Financing Agrochemical Reduction and Management (FARM)

Part I: Program Information

GEF ID
10872

Program Type
PFD

Type of Trust Fund
GET

CBIT/NGI
CBIT **No**
NGI **No**

Program Title
Financing Agrochemical Reduction and Management (FARM)

Countries
Global, India, Viet Nam, Ecuador, Kenya, Lao PDR, Philippines, Uruguay

Agency(ies)
UNEP, UNDP, ADB, UNIDO

Other Executing Partner(s)

Executing Partner Type

FAO, Viet Nam Ministry of Agriculture and Rural Development (MARD), Ministry of Chemicals and Fertilizers (India), Department of Agriculture and its units/ bureaux/ attached agencies (Philippines), Department of Agriculture (Laos PDR), Ministry of Environment and Water and Ministry of Agriculture, Livestock, Aquaculture, and Fisheries (Ecuador)	Government

GEF Focal Area
Chemicals and Waste

Taxonomy
Productive Landscapes, Protected Areas and Landscapes, Biodiversity, Focal Areas, Agriculture and agrobiodiversity, Mainstreaming, Land Cover and Land cover change, Land Degradation Neutrality, Land Degradation, Sustainable Agriculture, Sustainable Land Management, Pesticides, Chemicals and Waste, Plastics, Persistent Organic Pollutants, Persistent toxic substances, Pollution, International Waters, Agriculture, Forestry, and Other Land Use, Climate Change Mitigation, Climate Change, Transform policy and regulatory environments, Influencing models, Deploy innovative financial instruments, Convene multi-stakeholder alliances, Beneficiaries, Stakeholders, Local Communities, Non-Governmental Organization, Civil Society, Partnership, Type of Engagement, Large corporations, Private Sector, Financial intermediaries and market facilitators, SMEs, Behavior change, Communications, Education, Gender-sensitive indicators, Gender Mainstreaming, Gender Equality, Women groups, Knowledge Generation and Exchange, Gender results areas, Access and control over natural resources, Smallholder Farmers, Commodity Supply Chains, Integrated Programs, Sustainable Commodities Production, Sustainable Production Systems, Food Security in Sub-Sahara Africa, Agroecosystems, Food Value Chains, Food Systems, Land Use and Restoration, Sustainable Commodity Production, Sustainable Food Systems, Professional Development, Knowledge Generation, Capacity, Knowledge and Research, South-South, Knowledge Exchange, Targeted Research, Adaptive management, Learning

Rio Markers
Climate Change Mitigation
Climate Change Mitigation 1

Climate Change Adaptation
Climate Change Adaptation 0

Duration
60 In Months

Agency Fee($)
3,369,735.00

Program Commitment DeadlineSubmission Date

6/10/2023 10/26/2021

Impact Program

IP-Food-Land-Restoration **No**

IP-Sustainable Cities **No**

IP-Sustainable Forest Management Amazon **No**

IP-Sustainable Forest Management Congo **No**

IP-Sustainable Forest Management Drylands **No**

Other Program **Yes**

A. Indicative Focal/Non-Focal Area Elements

Programming Directions	Expected Outcomes	Trust Fund	GEF Amount($)	Co-Fin Amount($)
CW-1-2	Sound management of chemicals and waste addressed through strengthening the capacity of sub-national, national and regional institutions and strengthening the enabling policy and regulatory framework in these countries	GET	37,441,500.00	341,789,200.00
		Total Program Cost ($)	**37,441,500.00**	**341,789,200.00**

B. Indicative Project description summary

Program Objective

To catalyze a framework for investment in the agriculture sector which looks to detoxify the sector by eliminating the use of the most harmful inputs to food production systems

Program Component	Financing Type	Program Outcomes	Trust Fund	GEF Amount($)	Co-Fin Amount($)
Policy & Enforcement	Technical Assistance	Outcome 1: Enabling conditions exist for the sound management of chemicals & waste	GET	7,500,000.00	33,518,175.00
Finance & Investment	Investment	Outcome 2: Establishing sustainable financing for the transition to low/no-chemical agriculture	GET	16,425,000.00	216,572,525.00
Capacity development & knowledge dissemination	Technical Assistance	Outcome 3: Building capacity and making knowledge accessible on the sound management of chemicals and waste (SMCW)	GET	8,345,000.00	58,432,163.00
M&E	Technical Assistance	Monitoring and evaluation	GET	1,407,000.00	10,336,287.00
Finance & Investment	Technical Assistance	Outcome 2: Establishing sustainable financing for the transition to low/no-chemical agriculture	GET	2,000,000.00	7,750,000.00
			Sub Total ($)	**35,677,000.00**	**326,609,150.00**
Program Management Cost (PMC)					
			GET	1,764,500.00	15,180,050.00
			Sub Total($)	**1,764,500.00**	**15,180,050.00**
			Total Program Cost($)	**37,441,500.00**	**341,789,200.00**

C. Co-Financing for the Program by Source, by Name and by Type

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount($)
Recipient Country Government	Ministry of Agriculture, Livestock and Fisheries (MGAP): General Directorate for Agricultural Services (DGSA) General Directorate of Farms – DIGEGRA (Uruguay)	In-kind	Recurrent expenditures	1,456,800.00
Recipient Country Government	Pesticide Control Products Board (PCPB Kenya)	In-kind	Recurrent expenditures	5,499,900.00
Recipient Country Government	National Directorate for Environmental Quality and Evaluation, Ministry of Environment (Uruguay)	In-kind	Recurrent expenditures	1,237,800.00
Private Sector	Campo Limpio Civil Association Chamber of Commerce for Agrochemical Products of Uruguay (CAMAGRO) National Chamber for Fertilizers and Pesticides (CANAFFI) Uruguayan Association for the Chemical Industry (ASIQUR)	In-kind	Recurrent expenditures	798,400.00
Recipient Country Government	Ministry of Public health (Uruguay)	In-kind	Recurrent expenditures	100,000.00
Private Sector	International Centre for Genetic Engineering and Biotechnology (ICGEB)	Grant	Investment mobilized	1,193,200.00
Private Sector	International Centre for Insect Physiology and Ecology (ICIPE)	Grant	Investment mobilized	12,605,200.00
Donor Agency	FAO	Grant	Investment mobilized	49,452,900.00
Donor Agency	FAO	Grant	Recurrent expenditures	3,949,300.00

Civil Society Organization	Kenya Organic Agriculture Network (KOAN) and Organic Consumers Alliance	In-kind	Recurrent expenditures	2,280,000.00
GEF Agency	Asian Development Bank (ADB)	Loans	Investment mobilized	150,000,000.00
Private Sector	Croplife International	In-kind	Recurrent expenditures	100,000.00
Recipient Country Government	Government of India	In-kind	Recurrent expenditures	1,500,000.00
Beneficiaries	Central Public Sector Enterprise	Public Investment	Investment mobilized	20,500,000.00
Recipient Country Government	Government of Philippines	In-kind	Recurrent expenditures	1,500,000.00
Donor Agency	Development Bank of the Philippines	Loans	Investment mobilized	20,000,000.00
Other	Netherlands, IBMA, others	In-kind	Recurrent expenditures	3,949,500.00
GEF Agency	UNIDO	In-kind	Recurrent expenditures	150,000.00
GEF Agency	UNIDO	Grant	Investment mobilized	130,000.00
GEF Agency	UNEP and related knowledge partners (GGKP, Science Division, Economy Division)	Grant	Investment mobilized	4,000,000.00

GEF Agency	UNEP Finance Initiative	Grant	Investment mobilized	8,000,000.00
Civil Society Organization	PAN UK	In-kind	Recurrent expenditures	2,000,000.00
Other	University of Cape Town, Natural Resources Institute UK	In-kind	Recurrent expenditures	1,000,000.00
Private Sector	CLI, Global Alliance to End Plastic Waste	In-kind	Recurrent expenditures	5,000,000.00
Recipient Country Government	Ministry of Environment and Water of Ecuador	Grant	Investment mobilized	500,000.00
Recipient Country Government	Ministry of Environment and Water of Ecuador	In-kind	Recurrent expenditures	1,700,000.00
Recipient Country Government	Ministry of Agriculture	Grant	Investment mobilized	500,000.00
Recipient Country Government	Ministry of Agriculture	In-kind	Recurrent expenditures	1,300,000.00
Recipient Country Government	National Institute for Agricultural and Animal Research (INIAP)	In-kind	Recurrent expenditures	500,000.00
Recipient Country Government	National Institute for Agricultural and Animal Research (INIAP)	Grant	Investment mobilized	250,000.00

Recipient Country Government	Phyto and Zoo-Sanitary Control Agency (AGROCALIDAD)	In-kind	Recurrent expenditures	1,000,000.00
Recipient Country Government	Phyto and Zoo-Sanitary Control Agency (AGROCALIDAD)	Grant	Investment mobilized	275,000.00
Civil Society Organization	Associations (21 associations from banano, cacao, coffee, palm oil, vegetables, rice)	In-kind	Recurrent expenditures	8,400,000.00
Civil Society Organization	Crop Protection Industry Association (APCSA)	In-kind	Recurrent expenditures	300,000.00
Civil Society Organization	Crop Protection Industry Association (APCSA)	Grant	Investment mobilized	150,000.00
Civil Society Organization	Ecuadorian Chamber of Agricultural Innovation and Technology Industry (INNOVAGRO)	In-kind	Recurrent expenditures	120,000.00
Civil Society Organization	Ecuadorian Chamber of Agricultural Innovation and Technology Industry (INNOVAGRO)	Grant	Investment mobilized	330,000.00
Private Sector	Eco-KAKAO, La Fabril, Pronaca, etc	Grant	Investment mobilized	300,000.00
Donor Agency	Proamazonia	Grant	Investment mobilized	1,400,000.00
Donor Agency	Proamazonia	In-kind	Recurrent expenditures	1,600,000.00
Donor Agency	FAO	Grant	Investment mobilized	250,000.00

Recipient Country Government	Ministry of Agriculture, Ministry of Environment and National Institute of Biodiversity (INABIO)	Grant	Investment mobilized	100,000.00
Donor Agency	UNEP	Grant	Investment mobilized	150,000.00
Other	Universities and research centers (6 Universities, 4 research centers)	Grant	Investment mobilized	800,000.00
Other	Universities and research centers (6 Universities, 4 research centers)	In-kind	Recurrent expenditures	1,100,000.00
GEF Agency	UNDP Laos	In-kind	Recurrent expenditures	200,000.00
Recipient Country Government	Department of Agriculture, Laos PDR	In-kind	Recurrent expenditures	500,000.00
Donor Agency	Korea (ROK-MAFRA)	Grant	Investment mobilized	3,300,000.00
Donor Agency	US Department of Agriculture	Grant	Investment mobilized	8,500,000.00
Donor Agency	World Bank	In-kind	Recurrent expenditures	350,000.00
Recipient Country Government	Ministry of Agriculture and Forestry	In-kind	Recurrent expenditures	1,200,000.00
Donor Agency	FAO	In-kind	Recurrent expenditures	50,000.00

Private Sector	Pesticide dealer, pesticide applicator and crop production company	Other	Recurrent expenditures	150,000.00
Donor Agency	Republic of Korea (ROK)	Grant	Investment mobilized	1,800,000.00
Recipient Country Government	Laos Development Bank	Loans	Investment mobilized	3,950,000.00
Donor Agency	FAO	In-kind	Recurrent expenditures	4,361,200.00
			Total Program Cost($)	**341,789,200.00**

Describe how any "Investment Mobilized" was identified

UNEP - Under Component 2, the UNEP FI has a number of current and planned project proposals on development and piloting of modules and toolkits including the ENCORE tool and target setting guidance for PRB members. UNEP - FAO: Investment mobilized are confirmed grants, identified in consultations with key stakeholders and which have been secured and will be operating during the lifetime of the project, including ICIPE and ICGEB funded research projects on alternatives.. Further investment will be identified during the PPG. Recurring expenditures are Governments and Private Sector in-kind contributions FAO - Investment mobilized are confirmed grants, identified in consultations with key stakeholders and which have been secured and will be operating during the lifetime of the project. Further investment will be identified during the PPG. Recurring expenditures are Governments and Private Sector in-kind contributions. UNIDO - The HIL (India) Ltd., a Central Public Sector Enterprise under the Ministry of Chemicals and Fertilizers, India has conveyed their indicative co-financing of INR 1520 million (US$ 20,500,000). While in the Philippines, the Development Bank of the Philippines has an umbrella program for Agricultural Sector (Sustainable Agribusiness Financing Program) where producers/manufacturer of biopesticides could access at cooperative level. Other banking institutions that provides financial services on sustainable food and agriculture aiming to transform the global food system will be explored. Recurring expenditures are in-kind contributions from Governments, UNIDO and other partners. The indicative co-financing mentioned above will be confirmed during the PPG phase. ADB - Investment was identified through ADB's Country Partnership Strategy and formulation of Viet Nam's Country Operational Business Plan, which identified potential projects for TAs, loans and other investments. The ADB – Government of Viet Nam financed baseline investment “Climate-Smart Horticulture Value Chain Infrastructure Project” will promote sustained agriculture sector growth, raise sector efficiency and competitiveness, and increase agricultural exports targeting a number of provinces in Viet Nam. UNDP - Co-financing sources and amounts were estimated based on preliminary discussions with public entities and private companies. Investment mobilized was identified through bilateral aid sources available to the GEF Agency. Final amounts must be confirmed during the project preparation phase.

D. Indicative Trust Fund Resources Requested by Agency(ies), Country(ies), Focal Area and the Programming of Funds

Agency	Trust Fund	Country	Focal Area	Programming of Funds	Amount($)	Fee($)	Total($)
UNEP	GET	Global	Chemicals and Waste	POPs	7,455,000	670,950	8,125,950.00
ADB	GET	Viet Nam	Chemicals and Waste	POPs	7,500,000	675,000	8,175,000.00
UNEP	GET	Kenya	Chemicals and Waste	POPs	3,703,875	333,349	4,037,224.00
UNEP	GET	Uruguay	Chemicals and Waste	POPs	3,782,625	340,436	4,123,061.00
UNDP	GET	Lao PDR	Chemicals and Waste	POPs	4,000,000	360,000	4,360,000.00
UNDP	GET	Ecuador	Chemicals and Waste	POPs	4,000,000	360,000	4,360,000.00
UNIDO	GET	India	Chemicals and Waste	POPs	3,500,000	315,000	3,815,000.00
UNIDO	GET	Philippines	Chemicals and Waste	POPs	3,500,000	315,000	3,815,000.00
				Total GEF Resources($)	**37,441,500.00**	**3,369,735.00**	**40,811,235.00**

Core Indicators

Indicator 4 Area of landscapes under improved practices (hectares; excluding protected areas)

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)
3144153.00	0.00	0.00	0.00

Indicator 4.1 Area of landscapes under improved management to benefit biodiversity (hectares, qualitative assessment, non-certified)

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)

Indicator 4.2 Area of landscapes that meets national or international third party certification that incorporates biodiversity considerations (hectares)

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)

Type/Name of Third Party Certification

Indicator 4.3 Area of landscapes under sustainable land management in production systems

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)
3,144,153.00			

Indicator 4.4 Area of High Conservation Value Forest (HCVF) loss avoided

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)

Documents (Please upload document(s) that justifies the HCVF)

Title	Submitted

Indicator 5 Area of marine habitat under improved practices to benefit biodiversity (excluding protected areas)

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)

Indicator 5.1 Number of fisheries that meet national or international third party certification that incorporates biodiversity considerations

Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (Achieved at MTR)	Number (Achieved at TE)

Type/name of the third-party certification

Indicator 5.2 Number of Large Marine Ecosystems (LMEs) with reduced pollutions and hypoxia

Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (achieved at MTR)	Number (achieved at TE)
0	0	0	0

LME at PIF	LME at CEO Endorsement	LME at MTR	LME at TE

Indicator 5.3 Amount of Marine Litter Avoided

Metric Tons (expected at PIF)	Metric Tons (expected at CEO Endorsement)	Metric Tons (Achieved at MTR)	Metric Tons (Achieved at TE)
6,534.00			

Indicator 6 Greenhouse Gas Emissions Mitigated

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO_2e (direct)	0	0	0	0
Expected metric tons of CO_2e (indirect)	35108	0	0	0

Indicator 6.1 Carbon Sequestered or Emissions Avoided in the AFOLU (Agriculture, Forestry and Other Land Use) sector

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)

Expected metric tons of CO_2e (direct)	
Expected metric tons of CO_2e (indirect)	
Anticipated start year of accounting	
Duration of accounting	

Indicator 6.2 Emissions Avoided Outside AFOLU (Agriculture, Forestry and Other Land Use) Sector

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO_2e (direct)				
Expected metric tons of CO_2e (indirect)	35,108			
Anticipated start year of accounting	2027			
Duration of accounting	5			

Indicator 6.3 Energy Saved (Use this sub-indicator in addition to the sub-indicator 6.2 if applicable)

Total Target Benefit	Energy (MJ) (At PIF)	Energy (MJ) (At CEO Endorsement)	Energy (MJ) (Achieved at MTR)	Energy (MJ) (Achieved at TE)

Target Energy Saved (MJ)

Indicator 6.4 Increase in Installed Renewable Energy Capacity per Technology (Use this sub-indicator in addition to the sub-indicator 6.2 if applicable)

Technology	Capacity (MW) (Expected at PIF)	Capacity (MW) (Expected at CEO Endorsement)	Capacity (MW) (Achieved at MTR)	Capacity (MW) (Achieved at TE)

Indicator 9 Reduction, disposal/destruction, phase out, elimination and avoidance of chemicals of global concern and their waste in the environment and in processes, materials and products (metric tons of toxic chemicals reduced)

Metric Tons (Expected at PIF)	Metric Tons (Expected at CEO Endorsement)	Metric Tons (Achieved at MTR)	Metric Tons (Achieved at TE)
51,208.00	0.00	0.00	0.00

Indicator 9.1 Solid and liquid Persistent Organic Pollutants (POPs) removed or disposed (POPs type)

POPs type	Metric Tons (Expected at PIF)	Metric Tons (Expected at CEO Endorsement)	Metric Tons (Achieved at MTR)	Metric Tons (Achieved at TE)
Perfluorooctane sulfonic acid, its salts and perfluorooctane sulfonyl fluoride	1,214.00			

Pentachlorobenzene	216.00	
Aldrin	20.00	
Chlordane	21.00	
DDT	2,074.00	
Dieldrin	24.00	
Endrin	22.00	
Heptachlor	25.00	
Lindane	28.00	
Technical endosulfan and its related isomers	2,680.00	
Highly Hazardous Pesticides	44,884.00	

Indicator 9.2 Quantity of mercury reduced (metric tons)

Metric Tons (Expected at PIF)	Metric Tons (Expected at CEO Endorsement)	Metric Tons (Achieved at MTR)	Metric Tons (Achieved at TE)

Indicator 9.3 Hydrochloroflurocarbons (HCFC) Reduced/Phased out (metric tons)

Metric Tons (Expected at PIF)	Metric Tons (Expected at CEO Endorsement)	Metric Tons (Achieved at MTR)	Metric Tons (Achieved at TE)

Indicator 9.4 Number of countries with legislation and policy implemented to control chemicals and waste (Use this sub-indicator in addition to one of the sub-indicators 9.1, 9.2 and 9.3 if applicable)

Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (Achieved at MTR)	Number (Achieved at TE)
11			

Indicator 9.5 Number of low-chemical/non-chemical systems implemented, particularly in food production, manufacturing and cities (Use this sub-indicator in addition to one of the sub-indicators 9.1, 9.2 and 9.3 if applicable)

Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (Achieved at MTR)	Number (Achieved at TE)
3			

Indicator 9.6 Quantity of POPs/Mercury containing materials and products directly avoided

Metric Tons (Expected at PIF)	Metric Tons (Expected at CEO Endorsement)	Metric Tons (Achieved at MTR)	Metric Tons (Achieved at TE)

Indicator 10 Reduction, avoidance of emissions of POP to air from point and non-point sources (grams of toxic equivalent gTEQ)

Grams of toxic equivalent gTEQ (Expected at PIF)	Grams of toxic equivalent gTEQ (Expected at CEO Endorsement)	Grams of toxic equivalent gTEQ (Achieved at MTR)	Grams of toxic equivalent gTEQ (Achieved at TE)
14.79			

Indicator 10.1 Number of countries with legislation and policy implemented to control emissions of POPs to air (Use this sub-indicator in addition to Core Indicator 10 if applicable)

Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (Achieved at MTR)	Number (Achieved at TE)
4			

Indicator 10.2 Number of emission control technologies/practices implemented (Use this sub-indicator in addition to Core Indicator 10 if applicable)

Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (Achieved at MTR)	Number (Achieved at TE)

1

Indicator 11 Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment

	Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (Achieved at MTR)	Number (Achieved at TE)
Female	1,587,686			
Male	2,257,629			
Total	3845315	0	0	0

Provide additional explanation on targets, other methodologies used, and other focal area specifics (i.e., Aichi targets in BD) including justification where core indicator targets are not provided

Part II. Programmatic Justification

1a. Program Description

1.1. Systems Description

1.1.1.Global environmental and/or adaptation problems

Agrochemicals use and impacts

Agriculture is a globally significant development sector which attracts large investment and financial flows from a wide variety of institutions. In general terms the aim of this investment is to improve the agriculture production system to feed a growing population (food security), to provide producers with access to valuable markets (national and overseas) and thus improve the livelihoods of food producers along the entire value chain. In addition to that, development support also requires that human rights, health of workers and consumers, and the overall environment are respected at all stages in the process. There remains an issue, however, in the coordination of these financial flows to ensure maximum impact in terms of reducing chemical and waste externalities on the ground. The FARM programme therefore aims to catalyze a framework for investment in the agriculture sector which also looks to detoxify the sector by eliminating the use of the most harmful inputs to food production systems. The FARM programme will thus reduce the impacts on the global ecosystem from use of persistent agrochemicals and agricultural plastics (agri-plastics) and single use plastics along the food production value chain.

Global financial development flows committed to the agriculture sector amounted to USD19 billion in 2018, with disbursements of USD11 billion in 2018, up USD6.8 billion or 154%, compared to those in 2002. Africa (42%), Asia and the Pacific (32%), and Latin America and the Caribbean (10%) are the greatest beneficiaries of these agricultural development flows[1]. Despite the considerable development commitments, the agricultural sector remains dependent on the extensive use of harmful agrochemical and agricultural-plastic inputs, as most of these financial flows are directed towards supporting industrial agriculture and/or increasing efficiency.

The use of agrochemicals is growing globally. It is estimated that the world population will be 9.7 billion by the year 2050 and almost all this population growth will come from developing countries[2]. Pesticides have historically contributed to increases in food production, a decline in crop losses and therefore increasing farmer profits. It is estimated that about 10-28% of global crop yield is lost by pre-harvest pests[3]. The boost in food production enabled by pesticides did, however, come at a significant global cost in decline of soil fertility, biodiversity loss and in the context of bioaccumulation of the most persistent pesticides of toxic chemicals in food chains. In Ecuador, for example, the Ministry of Agriculture has determined that concentrations in soil of almost all pesticides used in the country, are over maximum permissible limits by far[4]. These and other negative impacts have often been overlooked, as pesticide use continues to play a prominent role in common agricultural practices and production systems under the premise of past success in boosting yields. FAO estimates that globally the agriculture sector applied approximately 4.19 million tonnes of pesticides in 2019[5]. Between 2002 and 2018, pesticide use per hectare of cropland increased by about 30%[6], while the toxicity of the pesticides applied has been progressively increasing over the years too[7]. Therefore, the challenge into the future involves steering the agricultural sector away from the use of agricultural inputs that harm the environment, human health and long-term soil fertility, and towards the adoption of sustainable and lower chemical agriculture practices, that have complimentary goals of maintaining agricultural productivity, without compromising a secure food supply for a growing population in a changing global climate[8] [9]. Taking India as an example, an estimation is that the total agricultural production lost by pests and diseases in India was about 20-25%. Together with the available land area for cultivation has been reduced by urbanization and rising population, they encourage farmers to use more pesticides in order to improve crop yields[10]. In a recent study for a period of 2010-2020 about toxicoepidemiology of poisoning exhibited in Indian population, pesticides were the main cause of poisoning either intentionally or unintentionally[11]. In another study, the watershed in India was one of five watersheds, where humans and animals rely on to survive,

which are high-concern regions in the world because of high pesticide risks and suffering from water scarcity while bearing high biodiversity[12]. Another country, Philippines is one of most HHP consumption countries globally. The top five mostly used pesticide active ingredients include cypermethrin, niclosamide, niclosamide ethanolamine salt, 2, 4-D, chlorpyrifos + BPMC.

Figure 1: Pesticide consumption by continents (FAO)

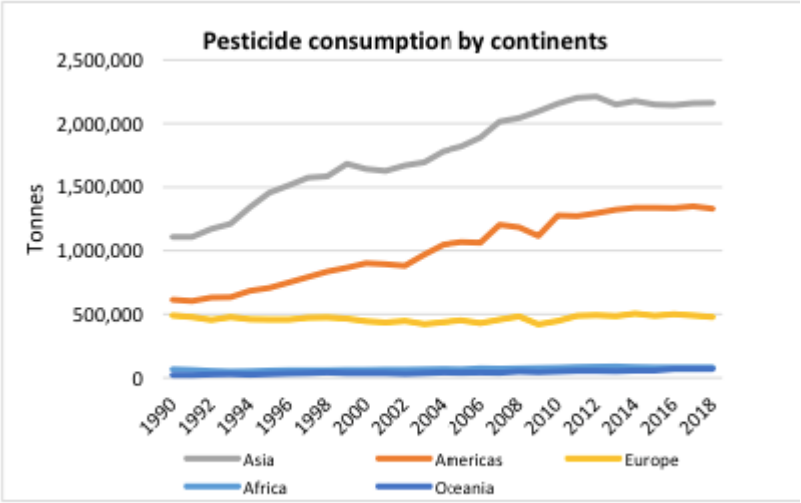


Figure 1. Pesticide consumption by continents (Source: FAO[11])

Harmful chemicals continue to be used across a wide spectrum of commodities and production approaches. Whilst a multitude of commercial agrochemical products are available to producers, the use of the most toxic and persistent products continues. The chemicals used include Stockholm Convention listed or candidate Persistent Organic Pollutant (POPs pesticides), such as chlorpyrifos, methoxychlor, endosulfan, dieldrin, DDT and lindane. Sulfuramid has been identified as an ant killer in Uruguay.

