerbaijan, must reinforce and catalyse implementation of the Declaration, and help countries and farmers to transition.

These initiatives, and national plans to align corporate practices and finance flows with the goals of the Paris Agreement and the Global Biodiversity Framework, should harness the potential and reach of the participants of the COP28 Action Agenda on Regenerative Landscapes.

In doing so, all UNFCCC stakeholders should harness efficiencies presented by complementary commitments across UN policy frameworks, including the Global Framework on Chemicals and the Global Biodiversity Framework – in line with UNEA resolutions, including on the Bern Process, the GFC, and HHPs.

Agriculture and food system reforms integrated into NDCs and NAPs, and into corporate policies, must:

- **Prioritize support to scaleup agroecological farming systems, in line with GFC Target D5 and GBF Target 10**
- **Prioritize the phase out of Highly Hazardous Pesticides (HHPs), in line with GFC Target A7**
- **Set ambitious pesticide risk reduction targets in line with GBF Target 7, and building on the above two actions.**

These actions will help delivery of key global commitments on agriculture and food systems common to the three UN policy frameworks to address the triple planetary crisis of climate change, biodiversity loss, and pollution, while reducing the national burden of delivery.

References

i. The COP28 UAE Declaration on Sustainable Agriculture, Resilient Food Systems, and Climate Action, signed by the UK and over 130 other countries on 1 December 2023, available at https://www.cop28.com/en/food-and-agriculture

ii. Parmesan, C., M.D. Morecroft, Y. Trisurat, R. Adrian, G.Z. Anshari, A. Arneth, Q. Gao, P. Gonzalez, R. Harris, J. Price, N. Stevens, and G.H. Talukdarr, 2022: Terrestrial and Freshwater Ecosystems and Their Services. In: Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 197–377, doi:10.1017/9781009325844.004, available at https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_Chapter02.pdf

iii. Percentages calculated against 40.8GT CO2e global energy related emissions in 2021, estimated by the International Energy Agency (IEA) using a 100-year global warming potential time horizon, as cited in: IEA (2022), Global Energy Review: CO2 Emissions in 2021, IEA, Paris https://www.iea.org/reports/global-energy-review-co2-emissions-in-2021-2, License: CC BY 4.0.

iv. Tubiello, F. N., Karl, K., Flammini, A., Gütschow, J., Conchedda, G., Pan, X., ... & Torero, M. (2022). Pre-and post-production processes increasingly dominate greenhouse gas emissions from agri-food systems. Earth System Science Data, 14(4), 1795-1809, as cited in https://www.panna.org/wp-content/uploads/2023/02/202308ClimateChangeEng.pdf

v. The COP28 UAE Declaration on Sustainable Agriculture, Resilient Food Systems, and Climate Action, signed by the UK and over 130 other countries on 1 December 2023, available at https://www.cop28.com/en/food-and-agriculture

vi. https://archive.wbcsd.org/Programs/Food-and-Nature/Food-Land-Use/COP28-Action-Agenda-Regenerative-Landscapes-accelerating-the-transition

vii. https://www.aimforclimate.org/innovation-sprints/

viii. https://archive.wbcsd.org/Programs/Food-and-Nature/News/Regen10-to-work-with-over-500-million-farmers-to-scale-regenerative-food-production-by-2030

ix. https://regen10.org/wp-content/uploads/sites/19/2023/12/Regen10-Zero-Draft-Framework.pdf

x. COP28 UAE, undated Press Release: COP28 Presidency launches technical group to support implementation of the COP28 UAE Declaration on Sustainable Agriculture, Resilient Food Systems, and Climate Action, available at https://www.cop28.com/en/news/2024/06/COP28-Presidency-launches-technical-group

xi. https://www.cop28.com/en/news/2024/06/COP28-Presidency-launches-technical-group

xii. https://cop29.az/en/news/cop29-presidency-launches-initiatives-to-focus-global-attention-and-accelerate-climate-action

xiii. https://yemenonline.info/gulf-news/8330

xiv. COP29 Presidency Action Agenda Letter, available at https://cop29.az/en/pages/cop29-presidency-action-agenda-letter

xv. PAN International, Food System Transformation at COP28: Why agroecology must be prioritised, November 2023, available at https://www.pan-uk.org/why-cop28-must-prioritise-agroecology/