Most of the POPs pesticides listed in the Stockholm Convention have been banned in compliance with countries' obligations under the Convention, however, many countries may struggle to achieve a complete phase-out of these once highly prevalent agricultural POPs pesticides. The Stockholm Convention national reports contain official data on POPs production, import, export and destruction, with the latest reports submitted in 2018 and covering the period from 2001-2018[13]. The reports contain gaps and inconsistencies that may indicate illicit production and use. Only 47% of Stockholm Convention parties submitted reports. Endosulfan production is reported at 9,185 tonnes globally (9,000 tonnes in China) but far higher reported imports of almost 24,000 tonnes (21,000 tonnes in Argentina) suggest some missing production sources. Lindane production is reported as 49,130 tonnes (China and Brazil accounting for 41% and 37% respectively). 28,200 tonnes of Dicofol were used globally from 2000 to 2012 according to the latest report of the POPs Review Committee[14]. By 2016, global production reports were limited to a facility based in India, which manufactured about 93 tonnes of dicofol that year[15]. During 2020-2021, India produced, used and exported a total of 1,100 tonnes of DDT (restricted use in public health programme). Chlorpyrifos production in India was 6,500 tonnes in 2020 and is decreasing over last few years. In the Philippines, carbofuran and trichlorfon are still in use and registered for some crops such as corn, cotton, eggplant, etc. The amount of imported carbofuran is about 1,842 tonnes in 2020. (See baseline section 2.1 for more detail). In addition, independent FAO estimates have found the wide availability of banned chemicals in most parts of Laos PDR, including Paraquat and Methomyl, confirming that illegal trade likely dwarfs reported legal imports by a large margin, although the scale of the trade remains unclear.

Candidate POPs pesticides including methoxychlor and chlorpyrifos are currently being evaluated by the POPs Review Committee. The risk profile on methoxychlor[17] adopted by the POPs Review Committee only outlines the countries that do not produce it or have banned it, with information still pending from countries where they are still registered or have been recently used. The recent Desert Locust and Fall Armyworm outbreaks fueled agrochemical use, resulting in importation of 891 tonnes of chlorpyrifos between 2018 and 2020. In 2020 Uruguay imported 24,585 tonnes of pesticide of which 228 tonnes were chlorpyrifos[18].

Highly Hazardous Pesticide (HHP) use is also high and growing. A survey of 44 countries in 2017 reported imports of 125,000 tonnes of just 6 HHPs. HHP use can represent up to 30% of all pesticides used in some low-income countries, as a result of substantial variation in regulatory status of HHPs (see Baseline section 2.1.1 on agrochemical use). Smallholder farmers in developing countries may rely on chemical pesticides including HHP and POPs[19] despite knowing about alternatives, due to perceptions of effectiveness, particularly speed of action and spectrum of activity against diverse pests[20]. Kenya and Uruguay are among the top 10 users of Highly Hazardous pesticides[21]. In the Philippines, pesticide use is about 6.5 kg per hectare with the HHPs presence of more than 80% of volumes applied[22].

In the case of Viet Nam, together with the trend of agricultural intensification and expansion, the use of chemical inputs for crops has also increased commensurate in over past three decades. Volumes of pesticides used in Viet Nam is estimated at 6,500–9,000 tons of trading products in 1981–1986, which multiplied tenfold to approximately 100,000 tons/year in 2015[23]. Pesticide registrations jumped from 14 active ingredients in 1996, to 1,832 in 2020 - of which 104 active ingredients are HHPs[24].

As mentioned above, the continued widespread use of pesticides and chemical fertilizers does however come at an estimated cost to the environment and ecosystems, including soil fertility, biodiversity conservation, conservation of marine resources, and to human health and farmer livelihoods.

Direct effects of pesticides have been linked to population reductions of terrestrial insects, aquatic arthropods[25], organisms responsible for pollination and natural pest control, birds, and others (see Baseline section 2.1.3 on biodiversity impacts of agrochemicals). The reduction in these ecosystem services ultimately undermines both biodiversity and food production. For example, in Galapagos, farmers are fighting to manage invasive species on their farms, which on the island of Santa Cruz (the most populated) reaches 800 species. A constant process to restore balance to the farm can contribute to the fight against species that are threatening the flora of the islands. Currently, Ecuador spends an estimated 3.2 million dollars to control these species[26].A decline in the diversity of common bird species is only one example of the indirect consequences resulting from the plummeting insect populations[27][28]. The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services concluded that unsustainable agricultural production is a leading cause of extinction, as the use of pesticides has been associated with adverse impacts on populations of non-target organisms. The Convention for Biodiversity is currently negotiating targets for its post-2020 framework, including a headline indicator to "*Reduce pollution from all sources to levels that are not harmful to biodiversity and ecosystem functions and human health, including by reducing nutrients lost to the environment by at least half, and* ***pesticides by at least two thirds*** *and eliminating the discharge of plastic waste*"[29]. The biodiversity framework aims to facilitate implementation, which will be primarily through activities at the national level, with supporting action at the subnational, regional and global levels. It also aims to promote synergies and coordination between the Convention on Biological Diversity and its Protocols, and other relevant processes. Cooperation between ministries, and alignment of national policies on agriculture and environment will be essential to agreeing to and achieving this goal. The FARM Programmatic approach will facilitate such intersectoral cooperation by bringing together different Agencies with financial institutions.

Vulnerable ecosystem services such as aquifers and surface waters, which provide vital life support systems underpinning global biodiversity, remain at risk from POPs and HHPs contamination. Although many of the original POPs listed under the Stockholm Convention (DDT, chlordane, mirex, heptachlor, toxaphene, aldrin, dieldrin, and endrin) have been banned for several decades, residues continue to be detected in various environmental and biological media (water, sediments, fish, air, and soil) of freshwater ecosystems[30] and remote areas such as the Arctic, due to their potential for long-range transport and deposition. The detected pesticides include legacy organochlorines, which may not have been authorized for decades in many countries, and current use

pesticides[31]. Soils often have POPs residues 30 years after application which contaminate food grown on contaminated soils decades after the last application[32]. A Global Modelling simulation has estimated that from 28,200 tonnes of global dicofol use, at least 731 tonnes remain in the environment[33]. The same model had also estimated that 1.9 tonnes of dicofol has been deposited in the Arctic, and 2.2 tonnes in the Antarctic, demonstrating the far-reaching consequences of POPs usage. These environmental sinks of POPs undermine provisioning, regulating and supporting ecosystem services and thus contribute to the impacts on biodiversity mentioned above, reinforcing the urgency of immediate elimination of POPs pesticide use, and phase out of HHPs. It is anticipated that climate change will further alter concentrations of POPs. With the melting of Arctic Sea ice, previous reservoirs for POPs are expected to release these chemicals back to the environment. Modelling of future POPs concentrations suggests that ocean waters could be particularly impacted, with up to a four-fold increase in concentrations of some POPs even after their production and use have been phased out[34].

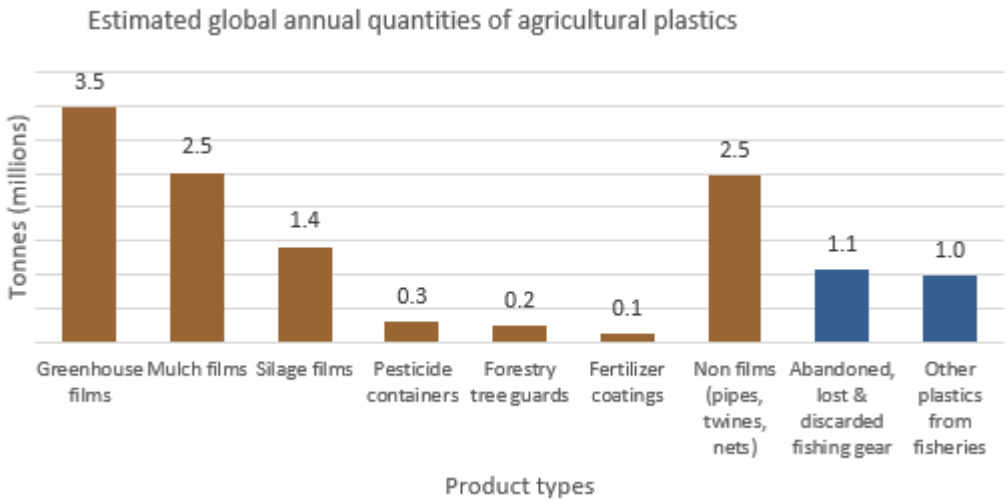
Farmers are also increasingly applying larger and larger dosages of pesticides in order to achieve their desired results. To illustrate, a detailed study on pesticide use in Ecuadorian agriculture in 2017 found that resistance to various pests and diseases is leading to increased application of pesticides in key crops[35]. In Kenya, the usage of pesticides increased from 9,000 to over 14,500 metric tons per annum between year 2009 and year 2019, with notably higher use among smallholder horticultural farmers, despite the fact the they are disproportionately more vulnerable to their adverse impacts. Unsustainable application negatively impacts capacity of countries to participate in global markets due to excessive chemical residues in products that exceed food safety limits imposed by importing countries. Examples include Kenyan farmers incurring major losses due to a significant decline in the export of snap beans, resulting from EU's strict phytosanitary and technical regulations, including maximum pesticide residue level measurements[36], as well as Vietnam's tea exports suffering approximately a $4million annual loss due to the adoption of American standards in their international trade regulations[37].

Widely used HHPs also have widespread impacts on human health, especially on agricultural workers, causing both acute and long-term health impacts. About 385 million cases of non-fatal unintentional pesticide poisonings have been estimated to occur every year, with approximately 11,000 deaths[38]. There is also a significant association between occupational and residential exposure to pesticides and adverse health outcomes, including cancers and neurological, immunological, and reproductive effects. Pesticide self-poisoning makes up 110,000–168,000 (14–20%) of global suicides and is particularly common in low-income and middle-income countries (LMICs) where small-scale farming allows easy access to highly hazardous pesticides among households and communities[39],[40]. All these factors amount to significant health costs for the countries supporting such unsustainable agrochemical use. POPs and HHPs have specific impacts on women and vulnerable populations, including fertility and reproductive issues, degenerative diseases (e.g. cancers, asthma), endocrine disruption due to poisoning, illness, and deaths. These risks posed by the use of harmful inputs in agriculture are significant, considering that women comprise 48% percent of the agricultural workforce globally[41].

Agricultural plastics use and impacts

A draft FAO study (to be published in 2021/2022) estimates around 12.5 million tonnes of plastic products are used in agricultural production annually, approximately 3.5% of the annual global plastics production of 359 million tonnes in 2018 (PlasticsEurope e.V., 2019). The regional usage of agriplastic films in 2018 was estimated at 450 000 tonnes in Africa and 240 000 tonnes in Latin America with both forecasted to increase by 50% by 2030[42]. The crop production and livestock sectors are the largest users, accounting for 10 million tonnes per year collectively (see figure 2 below). The estimates do not include plastics used in storage, processing, distribution, and retail. Asia is thought, by far, to be the largest user of plastics in agricultural production with China alone accounting for up to six million tonnes annually. Global demand for agricultural plastic films is anticipated to increase by 50%, driven by increasing use of greenhouse, mulching and drip irrigation practices to meet the growing demand for food and as a climate change adaption strategy.

Figure 2: Estimated global annual quantities of agricultural plastics



*Source: based on data of (*Sintim and Flury, 2017*; Le Moine, 2018, Eunomia Research & Consulting Ltd, 2016[43]) and the authors estimations (FAO draft report)*

Knowledge and understanding about the flows and fate of agricultural plastics are limited. FAO's study assessed specific products for their potential to leak into the environment during use and at their end of life. Products with a high potential for gross plastic dispersal included oxo-degradable films, thin mulching films (<20 μm thickness), and other products in contact with the soil, polymer coated seeds and fertilizer. The study concludes that soil is the predominant receptor for residues of agricultural plastic products, both during their intended use and at the end of their useful lives. However it has been estimated that 35% of plastics are mismanaged, of which 10% end up in the ocean (Jambeck, 2015).

Empty pesticide containers are probably the best controlled agricultural plastic waste. Annually, 330,000 tonnes of plastic are estimated to be used as pesticide containers[44],. The FAO/WHO JMPM Guidelines on Management Options for Empty Pesticide Containers[45], highlight empty pesticide containers as a major challenge for agricultural sustainability[46], Globally, there are now over 40 long-running empty container management schemes, either legally mandated by Extended Producer Responsibility (EPR) or established voluntarily under the product stewardship programmes of pesticide manufacturers. By 2019, pilot schemes were operating in a further 17 countries. Together, the 57 countries with operational pesticide Container Management Schemes (CMS) collected 97,700 tonnes of empty pesticide packaging. Overall, since 2005 these CMS have collected over 1.1 million tonnes of packaging of which 83% were recycled. CMS in Latin America and Europe have collection rates of over 60%, although collection rates in Asia and Africa are significantly lower. Fifteen Latin American and ten African countries (including Uruguay and Kenya) have empty pesticide container collection schemes that could be expanded to address all agriplastics and unwanted pesticides. In Viet Nam, each province generates about 50-100 tons of this waste on an annual basis. On average, farmers discharge about 1-1.5kg of packaging, bottles and cans to the environment for each hectare of rice. The amount doubles or triples with industrial crops and fruit trees[47]. These estimations do not include plastics used for mulching, irrigation pipes, ropes, storage, processing etc. The amount of plastic waste currently accounts for about 8-12% of daily-life solid waste, but only about 11-12% is treated and recycled. The rest is mainly buried, burned and discharged into the environment. The legally mandated National Institute for Processing Empty Packages (inpEV) scheme in Brazil has the highest collection rate at 94 percent of all pesticide containers entering the Brazilian market. However, in total, these 57 schemes only collect 30 percent of all the pesticide containers entering the market globally, with the remaining 70% being dumped, burnt or littered in the environment.

Europe and North America have the longest running and most comprehensive national EPR systems for collecting other agricultural plastic wastes, with collection rates varying between 25% and 84%, with the average around 60%. The A.D.I.VALOR (Agriculteurs, Distributeur, Industriels pour la Valorisation des Dechets Agricoles) scheme in France collects and recycles the widest range of terrestrial agricultural plastic products. The majority of the plastics collected by these schemes are sent for recycling, but due to residual contamination, most are downcycled to less valuable products; however, the Brazilian scheme does close-loop recycle the plastic back into new pesticide containers. Uruguay has established regulations for EPR but as yet, no schemes have been established for all agriplastics. Kenya is in the process of developing EPR regulations.

However, these schemes manage only a small fraction of global agricultural plastic wastes. The fate of the vast majority is unknown, as there are no specific data on the proportion of agricultural plastic waste that is openly burnt or dumped. In their global review of solid waste management, Kaza *et al.* (2018) assessed national disposal practices by income level. Open dumping was widely practiced, being the fate for 93 percent of solid waste from low-income countries, 66 percent for lower-middle income countries and 30 percent for upper-middle income countries[49]. Generally, evidence from global studies on waste suggests that plastics enter the environment as they are disposed of in landfills, dumpsites, dumped on farms, incinerated, openly burnt and littered. Data from Saskatchewan Canada indicate that 79% of silage films and 85% of twines were burnt on farms[50].

Scientific research about the environmental harm caused by plastics to land-based ecosystems currently falls far behind that of aquatic environments. Gross contamination of surface soils from agricultural mulching films has been shown to reduce agricultural yields by reducing seed germination and impairing root growth. There is evidence that residues of agricultural mulch films can reduce seed germination and impair root growth. In China, research suggested that cotton production was reduced by 15 percent when mulch fragments of around 200 kg ha^{-1} in the top 20 cm of soil were present[51]. Similarly, high levels of plastics (>240 kg ha^{-1}) were shown to impair yields of a range of crops between 11 to 25 percent[52].

Larger residues in both aquatic and terrestrial environments have the potential to harm wildlife through entanglement and ingestion[53] [54], however, of increasing concern is the formation and fate of microplastics, which have potential to transfer along trophic levels and to effect harm at the cellular level. In a series of experiments assessing the effects of a range of different microplastics on the growth of spring onions, de Souza Machado et al. (2019) noted that not only was the root and leave growth reduced, but they also recorded an adverse effect on soil properties and soil microbial activity[55], suggesting significant knock-on effects on biodiversity. Many plastics contain toxic additives such as phthalates and bisphenol A and are vectors for the long-range dispersal of adsorbed pathogens and toxic chemicals[56]. Inappropriate disposal at dumpsites prone to fires, or open burning on farms, are sources of toxic emissions, particularly in the case for PVC based products that releases unintentionally produced POPs (uPOPs) covered by the Stockholm Convention such as polychlorinated dibenzo-para-dioxins, furans (PCDD/F), and PCB. In their studies on open burning of eight different types of wastes including electrical cables and tires, Ikeguchi and Tanaka (1999) identified that PVC based agricultural plastic waste had the highest releases PCDD/F, at 6 554.1 ng(TEQ) per kilogram of waste[57]. Sarkar *et al.* (2019) report that, after polyethylene, PVC is the second most common material of manufacture of mulch films. Its use, however, is not reported in Europe[58] [59] [60].

1.1.2.Global Problem Statement

The problems that directly produce the above-mentioned global environmental impacts are the continued use of POPs and HHP pesticides and low-quality agricultural plastics. This can be broken down into three distinct problem statements:

1. Continued manufacture and trade of hazardous agrochemicals and agricultural plastics.
2. Continued use of hazardous and lower quality agricultural chemicals and plastics by farmers.
3. Environmentally unsound management and disposal of POPs and HHPs pesticides and agricultural plastics.

The continued use of hazardous pesticides persists despite the long history and proven success of lower toxicity chemical alternatives, use of bio-pesticides and the adoption of more ecologically sustainable approaches including Integrated Pest Management (IPM). Known alternatives including replacement of hazardous chemicals by less hazardous chemicals (while avoiding 'regrettable substitutions'); adoption of non-chemical pest control such as bio-control; and cultural and crop management practices (see section 2.2 on alternatives in the Baseline section). The alternatives face barriers for wholesale adoption due to farmer knowledge and perceptions, particularly for smallholders, and finance which still relies on external donors and time limited projects, rather than being integrated throughout the agricultural value chains and sustainably financed government programmes. Smallholder farmers still experience difficulties obtaining capital at affordable rates due to a lack of collaterals and perceived higher risks. For instance, a study carried out by National Agriculture and Forestry Research Institute (NAFRI) in 2019 showed that in Laos PDR, less than 70% of the maize farmers accessed credit, against only 41% of pig farmers and 43% of rice farmers.

The FARM Programme therefore seeks to establish a sustainable financial and knowledge focused basis for accelerating the transition to alternative and no/low-chemical production.

Root causes and barriers that need to be addressed

Over the past decades many initiatives have demonstrated effective approaches to reducing reliance on agrochemicals through regulation, training, value chain certification, and others. These mainly donor-funded projects have not systematically been scaled up and financed by agricultural value chains, investors, or governments.

The FARM problem analysis has identified three root causes as presented below:

a. **Weak policy and regulatory systems**: agricultural policy and regulations are focused on increasing production and designed to fit individual countries' agricultural context and needs. Commercial agricultural production chains are global, yet policies for registration and management of agrochemicals and agri-plastics are done by individual countries. This creates regulatory loopholes in the international supply chains of these inputs in developing countries, with limited ability to know exactly what is imported or how much. Furthermore, there is a lack of post-authorization surveillance, therefore the impact of pesticides in use on health and the environment are not adequately understood, therefore, the regulators are not able to effectively develop necessary interventions for agrochemicals responsible for most harm. Agricultural plastics are largely unregulated in most developing countries, with no minimum quality standards and no standards for use and end-of-life management.

Most developing countries also struggle to enforce adequate pesticide and plastics management, with crops grown for export adhering to more rigid regulations than crops produced domestic consumption. This dual standard results in poorer quality food with higher chemical residues being sold in local markets with impacts on health and nutrition of consumers in developing countries.

National ministries lack the necessary capacity, staff and resources to enforce the pesticide legislation and ensure complete compliance with the multilateral environmental agreements. Limited or perverse application of cost recovery or economic instruments such as pesticide subsidies fail to provide resources for sustainable regulatory systems.

Pesticide registration and procurement processes are designed to register chemical pesticides including HHP and are often not relevant for biocontrol and non-chemical alternatives. In the absence of dedicated registration frameworks, these less hazardous options may struggle to be registered to be placed on the market. Biocontrol solutions are highly pest- and agroecosystem specific, requiring efficacy testing in the countries where they are to be used, capacity and scientific knowledge for which is often lacking in developing countries.

b. **Low levels of sustainable financial support for alternatives**: Although huge sums of agricultural finance are available (as highlighted in the introduction), it tends to support intensification models with less consideration of the sound management of agrochemical and agri-plastics throughout their lifecycle. Pollution reduction by reduced and more sustainable use of pesticides and plastics is not currently encompassed by investors (e.g. through criteria and targets for use of no/low-chemical alternatives) and more is needed to build such criteria into the eligibility for investment, loans and agricultural subsidy schemes. Extended producer responsibility will allow agrochemical and agriplastic manufacturers to bear the direct end-of-life costs of their products and improve their circularity.

Global certification schemes for farmers have increased compliance to higher production standards on pesticide and plastic inputs (see Baseline section 2.2.3 on IPM and alternatives), but a majority of farmers remain excluded from these arrangements and market premiums. Only about 1% of total agricultural cropland has been certified and in most cases, it involves high value commodities such as coffee, cocoa and tea. Producers of staple crops in developing countries such as maize, rice and wheat are rarely involved in the sustainability standard-setting certification schemes[61]. The lack of connection to markets for many small holder farmers therefore fails to justify the costs associated with the adoption of alternative pest control and pollution management measures.

c. **Capacity and knowledge**: Another deeply rooted cause for the persistence of the pollution challenges in the agricultural sector is the difficulty of building the necessary capacity and knowledge dissemination on effective alternatives at all levels, particularly farmers and regulators. Farmers' decision-making on pest management is driven by profitability and risk-aversion, therefore the perceived efficacy is important (see section 2.1.1 on farmer perceptions on chemical vs biopesticides). For regulators, the need to ensure compliance with both export standards but increasingly meeting quality standards for domestically consumed crops is also important.

General awareness about available alternatives remains low among regulators, investors and farmers, hindering the market development and accelerated growth of the market share of alternative products, keeping the current options expensive and labor-intensive. This undermines to the popularity of less hazardous alternatives among farmers, who rely on the use of HHPs, POPs and agri-plastics. It is difficult for farmers to change these risk-averse and engrained practices without compelling incentives. Other barriers to adoption of less hazardous and more long-term management practices may include issues of land tenure, whereby more damaging practices continue because the land is not owned by the farmer but is leased for short term contracts.

The root causes presented above underlie the specific barriers that need to be addressed in order to achieve the transition to no/ low-chemical agriculture. The barriers presented below are the factors currently leading to the global problems identified in section 1.1.3 above, namely the continued production, use and unsound disposal of hazardous POPs, HHPs and agricultural plastics. The flip side of the first two problems is the limited production and use of effective alternatives, which would also directly reduce the generation of hazardous wastes at end of life.

1. **Barriers for increasing finance for manufacture and commercialization of alternatives:** the barriers for scaling up production of alternatives, and phase out of POPs and HHP production, are most strongly driven by the first root cause on regulation and enforcement. In particular:

i. Low grade and low-cost agrochemical and agri-plastic products widely produced, available and promoted on the market, including counterfeit and products with missing or incomplete labelling not compliant with GHS standards. This is strongly driven by weak regulations and enforcement, as well as perverse subsidies. There is also a link to the second root cause on finance as these hazardous alternatives are cheaper for farmers in the absence of the full accounting for externalities such as, cost recovery mechanisms for regulators, healthcare and social benefits associated with poisonings, EPR for end of life management to ensure life cycle costs are reflected in the price of hazardous products.

ii. POPs manufacture may continue semi-legally in some countries, where there is no explicit ban or retraction of license to produce, but governments don't report such manufacture to the Stockholm Convention in order to avoid being in non-compliance (see section on POPs reporting in Section 1.1.1 above). This is most strongly related to the enforcement root cause as regulatory agencies do not fully control POPs production where it may still be occurring.

iii. Multinational agrochemical enterprises control the pesticide production globally. They have "engaged in sophisticated multi-million-dollar lobbying efforts" for a long time[62]. This might put small- and medium-sized agrochemical manufacturers in a hard position to compete with those large chemical manufacturers. Even with leading agrochemical manufacturers with some priorities in biological products, bringing these products to market, especially in developing countries, still requires a lengthy process. Registration of alternatives e.g., biopesticides or emergency migratory pest control products, is missing, not proportionate, or complicated.

iv. Analytical and enforcement country capacity is low (laboratory, tracking, reporting and documentation). This results in limited tracking of flows of agricultural inputs, and monitoring of their environmental and health impacts. Monitoring of imports by agriculture ministries is not joined up with customs and ministries of finance, and opportunities to use customs, import/export procedures and tax information are missed/

v. Overall, due to the lack of knowledge of sustainable of alternatives on behalf of the consumers and the encouragement for use on behalf of agrochemical companies, chemical and plastic use in agriculture is more encouraged in preference to the use of natural ingredients available and alternative practices to farmers[63]

2. **Barriers for farmers in accessing finance to adopt alternatives:** the barriers for scaling up use of alternatives are most strongly driven by the second and third root causes, namely financial and cost considerations for farmers who are driven by profitability priorities; and technical knowledge and awareness on the differences in applying alternatives when biocontrol options are very pest- and crop-specific.

i. Public funding such as subsidies favor high-input crop systems including hazardous agrochemicals for pest control, instead of incentivizing the use of alternatives. Current financing systems lock farmers into standard packages of seed varieties and chemical regimes that leave no option for innovation or flexibility. Farmers have no choice but to follow the prescribed calendar spray regimes based upon market schemes that are often supported through government structures.

ii. Responsible banking/ investment/ insurance principles do not include pollution/ agroecology criteria or targets to actively promote and encourage the inclusion of no/low-chemical options in input packages or on-farm advice. There are insufficient support systems for the commercialization of alternatives for pesticides and plastics.

iii. Extension and advice services for farmers exist via stewardship and commodity certification schemes, while public (universal) extension advice is underfunded in most LMIC; or is oriented towards conventional production of cash crops. Advice is lacking for alternatives for commodity production or family or domestic market food production, caused partly by agronomy formal education curricula that focus on chemistry rather than biology; and the limited access of farmers to professional crop and plastic management services providing agroecology or IPM advice and support.

iv. The lack of transparency in key elements of the agri-food value chain - production to marketing - in such countries as Viet Nam, reduces consumer confidence and does little to motivate farmers to adopt good practices. Many of them have adopted improved farming techniques and received certification, only to backslide to unsustainable farming practices due to lack of access to premium and stable prices for higher-quality products

v. Most farmers are unconnected to the global and certified value chains or public investment programmes on agricultural development, and do not have the incentives or inclination to adopt alternatives (lack of crop insurance, no access to premium markets, risk of crop failure, etc.) and therefore continue to use hazardous chemicals to ensure crop security.

3. **Barriers for increasing financing of ESM of hazardous agricultural wastes**

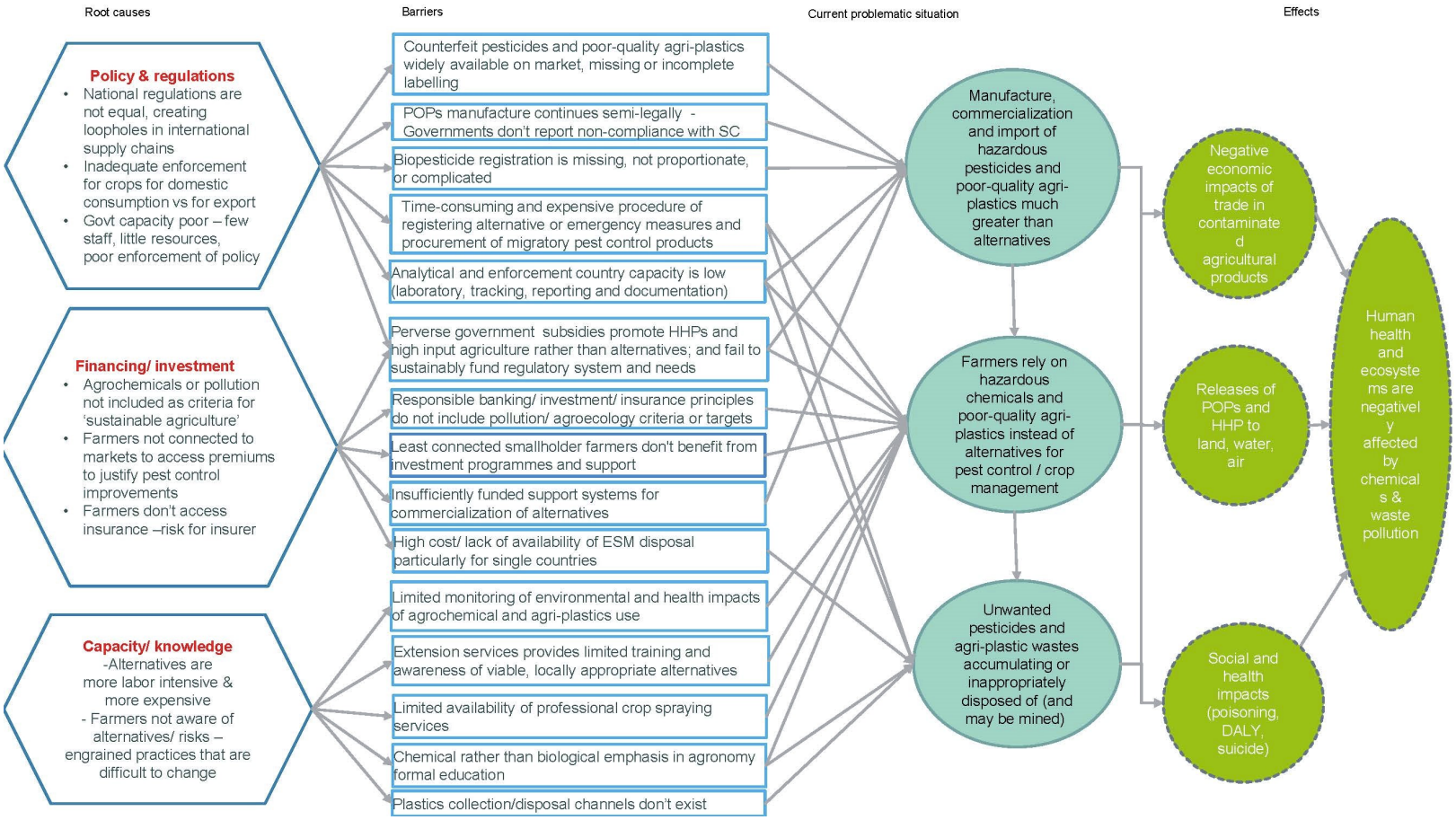
i. High cost of ESM disposal particularly for single countries and for plastics recycling due to lack of economies of scale (low volumes).

ii. Voluntary stewardship initiatives have successfully mobilized resources for unwanted products and container management, but only cover part of the pesticides on the market. Generic POPs producers do not have extended responsibility (EPR) schemes for wastes and stockpiles.

iii. Agricultural plastics including mulching films and irrigation plastics (often made of PVC with direct uPOPs emissions at end of life) are not collected and treated in a way that avoids uPOPs emissions and lack EPR schemes to support establishment of collection and treatment systems.

The above problem analysis, as also shown in Figure 3, has guided the development of the FARM Theory of Change, which will address these root causes and barriers.

Figure 3: Problem Analysis



1.2. Baseline scenario and any associated baseline program/ projects

Most chemicals & waste GEF investments in the agriculture sector have previously focused on addressing obsolete POP pesticide stocks in countries and promoting alternatives through training and regulatory support. The scope of these projects has dealt with the immediate and legacy problems at a national level. Whilst many of these projects have attempted to address the underlying issues (such as lack of government capacity to register, monitor and train farmers on agrochemicals and agricultural plastics), more needs to be done to systematically improve these aspects moving forward. While many good practices and successes in changing farmer behavior toward low/non-chemical alternatives have been demonstrated (e.g., FAO farmer field schools, UNDP Green Commodities Programme, CLI Responsible Care programme and others), there has been a lack of emphasis on widescale replication, scaling up or sustaining financing for these successful experiences beyond donor-funded projects. The Uruguay NIP (2017 – 2030) highlights that the only authorized financial tools for regulating chemicals are cost recovery on regulation, administration and inspection of phytosanitary products. Despite all the progress made, there are still no financial tools discouraging the use of harmful chemicals. The need to mainstream these aspects into future investment and financial flows into the agriculture sector is clear and this is where the FARM programme aims to have the most significant impact.

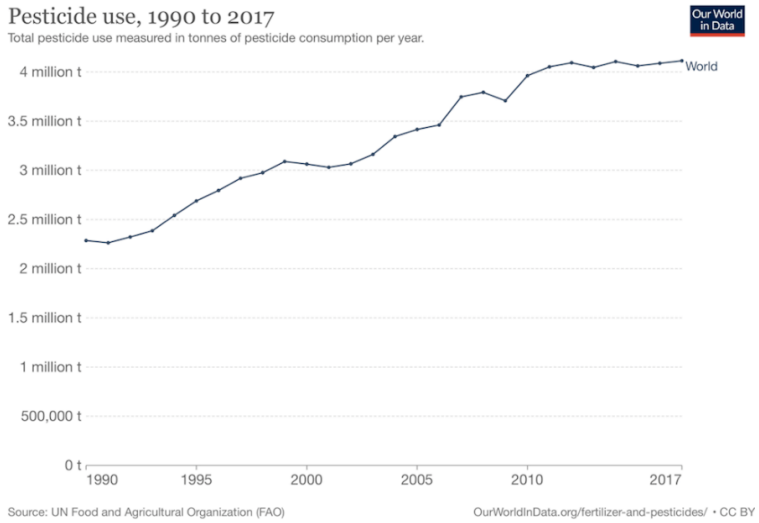
Laos PDR's National Implementation Plan (NIP) was updated in 2016. It assessed legislation related to POP pesticides; no specific legislation exists although POPs and selected HHPs are banned. DDT and chlordane were found to be illegally used even though they were banned in 2010; the Ministry of Health stopped using DDT in 1990. No comprehensive database on importation, distribution and use of pesticides including POPs existed, and a lack of awareness about the hazards associated to pesticides was found, which indicates the importance of the country's participation in the FARM programme. Initial inventories of new POPs were also initiated, which showed that endosulfan was still in use and that authorities were not familiar with other listed compounds (e.g. Lindane).

1.2.1.Agrochemicals and agricultural plastics use and impacts

Agrochemicals use

The use of agrochemical crop protection has been experiencing a sustained increase over the past decades, with pesticide consumption soaring from 2.29 million tonnes to 4.11 million tonnes per year globally between 1990s until 2017[64]. As of 2018, the crop protection industry was valued at $50 billion, with about 600 active ingredients, from across 40 chemical groups available to farmers around the world.

Figure 4: Global Pesticide use from 1990 to 2017 (FAOSTAT)



The growth of the conventional crop protection sector, however, has been challenged by some countries introducing increasingly stringent safety regulations for pesticides and other agrochemical products, as societal and stakeholder considerations address human safety and environmental health. Many active ingredients have been banned or rejected in re-registration process regulations in the United States and the EU, leading to a decline of the number of conventional crop protection products being introduced to the market every year. This is associated to an increased cost of product discovery and development, as the EU, US and other OECD requirements include extensive risk assessment studies and hazard profiles of the active ingredients and the final product. As a result, the US EPA had reduced its list of active ingredients permitted for use by 60, whereas the EU removed 293 of the 499 active ingredients of commercial importance following its 1991 re-registration directive. Furthermore, countries producing crops for export are required to meet the standards of crop importing nations.

As described in the Global Environmental Problem (section 1.1.1), despite bans on POPs pesticides (see table below), some countries may still struggle to achieve a complete phase out. The national reports under the Stockholm Convention indicate incomplete official reporting of production e.g. the case of endosulfan where production quantities reported are less than a third of total amounts imported. Similar situations existed for mirex, endrin, aldrin and dieldrin until 2001. National reports have also documented 49,130 tonnes of lindane produced globally between 2001 and 2018, with China and Brazil accounting for the largest contributions of 41% and 37% respectively. Prior to that, between 1950 and 2000, it is estimated that global lindane usage for agricultural, livestock, forestry, human health and other purposes amounts to around 600,000 tonnes[65]. Considering every ton of lindane produced generates approximately 6-10 tonnes of other HCH isomers, a considerable amount of residues was generated during the time this insecticide was manufactured. For decades, the waste isomers were generally disposed of in open landfills like fields and other disposal sites near the HCH manufacturing facilities. After disposal, degradation, volatilization, and run-off of the waste, isomers occurred[66].

Mexico continues to produce pentachlorophenol (PCP) for various uses, including for seed treatment of specific crops and application to the soil during planting of cotton, beans, potatoes[67]. Between 2007 and 2017, Mexico's exports of PCP have amounted to over 68,000 tonnes. Dicofol usage is also considerable, with 28,200 tonnes used globally from 2000 to 2012 according to the latest report of the POPs Committee[68]. Between 2000 and 2007, global production of dicofol was estimated to have been 2,700 - 5,500 tonnes per year[69] [70], but production has declined sharply since 2007 as counties have initiated phase-outs of their production and usage. China was previously one of the major producers of technical DDT and dicofol but reported ceasing production in 2014. Brazil manufactured around 90 tonnes of dicofol per annum up to 2010 but ceased production in 2014. By 2016, production was predominantly limited to the facility based in India, which manufactured about 93 tonnes of dicofol in a closed system as a batch process[71]. Sulfuramide

has been identified in Uruguay for its use as an ant killer and during 2015, 18.475t were registered for use in the forestry sector. In India, the Ministry of Agriculture recently proposed a ban on the manufacture, sale, and use of 27 hazardous pesticides in the country. It is expected that through the indicative co-financing commitment from the Government of India within the UNIDO Child project, at least seven (7) identified pesticides in generic range of product (Acephate, Chlorpyrifos, Dicofol, Malathion, Mancozeb, Monocrotophos and Pendimethalin) out of 27 proposed pesticides for banning will be replaced by biopesticides, safer chemical alternatives and other biocontrol agents.

Annually, Viet Nam's agriculture sector imports and uses from 70,000 to 100,000 MT of pesticides (most of which come from China) including 100% of active ingredients, 90% additives and 50% pesticides in finished products. The import of pesticides at 0% tax and the gross profit margin of this industry are attractive for businesses to enter the sector, increase sales and expand market share. Many companies in Viet Nam are willing to import active ingredients and additives at low cost and sub-standard quality to produce pesticides which contribute to higher profits[72]. This, along with low levels of risk awareness and entrenched attitudes, leads farmers to select the cheapest options regardless of origin and content or non-authentic products.

In the light of the increasingly stringent safety regulations in the US and EU product portfolios, the agrochemical companies based in these regions have ceased supplying banned products to their home markets, though some continue supplying them to nations where the regulatory frameworks regarding agrochemical hazards are less strict. (see Table 1).

Table 1: Registration Status for Some Common Highly Hazardous Pesticides in Different Regions of the World (FAO Internal Report)

Table2: Registration Status for Some Common Highly Hazardous Pesticides in Different Regions of The World (Icama 2018, European Commission 2017, Npirs 2018, Cofepris 2018, Government of India 2018, Watts 2016, Sapref 2018)

Active Ingredient	Criteria	EU	USA	China	India	Pacific-islands[&)]	Mexico	SADC[#)]
Lindane	POP	not registered	not registered	not registered	not registered	not registered	registered*)	registered[##)]
Endosulfan	POP	not registered	not registered	not registered	not registered	not registered	registered*)	registered
Dicofol	POP	not registered	not registered	registered	registered	registered	registered	registered
Aldicarb	Rotterdam Convention (RC)	not registered	registered	registered	not registered	registered	registered	registered
Azinphos-methyl	RC	not registered	not registered	not registered	not registered	registered	registered*)	registered
Methamidophos	RC	not registered	not registered	not registered	not registered	registered	registered	registered
Monocrotophos	RC	not registered	not registered	not registered	registered	not registered	registered	registered
Carbofuran	RC	not registered	registered	registered*)	registered	registered	registered	registered
Phorate	RC	not registered	registered	registered	registered	not registered	registered	registered
Parathion-methyl	RC (formulation)	not registered	not registered	not registered	registered	not registered	registered	registered
Paraquat	Candidate for RC	not registered	registered	registered[%)]	registered	registered	registered	registered
Ethoprophos	Highly acute toxic	not registered	registered	registered	not registered	registered	registered	registered
Benomyl	Reproductive and mutagenic	not registered	not registered	registered	registered	registered	registered	registered
Carbendazim	Reproductive and mutagenic	not registered	registered	registered	registered	registered	registered	registered

*) restricted use

&) Pacific-islands, approved means in some of the islands the active ingredient is registered

#) Southern African Development Community, approved means that in some of the 13 countries the active ingredient is registered,

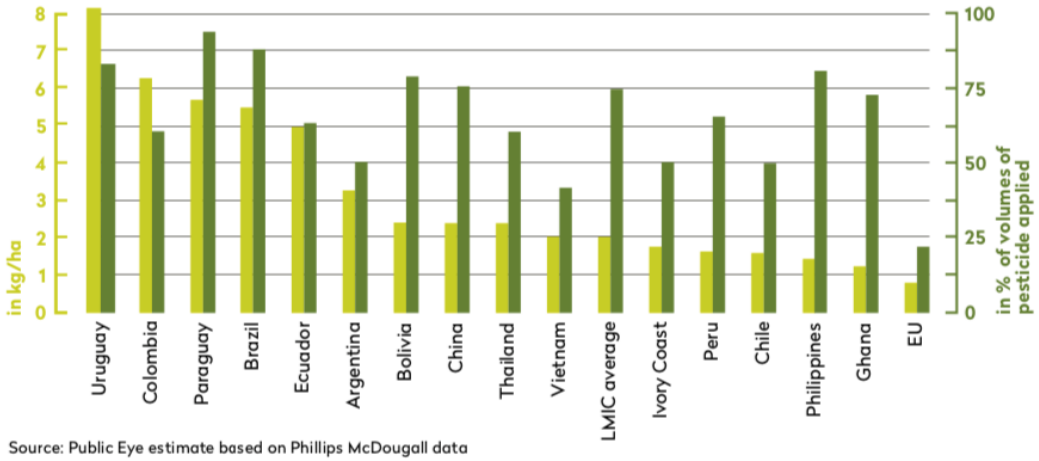
##) only in Tanzania, construction industry

%) Paraquat will be phased out in China by 2020

LMICs use about 1.2 million tonnes of HHPs a year worth $13 billion, representing approximately 60% of the global HHPs market, while the share of EU is much lower – at 5%, or about 90,000 tonnes of HHP per year[73]. The largest consumer of HHPs worldwide is Brazil, followed by Argentina, China, Paraguay, Mexico, India, Vietnam, Philippines, Ecuador, Colombia, Kenya and Ghana. In countries such as Uruguay, Brazil or Colombia HHP use per hectare of arable land is 7–10 times higher than in the EU (*Figure 5)*. The list of HHP developed by PAN UK currently includes approximately 30% of all active ingredients available on the pesticide market worldwide, due to their adherence to one or multiple hazard categories, with twelve of the 20 top-selling pesticides included on the list.

Figure 5: Highly Hazardous Pesticide use in selected LMICs

Figure 2.2 – **Highly hazardous pesticides (HHP) use in selected LMICs**



Source: Public Eye estimate based on Phillips McDougall data

Some smallholder farmers may rely on chemical pesticides, and often more affordable HHPs (see problem section 1.1.1, research in Kenya on smallholder farmers perceptions of chemical vs biopesticides); and in Kenya, the case of exports of green beans from smallholder producers, which declined from 2010-2018 largely due to the failure to meet maximum residue limits in the EU and US[74]. Often countries replace POPs pesticides with other harmful chemicals. For instance, sulfuramide has been used alongside, or replaced with either HHPs or candidate POPs, such as fipronil and chlorpyrifos. At the same time, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) also found that small landholdings (less than 2 hectares) contribute approximately 30 per cent of global crop production, using around a quarter of agricultural land and usually maintaining rich agrobiodiversity[75] (see also section 2.2 on IPM). Farmers of similar 'types' may have completely different pest management practices, therefore each intervention and child project would have to conduct a baseline assessment in the particular context of the country and crop to identify the particular producers to target. The FAO/UNEP child project with pilot activities in both Kenya and Uruguay is designed to provide inclusive solutions that address challenges facing smallholder/family farmers.

Socio-economic impacts

Exposure to hazardous agrochemicals has severe implications for human health. POPs and HHPs can be acutely toxic, cancerogenic, mutagenic, reproductive toxicants and endocrine disruptors. Exposure to POPs mainly occurs through contaminated foods and can have reproductive, developmental, behavioural, neurologic, endocrine, and immunologic adverse health effects[76]. Furthermore, POPs and HHPs can be transferred from mother to developing child through placenta and breast milk. Numerous studies on animals have shown that in utero or neonate exposure to OPs, particularly the insecticide chlorpyrifos, adversely affects a child's neurodevelopment[77] and can interfere with brain development leading to permanent brain damage[78]. These risks posed by the use of harmful inputs in agriculture are especially significant, considering that women comprise 48% percent of the agricultural workforce globally[79].

Furthermore, the intentional ingestion of pesticides accounts for up to 168,000 deaths every year or 20% of suicide deaths overall, making pesticides the most common means of suicide. Availability of highly toxic pesticides on the market therefore maintains the high fatality rate of global suicide attempts.

The cases of occupational unintentional poisoning are also high, with 385 million cases every year, among which 11,000 end with a lethal outcome. Recent field surveys show that a very high proportion of farmers and agricultural workers exposed to pesticides through their work are suffering acute health effects: in Pakistan, 100 percent of women picking cotton experienced health effects after pesticides were sprayed, in Bangladesh 85 percent of applicators, in Burkina Faso 82 percent of farmers and in Brazil 45 percent of agricultural workers surveyed[80].

In addition to the human suffering involved, exposing farmers to agrochemical hazards also bears a very high cost to society. The external cost to humans and the environment of pesticide use in the United States alone is estimated to be US $ 9.6 billion annually[81]. With external costs of pesticides use estimated to be at $4–$19 per kg of active ingredient applied[82], Pretty and Bharucha (2015) suggested that the adoption of IPM approaches that result in lower pesticide use can benefit not only farmers, but also wider environments, human health and prevent significant economic and societal costs.

In their study of human health and pesticide use in Sub-Saharan Africa, Sheahan, Barrett and Goldvale (2017) have demonstrated that farmers in Ethiopia could lose around 10 days from work due to pesticide illness, whereas farmers in Uganda could lose as many as 24 days[83], which is associated with significant loss of value and income for already vulnerable households of small-holder farmers in these regions. UNEP's 2013 "Cost of Inaction" report estimated that the accumulated health costs of acute injury alone to smallholder pesticide users in sub-Saharan Africa would be approximately US $97 billion by 2020[84].

A study conducted in Benin found a total of 47% or the farmers experiencing symptoms of acute pesticide poisoning having to miss days of work due to poor wellbeing. Furthermore, 48% of the farmers affected by the symptoms of pesticide poisoning had to spend a portion of their income medication, with an average of around $30 per year. This is a significant sum for subsistence farmers, whose total net income was reported to be less than $700 per year in 2018[85].

As many consumers become aware of the health risks associated with pesticide residues, crop export standards are becoming more and more demanding for the crop producing nations. The application of permitted hazardous agrochemicals often puts farmers' out of an opportunity to sell their products abroad, resulting in loss of income. As an example, 2002, Japan raised the standard of imported spinach pesticide residues, which directly led to a loss of US $3 million from Chinese export enterprises in Shandong, followed by the multiple provinces and cities across China whose pesticide residues happened to be beyond ones accepted by Japan. Since Japan is the largest exporter of agricultural goods from China, the country suffered an average annual loss of agricultural products exports due to excessive pesticide residues of up to US $7 billion by 2009[86]. By supporting a transition away from highly hazardous pesticide use, LMICs would be able to prevent export losses and grow their export economies, as their products would adhere to the requirements of importing nations (see also section 2.1.1 above on other examples of export failures due to MRL).

Environmental Impacts

Agricultural pollution is among the top sectors driving biodiversity loss, with direct pesticide effects reaching insect, plant, bird, mammal and amphibian species[87]. The use of broad-spectrum pesticides influences not only pests but also extends to non-target organisms and species critical for maintenance of ecosystem balance, such as pollinators. PAN UK's list of HHP suggests that 116 currently used active ingredients are highly toxic to bees[88]. A Global Biodiversity Information Facility (GBIF) study into bee species diversity reported a 25% decrease in abundance between 1990s until 2015, thus signifying a consistent pollinator decline[89]. Overall insect biomass was reported to have declined by as much as 75% by an analytical study conducted over the last 27 years in Germany[90]. Bird populations are also suffering significant losses, as the populations of farmland and common birds have fallen by 46% and 10% respectively[91]. PAN UK reports highest rates of species loss in areas employing intensive agriculture, of which high pesticide and plastics inputs is one of the key features[92].

Agriculture is outlined as one of the three top land-based sectors driving marine pollution based on a comparative assessment of the impact of land based activity on coastal resources: "*Agriculture was found to have a strong influence on stressors, particularly through chemical leaching from fertilizer applied to fields, including nitrogen, phosphorus and persistent toxins*" [93],. Aquatic ecosystems are largely affected by both chemical and microplastic contamination, as they enter surface waters from agricultural fields. A direct effect of aquatic pesticide contamination is the substantial reduction in the populations of aquatic plants, which in turn is associated with reductions in amphibians relative to predator population and its consecutive knock-on food-chain effects[94] [95]. HHPs such as atrazine have been found to have toxic effects on fish species, supress the immune system of endangered tiger salamanders and tadpoles of leopard frogs, as well as reduce the metabolic activity in Pacific tree frogs[96]. The occurrence of chlorpyrifos and endosulfan residues in aquatic environments under normal conditions has been demonstrated to have the potential to inflict significant damage to amphibian populations[97]. Plastics entering aquatic ecosystems can adsorb POPs and metals from the environment, particularly microplastics, which can also concentrate these chemicals due to their high surface area to volume ratios and hydrophobic nature[98]. When ingested, there is potential for concentration up trophic levels; although the extent to which these substances become bioavailable and are released systemically within individual organisms, and the harm they may cause, is likely to depend upon a range of factors[99]. There is evidence that nano-plastics may cross cell membranes, where there is potential to accumulate, impair cellular physiology and evoke inflammatory responses, therefore exerting chronic health effects on both, aquatic and terrestrial organisms that ingest them[100].

Gross contamination of surface soils from agricultural mulching films has been shown to reduce agricultural yields by reducing seed germination and impairing root growth. There is evidence that residues of agricultural mulch films can reduce seed germination and impair root growth. In China, Liu, He and Yan (2014) cited research in which cotton production was reduced by 15 percent when mulch fragments of around 200 kg ha^{-1} in the top 20 cm of soil were present[101]. Similarly, high levels of plastics (>240 kg ha^{-1}) were shown to impair yields of a range of crops between 11 to 25 percent[102]. In a series of experiments assessing the effects of a range of different microplastics on the growth of spring onions, de Souza Machado *et al.* (2019) noted that not only was the root and leave growth reduced, but they also recorded an adverse effect on soil properties and soil microbial activity[103].

Of all atmospheric microplastic pollution 5% originates from agricultural soil dusts[104]. Microplastic pollution has been shown to transfer at the trophic level with potential consequences for plant, animal and human health[105].

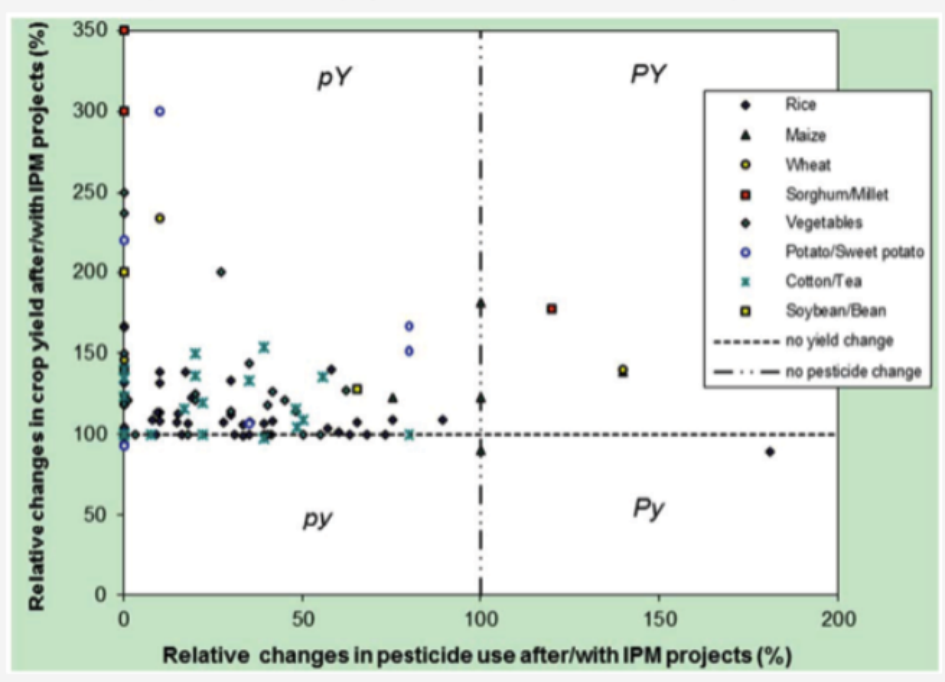
1.2.2.Low/no chemical alternatives

Integrated Pest management

A 2018 Phillips McDougall report confirmed a global consensus that integrated pest management (IPM) is the most effective and holistic approach within sustainable farming[106]. IPM focuses on preventing problems from arising using ecological principles. When intervention is needed it focuses on managing insects, weeds and diseases through a combination of cultural, physical, biological and chemical methods that are cost effective, environmentally sound and socially acceptable. The FAO's definition of IPM describes it as an ecosystem approach to crop production and protection that combines different management strategies and practices to grow healthy crops and minimize the use of pesticides.