xvi. https://www.cbd.int/gbf/targets/7/

xvii. See PAN International and Third World Network briefings, including: 'Interpreting the Mandate for Action on Pesticides in the Kunming-Montreal Global Biodiversity Framework (KMGBF)', October 2023, available at https://www.pan-uk.org/site/wp-content/uploads/PAN-TWN-KMGBF-Pesticides-Targets-Interpretation.pdf, and 'Optimizing the Monitoring Framework Indicators for Pesticides in the Kunming-Montreal Global Biodiversity Framework (KMGBF)', October 2023, available at https://www.pan-uk.org/site/wp-content/uploads/PAN-TWN-Optimising-the-KMGBF-Monitoring-Indicators-for-Pesticides.pdf

xviii. Pesticide Action Network International, 'Commitments in new chemical framework should catalyse strong global action on pesticides', 2 October 2023, available at https://pan-international.org/release/commitments-in-new-chemicals-framework-should-catalyze-strong-global-action-on-pesticides/

xix. See PAN International and Third World Network briefings, including: 'Interpreting the Mandate for Action on Pesticides in the Kunming-Montreal Global Biodiversity Framework (KMGBF)', October 2023, available at https://www.pan-uk.org/site/wp-content/uploads/PAN-TWN-KMGBF-Pesticides-Targets-Interpretation.pdf

xx. https://www.cbd.int/gbf/targets/10/

xxi. Pesticide Action Network International, 'Commitments in new chemical framework should catalyse strong global action on pesticides', 2 October 2023, available at https://pan-international.org/release/commitments-in-new-chemicals-framework-should-catalyze-strong-global-action-on-pesticides/

xxii. Ibid

xxiii. PAN International, Leveraging NBSAPS beyond the CBD: How action on agroecology and pesticides delivers across multiple UN policy frameworks, July 2024, available at https://www.pan-uk.org/conserving-biodiversity/

xxiv. https://www.unep.org/events/conference/bern-iii-conference-cooperation-among-biodiversity-related-conventions

xxv. UNEP, Report of the Bern III Conference on Cooperation among the biodiversity-related conventions for the implementation of the Kunming-Montreal Global Biodiversity Framework, 3 May 2024, available at https://www.cbd.int/doc/c/ff05/5015/84bd131c7b038cc541fed147/sbi-04-inf-15-en.pdf

xxvi. UNEP/EA.6/Res.4, available at https://www.unep.org/environmentassembly/unea6/outcomes

xxvii. UNEP/EA.6/Res.9, available at https://www.unep.org/environmentassembly/unea6/outcomes

xxviii. UNEP/EA.6/Res.11, available at https://www.unep.org/environmentassembly/unea6/outcomes

xxix. FAO & WHO, International Code of Conduct on Pesticide Management: Guidelines on Highly Hazardous Pesticides, 2016, available at https://openknowledge.fao.org/server/api/core/bitstreams/7c65af6a-52ca-4e44-8c57-4303d076bea4/content

xxx. In 2015, at the Fourth International Conference of Chemicals Management (ICCM4), the Strategic Approach to International Chemicals Management (SAICM – the precursor to the Global Framework on Chemicals) adopted a resolution that recognizes HHPs as an issue of international concern and called for concerted action to address HHPs. See: https://www.saicm.org/Portals/12/documents/meetings/ICCM4/doc/K1606013_e.pdf

xxxi. In 2015, at the Fourth International Conference of Chemicals Management (ICCM4), the Strategic Approach to International Chemicals Management (SAICM – the precursor to the Global Framework on Chemicals) adopted a resolution that recognizes HHPs as an issue of international concern and called for concerted action to address HHPs. See: https://www.saicm.org/Portals/12/documents/meetings/ICCM4/doc/K1606013_e.pdf

References continued...

xxxii. Parmesan, C., M.D. Morecroft, Y. Trisurat, R. Adrian, G.Z. Anshari, A. Arneth, Q. Gao, P. Gonzalez, R. Harris, J. Price, N. Stevens, and G.H. Talukdarr, 2022: Terrestrial and Freshwater Ecosystems and Their Services. In: Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 197–377, doi:10.1017/9781009325844.004, available at https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_Chapter02.pdf

xxxiii. Percentages calculated against 40.8GT CO2e global energy related emissions in 2021, estimated by the International Energy Agency (IEA) using a 100-year global warming potential time horizon, as cited in: IEA (2022), Global Energy Review: CO2 Emissions in 2021, IEA, Paris https://www.iea.org/reports/global-energy-review-co2-emissions-in-2021-2, License: CC BY 4.0.