Since International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD)[107], numerous transdisciplinary studies, United Nations and other intergovernmental processes have recognized the transformative potential of agroecology to promote food and livelihood security, sustainable diets, environmental health, social, economic, ecological and climate resilience, and social equity[108] [109] [110] [111]. Pretty and Bharucha (2015) conducted an evaluation using data from 85 IPM projects from 24 countries of Asia and Africa implemented over the past twenty years[112]. By analysing the outcomes on productivity and reliance on pesticides, their study demonstrated a mean yield increase across projects and crops of 40.9% (SD 72.3), combined with a decline in pesticide use to 30.7% (SD 34.9) compared with baseline. A total of 35 of 115 (30%) crop combinations resulted in a transition to zero pesticide use.

Figure 6: Impacts of IPM projects and programmes on pesticide use and crop yields (data from 115 crop combinations, 85 projects, 24 countries of Africa and Asia)



Successes of effective implementation of IPM systems have been also reported by India's Directorate of Plant Protection Quarantine & Storage, whereby they managed to successfully control the outbreaks of sugarcane pyrillas, apple woody aphids, San Jose scale, as well as many others by non-chemical agents, thus preventing significant losses of economically important crops[113]. In Southeast Asia, a variety of Biocontrol Agents (BCAs), in particular, commercial BCAs, are reliable components of IPM. If IPM consists of good agricultural practices and other pest management strategies (such as crop rotation), the use of BCAs can be of success. These resulted in a potential expansion of the commercial BCAs in the region. The benefits of commercial BCAs integrated with IPM had been proven in applications on citrus farm households in Indonesia, rice in Cambodia and Vietnam, among others crops in other countries in this region (vegetables, coffee, cocoa, coconut, oil palm)[114].

To encourage the adoption of integrated pest management approaches, in 2019 the ISEAL Integrated Pest Management coalition had launched a Pesticides and Alternatives' app, which provides accessible information on pesticides, their toxicity levels and which crops and pests it can be used for. As the app is designed to provide offline support in the field, it is aimed to facilitate farmers in their decision-making regarding their choice of agricultural inputs. By providing suggestions of non-chemical pest control alternatives from CABI for over 2700 pests and diseases, in addition to informing the users of pesticide restrictions across eight standard systems, the app aims to reduce the use of HHPs and promote IPM among the countries where access to impartial and free information remains a challenge. The initial version of the app included geographically customized information for farmers based in Mexico, Brazil, India, Columbia and Kenya, however there was intent to include more countries to further encourage the elimination of HHP use. Nonetheless, policy support for IPM is relatively rare globally, counter-interventions from pesticide industry common, and the IPM challenge endures as pests, diseases and weeds evolve and move.

Biocontrol options and market

The market for less hazardous alternatives to dangerous agrochemicals is significantly greater than perceptions of many agricultural stakeholders and policy makers. The Dunham Trimmer report on the Global Biocontrol Market, indicated that biological pest control market has been steadily growing since the early 1990s and as of today, biocontrol products represent 5.6% of the total plant protection market[115]. This market share is projected to raise to 10% by 2025, reaching a value of over $10 billion US dollars for the biocontrol sector, maintaining its position as the fastest growing crop protection market segment.

Among the different biopesticides available on the market, there are microbials and biochemicals. Microbials include bacteria, fungi, protozoan, and yeasts that target specific pests and are inherently less toxic than synthetic pesticides, however most producers currently encounter problems with formulating for sufficient shelf-life, performance, and stability[116]. The second class, biochemicals, includes plant extracts, semiochemicals and organic acids, the manufacturers of which encounter challenges with ensuring the consistent quality of the active ingredients, as they are derived from natural materials[117]. Efficacy of the different biocontrol measures is well confirmed by literature in control conditions[118]; however, research generally shows their efficacy to be variable in field conditions, which could be attributed to the unstable quality of the products, as well as the climatic variations in the fields, varying storage and transport conditions[119] and the differing colonization abilities of the biocontrol agents (ecological competence) in the differing environments[120][121], therefore, highlighting the need for strictly tailored IPM strategies to fit the local needs.

BioProtection Global (BPG) is a federation of biocontrol and biopesticide industry associations acting as a platform for the entire sector to collectively formulate the common positioning, communicate messages toward institutional actors and policy makers, and advocate for the proportional regulation of bioprotection measures in order to enable the market growth of the sector. BPG serves as an umbrella for numerous associations around the world hosting hundreds of member producer companies. One of such associations is the Biological Products Industry Alliance (BPIA) that promotes the development of safe alternatives, such as biopesticides, to hazardous agrochemicals mainly across North America. BPIA routinely engages with key regulators at USEPA, USDA, Canada's PMRA, as well as regional institutional representatives, while its membership exceeds 150 companies. Another association is the Pesticides Manufacturers and Formulators Association of India (PMFAI), which represents over 250 India-based pesticide manufacturers, formulators and traders. In addition, PMFAI works with a variety of research and social society partners as well as liaise with a number of pesticide associations throughout the world having common interest under the BPG Federation. One of the goals of BPG is to address the currently fragmented market for pest control alternatives, by reconciling between the plurality of product definitions used by the participating countries. BPG does this by giving them an overarching global term of bioprotection, which increases the harmonization of the sector in the hopes of achieving more proportional regulation on a global level. Therefore, bioprotection is used as a collective concept for the varying terminology of products originating in nature and used to protect against unwanted pests and pathogens in agriculture, forestry, public health, and gardening.

Growing consumer awareness of pesticide risks presents another opportunity for the biopesticides market, as the consumer choice drives many retailers to adopt secondary residue standards in addition to the national ones to which food producers are forced to adhere. While many of the food producers face increasingly stringent pesticide residue standards and agrochemical restrictions, most of the biopesticides are exempt from tolerance (MRL) and have short PHI. This trend however is not consistent everywhere as many countries still face difficulty with establishing specific regulatory mechanisms, registration processes and gaining farmers' acceptance of these alternatives[122].

Private sector engagement for sound management of chemicals & alternatives

There are several international and multi-stakeholder platforms working on sustainable agriculture designed to lessen the impacts of agrochemicals. Illustrative platforms include, but are not limited to, the Better Cotton Initiative (BCI), generates about €10 million from the private sector and leverages a further €4 million to support filed activities[123] Rainforest Alliance/UTZ, Global Coffee Forum, World Cocoa Foundation, Fair Trade Foundation and the World Banana Forum. Many of these initiatives support training and monitoring to assist member producers to meet better agrochemical use standards. The ISEAL IPM coalition represents eleven standards that aim to reduce and eventually eliminate the use of HHP, and to promote more sustainable alternatives[124].

These platforms are expanding and represent a substantial contribution to the baseline. However, there is a need to work with these organizations to better strengthen and amplify effectiveness. Collectively, these platforms incentivize over 5.5 million farmers in over seventy countries to produce commodities in a more sustainable manner. Over 40% of coffee and 22% of cocoa produced globally is now done according to certified production standards. However, this is only a small fraction of the 2 billion people[125] globally who derive their livelihood from agriculture. The platforms provide farmers with financial and technical support to adopt more sustainable farming practices while at the same time linking them to high value export markets. They have strong linkages with major multinational buyers and offer enhanced access to the supply chains of these companies. On a commodity basis, they organize growers, providing standardized training to ensure that production meets common standards (sustainability and quality). They drive demand for more sustainably produced commodities with retailers and consumers. At a national level, the initiatives co-ordinate the delivery of their programmes and via local networks and in collaboration of national priorities and links with export markets. Each initiative leverages funding from the private sector to support communities – either in the form of direct payments (e.g. Fairtrade premiums and guaranteed prices for growers), or to provide farm level support (e.g. Better Cotton Initiative levies a fee on all cotton purchased through the scheme which is directly earmarked for farmer support – in 2018, this fund generated more than 14 million euros to be spent solely on field-level activities).

Global pesticide industry stakeholders have an important role to play in the transition towards safer alternatives to HHPs. CropLife International member companies cooperate on stewardship programmes including training of pesticide retailers to promote safer alternatives, which have reached 4 million farmers and pesticide sellers since 2005[126]. However generic producers, who are increasingly important in HHP sales, may not have sufficient stewardship programmes. CLI and its members also provide obsolete stocks and pesticide container management schemes in over 50 countries (see Section 1.1.2 above). The UNEP UNEA5 report on pesticides and fertilizers includes a recommendation that extended producer responsibility requirements be progressively incorporated into national pesticide legislation to ensure that all actors in pesticide trade undertake essential stewardship of their products.

Agriplastics industries also have a role to ensure that their products are designed to minimise their potential for pollution during use retrieval, collection and end of life management. The industry's association in Europe, Agriculture Plastics Environment, in 2020 published "The European Plasticulture Strategy" which sets out its plans for products that are less harmful to the environment and its obligations for driving circular approaches for its end of life management[127]. Such products include biodegradable mulching films. In 2021 The agricultural European Innovation Partnership published its report on reducing the plastic footprint of agriculture which includes assessments and recommendations for alternatives and end-of-life management[128]. Additional relevant platforms for plastics include Comité Iberoamericano para el Desarrollo y Aplicación de los Plásticos en la Agricultura (CIDAPA) and Agrocare. CIDAPA is a regional association of Latin American plastics manufacturers that assists countries in promoting standards and good practices for agriplastics including circular economy approaches. AgroCare is the association of off-patent pesticide manufacturers that sets standards for product stewardship for its members.

Croplife Vietnam is non-profit industry association, a member of Croplife Asia and Croplife international - representing the voice of plant science. In Vietnam, CropLife and its affiliates commit to supporting and implementing long-term strategies to help more than 25 million farmers effectively apply scientific solutions to improve crop yields, produce high-quality agricultural products while minimizing negative impacts on the environment[129]. Croplife International supports risk assessment capacity-building which focuses on operator exposure and environmental health, as well as downstream regulations to help exporter associations with GAP compliance. Croplife also supports agro-chemical container management programs, as well as farm-level behavior change initiatives in Viet Nam, and other countries.

1.2.3.Finance and investment baseline

Investments into the agriculture sector are enormous but predominately go toward industrial and intensive production systems. Many investment instruments have limited mechanisms and targets aiming to reduce the social and environmental impacts from the use of POPs pesticides, HHPs and the misuse of agricultural plastics.

Multilateral development finance

According to the International Panel of Experts on Sustainable Food Systems (IPES), as much as 85% of the research projects for agricultural development in Africa focus on conventional agricultural approaches, increasing profitability and minimizing crop losses, whereas only a minimal fraction of those had incorporated elements of regenerative agroecology and focused on the substitution of harmful and synthetic products[130]. A separate analysis by Coventry University of EU, FAO, International Fund for Agricultural Development (IFAD), World Food Programme (WFP), and Green Climate Fund (GCF) similarly concluded that a minimal portion of public money is channeled towards supporting the conversion to agroecological practices and steering the sector away from the use of hazardous chemical inputs [131] As an example, only 2.7% of the EU disbursements to FAO, IFAD and WFP between 2016 and 2018 flowed to projects supporting first steps towards agroecology through a focus on substitution of harmful inputs. At the same time, 79.8% of the EU funds channeled through the FAO, IFAD and WFP and 79.3% of the GCF's agriculturally relevant investments support is for projects that focus on conventional agriculture and/or efficiency-oriented approaches such as sustainable intensification.

Bilateral finance into the agriculture sector globally

Bilateral donors allocate significant financial contributions for agricultural development globally. FAOSTAT's dataset on Development Flows to Agriculture includes Official Development Assistance (ODA) flowspan (OOFs) and Private Grants reported by donor countries, international organizations and private entities to the OECD Development Assistance Committee (DAC) Directorate from all donors to all recipients since the early 1970s. The tool offers an overview of development funds going towards the sectors of agriculture, forestry and fishing, including their respective sub-sectors, such as agricultural land resources, food security programmes, livestock and veterinary services. The data extracted from FAOSTAT on bilateral funding indicates that between 2010 and 2018, thirty donor countries have allocated a total of $3.54 billion in the categories of "alternative agricultural development", "agricultural finance and research", and "plant and post-harvest protection and pesticides"[132]. A detailed understanding of these categories and typical initiatives supported under each will be further clarified in the PPG phase, to identify which may relate to agrochemical and/ or agriplastic interventions.

Alternative agricultural development related to the most significant contributions, with USA channeling almost $1.32 billion towards Afghanistan, Bolivia, Colombia, Ecuador and Peru, followed by Germany providing almost $46 million in Zambia, Myanmar, China, Zimbabwe, Guatemala and India. Bilateral funding towards agricultural financial services is more diversified among the donor countries: Japan contributes the highest share of almost $273 million to Myanmar, Bangladesh and Philippines. Germany had committed $172 million to India, Ethiopia, Kenya and Benin, whereas France had allocated $120 million to Peru, Egypt and Senegal. Agricultural research was primarily supported by Australia ($362 million) towards Viet Nam, Indonesia, Papua New Guinea; and France ($284 million) with a highly diverse set of funding recipients across African, Asian and Latin American countries. Lowest contributions were allocated towards the purpose of plant and post-harvest protection and pesticides, totaling around $68 million worldwide. The most significant finance flows were from New Zealand, France and Canada, while the greatest beneficiaries of these funds were Viet Nam, Vanuatu and Honduras.

Investment finance

Pressure is growing on private investors to be more proactive on supporting less polluting agricultural production systems in support of the 2030 Goals and human rights and environmental objectives. UNEP Finance Initiative is a partnership between UNEP and the global financial sector to mobilize private sector finance for sustainable development. UNEP FI works with more than 400 members – banks, insurers, and investors – and over 100 supporting institutions – to help create a financial sector that serves people and planet while delivering positive impacts. UNEP FI supports global finance sector principles to catalyze integration of sustainability into financial market practice, especially through the Principles for Responsible Banking (PRB) and the Principles for Sustainable Insurance (PSI). UNEP FI works in close collaboration with the Principles for Responsible Investment (PRI), a UN-supported entity advocating responsible investment. These industry-led frameworks, established or co-created by UNEP-FI, set the norms for sustainable finance, respectively for banks, insurers/reinsurers and investors, providing the basis for standard-setting and helping to ensure private finance fulfils its potential role in contributing to achieving the 2030 Agenda for Sustainable Development and Paris Agreement on Climate Change.

They are comprised of practical tools, particularly Key Performance Indicators (KPI) frameworks, to help banks to assess borrower activities and promote financial flows to borrowers who can deliver positive environmental results for biodiversity and climate. The PRB Guidance on Biodiversity include exclusion criteria and Nature Positive Key Performance Indicators (KPIs)[133]. In land use finance, a positive impact KPI directory was developed by the World Conservation Monitoring Centre[134]. The Sustainable Blue Economy Finance includes a KPI on MARPOL waste management standards for ports. The ENCORE tool supports banks to identify dependencies of their lending portfolios to nature-based risks. While existing tools do include certain pollution and resource efficiency indicators, there are significant gaps around agrochemicals and agricultural plastics. This gap has been identified and is currently being addressed by a Target Setting Guidance on Resource Efficiency (similar to the equivalent guidance on biodiversity mentioned above) to be finalized in 2021.

Guidance on responsible investment in the agricultural sector is also provided by FAO. Together the OECD and FAO published Guidance for Responsible Agricultural Supply Chains which sets out a five step risk-based due diligence along agricultural supply chains[135]. The Committee for Food Security Investments in 2014 published Principles for Responsible Investment in Agriculture and Food Systems[136] which sets out 10 principles. These two documents will assist the child projects under the FARM programme to ensure that their investments conform to best practice in the sector.

The UK's development investment arm the CDC Group provides tools for responsible private equity fund managers investing in emerging markets. Their Environmental, Social and Governance (ESG) Toolkit for Financial Institutions includes a Sector Profile on Agriculture & Aquaculture, which identifies risks and opportunities and recommends mitigation and management measures to be applied by investors to all their primary investments[137]. Chemical & waste risks are addressed under Resource Efficiency and Pollution Prevention, requiring procedures for procuring, storing, applying chemicals and disposing their containers, applying IPM, appropriate permits and robust systems to store and dispose safely of waste, etc. The overall advice from the CDC on the agriculture and aquaculture sector is to give serious consideration to using independent ESG experts to support them in transactions in this sector as their ESG risks and impacts are likely to have material implications for long-term shareholder value and be aware of the increasing scrutiny from regulators, buyers, stakeholders in the supply chain, consumers and NGOs in relation to ESG issues in the sector.

The collaborative effort between ADB, AfDB, EBRD, UNDP and International Finance Corporation (IFC) has led to the development of the eight Environmental and Social (E&S) Performance Standards that describe their clients' responsibilities for managing their environmental and social risks. Resource efficiency and pollution prevention is covered under Performance Standard No. 3[138]. The Pollution Prevention and Pesticide Use and Management specifications require IFC clients to avoid or minimize the release of hazardous materials and explicitly prohibit chemicals and hazardous materials that are banned internationally or are in phase out. General requirements also include implementing IPM approaches, careful selection and use of chemical pesticides, and conditions around packaging, labelling, protection of workers, production by licensed companies, and avoiding or minimizing damage to the natural enemies or pest resistance.

Investors are increasingly focusing on human rights impacts of their investments. Chemicals use in agriculture was confirmed as a priority human rights issue by the establishment of a Special Rapporteur on Hazardous Substances and Wastes by the Commission on Human Rights in 1995. The rapporteur mandate includes environmental emissions of hazardous substances from all sources and labour conditions in the agricultural sector. In his report on the 25th anniversary of the creation of the mandate[139], the Special Rapporteur concluded significant gaps remain. The most vulnerable groups still suffer the most from the impacts of hazardous substances and they are not equally enjoying the human rights to the highest attainable standard of life, safe food and water, adequate housing, and freedom from toxic pollution. Risk assessments often underestimate risk; continuing export and import continues of toxic industrial chemicals and pesticides that are banned from use where they are manufactured; there has been a failure to realize the right to information and effective remedy for the majority of toxic exposures. Key recommendations include levies on polluting industries to mobilize funds to finance the strengthening of environmental health protection, including their duty to prevent exposure; full implementation of the principles on worker's rights and toxic or hazardous substances and wastes by businesses and international organizations, as encouraged by the Human Rights Council in its resolution 42/21; ending the export of toxic chemicals banned from use where they are manufactured; ratifying all treaties on chemicals and waste; and (for businesses), phasing out the production and use of toxic chemicals and investing in the development of safer alternatives.

Private & philanthropic finance flows

The Global Alliance for the Future of Food is a strategic alliance of 31 philanthropic foundations working together and with others to transform global food systems now and for future generations. In 2021 they proposed seven bold Calls to Action[140] which align with the FARM programme, including accounting for the environmental, social, and health impacts of food systems policies and practices in order to inform better decision-making; directing public sector investment and unlocking investment opportunities toward sustainable food systems, and creating enabling environments where agroecology and regenerative approaches flourish.

1.2.4.Knowledge Platforms and Capacity Building

Green Growth Knowledge Platform (GGKP) is a global network of international organizations and experts that identifies and addresses knowledge gaps in green growth theory and practice. Its Knowledge Partners include UNEP, World Bank, Organization for Economic Co-operation and Development (OECD), Global Green Growth Institute (GGGI) and others. The GGKP is composed of three knowledge platforms - the Green Policy Platform, Green Industry Platform, and Green Finance Platform, that aim to provide access to the latest research, case studies, guidance, and tools to empower policy makers and advisors, small and medium-sized enterprises (SMEs), and banks, insurance, and investment firms to enable evidence-based decision-making about how to green their operations. The platforms encompass learning tools and knowledge resources from across 193 countries, 6 regions, and 49 sectors and themes. Agricultural sector is thoroughly represented with numerous research and case studies regarding biodiversity, land management and resource efficiency, as well as general outlooks on the current state of the sector contributed by knowledge partners. However, sufficient guidance and tools for establishing sustainable finance flows towards improved agrochemical practices are still lacking on these platforms.

Coordination among stakeholders on HHPs globally is being addressed under SAICM's information exchange and knowledge management functions. The UNEP/SAICM/UCT Communities of Practices being run under the Knowledge Management Component of the SAICM Full Size Project (GEF ID 9771) is providing a new forum for such coordination amongst relevant stakeholders from governments, industry, international and non-governmental organizations, and academia. FAO participates as a lead member of the new SAICM community of practice on HHPs – with over 200 registered members - and led a successful discussion in October 2020 on the Global Action Plan on HHPs to gather inputs and feedback from stakeholders. FAO intends to continue using this CoP for further discussions of the Global Action Plan on HHPs scheduled to be launched at the ICCM5. In addition, the newly launched SAICM KM platform at – also developed under the SAICM Full Size Project – features a dedicated webpage on HHPs that includes the latest publications and resources developed by relevant stakeholders on this topic and serves as a space for dissemination of knowledge and information on HHPs under SAICM.

The Centre for Agriculture and Biosciences International (CABI) is an international, inter-governmental, not-for-profit organization that works on projects focused on agricultural and environmental issues in 40 countries across the world, whereby they aim to create, curate and disseminate scientific knowledge. Their work targets the problems of crop loss due to pests and disease, invasive species, lack of access to scientific knowledge and matters regarding biodiversity. Their network of universities, research institutions, development agencies, governments and private sector across a geographical spread provides them with considerable ability to access smallholder farmers and advisors. CABI BioProtection Portal facilitates the identification, sourcing and application of more environmentally friendly, cost-effective and sustainable biological control products in the global fights against agricultural pests and diseases.

FAO's Farmers' and Rural Producers' Organizations Mapping (FO-MAPP) is an interactive online database that provides geo-referenced information on local smallholders', family farmers' and other rural producers' organizations in Africa, Asia and the Pacific, Latin America and the Caribbean. FO-MAPP provides farmers and rural producers' organizations around the world with a global online database they can feed with information about their status, membership, geographical outreach, services provided and agricultural products. It thereby enables them to make proactive efforts to improve their visibility and engage in markets and sustainable development partnerships. FO-MAPP makes no attempt to be exhaustive/comprehensive in listing existing organizations in the geographical areas covered, as its development is still in progress, to be fed primarily by organizations themselves with appropriate data certification by peers.

The GEF Food Systems, Land Use and Restoration (FOLUR) Impact Program (GEF ID 10201, led by World Bank) aims to promote sustainable integrated landscapes and efficient food value chains at scale, focusing on greenhouse gas emissions and deforestation and land use. It sets out to encourage transformation to environmentally sustainable production and practice through two main elements- a Global Knowledge to Action Platform Project (Global Platform) and Country Projects- designed to tackle the dual challenges of achieving a global food system built on sustainable land use practices and productive, healthy landscapes, using both top-down and bottom-up strategies. The program focuses on improving the enabling environment for sustainable food production through support for reform of policy, regulation & standards, and identification of economic incentives and related national policy-related outcomes.

The UNDP Green Commodities Program works in eleven countries in Africa, Pacific and Latin America to help address the sustainability problems of vital commodities including cocoa, coffee and pineapple. The program facilitates the establishment of National Commodity Platforms led and owned by governments. The program supports companies and governments operating in producer countries to pilot innovative ways of assisting farmers to adopt sustainable practices, thereby creating opportunities to navigate the agricultural financial flows away from the intensive use of hazardous chemicals.

Since 2004, UNIDO has been working globally on Chemical Leasing, a Product-as-Service oriented business model to support enterprises in their efforts to enhance resource efficiency and cleaner production, handle chemicals safely and establish sustainable business practices. The model forms a direct connection between farmers and manufacturers creating proper benefit sharing and high-quality standards for a win-win approach.

1.2.5.Government regulations and Multilateral Environmental Agreements

The Stockholm Convention on Persistent Organic Pollutants is making significant progress with identifying and listing POPs, with new chemicals are evaluated as candidates for inclusion in the Convention. To date, Parties to the Convention are to stop the production and use of seventeen listed agrochemicals. However, issues and challenges continue. Progress has been slow particularly in the agricultural sector. There is a need to work with and through the Stockholm Convention to assist countries develop and ensure that the agriculture sector is addressing existing POPs, reducing the production and use of POPs, and developed along a pathway that reduces reliance upon future POPs. National development plans and strategies under the Stockholm Convention increasingly seek to contribute to sustainable productive development and management of agrochemicals, plastics and packaging wastes as highlighted (E.g. NIPs of Kenya and Uruguay).

SAICM has established HHP as an emerging policy issue, with criteria defining them developed at the Joint FAO\WHO Meeting on Pesticide Management (JMPM) and published in the FAO/WHO guidelines on Highly Hazardous Pesticides (2016)[141]. At ICCM4 (Resolution IV/3), SAICM stakeholders adopted an HHP Strategy[142], for which FAO, WHO and UNEP developed a Global Action Plan on HHPs, consolidating the commitments and efforts of diverse organizations that have interests and responsibilities in eliminating the risks from HHPs. The intention of this Action Plan is to challenge stakeholders to commit to working together to achieve significant and measurable change on phase-out of HHPs by 2030, in line with the SDG agenda.

A 2020 UNEP assessment report on SAICM Issues of Concern[143] acknowledged that “current instruments do not comprehensively address the sound management of HHPs at a global scale” and that “instruments and actions are as yet inadequate to solve these issues at a global scale”; that progress on HHPs has been uneven across countries and regions; that there is a disconnect between international recognition and national action. The report suggests strengthening international support for developing and transition countries, possibly through legally binding instruments and partnerships, including building up resources and capacities to establish and enforce national pesticide legislation. The report also recommended “increased research and development of safer alternatives, particularly non-chemical alternatives such as agroecology techniques that minimise chemical uses and methods such as integrated pest management, and making them available, accessible and visible to farmers across the globe”. A second UNEA-5 report on the environmental and health impacts of pesticides and fertilizers[144] lists minimising risks from HHPs among the areas for priority actions.

While not a convention for which the GEF is financial mechanism, the Rotterdam Convention on Prior Informed Consent works to oversee the trade of certain hazardous chemicals, contribute to the sustainable use of those chemicals, and promote improved and informed decision making. The convention covers pesticides and chemicals that have been banned or severely restricted by national authorities ("Annex III" chemicals), currently thirty-five pesticides, with several pesticides currently under review for inclusion. Listing under the Rotterdam Convention is one of the criteria for defining HHP. Important implementation efforts under the baseline include assisting countries to make informed decisions regarding chemical and pesticide use, covering information exchange, labeling and/or information regarding best-practices in reducing health and environmental impacts.

Stronger linkages between chemicals MEAs, biodiversity and climate change are a key emerging issue, particularly for the agriculture sector. Studies of impacts of human activity on biodiversity, land degradation and marine pollution all highlight the agriculture sector as a key stressor (see section 2.1.3), with the role of pesticides, fertilizers and plastics practices at the forefront. The necessary regulatory coordination to address these inter-connected environmental impacts is challenging for governments in developing countries to fully achieve.

In practice, governments are under-resourced to deliver practical shifts towards no/low-chemical agricultural systems. An FAO survey found that out of 109 developing countries, 97% had fewer than 6 people working in pesticide registration and regulation and that, of these, 77% had no more than 2 technical staff dealing with pesticide registration[145]. To support the member countries that have such limited capacities both in staff and resources, the FAO Pesticide Registration Toolkit was launched in 2016 which is a decision support system for pesticide registrars responsible for reviewing and registering pesticide products. The Toolkit is intended to serve as a desk-top electronic handbook for day-to-day use in registration of agriculture and public health pesticides. FAO tested the implementation of the Guidelines on HHPs[146] and of the Pesticide Registration Toolkit in Botswana, Malawi, and Myanmar, and since 2016 has carried out an extensive widespread rollout of national and regional training in more than 70 countries. Through IOMC and EU funding, work has already begun to develop a new module for FAO's Registration Toolkit, designed to support pesticides registrars to identify suitable, context-specific alternatives to HHPs; and another module on biopesticides. Recognizing the serious environmental and health issues associated with POPs, Viet Nam became a signatory to the Stockholm Convention on May 23, 2001 and ratified the Convention on July 22, 2002, officially becoming the 14th member of the Stockholm Convention. The Government of Viet Nam has developed relevant policies and regulations and implementing national actions No 184QD-TTg in 2006 and No 1598/QD-TTg in 2017 aimed at safe management of POPs to 2025 and vision to 2030.

1.2.6. Relevant Projects

A number of relevant co-financing projects are underway on finance and agriculture and will be coordinated with by the relevant child projects. These projects have generated lessons or approaches that would be applied in the FARM programme.

Table 2: FARM co-finance projects

Project/ donor/ budget	Planned Activities	Status/ Lessons learnt/ Approaches to adopt in FARM	Relationship with FARM
GGKP			
ADB Climate Smart Agriculture Value Chain Infrastructure Project (Viet Nam)	Will promote sustained agriculture sector growth, raise sector efficiency and competitiveness, and increase agricultural exports targeting a number of provinces in Viet Nam. Main outputs include: i) Climate -smart and safety -assured o	Loan under preparation in consultation with Government of Viet Nam. Ministry of Agriculture and Rural Development (MARD) will be executi	Baseline investment. GEF funds will be blended with loan and provide additionality

Loan: $ 153 million (provisional estimated)	i) Climate-smart and safety-assured on-farm production promoted with advanced technologies. Improve productivity and quality of primary production, ii) Post-harvest production, market, and connectivity infrastructure strengthened and climate-proofed, and iii) Capacity of high- quality and climate-smart horticulture value chains strengthened.	(MARD) will be executing both the loan and the proposed GEF grant. MARD has key responsibilities for agrichemicals management. Collaboration is envisaged with Croplife International / Asia / Viet Nam through their container management / stewardship programs.	quality
ADB Innovating Eco-Compensation Mechanisms for Yangtze River Basin" PRC (GEF 10711) Implemented by ADB: 5 years. GEF Budget: $ 8.256,884 (excluding Agency Fee) ADB Co-financing: up to $ 300 million	Improve the understanding of the plastics supply chain, strengthen local capacity to carry out plastics management action plans, investments in plastics recovery/reuse/recycling programs in selected counties; and initiate the innovative eco-compensation mechanism This will contribute to reduced dioxin emissions from traditional ways of disposal of agricultural field plastics.	Detailed project preparation ongoing. Submission of GEF CER on or before 06 December 2021	Knowledge sharing and coordination across Governments and GEF Agencies
UNEP Finance Initiative – Principles for Responsible Banking			
GROW Asia International Biocontrol Manufacturers Association	https://www.aseanfawaction.org/ a Fall Army work project, working in 10 countries including Philippines	UNIDO child project will be linked to the ongoing activities of the project in Philippines	Lessons learnt and exchange of information
Agtech for inclusion and sustainability - Agventures II (GEF ID 10336) Implemented by In	GEF Non-Grant Instrument establishing an investment fund to invest in Agtech) early-stage companies (SMEs) developing new biological solutions. Such solutions including pest-controlling organism	Pending approval for implementation Informing Component	Lessons learnt & exchange of information via the Global Coordination Child P

implemented by Inter-American Development Bank, budget USD 1.8m for C&W (5m total, including land degradation & climate change)	s, micronutrients and probiotics as alternatives to agrochemicals for pest control. The project will trigger corporate investors from the chemicals sector.	2 of FARM on Finance: The project objective on increasing investment into sustainable agriculture solutions by private investors. The GEF grant will be used as seed finance. Methodology developed for estimating GEBs based on investment mobilized	dination Child Project.
FAO's Strategic Framework 2022 to 2031 includes 20 Priority Programme Areas (PPA). The *Bioeconomy for sustainable food and agriculture* PPA has regular programme funding of USD 57m and USD 160m of extra-budgetary funds concurrent with the FARM programme.	The PPA will drive FAO's normative work to support bioeconomies that balance economic value and social welfare with environmental sustainability promoted through formulation and implementation of integrated evidence-based policies and practices in micro and macro environments, using technological, organizational and social innovations. It is expected that 10% of the funds will support the normative work on agricultural plastics.	Approved. The policy and investment guidelines and tools will help governments to develop regulatory and fiscal environments that promote alternatives and reduce the risk of environmental pollution from agricultural plastics	Baseline investment. GEF funds will be blended with loan and provide additionality
FAO's Agrinvest and Hand In Hand Initiatve Programme - $40 million in over 20 countries	Agrinvest promotes private investment in agro-food systems by creating an environment favourable to private sector investment, creating incentives and by reducing the associated risks through: Enabling conditions, laws and policies, to support access to finance and investment for micro, small and medium enterprises and a sustainable business environment for financial institutions and investors. Hand-in-Hand is FAO's evidence-based, country-led and country-owned initiative to accelerate agricultural transformation and sustainable rural development to eradicate poverty (SDG 1) and end hunger and all forms of malnutrition (SDG 2). In doing so, it contributes to attainin	Approved globally and already being implemented in some scale out countries in Africa and Latin America. Agrinvest facilitates public-private policy dialogue, eases access to finance and inclusivity by involving smallholder farmers in policy dialogue, creating market linkages and addressing their financial needs. Hand-in-Hand focuses on countries that struggle with poverty and food security. The initiati	Baseline investment for Components 1 and 3.

	g all of the Sustainable Development Goals. The initiative prioritizes countries where national capacities and international support are the most limited or where operational challenges, including natural- or man-made crises, are the greatest.	ve applies a framework specifically conceived to identify areas within these countries that have good agricultural potential but also high levels of poverty and hunger.	
FAO Pesticide Management Regular Programme and FAO Legal Services Department – Annual budget 2021-25 $2,610,500	The "Joint Meeting on Pesticide Specifications" (JMPS) is an expert ad hoc body administered jointly by FAO and WHO, composed of scientists collectively possessing expert knowledge of the development of specifications. The "Joint Meeting on Pesticide Residues" (JMPR) is an expert ad hoc body administered jointly by FAO and WHO in the purpose of harmonizing the requirement and the risk assessment on the pesticide residues. The FAO/WHO Panel of Experts on Pesticide Management (JMPM) advises on matters pertaining to pesticide regulation, management and use, and alerts to new developments, problems or issues that otherwise merit attention." The JMPM	Approved and ongoing. Voluntary guidelines and Tools including the FAO/WHO Code of Conduct and ; supporting Guidelines (e.g., Guidelines on Highly Hazardous Pesticides); FAO Pesticide Registration Toolkit and FAO Legal Division's Guidance on Development of National Pesticide Legislation will be rolled out in pilot countries and scaled regionally, including for regional harmonization initiatives	Baseline investment to support enhancement of pesticide policies and capacities
FAO Global Fall Armyworm Programme and Locust Control Programme - $10,400,000	The goal of the FAO Global FAW programme is to improve food security and the livelihoods of millions of smallholder farmers as well as reduce environmental pollution through management and control of FAW. The programme will produce several outputs that will lead to the following outcomes: 1. global, regional, national and farmer-level coordination and collaboration on FAW control are enhanced, resulting in implementation of ecosystem-friendly integrated pest management (IPM) practices and policies; 2. reduction in crop-yield losses caused by FAW;	Endorsed; and with ongoing and anticipated new investments to halt use of HHPs for transboundary pest control; promote early warning systems, IPM and specifically greener procurement for FAW and Locust management.	Baseline investment – closely linked to FARM Components 1 and 3.

	3. prevention of the further spread of FAW to new areas The FAO Locust Programme closely monitors the global Desert Locust situation 24/7 and provides forecasts, early warning and alerts on the timing, scale and location of invasions and breeding through its global Desert Locust Information Service (DLIS). In addition, the programme supports control operations for other locust species Support includes information sharing on outbreak status through monthly bulletins and periodic updates summarizing the locust situation and forecasting migration and breeding on a country by country basis. Furthermore, FAO undertakes field assessment missions, strengthens national capacity, and coordinates survey and control operations as well as emergency assistance during locust upsurges and plagues		
The International Centre for Insect Physiology and Ecology (icipe) –various grants up to $12, 605, 200	Research and development of safer alternatives to HHPs; information sharing on agroecosystem based practices that rely less on agrochemicals (e.g., Push-pull technique for FAW and cereal stemborers)	Various ongoing IPM and innovative knowledge management projects; several IPM models available for scaling up for various crop/pest combinations.	Baseline investments for capacity enhancement and knowledge management (Component 3)
Kenya Organic Agriculture Network (KOAN) and Organic Consumers Alliance – $2,280,000	Promoting organic farming, access to finance and market linkages. At KOAN provides technical advice, training, promotion and business support in the areas of commercial organic production, improved processing technologies, organic market development, certification support, and coordination of organic certification and inspection services	Ongoing with increasing membership. KOAN lobby's for policies in Organic Agriculture; has concrete activities to strengthen organic farmers' access to markets, enhance and finance	Baseline investment linked to all 3 FARM components
Agriculture Creating Linkages for Expanded Agricultural Networks (CLEAN)	Using a value chain approach, the Creating Linkages for Expanded Agricultural Networks (CLEAN) is working to improve the agriculture sector in Laos. The project will increase production and reduce post-harvest losses of clean horticultur	Lessons learned from the project on value chain approach and agricultural networks will be tapped into under the Laos child project	Baseline Lessons learnt and exchange of information

	e to improve quality compliance and ce rtification systems, and develop linkage s and increase demand for clean hortic ulture in domestic, sub-regional and glo bal markets.		

1.3. Proposed alternative scenario

1.3.1.Programmatic Justification

The proposed FARM Programme aims to catalyse a framework for investment in the agriculture sector which looks to detoxify the sector by eliminating the use of the most harmful inputs to food production systems through a set of individual but connected child projects. A global programme can influence at scale, leveraging transformative change in existing structures. FARM will aim to influence global investment conditions on chemicals and plastics in sustainable agriculture programmes, catalyse the expansion of and compliance with global agricultural sustainability standards, and thus accelerate the adoption of low/no-chemical alternatives and decreased use of agrochemicals and agri-plastics. A global approach is important to address globalized agricultural supply chains, to prevent loopholes and increase efficiency when implementing policies, financing and, capacity building for registration and management for agrochemicals and agri-plastics. By ensuring coordination and exchange of knowledge, the programme can establish the required global framework for policy, legislation, investment, finance, standards and norms across the different project countries, while preserving the required capacity to address highly diverse and localized pest and crop management needs. In this way, the programme can amplify its results to more than the sum of outcomes of the individual child projects through the exchange of knowledge, replication, scale up of successful innovations influence the flows of existing investment into the sector and, leverage of higher amounts of investments in the future.

In accordance with the GEF-7 principles, the programme builds on existing networks and private sector engagements as described in the Baseline section above. It is designed to ensure gender empowerment, innovation, cost-effectiveness, and sustainability (see sections below). The child projects include partnerships with private sector partners, including the chemical industry, biocontrol industry, and commercial banks. Furthermore, it supports the countries' compliance with the Stockholm Convention, and supports the achievement of SAICMs objectives.

1.3.2.Theory of Change

The programme's theory of change (TOC, see Figure 7 below) proposed three approaches to address the identified root causes underlying the continued use of POPs and HHP pesticides and low-quality agricultural plastics, and the barriers to achieve the transition to a no/low chemical agriculture (see section 1.1.2 on Root causes and Barriers). Each of the approaches is the basis of one of the three Programme Components as follows:

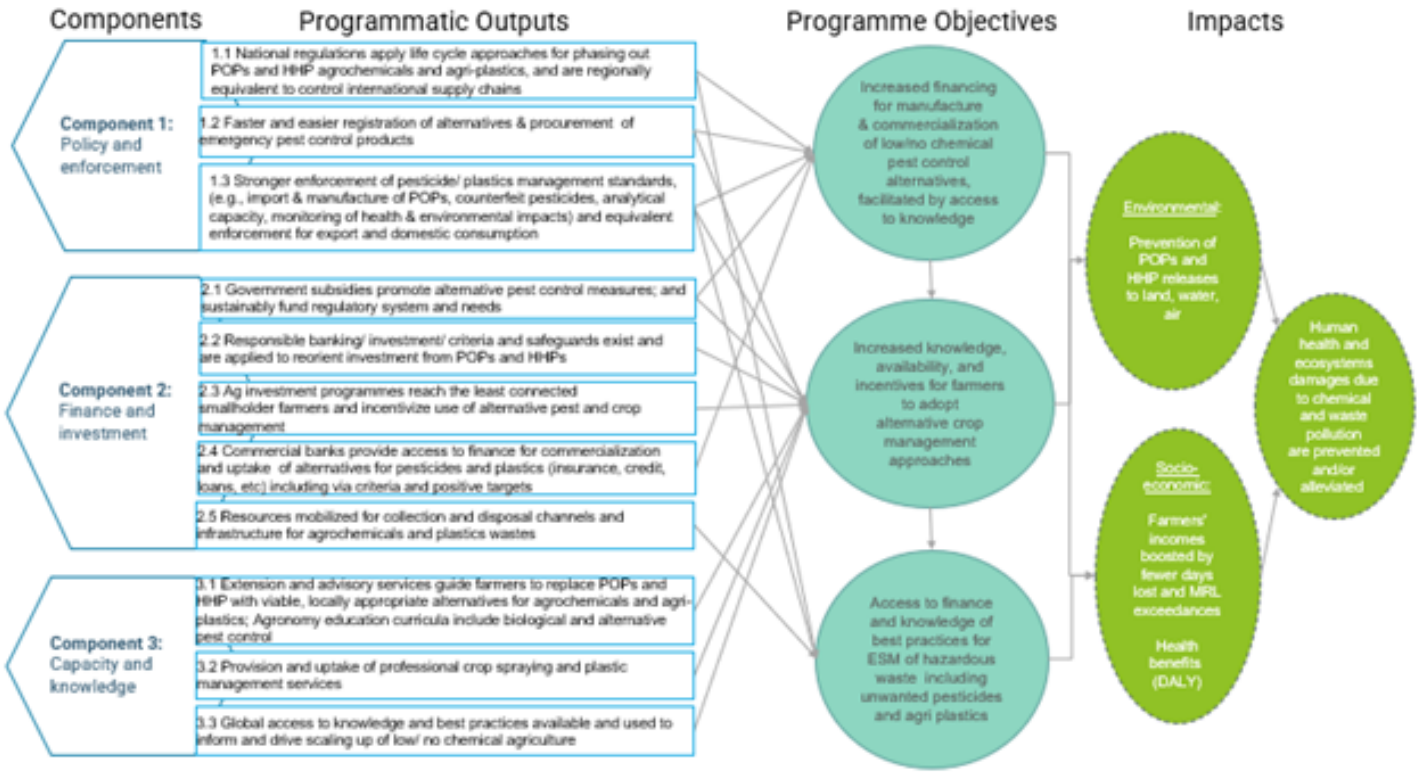
- Enabling conditions for the sound management of chemicals & waste through policy and enforcement (Component 1 – Policy and Enforcement)
- Establishing sustainable resources for the transition to low/no-chemical agriculture through finance and investment (Component 2 – Finance and investment)
- Building capacity and making knowledge accessible through the sound management of chemicals and waste (SMCW) (Component 3 – Capacity and knowledge)

These three components all relate to and address the three global problems presented in the problem analysis (Section 1.1), which are presented in the TOC as the three global Programmatic Objectives:

1. Increased financing for manufacture and commercialization of low/no-chemical pest control alternatives, facilitated by access to knowledge.
2. Increased knowledge, availability and incentives for farmers to adopt alternative crop management approaches.
3. Access to finance and knowledge of best practices for the environmentally sound management (ESM) of hazardous waste, including unwanted pesticides and agricultural plastics.

Each of these objectives will be facilitated by an increased access to information, education, knowledge management, best practices, and knowledge transfer among all actors. This will mainly be accomplished through component 3 that aims to build capacity among farmers' and regulator's networks and ensure global coordination and access to knowledge on best practices in agroecosystem approach and alternatives. This way, the partner countries will learn from each other across the programme, further strengthening south-south cooperation with resultant opportunities for replication and scale up in the future. Achieving these three Objectives will contribute to the overall aim to catalyse a framework for investment in the agriculture sector to detoxify the sector, and thus achieve long term high level environmental and socio-economic impacts, contributing to achievement of the 2030 Global Goals.

Fig 7: FARM Programme Theory of Change



The programme, currently consisting of six individual child projects with potential additional projects to be included in future work programmes (see Section 6 on Coordination), aims to address the use of POPs, HHP, and low-quality agricultural plastics in the agricultural sector in seven countries in the Africa, Asia-Pacific, and Latin America and Caribbean regions. The problem analysis presented in Section 1.1 is applicable to all regions, with similar barriers that can best be addressed in a coordinated approach. Therefore, all child projects will apply all three of the TOC approaches, i.e. activities and outputs addressing the root causes and barriers related with policy and enforcement (component 1), finance and investment (component 2), and capacity and knowledge (component 3), will be included in each of the child projects.

At the next level in the TOC, the Programmatic Outputs define the interventions to be delivered by child projects (see sections below). Each component includes 3-5 specific interventions, which were prioritized during the problem analysis. Each child project contributes to one or more of the Programmatic Outputs per component, according to the country situation and Agency comparative advantage. While individual child projects do not cover all the Programmatic Outputs, the FARM Programme as a whole will address all the prioritized outputs. Figure 8 shows how each of the child projects will contribute to the overall programme outputs. The table includes green 'primary' shading, indicating strong contribution of child project activities to the Programmatic Output and a clear link to agency comparative advantage and clear description of how the output will be achieved. The blue 'secondary' shading indicates cross-cutting and supporting activities covered by the child project that will contribute in a more general or indirect manner to achievement of the Programmatic Output. The contributions of child projects to Programmatic Outputs will be fully elaborated in the preparatory phase.

Figure 8: Mapping of FARM Child Projects to the Programmatic Outputs

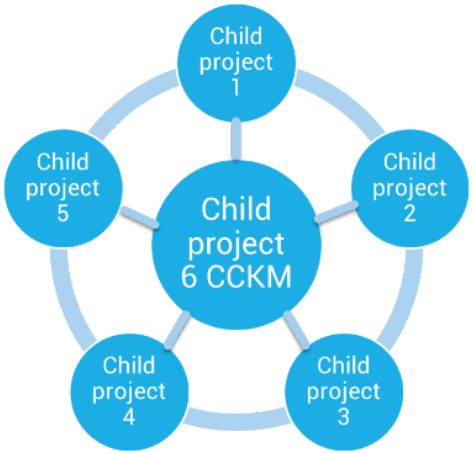
Green = Primary output directly addressed by child project; Blue = Secondary output, covered in a less direct manner

FARM: Mapping of Child Projects to Programme Comoponents & Outcomes

	FARM Programmatic Outputs	UNEP	UNDP		FAO	UNIDO	ADB
			Laos	Ecuador			
C1	1.1 National regulations apply life cycle approaches for phasing out POPs and HHP agrochemicals and agri-plastics, and are regionally equivalent to control international supply chains						
	1.2 Faster and easier registration of alternatives & procurement of emergency pest control products						
	1.3 Stronger enforcement of pesticide/ plastics management standards, and equivalent enforcement for export and domestic consumption and export						
C2	2.1 Government subsidies promote the use of alternative pest control measures; and sustainably fund regulatory system and needs						
	2.2 Responsible banking/ investment/ criteria and safeguards exist and are applied to reorient investment from POPs and HHPs						
	2.3 Ag investment programmes reach the least connected smallholder farmers and incentivize use of alternative pest and crop management						
	2.4 Commercial banks provide access to finance for commercialization and uptake of alternatives for pesticides and plastics (insurance, credit, loans, etc) including via criteria and positive targets						
	2.5 Resources mobilized for collection and disposal channels and infrastructure for agrochemicals and plastics wastes						
C3	3.1 Extension and advisory services guide farmers to replace POPs and HHP with viable, locally appropriate alternatives for agrochemicals and agri-plastics; Agronomy education curricula include biological and alternative pest control						
	3.2 Provision and uptake of professional crop spraying and plastic management services						
	3.3 Global access to knowledge and best practices available and used to inform and drive scaling up of low/ no chemical agriculture						

The different child projects will be coordinated and supported through a global communications, coordination and knowledge management (CCKM) child project that will ensure the exchange, replication, and scale up of successful interventions, innovations, programme tools and results. Each of the child projects will provide, exchange, and receive information to, with, and from the other child projects, according to the hub and spoke model adopted for the GEF ISLANDS programme. The global child project will act as a central knowledge hub, receiving and providing information to and from the other child projects (the spokes). This exchange will be facilitated through a platform under the global child project, where the generated knowledge will be managed. In this way, the FARM programme will replicate the successful coordination under the ISLANDS and GOLD programmes, and SAICM's communities of practice. Individual child projects will also share knowledge directly with other child projects around the rim of the "wheel" as represented in Figure 9 below:

Figure 9: Hub and spoke model for Coordination, Communications and Knowledge Management (CCKM)



The coordination, knowledge management and communication between these child projects will facilitate the delivery of the programme's objectives and ultimate environmental and socio-economic impacts. The coordination approach that the programme offers will ensure that all child projects are executed in a consistent manner regarding gender mainstreaming, private sector engagement, risk management and project management and monitoring and evaluation. In a larger context, the knowledge management platform will have linkages to existing platforms (e.g., FOLUR, Resilient Food Systems, Green Commodities, and ISLANDS programme platforms), as well as the Green Growth Knowledge Platform (GGKP) that serves as a hub for knowledge management practices. The generated knowledge can be in turn used in the context of other programmes like ISLANDS and feed into the GGKP. Furthermore, through the UNEP GEF communications task force, the platform will inform other communication activities and have access to audiences and stakeholders across the UNEP GEF portfolio.

The UNEP/FAO child project with pilot activities in Kenya and Uruguay will ensure close technical cooperation within and across the EAC and MERCOSUR regions. The policies and strategies developed or reviewed with support the FARM programme will assist national governments and regional economic communities to improve their regulatory and financial frameworks to support sustainable agriculture, while benefitting from lesson learnt from the other child projects and shared globally.

The ADB project in Viet Nam is aligned with Component 1 Policy and Enforcement, notably Outputs 1.1 and 1.3. While Viet Nam has advanced its legal and regulatory provisions for POPs and HHPs, limited, if any, work has been done to assess the life cycle of the various types of agricultural field plastics. Under the ADB child project, a gap analysis and interventions to identify regulatory issues such as mandated thickness of agri-plastics, or directives to reduce / recycle, will be considered. Links with Component 1, Outputs 2.1 to 2.4. The key element of this ADB-supported work will be the creation of a "green financing framework" for horticulture sector of Viet Nam, to systematically address the nexus between ESM of agrichemicals and hybrid forms of finance and access to finance for key stakeholders. Further work under in Viet Nam will focus on practical, demonstration investments. The ADB child project is also relevant to all outputs under the PFD Component 3, including support for private sector engagement and behaviour change / technical advisory campaigns targeting all segments in the agri-food value chain. The main aim will be to alter the trajectory of agrichemical use in the horticulture sector of Viet Nam to be more 'nature positive'.

The UNDP Ecuador child project will use the global component to connect international buyers and local producers, to ensure the buyer motivates the producers in using best environmental practices and best available techniques to provide responsible products that don't use hazardous agricultural chemical inputs. Component activities will aim to strengthen practitioners' capacity – virtually and through inspiring face to face encounters and events – on issues

relevant across multiple crop supply chains and landscapes. This will foster a community of practice among participating countries and will allow for the sharing of successful models with a wide range of global actors and stakeholders.

In the UNDP Laos child project, the component activities will aim to strengthen beneficiaries' capacity on issues relevant across multiple crop supply chains and landscapes. These activities will contribute to the global component's focus on knowledge sharing with local and global practitioners and decision-makers from governments, CSOs, and businesses along the agricultural value chain involved in the global FARM programme.