xxxiv. He, X., Batáry, P., Zou, Y. et al. Agricultural diversification promotes sustainable and resilient global rice production. Nat Food 4, 788–796 (2023). https://doi.org/10.1038/s43016-023-00836-4 and : G. Tamburini, R. Bommarco, T. C. Wanger, C. Kremen, M. G. A. van der Heijden, M. Liebman, S. Hallin, Agricultural diversification promotes multiple ecosystem services without compromising yield. Sci. Adv. 6, eaba1715 (2020), available at https://www.science.org/doi/pdf/10.1126/sciadv.aba1715

xxxv. Ibid.

xxxvi. FAO, Scaling up Agroecology Initiative, available at https://www.fao.org/agroecology/overview/scaling-up-agroecology-initiative/en/

xxxvii. Drugmand, D., Feit, S., Fuhr, L., & Muffett, C. (2022). Fossils, Fertilizers, and False Solutions: How Laundering Fossil Fuels in Agrochemicals Puts the Climate and the Planet at Risk. The Center for International Law. https://www.ciel.org/wp-content/ uploads/2022/10/Fossils-Fertilizers-andFalse-Solutions.pdf, as cited in https://www.panna.org/wp-content/uploads/2023/02/202308ClimateChangeEng.pdf

xxxviii. Audsley, E., Stacey, K. F., Parsons, D. J., & Williams, A. G. (2009). Estimation of the greenhouse gas emissions from agricultural pesticide manufacture and use. Cranfield University.

xxxix. Wyckhuys, K.A.G., Furlong, M.J., Zhang, W. et al. Carbon benefits of enlisting nature for crop protection. Nat Food 3, 299–301 (2022). https://doi.org/10.1038/s43016-022-00510-1

xl. Oertel, C., Matschullat, J., Zurba, K., Zimmermann, F., & Erasmi, S. (2016). Greenhouse gas emissions from soils—A review. Geochemistry, 76(3), 327-352.

xli. Gunstone T, Cornelisse T, Klein K, Dubey A and Donley N (2021), Pesticides and Soil Invertebrates: A Hazard Assessment. Front. Environ. Sci. 9:643847. doi: 10.3389/fenvs.2021.643847, and Benjamin Fuchs, Academy Research Fellow, Biodiversity Unit of the University of Turku, 8 February 2023, Reducing pesticide pollution and the intensity of harvesting can increase crop yield and contribute to climate change mitigation, available at https://www.utu.fi/en/news/press-release/reducing-pesticide-pollution-and-the-intensity-of-harvesting-can-increase-crop

xlii. Laihonen, M., Rainio, K., Birge, T. et al. Root biomass and cumulative yield increase with mowing height in Festuca pratensis irrespective of Epichloë symbiosis. Sci Rep 12, 21556 (2022). https://doi.org/10.1038/s41598-022-25972-y

xliii. U.S. Environmental Protection Agency. What are Volatile Organic Compounds (VOCs)?, available at https://www.epa.gov/indoorair-quality-iaq/what-are-volatile-organiccompounds-vocs, and: Martin, T. (2013). Volatile Organic Compound (VOC) Emissions from Pesticides. University of California, Agriculture and Natural Resources, available at https://ipm.ucanr.edu/mitigation/reducing_voc.html#:~:text=Volatile%20organic%20compounds%20(VOCs)%20are,to%20form%20ozone%2C%20or%20smog

xliv. USDA ARS, Effects of Ozone Air Pollution on Plants, 13 April 2020, available at https://lindseyresearch.com/wp-content/uploads/2020/08/NHTSA-2017-0069-0800-USDA_2016_Effects_of_Ozone_Air_Pollutants_on_Plants.pdf

xlv. Majewski, M. S. (2019). Pesticides in the atmosphere: distribution, trends, and governing factors (Vol. 1). CRC press, and Aktar, M. W., Sengupta, D., & Chowdhury, A. (2009). Impact of pesticides use in agriculture: their benefits and hazards. Interdisciplinary toxicology, 2(1), 1.

xlvi. Spokas, K., & Wang, D. (2003). Stimulation of nitrous oxide production resulted from soil fumigation with chloropicrin. Atmospheric Environment, 37(25), 3501-3507. See also: Spokas, K., Wang, D., & Venterea, R. (2005). Greenhouse gas production and emission from a forest nursery soil following fumigation with chloropicrin and methyl isothiocyanate. Soil Biology and Biochemistry, 37(3), 475-485, and Jezierska-Tys, S., Joniec, J., Bednarz, J., & Kwiatkowska, E. (2021). Microbiological Nitrogen Transformations in Soil Treated with Pesticides and Their Impact on Soil Greenhouse Gas Emissions. Agriculture, 11(8), 787.

Pesticide Action Network International (PAN International) 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.

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