In line with the FARM Programme objective, the UNIDO child project aim to address the existing barriers on continued production and use of POPs and HHPs and develop alternatives through sustainable and greener crop protection solutions, which will directly reduce the use of POPs and HHPs during and post application as well as generation of hazardous wastes at end of life, thus protecting the human health and the environment. The child project will focus on the following: (1) Support legislative framework for faster, easier and relaxed registration of alternatives (C1.2) where procedures on registration process and market acceptance will be harmonized among the participating countries; (2) Enhance government subsidies to promote the use of biocontrol and less hazardous crop protection agents (C2.1) where review on criteria and requirements to access existing financial incentives will be undertaken; (3) Identify responsible banking/investment/insurance principles and mechanism for agrochemicals (C2.2); (4) Adequate support system under PPP through finance by commercial banks for commercialization and uptake alternatives to current POP/HHP pesticides (C2.4); (5) Provide guidance to farmers to replace POP pesticides and HHPs with eco-friendly biocontrol and less hazardous crop protection agents and educational curricula on alternative to pest control (C3.1); and (6) Global access to knowledge and best practices from project implementation for information dissemination and scaling up of low/non-chemical agriculture (C3.3).

1.3.3.Component 1: Policy and enforcement

As described in Section 1.1.2 and shown in the TOC, policy and enforcement capacity are barriers for all of the Programme Objectives, but particularly relevant for manufacture and commercialization of alternatives (Objective 1) and ESM of hazardous agricultural wastes (Objective 3). Strengthening enforcement capacity underpins all three of the Objectives.

This component will focus on creating an enabling environment for promoting the production, licensing and use of bio-control systems such as biopesticides and less hazardous alternatives to POPs and HHPs at all life cycle stages (from development, production, and application); and supporting the phase out and environmentally sustainable end of life management of POPs pesticides, HHPs and agri-plastics, through the implementation of the below presented outputs.

Through Component 3, Output 3.3, this component will also contribute to access to information, sharing of best practices, replication, and knowledge management and sharing on policies and regulations that aim to support the use of biopesticides and less hazardous chemicals, phase out the use of POPs and HHPs and agricultural plastics among the partner countries' regulators and other relevant stakeholders.

Output 1.1 National regulations apply life cycle approaches for phasing out POPs and HHP agrochemicals and agri-plastics, and are regionally equivalent to control international supply chains

National regulations are often focused on increasing agricultural production and designed to fit their countries' individual context. By applying life cycle approaches to regulations, POPs and HHPs agrochemicals and agri-plastics phase out/improved management can be supported from production to application and end-of-life. The regional equivalence and potential harmonization of these regulations will prevent loopholes in the international supply chains.

As per the TOC (Fig 7), this output will strengthen the manufacture regulations of hazardous agrochemicals (Objective 1) and ESM of hazardous agricultural wastes (Objective 3).

Specific activities proposed under this Output may include:

- Regulatory strengthening including registration, GHS, import controls, lifecycle assessments, principles of circular economy, standards, monitoring and tracking systems for post-registration surveillance (all Agency child projects).
- Gap analysis of regulations related to the life cycle management of agrochemicals and piloting regulations on product standards and mandatory EPR for empty containers, unwanted pesticides and agricultural plastics (UNEP/FAO[147], ADB);
- Empty containers, and other contaminated agricultural plastics waste; government policies establishing incentives that favour reduction and/or substitution of hazardous agrochemicals (UNEP/FAO, ADB, UNDP).
- Regulations are harmonized at regional/sub-regional level to prevent loopholes in the international supply chains (UNEP/FAO, UNEP, UNIDO).
- Regulations enhanced and harmonized with powers to raise funds for its enforcement and recovery of external costs, and linked to agricultural investment policies (UNEP/FAO)

Partnerships with the private sector under this output include consultation with Croplife International (CLI) and their member companies in the strengthening and development of container management schemes, product stewardship and responsible use of crop protection chemicals and the necessary policy support for such schemes to be effective, while ensuring strong transparency to avoid conflicts of interest. The output is particularly relevant for small-scale and informal farming actors, since it aims to strengthen a basic-level policy and enforcement structure.

Output 1.2 Faster and easier registration of alternatives and procurement of emergency pest control products

As the Output above (Output 1.1) aims to strengthen regulations that support the phase out of hazardous chemicals, this output will support the manufacture and commercialization of less hazardous alternatives. Governments will be supported in setting up and strengthening the registration frameworks and procurement processes for these alternatives (both routine and emergency control products) that are currently lacking. As per the TOC (Fig 7), this output will support Objectives 1 on commercialization of alternatives; and Objective 2 on use of alternatives, particularly for emergency pest control.

Specific activities proposed under this Output may include:

- Establishment of an easy and efficient registration process of alternatives for agrochemicals (UNEP/FAO).
- Establishment of procurement of emergency migratory pest control products (UNEP/FAO).

· Strengthening technical and institutional capacity of competent authorities in evaluating and certifying registered safe chemical alternatives and bio-control products including biopesticides (UNEP/FAO, UNIDO).

· Capacity strengthening of government institutions and the private sector to properly uptake, utilize, and adapt tools such as the FAO Pesticide Registration Toolkit (UNEP/FAO, UNDP).

· Institutional strengthening for the rapid identification of alternatives to agrochemicals with high environmental impact (i.e., HHP), agile registration processes of better products and strengthening of the procurement processes to facilitate the use of the alternatives found (UNEP/FAO, UNDP).

This output includes consultations with the biocontrol industry who are providing the industry perspective on regulation and registration issues, and whose member companies are partnering with country child projects in Africa, Asia-Pacific and Latin America regions.

Output 1.3 Stronger enforcement of pesticide and plastics management standards and equivalent enforcement for export and domestic consumption

Partner countries will be supported in the equal and stronger enforcement of pesticide and plastic management, especially for domestic enforcement, as crops grown for export often adhere more rigid regulations, This includes the import and manufacture of POPs, counterfeit pesticides, inappropriate agriplastics, analytical capacity to identify POPs pesticides and HHP, and monitoring of health and environmental impacts. As per the TOC (Fig 7), this output will support all three Objectives of the programme (1, 2 and 3) on manufacture of agrochemicals/ alternatives, increased availability of alternative crop management for farmers, and ESM of hazardous waste.

Specific activities under this Output may include:

- Capacity development and training in monitoring and enforcement of pesticide and plastics management compliance (trade controls at border, counterfeit / labelling issues) (ADB, UNEP/FAO, UNDP).
- Enhancement of national policies, regulations, and enforcement capacities by adding monitoring, tracking, and reporting requirements, all supported by digital innovation and strengthening of regional cooperation to combat illegal trade (UNEP/FAO).
- Reinforcing formal training including at university/ Masters level to build sustainable global capacity for chemical risk management (UNEP in partnership with University of Cape Town).
- Cooperation with BRS Secretariat and partnership with Green Customs Initiative to strengthen the control of imports of hazardous materials, facilitating tracking at national level using global customs codes (UNEP).
- Training and outreach with customs authorities to avert illegal imports and trade of hazardous chemicals conducted (UNDP).

1.3.4. Component 2: Finance and investment

As described in Section 1.2.2 and shown in the TOC, the current finance and investment flows in the agricultural sector are currently not coordinated and often counter-productive (e.g. provision of subsidies on inputs of hazardous agrochemicals). This is a barrier for all three of the Programme Objectives, but particularly relevant for adoption of alternative approaches by farmers (Objective 2) and was also highlighted by the NIPs of countries such as Uruguay.

Individual outputs within the component will also address commercialization and ESM of hazardous agricultural wastes.

This component will focus on establishing a sustainable resource basis for accelerating the transition to alternative and no/low-chemical production, with outputs addressing financial sources from public sector (government subsidies), the private sector (chemical industry Extended Producer Responsibility, commodity certification schemes) and the financial sector (investment and the banking and insurance sectors through insurance, credits, microfinance and loans). The proposed outputs address the barriers identified in Section 1, including perverse public incentives, lack of access of small-scale farmers to financial services and products, high costs of ESM of hazardous wastes, and sustainable agriculture investment criteria that lack explicit chemicals or waste criteria.

Through Component 3, Output 3.3, this component will also contribute to access to information, sharing of best practices, replication, and knowledge management and sharing on responsible banking and investment criteria, access to commercial bank finance for commercialization and uptake of alternatives for pesticides and plastics, government subsidy schemes, and resource mobilization for collection and disposal channels, among relevant stakeholders.

Output 2.1 Government subsidies promote alternative pest control measures and sustainably fund regulatory system

Currently, many governments subsidize high input agriculture with the use of HHPs, including POPs agrochemicals, and agriplastics that lock farmers into standard packages that leave no option for innovation or flexibility and their regulatory system is not sustainably funded (see section 1.1). Under this output the partner countries will be supported in the review and establishment of government subsidies promoting the use of alternative pest control measures instead of hazardous agrochemicals and the establishment of cost recovery mechanisms to fund the regulatory system. As per the TOC (Fig 7), this output will thus support Objectives 1 and 2 on commercialization of agrochemicals/alternatives, and increased incentives for farmers to adopt alternative crop management approaches. This output will primarily target commercial and organized farmers who are in receipt of existing subsidies, while looking to expand access to these to more farmers (see also Output 2.3).

Specific activities under this Output may include:

- The adaptation of government subsidy schemes to promote eco-incentives /cross compliance for selection of alternatives and encourage sustainable use and end-of-life management of agrochemicals and agri-plastics. Enforcement capacity will be strengthened through these subsidy schemes (see output 1.1) (UNEP/FAO,).
- Establishing government financial incentives (see output 1.1), such as subsidies on the use of alternatives and/or in other forms e.g., tax incentives, Research and Development (R&D) funding (UNEP/FAO, UNIDO, UNDP).
- Creation of a “Green finance framework” for agri-foods industry in Viet Nam, includes options and modalities for sustainable finance and investment, including “eco-compensation’ (ADB).

Output 2.2 Responsible banking/ investment/ criteria and safeguards exist and are applied to reorient investment from POPs and HHPs

Under this output responsible banking, insurance, and investment criteria will be strengthened to include pollution and agroecology criteria or positive target that actively promote the inclusion of no/low-chemical options in input packages. This way, finance flows will be oriented to the uptake of alternative pesticides and plastics instead of supporting the high-input crop systems. As per the TOC (Fig 7), this output will support Objective 2 by incentivizing farmers to adopt alternative crop management approaches.

Activities under this Output across different child projects may include the following:

- Support of the implementation of the Principles for Responsible Banking target setting guidance produced by UNEP FI (UNEP).
- Promoting low/no-chemical pest control options as part of targets for commercial banks and providers of financial services (UNDP, UNIDO).
- Strengthening capacity of banks and investors in safeguards on agrochemicals and agri-plastics, to drive the adoption of alternatives as part of responsible investment (UNDP).

Output 2.3 Agricultural investment programmes reach the least connected smallholder farmers and incentivize use of alternative pest and crop management strategies

Through this output, unconnected farmers will be incentivized to adopt alternative approaches on crop management as they are not inclined to risk the food security the use of hazardous chemicals is currently giving them. By connecting them to global and certified value chains through agricultural investment programmes, these farmers will receive the needed support to transition to the use of low risk/non-chemical pesticides. As per the TOC (Fig 7), this output will support Objective 2 on increased availability and incentives for farmer incentives to adopt alternative crop management approaches.

Activities under this Output may include:

- Demonstrations of phasing-out POPs and HHPs through sustainable agricultural alternatives including, drought resilience, crop protection, traditional and innovative agricultural practices, and yield enhancement. Further cover financial and technical inputs, information technology, and sustainable agrochemical waste management and restoration of contaminated sites (UNEP/FAO).
- National agricultural investment programmes adapted in pilot countries to reach the least connected smallholder farmers and incentivize adoption of safer alternatives to pesticides and plastics and recommendations shared across regions (UNEP/FAO).
- Responsible banking and investment from development banks in the form of microfinance loans to farmers (both direct use of biopesticides and involvement in biopesticide raw material supply) (UNIDO).

Output 2.4 Commercial banks provide access to finance for commercialization and uptake of alternatives for pesticides and plastics using their developed criteria and positive targets

Currently there are insufficient support systems for the commercialization and usage of alternatives for hazardous pesticides and plastics. By using their established criteria and positive targets (see Output 2.1), local commercial banks will provide finance under this output in the form of insurance, loans (with low interest rates), and credit to manufacturers to take up and adopt biopesticide technology, sustainable alternatives to agriplastics, and microfinance loans and insurance to farmers. As per the TOC (Fig 7), this output will support Objective 1 on the commercialization of agrochemicals/ alternatives. This output will target all types of farmers, with different financial products developed and improved for different categories of farmers. Access to micro-finance will particularly be targeted towards the least organized and informal producers (see also Output 2.3).

Activities under this Output include:

- Partnering with financial institutions including commercial banks creating innovative financing products to reduce agrochemical and agri-wastes pollution and encourage uptakes of alternatives to POPS/HHP (UNDP).
- Development of a competitive fund mechanism to identify and finance innovative proposals and initiatives to reduce the use of HHP, increasing access to credit by farmers who use good practices (UNDP).
- Responsible banking and investment from development banks in the form of microfinance loans to farmers (both direct use of biopesticides and involvement in biopesticide raw material supply) (UNIDO, also linked to Output 2.3 which is the equivalent for development banks).
- Establishment and strengthening of financial information centres in one pilot country, and digitally linked these, to improve access of supply chain actors to finance for commercialization and uptake of alternatives to POPs/HHPs and agriplastic (UNEP/FAO).

Output 2.5 Resources mobilized for infrastructure and collection and disposal channels for agrochemicals and plastics wastes

This output will focus on addressing the barriers to increasing the finance of ESM of hazardous agricultural waste. Currently, the disposal cost of this type of waste are high to single countries due to lack of economies of scale (e.g. in NIP Uruguay 2017-2030), often borne directly by farmers, voluntary stewardship initiatives do not cover the whole market, POPs and HHP producers have not extended EPR schemes for unwanted pesticides, wastes and stockpiles, nor are there sufficient EPR schemes to avoid the end-of-life impacts of agri-plastics. By establishing the necessary EPR schemes, reduce and recycle programmes and the mobilization of resources to support these, this output will support the collection and disposal of agrochemicals and plastic wastes. As per the TOC (Fig 7), this output will support Objective 3 on the ESM of hazardous wastes.

Activities under this Output may include:

- The facilitation of funding by pesticide and agri-plastics producers, importers and distributors and the organization of a mandatory EPR mechanism for free of charge collection, recycling or disposal of unwanted pesticides and agricultural plastics (UNEP/FAO).

- Catalyze the recycling, reducing, and eliminating use of agricultural field plastics (e.g. plastic mulch film, irrigation drip tape, seed trays, thin hothouse films) with parallel work on introduction and scaling of non-chemical alternatives (ADB).

The output will be delivered in close cooperation with the private sector to ensure that waste collection and management schemes are established bearing in mind best practices from existing global container and other agricultural waste management schemes run by CLI members and others. It will also link to Output 1.1 with an iterative approach whereby regulations establishing mandatory (or encouraging voluntary) EPR schemes are informed by evolving experience with the implementation of such schemes in practice.

1.3.5.Component 3: Capacity development and knowledge dissemination

Lack of capacity and knowledge, particularly for farmers and regulators, underpins the whole problem analysis, and strongly drives continued use of hazardous agrochemicals and agri-plastics. While previous GEF-funded agriculture projects have focused on directly training beneficiaries on alternatives (see baseline section), the FARM programme will seek to strengthen and reorient existing supply chain and public sector channels for training and informing farmers. This component focuses on expanding the existing farmers' and regulators' networks and mechanisms for training and awareness raising on pest and crop management and agricultural plastics (Outputs 3.1 and 3.2). The knowledge generated from these Outputs will managed, shared, and scaled up through Output 3.3, including connecting to and learning from the diverse existing farmer training and support networks and experiences across different sectors (see Baseline section)

The component will ensure global coordination among the different child projects and access to knowledge on best practices in the agroecosystem approach and alternatives established under the different programme components under Output 3.3. Replication and scale up of these best practices catalyzing investment to detoxify the agriculture sector will be established thus raising the bar in terms of adoption and implementation of higher standards of environmental compliance. South-south cooperation will be strengthened through the learning from the partner countries across the FARM programme. This component will further link and build on successful cooperation under the ISLANDS and GOLD+ programmes, as well as the communities of practice established under the SAICM project and coordinate with other initiatives notably the FOLUR and Green Commodities platforms.

Output 3.1 Extension and advisory services guide farmers to replace POPs and HHP with viable, locally appropriate alternatives for agrochemicals and agri-plastics and agronomy education curricula include biological and alternative pest control

This Output aims to increase famers and future agronomists' knowledge on available alternatives and their use of through advisory services. In that way, the growth of the market share of alternative products could accelerate, lowering their price and driving further innovation. Currently, these advisory services are oriented towards conventional crop production and agronomy formal education is focused on chemistry. This Output will aim to extend this advice to commodity production or family or domestic market food production and include biological and alternative pest control in agronomy education curricula.

As per the TOC (Fig 7), this output will support Objective 2 on farmer incentives on alternative crop management approaches.

Activities under this Output across different child projects may include the following:

- Enhancement of extension and education curricula to include modules on finance (economic decision-making, access to investments and financial management) and sustainable agricultural practice (local knowledge and practices, regenerative agriculture and other alternatives to agrochemicals and agri-plastics, and their sustainable management) (UNEP/FAO).
- Strengthening the capacity of national extension units, technical advisers, farmers and other key public and private stakeholders in crop production (promote sustainable agricultural practices, demonstrate how to increase income and reduce the use of harmful agrochemicals, commercial development for export through agricultural practices that encourage the use of integrated pest management) (UNDP) UNEP/FAO).
- Establishment of national and regional technical advisory mechanisms to identify, design, demonstrate and promulgate (through appropriate or new channels) innovative solutions and sustainable usage practices on alternatives and agricultural plastics (UNEP/FAO).Increasing access to relevant courses at higher education level (Professional Masters) on chemical risk management and creating modules on finance and investment and other relevant experience and lessons from the FARM programme (UNEP).

Private sector commodity and certification schemes will play an important role in this output, by sharing experience and tools that currently exist, and by aligning their own scale up and expansion strategies to include more farmers, with the FARM child projects. The FARM programme will seek to bring the least connected and smallest scale farmers into such existing programmes in a sustainable manner. Value chain actors' experiences and perspectives will be proactively sought and shared with all child projects and countries via the KM platform and output 3.3.

Output 3.2 Provision and uptake of professional crop advisory and plastic management services

Under this Output, support and trainings on professional crop advisory and plastic management services will strengthen farmers' capacity on the use of alternatives for hazardous pesticides and agri-plastics.

As per the TOC (Fig 7), this output will support Objective 2 on accessibility and incentives for farmers to adopt alternative crop management approaches. It will also support Objectives 1 and 3 by strengthening markets and demand for commercialization of alternatives and waste management services.

These can include any of the below activities:

- Training of relevant stakeholders in formulations, production, and application of the alternatives through skill development training, where field trips to other countries for relevant stakeholders and workshops organized for potential buyers, farmers, processing enterprises, and pesticide manufacturers (UNIDO).
- Pilot activities demonstrating how farmers can increase income and reduce the use of harmful agrochemicals in priority crops for export and domestic consumption through farming practices that encourage an agroecological approach through integrated farming and integrated pest management (IPM), including less toxic options, non-chemical alternatives and cultural procedures conducted (UNDP).

This output will seek to strengthen a diversified agronomy and crop production and protection private sector in rural areas, with availability and access to various technical and financial services by commercial farmers (primarily). The output will benefit from cross-linkages via the global KM platform to other outputs notably on biocontrol and agroecological alternatives (output 1.2) and on financial services (output 2.3 and 2.4).

Output 3.3 Global access to knowledge and best practices available and used to inform and drive scaling up of low/ no chemical agriculture

Under this output, the information and resources developed under the different programme components and child projects will be collected and shared on a global platform established under the global child project. Knowledge management will be improved by providing a space for knowledge exchange instruments, and long-term engagement through active communities of practice.

The platform will build on the working groups/communities of practice on technology and innovation, inclusiveness, behavioral insights, sustainable infrastructure, natural capital, and green growth and the law, established in the GGKP and, include linkages to existing platforms (e.g., FOLUR, Resilient Food Systems or Green Commodities Programme). FARM will further leverage on GGKP's comprehensive communications and outreach program that includes in-person events, active webinar series, and broad social media engagement.

The platform will facilitate the tracking of data and progress on regional, national and global level and ensure knowledge is accessible to stakeholders. This output responds directly to the difficulty of building the necessary capacity and knowledge dissemination on effective alternatives at all levels particularly farmers and regulators. It will curate, format and generate case studies and knowledge products from this data and disseminate them to key stakeholders and broader audiences.

As per the TOC, this output will support Objective 2 on accessibility and incentives for farmers to adopt alternative crop management approaches.

Specific activities under this Output may include:

- Identification of appropriate ICT tools for information sharing to inform and drive scaling up of alternatives and sustainable management practices for agrochemicals and agri-plastics (UNEP/FAO).
- Establishment of a digital hub that will be a repository of knowledge and experiences from project implementation and serve as a hub to introduce the market information on participated pesticide manufacturers and farmers (UNIDO).
- Promote the exchange of knowledge and experiences in South-South cooperation schemes and among the actors of the global program to strengthen the capacities of the regions in sustainable development of agriculture, considering buyers and producers, to ensure motivation in the use of best environmental practices to offer sustainable products through the global component (UNDP).
- Synthesising, developing and packaging knowledge products between child projects and for the benefit of all participating countries, including engagement with the SAICM Community of Practice on HHP (all Agencies).
- Creation, delivery and monitoring of a comprehensive FARM communication and outreach strategy, including visual identity and stakeholder engagement plan (UNEP).
- Coordination and consolidated monitoring and reporting on performance and results of the FARM programme (UNEP).

1.4. Alignment with GEF focal area and/or Impact Programme strategies;

The programme is aligned with the GEF-7 Chemical and Waste Focal Area Programming Directions and Strategy. The programme will support the reduction and elimination of most harmful chemicals primarily associated with the Stockholm Convention, and HHP addressed by SAICM and the Rotterdam Convention. The programme specifically responds to the GEF-7 Strategy vision for a programmatic approach to addressing Agrochemicals, in a fully integrated focal area initiative aligned with Sectoral investments, government policy in agriculture, and the GEF 7 Impact Programme on food systems (FOLUR). The FARM programme explicitly addresses the following commitments in the GEF 7 Strategy:

- Addressing agricultural chemicals listed as persistent organic pollutants under the Stockholm Convention.
- Supporting investment in actions to introduce and encourage the adoption of sustainable alternatives.
- Targeting the reduction of Endosulfan, Lindane and highly/severely hazardous pesticides that enter the global food supply chain;
- Addressing end of life, waste and obsolete POPs and management and safe disposal of agricultural plastics contaminated by POPs and HHP.

With the inclusion of multiple LMICs (Ecuador, India, Kenya, Laos PDR, Philippines, Uruguay, and Viet Nam), the programme will also contribute to GEF-7 goal of addressing the sound management of chemicals and waste through strengthening the capacity of sub-national, national, and regional institutions and strengthening the enabling policy and regulatory frameworks in these countries. As noted in the baseline, the capacity of agricultural agencies charged with tackling these issues is particularly low and in urgent need of strengthening through programme described interventions.

The programme will support GEF-7 ambitions to accelerate the shift to more sustainable 'green' production technologies, including manufacture of biocontrol and less hazardous agrochemicals, and increasing production of certified commodities and agricultural production for domestic consumption. This will be catalysed by knowledge and evidence building; by redirecting finance flows from public and private sector towards the adoption of sustainable agricultural practices which reduce reliance upon harmful agricultural chemicals now and into the future; and by integrating and involving global commodity and private sector partners.

1.5. Incremental/ additional cost reasoning and expected contributions from the baseline, the GEFTF, LDCF, SCCF, and co-financing;

GEF resources will be used to leverage change and scale up effective measures that already exist in pockets around the world. The programme will accelerate uptake of the baseline of sustainable production practices that reduce reliance upon and prevalence of harmful chemicals in the agriculture sector, by catalysing investments made by governments, farmers, and the private sector and shifting existing investments towards more sustainable production methods that reduce harmful agrochemical use at a global scale. The programme will contribute to ongoing global, regional, and national efforts to shift to sustainable production patterns (see Programme Justification above & Baseline).

The programme is strongly incremental with the multilateral development bank child projects. The Asian Development Bank's '*Climate Smart Agriculture Value Chain Infrastructure Project'* involves multi-million-dollar investments by governments into the agriculture sector and is an example of the kinds of investments that FARM is targeting to include positive criteria for use of alternatives, phase out of HHPs and ESM of hazardous agricultural chemicals. By working closely with these initiatives and connecting them with the UNEP Finance Initiative's tools and methodologies (particularly Principles for Responsible Banking), the FARM programme will provide a pathway to facilitate global amplification of improved investment and financial incentives.

The programme also builds on a considerable baseline of successful pilot experiences by Agencies, countries, civil society, and the private sector on demonstrating alternative pest management, managing hazardous agricultural wastes, and developing policy and economic instruments for SMCW (see Baseline section). The global child project will allow the programme to collect and facilitate access to these experiences, and the programme will focus on replication and rapid expansion rather than continuing the previous GEF practice of funding pilots and demonstration initiatives. The close links with private sector partners (see section 4), including commodity certification schemes, chemical input manufacturers and distributors, and the biocontrol industry, will all be critical for scaling and expanding on their existing work.

A global programme has the advantage of leveraging more resources than single countries or regions and attracting the private sector investments which are more sustainable at a scale not achievable by single country as well as promoting exchange of knowledge and experience across regions which would not be possible with regional interventions. It is recognized that GEF resources are limited so the use of this programme to leverage additional support to countries/regions and identify opportunities for future investment into the public and private sector is a one of the key elements in the programme design. This will include assistance from development banks, national resources, as well as the private sector through incubation and acceleration of entrepreneurship in these regions.

1.6. Global environmental benefits (GEFTF) and/or adaptation benefits (LDCF/SCCF);

GEF FARM will deliver Global Environmental Benefits contributing to the following GEF-7 indicators, including Chemicals & Waste focal area and co-benefits in other focal areas (in italics in the table). Quantitative targets are included within child project proposals and summarized in the Core Indicators table (Table 3) and Annex.

Table 3: Summary of Global Environmental benefit targets

Core Indicator	FARM intervention/ results - please see Core Indicators for POPs break down by chemical
9.1 Solid and liquid Persistent Organic Pollutants removed or disposed (POPs type)	Tonnes of POPs pesticide manufacture and trade phased out or prevented - Endosulfan, lindane, sulfuramid and dicofol; methoxychlor and chlorpyrifos as candidate POPs Co-benefits: *Additional HHP reductions*
9.4 Number of countries with legislation and policy implemented to control chemicals and waste.	HHP de-registrations and registrations of alternatives; Monitoring & enforcement of POPs bans Subsidies reformed; Investment targets and criteria on agrochemicals applied
9.5 Number of low chemical/non-chemical systems implemented particularly in food production…	Number of farms/ area with improved no/low chemical pest and crop management including soil health and landscape benefits Co-benefits: *3.1 Area of degraded agricultural land restored* *4.1 Area of landscapes under improved management to benefit biodiversity* *4.2 that meet national or international third-party certification that incorporates biodiversity considerations*
9.6: Quantity of POPs/Mercury containing materials and products directly avoided	Increases in volumes of alternatives / biopesticides used, including migratory pest control; Increase in volumes of certified commodities, i.e., tonnes of produce no longer containing POPs and HHPs residues
10: Reduction, avoidance of emissions of POPs to air from point and non-point sources	Management of plastics (Tonnes collected) and reducing open burning Co-benefits: *6.1 Carbon sequestered, or emissions avoided in the AFOLU sector* *5.3 Marine litter avoided*
11: Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment:	No of farmers reached and no longer using POPs or HHP pesticides Numbers who are connected to certified value chains or accessing extension advice.

1.7. Innovation, sustainability, and potential for scaling up

1.7.1.Innovation

This programme will represent one of the first concerted efforts to reduce the use of harmful agrochemicals on a global scale using an integrated approach linking international conventions, multilateral development banks (MDB), national agriculture and environment agencies, commodity groups, agrochemical and agri-plastic manufacturers, and farmers. The programme will assist to link and improve the efficiency and effectiveness of information flow between each of these stakeholder groups, and generate improved approaches and templates for addressing the perverse incentives that drive the use of harmful agrochemicals, while leveraging finance towards the broader adoption of low and non-chemical alternatives. This will include regulatory frameworks, financial incentives and access to knowledge required to uptake improved approaches. The programme will target and engage the private sector along with investors to make sure impacts are sustained.

At a child project level, the programme will stimulate and develop innovations related to the design and implementation of regulatory frameworks and enabling environments for the agriculture sector that fully integrate and address the issue of harmful agrochemical use. The programme will catalyse research and information related to the improvement of agriculture practices designed to assist farmers with evidence-based results proving that sustainable agriculture that reduces reliance upon chemicals can deliver productivity that results in global environmental benefits, healthier communities, and strong investment returns. This includes agricultural value chain commercialization, food safety, and usage reduction of agrochemicals in targeted crops. The ADB child project and partnership with Croplife will introduce plastic and chemical waste management in a government investment programme, while UNIDO's project will directly engage the biocontrol industry association to promote innovative solutions for accelerating biocontrol registration solutions. UNEP's project will apply new guidance on setting positive targets for commercial banks and other investors to explicitly include chemical and waste issues in rating and monitoring frameworks for sustainable agriculture. UNDP's child project in Ecuador will create financing programs and promote risk management of value chains, applying concepts of green recovery considering environmental quality criteria (pollution), adaptation and mitigation of climate change while UNDP's child project in Laos PDR will partner with financial institutions including commercial banks in strengthening their capacity on environmental and social safeguards and responsible investment in the agriculture sector. The UNEP-FAO project will assist governments to establish minimum product standards and mandatory requirements for EPR schemes for unwanted pesticides, empty containers and agriplastics. It will facilitate the industries (Croplife, Agricare and CIDAPA and other agriplastics associations) to expand the existing voluntary container management collection schemes based on global best practice. In addition, through UNEP/FAO child project will promote regional collaboration and harmonization of policies and practices to optimize inclusive and sustainable economic development within and across the two regions (Africa and Latin America). These initiatives include harmonized pesticide regulation and regional based bioeconomies. The programme will assist with the development of new technologies and approaches to addressing agricultural waste and associated environmental harm. Each of these innovations will be replicated and amplified globally through the global child project.

1.7.2.Sustainability and Potential for Scaling Up

The programme theory of change directly targets all three pillars of sustainable development (see Fig 7). Environmental sustainability is the focus of the programme's proposed interventions. This includes promoting the reduction of harmful agrochemical and agri-plastic use through the expansion of sustainable farming practices and will contribute to the SDGs 6 on clean water, 14 on seas, 15 on life on land. The programme also explicitly aims for social (SDG 5 gender, SDG2 on hunger, SDG 3 on health) and economic (SDG1 poverty, SDG 8 decent work) results, which will ensure the relevance to communities and decision makers.

It is estimated that over 2 billion people worldwide work in agriculture and the sector generates more than US$ 3.4 trillion annually[148]. In LDCs, agriculture employs more people than any other industry. The potential for scaling up is vast. The programme has been designed to integrate and promote up-scale and amplification of successful experiences, for example by building capacities at the global, regional, national, and producer levels to access and share information and results. The programme's sustainability will be ensured through integration and embedding of results with global and national decision-making frameworks. Globally, the close involvement of the Stockholm Convention Secretariat and linkages with international private sector (agrochemicals, biocontrol, and crop certification and commodity schemes) will provide opportunities to consult with and provide solutions for a much wider range of stakeholders than those directly involved in the programme. At national levels, programme investments will be designed to ensure that government agencies and associated funding policies are re-oriented to provide a more stable financial footing to support established solutions, rather than one-off interventions to train or build capacity directly for farmers, regulators or other beneficiaries.

The Association of Southeast Asian Nations (ASEAN) and its member countries, which includes the Philippines, have developed guidelines on regulation and use of biocontrol agents. In many countries in Asia, laws and regulatory framework as well as financial investment and incentives related to biopesticides, better agricultural practices, etc. have been established. However, certain criteria and requirements are set that impede implementation and enforcement. Existing infrastructure on biopesticide formulations, production and application in those countries needs to be upgraded with advance technologies. Training as well as awareness on the challenges and benefits of crop protection solutions will be conducted to all relevant stakeholders including decision makers, pesticide manufacturers and associations (also small and medium-sized enterprises), farming communities, academia, civil society, NGOs, women associations, public and private sectors. Successful implementation of the UNIDO child project will put a step for further replication to other countries in the Asia region.

The child project in Ecuador will aim to connect local and global practitioners and decision makers from governments, civil society, and businesses of other countries. The child project will use the global component to connect international buyers and local producers, to ensure the buyer motivates the producers in using best environmental practices and best available techniques to provide responsible products Component activities will aim to strengthen practitioners' capacity – virtually and through inspiring face to face encounters and events – on issues relevant across multiple crop supply chains and landscapes. This will foster a community of practice among participating countries and will allow for the sharing of successful models with a wide range of global actors and stakeholders.

The child project in Laos will require engagement with its neighboring countries to improve the controls of imports through porous borders, it will also benefit from the lessons learned and sharing of experiences from the GEFID 9724 "Phase-out of Endosulfan in China". Proper trainings for relevant authorities will be required as result of the improved Legal Framework and strengthen cooperation with bordering countries as part of the regionally harmonized approach to avert illegal imports and trade of hazardous chemicals will be promoted.

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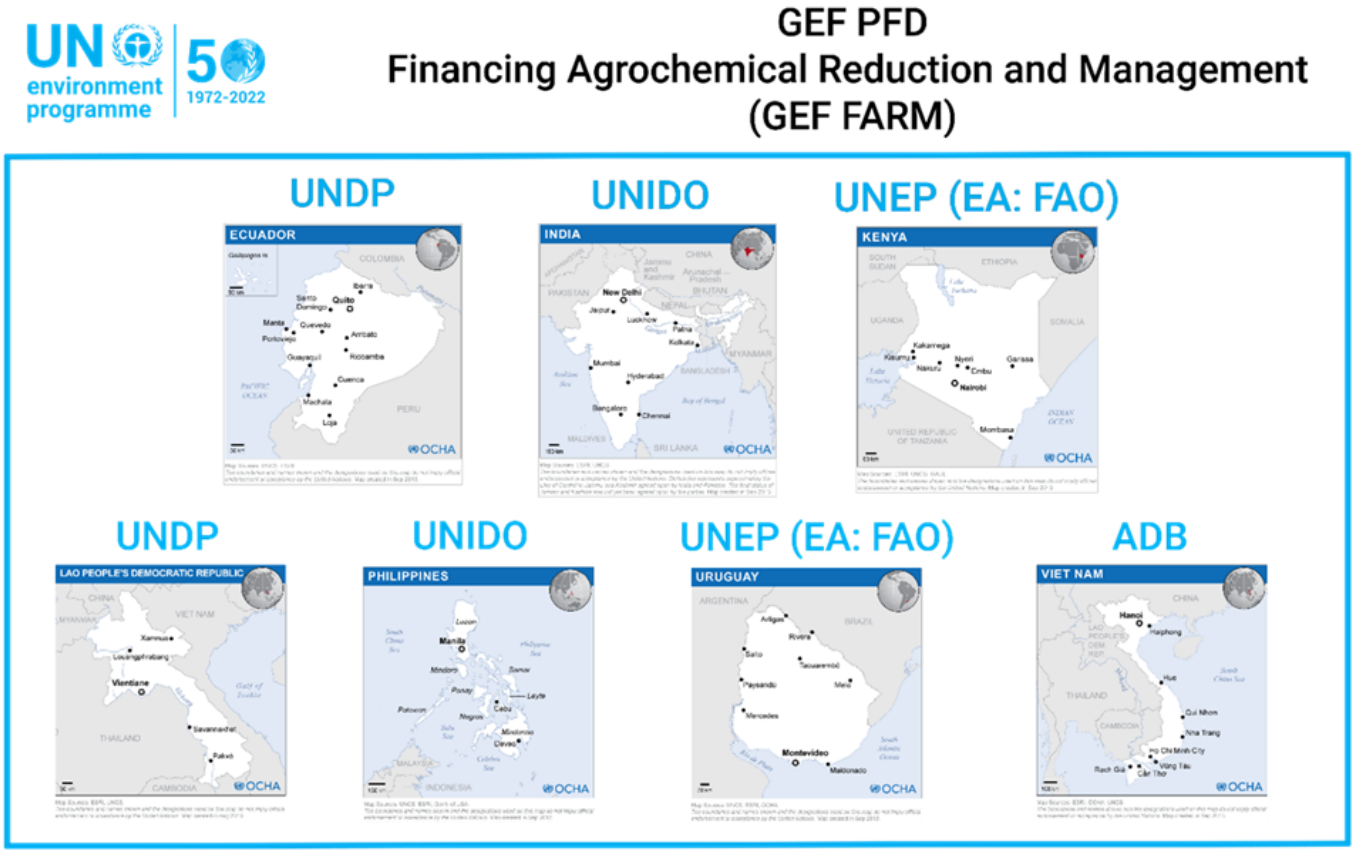
1b. Program Map and Coordinates

Please provide geo-referenced information and map where the program interventions will take place.



The designations employed and the presentation of material on this map do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

This map is intended for illustrative purposes only, and should not be used to derive any information regarding the project's operations. Based on OCHA/ReliefWeb retrieved from HTTPS:/reliefweb.int/location-maps

2. Stakeholders

Select the stakeholders that have participated in consultations during the program identification phase:

Civil Society Organizations Yes

Indigenous Peoples and Local Communities No

Private Sector Entities Yes

If none, please explain why:

In addition, provide indicative information on how stakeholders, including civil society and indigenous peoples, will be engaged in the program preparation, and their respective roles and means of engagement

The PFD was developed through extensive consultations with a network of stakeholders from government ministries, convention secretariats, civil society and non-government actors, farmer associations, national and international research institutions, private sector representatives (including commodities platforms, sustainable initiatives, agrochemical and biocontrol industry associations and investment institutions), multilateral development banks and intergovernmental agencies.

This complex array of stakeholders will be engaged via the Child Projects more intensively during the PPG phase, providing meaningful opportunities for farmers, civil society, private sector, and financial institutions to participate in project design and implementation. Without the full participation of farmers and private sector, investments risk not adequately addressing the issues required to incentivize improved production behaviours. Stakeholder engagement will follow the general practices and guidelines of the relevant agency and GEF. Each of the Child Projects will use a consistent approach, based upon best practices, and refined to match the unique needs of relevant stakeholders. This includes, where necessary, “Free, Prior and Informed Consent” protocols with particular attention given to issues of indigenous peoples, gender, and marginalized groups. Issues of gender are important to the agriculture sector in general and within the realm of agrochemical use, and each PPG will be requested to specifically analyse gender issues and guarantee meaningful engagement with women and women’s groups in their stakeholder engagement plans.

The following list of stakeholders have been identified and approached by the child projects. The list will be further developed and completed during the PPG phase.

Stakeholder	Role and Means of Engagement
International Agencies	
UNEP	Lead Implementing Agency (IA) for the global programme as well as several child con

	cepts, including a Global Project for Coordination, Knowledge Management and Common Finance Tools.
UNDP	Implementing Agency for Laos PDR and Ecuador Child Projects aimed at enhancing the countries' capacity in agrochemical management and financing the reduction of hazardous inputs, as well as the adoption of alternatives
FAO	Will engage in the development and execution of the inter-regional child project in Africa and Latin America (pilot countries: Kenya and Uruguay)aimed at increasing sustainable finance towards the adoption of alternatives and sustainable management of agrochemicals and agri-plastics through the regional economic communities, EAC and MERCOSUR.
UNIDO	Implementing Agency for Child Project in India, Indonesia and Philippines targeted at promoting the formulations, development, production, and application of eco-friendly crop protection alternatives to POP pesticides and Highly Hazardous Pesticides in Asia
Asia Development Bank	Implementing Agency for Child Project in Viet Nam primarily focused on building infrastructural capacity of climate-smart agricultural value chain
Stockholm Convention Secretariat	The Secretariat has provided review and technical inputs into the PFD and will support the programme and country requests for NIP implementation, exchange information, build awareness, support innovative research, provide regular reporting, and secure adequate financial mechanisms.
The Strategic Approach to International Chemicals Management (SAICM)	The Strategic Approach to International Chemicals Management (SAICM) Secretariat has been facilitating a multistakeholder process to develop a Global Plan of Action to help support and guide implementation. SAICM specifically includes and addresses issues related to agrochemicals as well as waste management. The Secretariat will be involved in promoting knowledge exchange and consultations at global level.
The Rotterdam Convention	The Rotterdam Convention is co-hosted by UNEP and FAO and will be engaged during the project to support countries in pesticide surveillance and reporting.
IFAD	Will be engaged to help identify investment opportunities to support and upscale improved practices.
The World Health Organization (WHO)	The World Health Organization (WHO) assists with identifying Agrochemical risks to human health. WHO has published the "Recommended Classification of Pesticides by Hazard", "Exposure to Highly Hazardous Pesticides: A Major Public Health Concern". WHO currently lists 28 pesticides as Class Ia and 57 as Class Ib. WHO works along with FAO to fulfil the SAICM ICCM recommendations on HHPs. These organizations hav

	the FAO to fulfil the GATCW/IOCW recommendations on HHP's. These organizations have prepared "Guidelines on Highly Hazardous Pesticides" and the "International Code of Conduct on the Management of Pesticides".
Regional organizations	The programme will work through a host of regional organizations, such as the East African Community and the Andean Community, to help catalyse investment and policy support to the generation and upscale of innovations. The programme will also engage these regional organizations to assist with monitoring POPs interstate transport and use.
Governments	
Ecuador, India, Indonesia, Kenya, Laos PDR, Philippines, Uruguay, Viet Nam	Ministries of agriculture, industry, health, environment, finance, and customs will support a child project, including engagement of agencies responsible for environment, agriculture, and finance and planning.
Academic and Research Institutions	
CGIAR centres	CGIAR centres develop and validate alternative crop protection techniques and technologies that can reduce reliance on pesticide while preserving yield and profitability. CGIAR centres have conducted research on the determinants of pesticide use, pesticide safety behaviour and the process leading to pesticide lock-in in Asia, Africa, and South America. The techniques and technologies range from microbials and botanicals, resistant variety deployment, habitat manipulation for natural enemy conservation, to pest behavioural manipulation through sex pheromone and trapping techniques.
Institute of Pesticide and Technology (IPFT), India	IPFT will be engaged in upscaling the biopesticide formulations and provide skill development training to all relevant stakeholders
NGOs and society organization	
The Pesticide Action Network (PAN – UK)	The Pesticide Action Network (PAN – UK) is actively engaged globally in phasing out POPs and highly hazardous pesticides. For instance, FAO and PAN collaborate in Africa and the Pacific to gather evidence on the health hazard of pesticides and to train pesticide regulators.
Farmers and producer associations	Farmers are the key stakeholder in this programme. They will be fully engaged in the design and implementation of FARM interventions
Pesticides Manufacturers and Form	PMFAI represents over 250 India-based pesticide manufacturers, formulators and traders. The association works with research and social society partners as well as liaise

ulators Association of India (PMFAI)	with a number of pesticides association worldwide having common interest under the BioProtection Global Federations
Regional Network on Pesticides for Asia and the Pacific (RENPAP)	UNIDO/RENPAP promotes the use of eco-friendly pesticides formulations containing biodegradable biopesticides and conduct skill development training through its Technical Coordination Units (TCUs) in 17 member participating countries in Asia.
Industry Based Initiatives	
The ISEAL Alliance	The ISEAL Alliance has collated some of the most credible sustainability standards and organizes producer organizations and supply chain actors to work collectively. ISEAL members recently established the IPM Coalition with an online data base to support reduction of harmful agrochemicals.
The Better Cotton Initiative (BCI)	The Better Cotton Initiative (BCI) supports several national, regional, and global initiatives to address the sustainability challenges of cotton production. The initiative encompasses nearly twenty percent of global cotton production and is growing with target of thirty-percent total by the close of 2020. There are two million farmers participating farmers in 29 different countries. This includes nations such as China, India, Pakistan and South Africa with large cotton sectors and heavy dependence upon agrochemicals. The BCI works with 2 million farmers covering more than 2.6 million hectares in 21 countries.
Fairtrade International	Fairtrade International connects farmers and workers with the people who buy their products with criteria standards covering a range of economic, environmental, and social criteria. Organic production is promoted and rewarded by higher Fairtrade Minimum Prices for organically grown products. Fairtrade works with 1.6 million farmers covering 2.3 million ha in 73 countries.
GlobalG.A.P.	GlobalG.A.P. began as an initiative by retailers to address consumer concerns regarding product safety, environmental impact and the health, safety and welfare of workers and animals. GlobalG.A.P. harmonized standards and procedures to develop an independent certification system for Good Agricultural Practice (G.A.P.). This is now one of the world's leading farm assurance programmes, translating consumer requirements into Good Agricultural Practice in more than 135 countries.
The Global Coffee Platform	The Global Coffee Platform is a multi-stakeholder platform that works as an advocacy organization on behalf of coffee producers internationally.
The Global Alliance for Climate-Sma	The Global Alliance for Climate-Smart Agriculture (GACSA) is an inclusive, voluntary, and action-oriented multi-stakeholder platform on Climate-Smart Agriculture (CSA). GA

rt Agriculture (GACSA)	CSA is housed within FAO and aims to address the challenges facing food security and agriculture by tapping the wealth and diversity of resources, knowledge, information, and expertise, from and between its members. GACSA works to improve food security, nutrition, and resilience in the face of climate change. Platform efforts include assisting private industry members to reduce reliance upon harmful agrochemicals.
Private Sector	
Croplife International (CLI)	CLI together with its six member companies was engaged in the PFD development at a global and child projects level. CLI will engage establishing mechanisms for eliminating POPs and disposal of stocks and unwanted pesticides, management of contaminated plastics, and supporting farmer advisory services, through technical support and financial contribution
International Biocontrol Manufactures Association (IBMA)	The International Biocontrol Manufactures Association (IBMA) has over 254 members and is the global representative the biocontrol industry. They were engaged during the PFD preparation, providing baseline information at global level and in child project consultations. It will engage in development and demonstration of biopesticides and integrated pest management practice.
BioProtection Global (BPG)	BioProtection Global (BPG) is a worldwide federation of biocontrol and biopesticides industry associations with regional associations of biopesticide manufacturers in Africa, Latin America, and Asia.
Producers	The programme will engage with a host of small, medium, and large-scale agriculture producers through each of the child projects
Manufacturers and Distributors	The programme will engage companies responsible for refining, manufacturing, and distributing agriculture sector products. This may include working with these companies to support traceable, value chains designed to increase incomes and incentivize sustainable production that reduces POPs.
Suppliers	The programme will engage agriculture input suppliers – including those who supply agrichemicals, seeds, equipment, etc. – required to support sustainable practices.
Agrocare—the association of manufacturers of off-patent pesticides	Agrocare will be involved in eliminating POPs and harmful agrochemicals, developing alternatives/biopesticides, funding and organizing the management of agrochemical waste
Agricultural Plastics trade associations	Associations of manufacturers and distributors of agriplastics such as Comité Iberoamericano para el Desarrollo y Aplicación de los Plásticos en la Agricultura (CIDAPA) will be engaged to fund and organize the EPR schemes for collection and recycling of agriplastics
Waste Manageme	The programme will engage with private waste management companies through child

nt Companies	concepts.
Financiers, Investors, and Banks	The programme will engage with private sector financial institutions and investors to drive forward investment in sustainable production and waste management practices designed to reduce POPs

3. Gender Equality and Women's Empowerment

Are gender dimensions relevant to the success of program? Yes

If yes, please provide indicative information on these dimensions and how these will be addressed in the program. If no, please explain why

In all countries to be targeted by this programme, rural women are important players in the agriculture sector. According to the ILO (International Labour Organization), 66% of women in low-income countries are employed in agriculture compared to just 2% in high income countries[1]. Although women are critically important to the sector, women generally have less prospects to advance. Rural women are often marginalized from decision making and educational opportunities. Women are often engaged in field work and/or subject to 'take-home' exposures by cleaning clothes and equipment used for pesticides, and are, as a result, disproportionately affected by harmful exposure to agrochemicals. Even if hazardous substances, chemicals and wastes reach and expose populations equally, other factors determine the extent of repercussions and ramifications of these on population subgroups. These include:

- poverty and socioeconomic status;
- gender-based and customary norms;
- health access and equity; and
- overall representation in decision-making processes and management policies relating to chemicals and wastes.

Participation of women in agriculture as a percentage of registered farmers varies between countries in LMIC. Agriculture constitutes an important source of income and employment for women. Low participation rate of women is related to gender-based inequalities related to different factors including difficulties to access land, financial capital, technology and market information. Informal land tenure, that is frequent in LMIC, translates to fewer and less valuable loans due to lack of collateral. Other factors contributing to gender inequalities are related to underrepresentation of women in producer associations and disproportionate household workload distribution that leaves women with less time to participate in agricultural activates.

Gender responsive measures to be undertaken by the project and included in the framework gender action plan and include:

- A gender-specific outreach campaign for project stakeholders to ensure women are targeted and reached as part of communication activities; and
- Training on gender awareness-raising and capacity building at each regional child project inception meeting.

Targeting women and opening opportunities for women to actively engage and contribute to positive change in the agriculture sector is and will be an increasingly critical dimension as the programme moves forward. As SAICM states in the publication *Gender and the Sound Management of Chemicals and Waste*: "*Understanding gender roles in agricultural communities can create opportunities to unpack root causes of unsustainable behaviour in communities and has potential to support transformational change*."[2]

The programme design encompasses targeting specifically to catalyse elevated involvement by women and to promote opportunities to empower women. This includes addressing regulatory and institutional barriers that may inhibit the ability of women to move forward, including addressing issues related to financing and access to financing to allow women to invest in sustainable agriculture that limits reliance upon harmful chemicals. Examples may include models designed specifically to meet the needs of rural women and create cohorts of women for farmer field schools or agri-business opportunities; providing entry points for actions that are often weak points for gender parity within production approaches; promoting opportunities to increase financial independence and secure higher levels of meaningful involvement in decision-making; opportunities to reduce unequal labour aspects, and, importantly, increase the health and nutrition of households through reduction in the use of harmful agrochemicals. During the PPG and throughout programme implementation, the child projects will monitor gender differences in key aspects that have been identified in research and scientific literature, including potential differences in access to finance, awareness and knowledge of chemical risks and of alternatives, and the resulting behavioural differences. For example, studies in China have suggested that women's lower awareness of pesticide risks may influence their personal protection choices[3]. By closely monitoring such differences and effects, the programme Gender Action Plan will continuously revise and modify the implementation of all child projects, for example by rolling out gender-sensitive and differentiated awareness and access to finance initiatives, to ensure effective mainstreaming and women's full participation and benefit from FARM.

The programme will integrate, disaggregated, and closely monitor indicators that are gender specific. This will include monitoring and capturing of best practices focused upon women empowerment and feeding these practices and lessons learned in knowledge platforms to encourage replication and amplification at national, regional, and global scales. Child projects will be informed by existing comprehensive Country Gender Assessments (CGAs) developed by FAO, providing up-to-date information about rural women and the gender gap in the broader agriculture sectors. These reports are specifically intended to assist with the formulation of evidence-based interventions and policies. These approaches and others will be clearly elucidated in gender mainstreaming and empowerment strategies to be developed during the PPG, as the child projects will develop detailed and geographically specific gender analyses, which will be consolidated by the UNEP Knowledge Management child project. A programmatic Gender Action Plan will be adopted and implemented by all child projects in a consistent manner, and with linkages to global networks and knowledge exchange for women in agriculture.

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[3] Wang et al (2017) Gender differences in pesticide use knowledge, risk awareness and practices in Chinese farmers (https://doi.org/10.1016/j.scitotenv.2017.03.053)

In addition, please also indicate whether the program the program will include gender sensitive indicators in its result framework

Yes

4. Private sector engagement

Will there be private sector engagement in the program?

Yes

Please briefly explain the rationale behind your answer.

The programme relies on strong engagement of the private sector. This includes agricultural production enterprises (especially those crops associated with reliance on POPs, HHP and agri-plastic inputs), farmers associations, value chains for agricultural products (buyers, processors, and sellers at all geographical levels), suppliers and distributors of production inputs and services such as extension advice, and private and public financial sectors who provide services to producers. During programme formulation, consultations included global private sector stakeholders including Croplife and the biocontrol industry associations, and at child project level with commodity organizations, national industries, and producers. During the PPG, further consultations will continue at local, country, regional and global levels.

Agricultural chemical input providers are engaged in the programme providing both technical perspective and financial support. Their networks of distributors and other baseline activities are essential elements of agricultural value chains in LMIC and LDCs, often the only source of information for farmers. The experience of voluntary container management schemes and stockpile disposal investments is relevant and available for scale up e.g. in MDB programmes. The manufacturers and their other supply chain stakeholders will be responsible for funding and organizing the mandatory EPR schemes for empty containers, unwanted pesticides and agricultural plastics Finally, they have experience of working with regulators in LMIC to introduce and support risk management measures to mitigate the risks of agrochemical products, including through stewardship schemes run by national members and distribution networks. They will continue to be engaged during the PPG at global level and in relevant child projects including ADB. The biocontrol industry is also a key stakeholder who has provided information and advice during the PPG, particularly around the regulatory, training and awareness barriers their member companies may face. They have supported development of the UNIDO child project including via their India national association and will also be engaged at global level to share best practices and information on alternatives with all child projects.

The commodity certification schemes identified by FAO serve over 5.5 million farmers, generating millions of dollars per year for farmer training and field activities, explicitly including agrochemical management, IPM and alternatives. These schemes will be further engaged during the PPG to ensure their contributions to the development of the child project, including those of MDBs and to achieve a step change in the membership and coverage of the schemes. Many major global private sector entities are already investing heavily in improving the sustainability of value chain elements from production in the field through storage, transport, processing, packaging, and sale. Working with a number of these entities – commodity specific or complex retail networks - would allow Programme investments to influence their protocols on pest management to remove recommendations for the use of harmful agrochemicals and replace them with sustainable approaches.

The finance sector is engaged via the UNEP Finance Initiative, with its Principles for Responsible Banking and network of member commercial banks all over the world, while FAO, UNDP and UNIDO are engaging investment centres and banks providing loans to small scale and large scale farmers. During the PPG a systematic review of financial institutions from all sectors who support agricultural investments and financial services will be conducted and engaged to inform the detailed planning of Component 2 on finance & investments.

The programme will put in place mechanisms to ensure this private sector engagement continues and is mainstreamed through the child project concepts' activities to unlock national and global capacity and resources to support reductions of hazardous agrochemicals and advance sustainable agriculture. The programme will support capacity building of identified private sector entities and small holder farmers to strengthen their relationship and improve access to finance for low/no-chemical production. Government capacities will be strengthened to establish an enabling environment for predictable, proportionate, and universal engagement of the private sector in transforming towards sustainable production practices that reduce reliance upon harmful agrochemicals while maintaining the productivity and profitability of this sector. The co-finance mobilized from the private sector includes commitments by both chemical and biocontrol industries and by farmer association and technical service providers (see Table C). These will be regularly reviewed and included in Programme level coordination reports by the global child project, to ensure maximum engagement by relevant private sector partners across all child projects.

5. Risks to Achieving Project Objectives

Indicate risks, including climate change, potential social and environmental risks that might prevent the Program objectives from being achieved, and, if possible, propose measures that address these risks to be further developed during the Program design (table format acceptable)

The following risks (Table 4) that might prevent the programme from achieving its objectives have been identified, ranked according to impact and likelihood, and linked to the different programme outputs. For each of the risks, mitigation measures have been proposed. This table will be used for the further analysis of risks and proposal of mitigation measures in each of the specific individual child project preparations.

Table 4. Project risks, impact and likelihood, proposed mitigation measures and links to programme outputs.

Risk	Impact	Likeli-hood	Proposed mitigation measures	Link to outputs
COVID-19 risks				
Restricted travel	Medium	Medium	Though most countries have reopened since the COVID-19 pandemic first hit, lockdowns and restricted travel measures continue. Meetings, workshops, and consultations will be held virtually as much as possible.	1.3 and 3.1
Decreased local support due to shifted priorities	Medium	Low	It is expected that countries' political priorities may shift to recovery from the pandemic. In order to ensure continued support, activities will be validated with the national stakeholders. The Programme offers the countries an opportunity to chart a new course towards transforming their food systems and take steps necessary towards the Blue and Green Recovery post-pandemic. By strengthening sustainable investment flows to non-contaminating agriculture, they can make strides towards greener economies.	All
Climate Change Risks				
Shifts in political priorities	Medium	Low	Due to the impacts of climate change, political priorities may shift. These impacts will be considered in the development and implementation of the	All

			programme.	
Delays in project outputs	Medium	Low-Medium	Considerations will be made for changes in the project execution timeline to minimize the probability of natural disasters affecting the project timeline, thereby delaying project execution.	All
Increased chemical pesticide and agriplastic use due to warmer weather leading to a rise of weeds and insect pests	Medium	Low	As climate change may increase the use of pesticides and agriplastics (irrigation and mulching), the programme will support farmers through regulations, finance, and capacity in the transition to no/low-chemical pesticides and alternatives to agriplastics or their sustainable use. Furthermore, the overall programme will promote sustainable agriculture practices that generate resilience.	All
Operational/delivery risks				
Political priorities, will and/or buy-in are not adequate for execution of key project activities	Medium	Low	The programme will engage with government stakeholder all throughout the development and implementation to ensure that the countries' national priorities are considered and that political buy-in is ensured. Furthermore, the national focal points will be regularly updated on the programme progress to guarantee continued support.	All
Changes in governments and country personnel to persons with little awareness and buy-in to the project	Low	Low	Information on the programme will be widely distributed to (multi-party) political stakeholders.	All
Investment programmes and access to finance are not adequate	Medium	Low	The investment programme's ability to reach the least connected smallholder farmers and the farmers' access to finance will be explored and quantified during the PPG.	2.1, 2.3, 2.4 and 2.5
Farmers behavioural change is not adequate	Medium	Low	During its implementation, the programme will be relying on the co-financers to reach out to the farmers. During the development and implementation of the programme, the relevant stakeholders will continue to be engaged to ensure their suppo	2.1, 2.3, 2.4, and 3.1

			will continue to be engaged to ensure their support.	
Private sector may not engage with the project	Medium	Medium	Some pesticides and agriplastics manufacturers may be unwilling to cover the costs of organizing and operating EPR schemes, and the cost recovery mechanisms for regulatory enforcement and other environmental and social externalities	1.1, 1.3 2.5, and 3.2
Striking a balance between ensuring active and expansive private sector participation and avoiding potential conflicts of interest	Low	Low	Maintaining transparency and ensuring full public disclosure of consultation opportunities	All
Technical Risks				
Inadequate data collection/reporting on POPs production and use.	Medium	Medium	POPs use has proven difficult to quantify due to illegal and under the radar use. The programme will work with and engage all stakeholders during the PPG and implementation to collect data.	1.1 and 1.3
Practical barriers and knowledge gaps mean that nonchemical alternatives are not as effective as hazardous chemicals	Low	Medium	Biocontrol options tend to be pest and crop-specific, making it more challenging for farmers to know which product to use. Some biocontrol agents such as insects face logistical challenges. These risks will be mitigated by cooperation with the biocontrol industry associations to predict and address potential problems.	1.2,
Social Risks				
Continued disregard for the environmental and health impacts of hazardous pesticide and agri-plastics use	Low	Low	The continued disregard of the impacts of hazardous pesticide and agri-plastics use will continue to reduce farmers income below its potential due to the loss of working days due to sickness and pesticide MRL exceedances. The programme aims to change this and will adopt participatory and behavioural science led approaches to ensure impactful education and awareness programmes.	2.2, 2.3, 2.4, 3.1, and 3.2

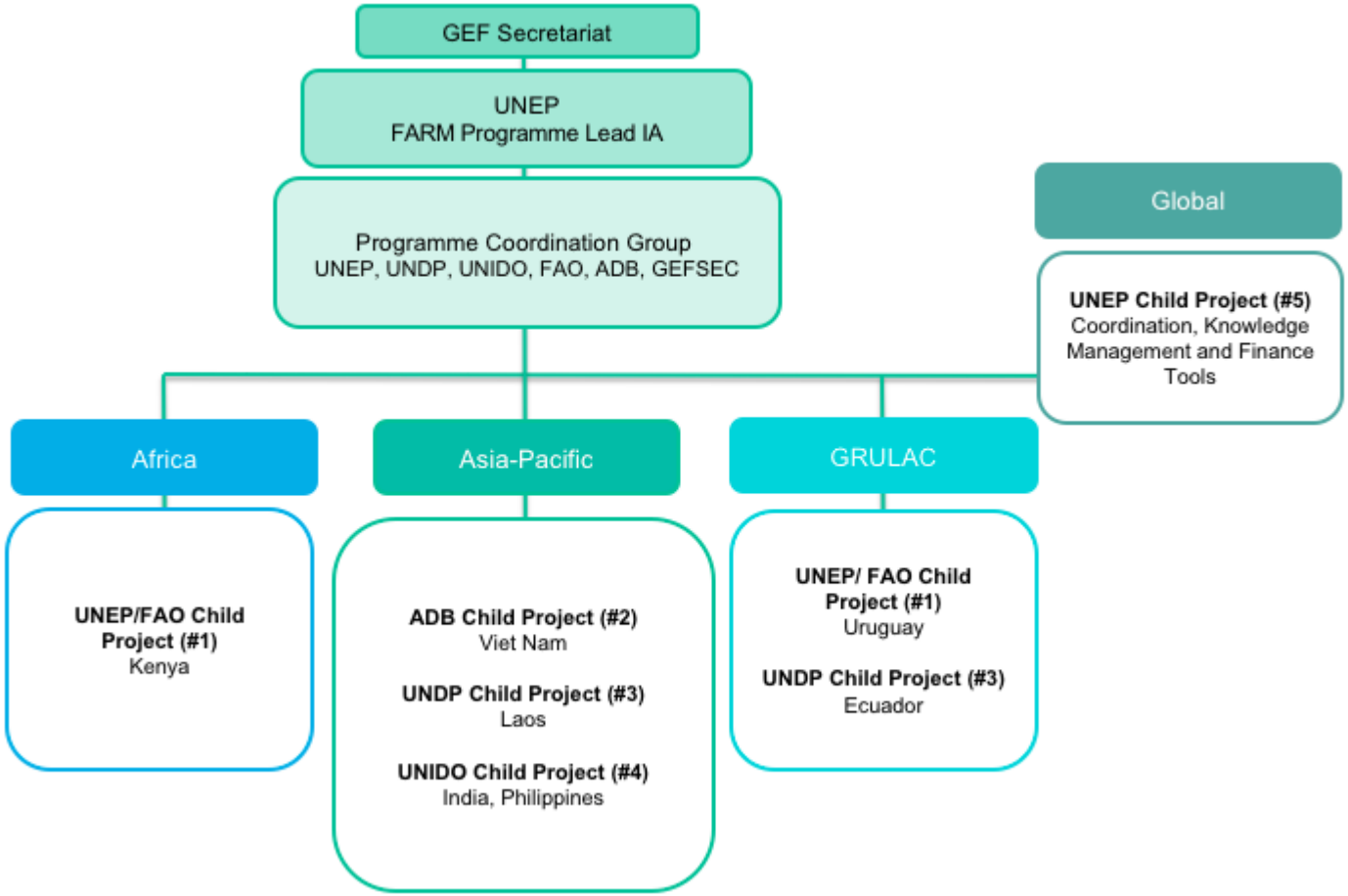
Economic impact on small-scale producers through regulations that support the phase out of cheaper POPs pesticides, HHPs and agri-plastics use	Medium	Medium	The programme will simultaneously support the creation of an enabling environment including reforming subsidies and economic support for biopesticides and less hazardous chemicals development, production, and application.	2.1 and 2.4
Indigenous people, women, and other vulnerable groups are excluded from decision making that may affect them	Medium	Medium	The development of safeguards instruments including environmental and social risks assessment, stakeholder engagement plan, gender action plan, and IP plan, when applicable, will identify the risks and measures to protect their rights and access to resources	All

6. Coordination

Outline the institutional structure of the program including monitoring and evaluation coordination at the program level. Describe possible coordination with other relevant GEF-financed programs and other initiatives.

The FARM programme is a multi-agency initiative that builds on the experience of several GEF Implementing Agencies (IA). UNEP has been designated as the lead agency for the programme, and as such will be responsible for the overall programme coordination and ensuring the results at national / regional level. This role includes the monitoring of progress and delivery of programme results as well as providing a platform for knowledge sharing and exchange of information to all project beneficiaries. Making knowledge accessible to all partners and ensuring knowledge transfer between regions is seen as a major mechanism for ensuring that the programme makes progress towards achieving intended objectives. UNEP will work the other GEF implementing and executing partners to ensure equivalence of standards and adoption of international best practice in the core components of the programme.

Figure 10: Programmatic Structure Organogram



The Agencies' child projects will be delivered by ADB, UNEP&FAO, UNIDO, and UNDP. A global Child project on Coordination, Knowledge Management and Finance Tools will be implemented and executed by UNEP. This child project will provide reports on progress to the Programme Coordinating Group (PCG) as part of the annual reporting and monitoring process. This project will design the Child Project reporting format, as well as other procedures and modalities for sharing information across the regional and national focused child projects. This modality will allow regions to learn from each other's experience and foster an environment of south-south cooperation through peer-to-peer learning.

Programme coordination will be supported through a Programme Coordinating Group (PCG). The PCG will consist of the GEF Secretariat and the Implementing and Executing Agencies for the Child Projects along with responsible government representatives. As viable with regards to Covid-19 (please see section addressing this) the PCG will meet face to face annually, taking advantage of existing events in the chemicals and wastes calendar such as Conferences of the Parties of the Basel, Minamata, Rotterdam and Stockholm Conventions and events linked to the Strategic Approach to International Chemicals Management (SAICM). This modality serves to reduce cost and provides the opportunity for further interaction with a wider network of project stakeholders from the beneficiary countries, private sector, and civil society through additional parallel events. The approach also ensures close collaboration with the Conventions and SAICM Secretariats. FARM will coordinate and exchange experiences with related programmes and other knowledge management platforms, including south-south collaboration approaches.

All monitoring activities will be developed to be fully in line with GEF policy. The global child project will prepare an annual report on programme-level activities and achievements beyond those of the Child Projects as presented in their respective implementation reports. These annual reports will include progress towards programme-level outcomes, major milestones achieved through overall programme implementation, and engagement in regional or global fora as means to advance the overall programme goal.

7. Consistency with National Priorities

Yes

Is the Program consistent with the National strategies and plans or reports and assesments under relevant conventions?

Each of the proposed child projects within the programme is consistent with national strategies, plans, reports, and assessments, as described in the child project documents. Agriculture is a significant sector in many countries, due to its position in the exports and jobs creation, with national plans and strategies that the child projects are coordinating with.

Each participating country is a signatory of and an active participant in the Stockholm Convention and has prepared NIPs as required including for the newly added POPs pesticides. As described in the programme framework, the child projects are designed specifically to comply with and strengthen work under the Stockholm Convention. The programme and associated child projects will be fully consistent with NIPs and be designed to assist government agencies increase capacity to improve NIPs implementation and relevant monitoring and reporting.

Within the framework of the UNIDO child project, it aligns with participating country strategies and plans to phase out and eliminate the use of POP pesticides and HHP. Some would be mentioned, such as the new Pesticides Management Bill (PMB), 2020 in Rajya Sabha in March 2021 in India to replace the Insecticides Act, 1968. The PMB aims to regulate the manufacture, import, sale, storage, distribution, use, and disposal of pesticides, while ensures the availability of safe pesticides and minimize the risk to humans, animals, and environment. In Philippines, the Republic Act No. 11511 was established in July 2020 to amend the Republic Act No.10068 to promote, propagate, develop further and implement the practice of organic agriculture in the country. This UNIDO child project is also aligned with the ASEAN Guidelines on the Regulation, Use, and Trade of Biological Control Agents (BCA) in 2014.

UNDP Ecuador: Ecuador is a party to the Stockholm Convention, which it ratified in 2004. Ecuador is also party to the Rotterdam and Basel Conventions and is a signatory to the Montreal Protocol. Ecuador has also taken important steps regulating pesticides and banning various substances (e.g. all pesticides classified as extremely hazardous by WHO were banned by the Ministry of Agriculture in 2010). The Government indicates strong willingness to further pursue actions in this same direction. The FARM program is aligned with the priorities identified in Ecuador's NIP (2009 and 2017), in which the management of POPs pesticides is listed as a priority. The following overall objectives were established on POPs in Ecuador's NIP (2009):

- Policy Strengthening;
- Strengthening of monitoring and evaluation capacity;
- Improvement of the management of PCBs;
- Improvement of the management of POPs pesticides;
- Reducing emissions of unintentionally produced POPs
- Management of contaminated sites;
- Information management, creating awareness and undertaking research.

UNDP Laos PDR: Laos PDR is a party to the Stockholm Convention, which it ratified in 2006. Laos PDR is also party to the Rotterdam and Basel Conventions and other Multilateral Environmental Agreements (MEAs). The updated NIP (2016) on POPs stockpiles found no endosulfan but it was reported to be in use, plus stockpiles of methyl parathion. Certain POPs have been reportedly used in Lao PDR; illegal imports of POPs pesticides such as chlordane, DDT, Dieldrin, endrin, and heptachlor were detected. In addition, various HHPs are known to be in use and made available both through legal and illegal channels.

Within the framework of the UNEP/FAO child project, there is alignment with participating country priorities, as there is intention to address pesticide and plastics priorities cited in Kenya's NIP and Uruguay's NIP update. Furthermore, the project will promote agricultural practices that promote conservation of biodiversity and reduce environmental pollution, as per the CBD, Cartagena and Nagoya Protocols National Reports. The UNEP/FAO project additionally enables the reduction of emissions through the reduced plastic usage and increased recycling as per UNFCCC Technology Needs Assessment.

8. Knowledge Management

Outline the knowledge management approach for the Program, including, if any, plans for the Program to learn from other relevant Programs and initiatives, to assess and document in a user-friendly form, and share these experiences and expertise with relevant stakeholders.

The programme is based upon the generation and dissemination of knowledge required to scale up the adoption of agricultural practices that reduce the use of harmful agricultural inputs. As detailed in the programme framework, each of the components will generate knowledge and information, which will be combined with a systematic review and compilation of existing and third-party experiences, lessons, case studies and tools. These will cover models for improved regulatory frameworks, establishment of financial policies to support investment in sustainable agriculture, innovating and implementing sustainable agriculture practices, and building capacity to prevent stockpiles of agricultural waste and its leakage into the environment. Literature indicates that there is a wealth of untapped traditional agricultural knowledge, especially among family/smallholder farmers in LMICs who have evolved food production and livelihood systems through traditional and ecological knowledge[1][2]. During the programme implementation, the global KM activities will coordinate engagement with relevant experts and networks, including FAO Indigenous Peoples Team and the Family Farming Knowledge Platform (https://www.fao.org/family-farming/background/en/). The tools and models developed under these components will feed into global, regional, and national knowledge management platforms. These platforms will be linked through a global network to be connected to the Stockholm Convention Secretariat, SAICM and Implementing Agency platforms including UNEP, FAO, UNDP, and World Bank (see baseline section 2.4).

Under the Programmatic knowledge management approach, each FARM Regional Child project maps to the programmatic output 3.3 on global knowledge exchange and learning (see Fig 7). Activities under Output 3.3 will generate knowledge within the scope of each child project (using tools and formats developed by the global child) and, provide input to the global child for dissemination to all FARM partners and beyond. It is expected child projects will include activities dedicated to the generation of case studies and sharing of knowledge on best practices and technologies related to chemicals, agriculture, and alternatives. These will include specific aspects related to COVID-19, and the need to prevent further impacts of zoonotic diseases. Child projects will also focus on development of regionally focused learning products aimed at all educational levels from primary, secondary and tertiary.

To facilitate this knowledge management approach, as part of the project preparation process, the Lead Agency will provide templates on knowledge management to each executing partner to elaborate and programme the development of knowledge management activities. It is expected that child projects will submit their respective knowledge management activities including budget, key deliverables, and timeframe. Templates will include pilot activities to establish, analyse and validate indigenous and traditional alternatives to promote local adoption and enhance better production and pest control. At inception, the project will compile this information into a Programmatic knowledge management plan, to guide project activities.

Information in these connected networks will be tailored and made available to stakeholders globally based on their needs and interests. During the PPG a comprehensive mapping and needs assessment will be conducted to identify the gaps in existing platforms and identify messaging on agrochemicals & agri-plastics, and opportunities to raise the profile of these issues in other platforms. The information and knowledge will enable government agencies and private enterprise to make informed, evidence-based decisions to reduce the use of harmful agrochemicals and agri-plastics. They will provide a rigorous system for

reporting and monitoring NIPs implementation and progress. This information will include standards and criteria for waste reduction and removal. The platforms will offer models for better regulatory and policy approaches while providing an agricultural pollution dimension to the current standards for agricultural investment adopted by lenders, thus financially incentivizing improved practices.

The FARM KM strategy to be developed and rolled out will target decision makers, farmers, and experts via global networks including a) governments and policy makers (e.g. via global and UN-convened networks such as SAICM); b) expert practitioners and researchers (e.g. https://agrinatura-eu.eu/), c) civil society and farmer associations (e.g. PAN network and Global Food Summit partners) and d) value chain stakeholders (e.g. Better Cotton Initiative, producers of chemical and biological pesticides). The participation of all FARM partners will be essential to achieve a comprehensive targeting of global audiences and relevant channels of communication and knowledge exchange. The knowledge products to be developed by child projects will be reviewed and presented by crop type, agroecological system, and governance type in order to be indexed and curated in a way that will be fully accessible, searchable and relevant for global stakeholders.

It is envisioned that once these platforms and networks for knowledge management are well connected and operational, they will provide an efficient and effective tool for monitoring the use, impacts and investment flows towards agrochemicals. This, in turn, will help to accelerate uptake of sustainable production, offer a living and adaptive knowledge management tool that can be updated and improved as new lessons and innovations come on-line, allowing to quickly identify and address emerging agrochemical challenges.

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[1] (Chandola et al., 2011). https://link.springer.com/article/10.1007/s12571-013-0313-5

[2] FAO https://www.fao.org/documents/card/en/c/cb5131en FAO and Alliance of Bioversity International and CIAT. 2021. Indigenous Peoples' food systems: Insights on sustainability and resilience from the front line of climate change. Rome.

9. Child Program Selection Criteria

Outline the criteria used or to be used for child program selection and the contribution of each child program to program impact.

During the preparation of the PFD, the following criteria were identified and prioritized for selection of Child Projects and countries to participate in the Programme.

1. Number of relevant outcomes as per Theory of Change (see child project mapping table in the Alternative Scenario section)
2. Level of potential Global environmental Benefits
3. Geographic diversity & country political commitment to shift to low/no-chemical agricultural system, including existence of significant co-finance investment by governments and private sector
4. Agroecosystem diversity - based on analysis and synthesis of best practices across geographies, crop types etc.
5. Potential for scaling up - by crop type, partnerships, scope to shift needle on financial flows
6. Agency comparative advantage and partnership to complement technical and investment gaps

The child projects are proposed by the Implementing Agencies based on the above criteria.

10. Environmental and Social Safeguard (ESS) Risks

Provide information on the identified environmental and social risks and potential impacts associated with the project/program based on your organization's ESS systems and procedures

Overall Project/Program Risk Classification*

PIF	CEO Endorsement/Approval	MTR	TE
Medium/Moderate			

Measures to address identified risks and impacts

Provide preliminary information on the types and risk classifications/ratings of any identified environmental and social risks and potential impacts associated with the program (considering the GEF ESS Minimum Standards) and describe measures to address these risks.

Each child project has been separately screened by the relevant agencies' process. In all projects, the safeguard risks and mitigation measures identified will be refined at the PPG.

Supporting Documents

Upload available ESS supporting documents.

Title	Submitted
FARM_UNIDO_Child Project_ESSPP	
FARM - UNDP - GEF Checklist - Laos	
FARM - UNDP - GEF Checklist - Ecuador	
FARM - UNDP Child Lao PDR - PreSESP	
FARM - UNDP Child Ecuador - PreSESP	
FARM - ADB Child - REA	
FARM - UNEP FAO Child Project - SRIFfinal	
FARM - UNEP Global Child Project SRIF	

Part III: Approval/Endorsement By GEF Operational Focal Point(S) And GEF Agency(ies)

A. RECORD OF ENDORSEMENT OF GEF OPERATIONAL FOCAL POINT (S) ON BEHALF OF THE GOVERNMENT(S): (Please attach the Operational Focal Point endorsement letter with this template).

Name	Position	Ministry	Date
Mr. Jose Luis Naula	Coordinador - Dirección de Cooperación Internacional	Ministerio del Ambiente y Agua del Ecuador	8/31/2021
Mr. Virana Sonnasinh	Acting General Director	Ministry of Natural Resources and Environment, Laos	9/10/2021
Dr. Christopher Kiptoo	Principal Secretary	Ministry of Environment and Forestry, Kenya	9/8/2021
Mr. Eduardo Alejandro Andres Lopez	National Director for Environmental Quality and Evaluation	Ministry of Housing, Land Planning and Environment, Uruguay	8/30/2021
Neelesh Kumar Sah	Joint Secretary	Ministry of Environment, Forest and Climate Change, India	9/14/2021
Analiza Rebuelta-Teh	Unersecretary	Ministry of Finance, Information Systems and Climate Change, the Philippines	10/19/2021
Nguyen Duc Thuan	Director	Ministry of Natural Resources and Environment, Vietnam	9/15/2021

ANNEX A: LIST OF CHILD PROJECTS UNDER THE PROGRAM

Child Projects under the Program[a/]							
Country	Project Title	GEF Agency	GEF Amount ($)			Agency Fee ($)	Total ($)
			Focal Area 1	Focal Area 2	TOTAL		
			Project	Project	Project		
	FSPs						
Inter-regional Africa and Latin America (pilot countries: Kenya and Uruguay)	1. Strengthening investment for adoption of alternatives and sustainable management of agrochemicals and agri-plastics in Africa and Latin America through pilots in Kenya and Uruguay	UNEP/ FAO	7,486,500		7,486,500	673,785	8,160,285
Viet Nam	2. Financing Agrochemical Reduction and Management (FARM) in Agri-Food Value Chains	ADB	7,500,000		7,500,000	675,000	8,175,000
Laos PDR	3. FARM in Laos PDR	UNDP	4,000,000		4,000,000	360,000	4,360,000
India, Philippines	4. Promoting eco-friendly crop protection solutions for persistent organic pollutant and highly hazardous pesticide reduction in Asia	UNIDO	7,000,000		7,000,000	630,000	7,630,000
Ecuador	5. FARM in Ecuador	UNDP	4,000,000		4,000,000	360,000	4,360,000
Global	6. Global Coordination, Knowledge Management and Common Finance Tools	UNEP	7,455,000		7,455,000	670,950	8,125,950
	Total		37,441,500		37,441,500	3,369,735	40,811,235

a/ Total amount of child project concepts should equal the GEF program financing requested and consistent with Tables A, B and D.

ANNEX A1: Project Map and Geographic Coordinates

Please provide geo-referenced information and map where the project intervention takes place

See maps in Section 1b above.