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THE NIGERIA FOR WOMEN PROJECT SCALE - UP (NFWP - SU)

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FINAL REPORT

FOR

INTEGRATED PEST MANAGEMENT PLAN (IPMP)

DECEMBER, 2022

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Abbreviations & Acronyms

BP	Bank Policy
CBOs	Community Based Organizations
CDA	Community Development Associations
EA	Environmental Assessment
ESMP	Environmental and Social Management Plan
EIA	Environmental Impact Assessment
ESMF	Environmental and Social Management Framework
EPA	Environmental Protection Agency
EHSG	Environmental, Health and Safety Guidelines
FEPA	Federal Environmental Protection Agency
FGN	Federal Government of Nigeria
FMENV	Federal Ministry of Environment
FPMU	Federal Project Management Unit
GoN	Government of Nigeria
GIP	Good International Industry Practice
HSE	Health, Safety & Environment
IPMP	Integrated Pest Management Plan
LGAs	Local Government Authority
LGIU	Local Government Implementation Unit
MDAs	Ministries Department and Agencies
M&E	Monitoring & Evaluation
MoE	Ministry of Environment
MoWASD	Ministry of Women Affairs and Social Development
NEWMAP	Nigeria Erosion Watershed Management Project
NESREA	National Environmental Standards and Regulatory Enforcement Agency
NFWP	Nigeria for Women project
NFWP-SU	Nigeria for Women project Scale Up
NGP	National Gender Policy
NGOs	Non- Governmental Organizations
PCN	Project Concept Notes
PDOs	Project Development Objectives
PIM	Project Implementation Manual
PIU	Project Implementation Unit
PMP	Pest Management Plan
POP	Persistent Organic Pollutants
PSRs	Project Supervision Reports
RAPs	Resettlement Action Plans
RPF	Resettlement Policy Framework
SPMU	State Project Management Unit
TOR	Terms of Reference
WAGs	Women Affinity Groups
WB	World Bank

Executive Summary

Background

The Integrated Pest Management Plan (IPMP) is prepared as an annex to the ESMF of the Nigeria For Women project Scale-up (NFWP-SU) and in fulfillment of the requirement of the Nigerian EIA laws and the World Bank Environmental and Social Framework. The activities of Component 1 "Building Community Institutions" and Component 2 "Livelihood Program" of the project trigger six out of the ten environmental & social standards (ESSs) among which is ESS3 (resource efficiency and pollution prevention & management), which requires the preparation of an integrated pest management plan (IPMP) for projects whose activities may lead to significant pest and pesticide management issues, or if financing pest control products represent a large component of the project.

Project description

The proposed program builds on the successful Nigeria for Women Project (NFWP – P161364), which is currently being implemented in six states[1] across Nigeria. The original project tested the WAG model as a platform for addressing key constraints to women's social and economic empowerment at the societal, community, and household levels. This program will scale up NFWP and integrate lessons learned as it is expanded into a national program. The program is structured around three components. The first focuses on building community institutions by creating WAGs at the community level and federating these at higher levels (village level and local government area [LGA] level) to take advantages of economies of scale to build linkages to markets and access to finance. The second component supports improvement of livelihood opportunities for WAG members through Community Investment Fund (CIF) and livelihood collective (LC) grants to enable women to increase income and enhance livelihood opportunities. The third component covers project management, monitoring and evaluation, and adaptive learning.

Objectives of the Nigeria-for women scale up project (NFWP-SU)

To institutionalize Women's Affinity Groups and other platforms for women's economic empowerment and enhance the economic opportunities of unbanked women. The following key results will measure progress toward the Project Development Objective:

(a) Number of women who are members of WAGs (disaggregated by state);
(b) Number of WAGs that are in operation for more than one year;
(c) Number of higher-level federations established and in operation for at least one year;
(d) Policies and programs at the state level to support the functioning of WAGs;
(e) Savings mobilized by WAGs per year before share out;
(f) Number of unbanked women[2]; and
(g) Increase in the number of livelihood sources per household.

Component 1: Building Community Institutions (US$168 million)

This component aims to leverage existing practices of mutual help among women to address gender inequalities and create economic opportunities. Specifically, activities under this component will support the creation of WAGs that will build on practices of mutual help and leverage these as an institutional platform to support access to finance, enhance women's voice and agency, and drive behavior change. Activities under this Component will be implemented through three subcomponents: (i) Women Affinity Groups and Federations; (ii) Platforms for Behavior Change in Health, Sanitation, and Climate Adaptation, and (iii) Influencing Social Norms.

Subcomponent 1.1: Influencing Social Norms (US$14.9 million equivalent)

This subcomponent will finance Operational Project Communication (OPC), as well as activities to facilitate positive shifts in norms, behaviors, and attitudes to reduce gender stereotypes detrimental to women's socioeconomic engagement, household decision-making, and resilience to climate change.

[1] Abia, Akwa Ibom, Ogun, Niger, Kebbi and Taraba States.

[2] This indicator measures the Project's effect on the overall number of unbanked women in Nigeria (this is defined as women without bank accounts or mobile wallets, as measured in the Global Findex). The Project expects to open accounts or wallets for about 3.1 million women, therefore this would bring down the number of unbanked women in Nigeria from approximately 37 million to 34 million.

Subcomponent 1.2: Women Affinity Groups and Federations (US$144.4 million equivalent)
As in the original project, this subcomponent is the core investment of the Project in developing and strengthening community institutions (WAGs, VOs, and CLFs) and will be implemented in a phased manner.

The Project will support strengthening the organizational capabilities of the VOs and CLFs in livelihood promotion, climate and disaster risk management, developing linkages with public and private service providers, and building a knowledge base and skills at the grassroots level by developing a cadre of good-quality community resource persons (CRPs)—community-managed bookkeepers, livelihood associates, and other VO- and CLF-level functionaries.

Subcomponent 1.3: Platforms for Behavior Change in Health, Sanitation, and Climate Adaptation (US$8.7 million equivalent) This subcomponent will finance the mobilization of mature WAGs, VOs, and CLFs as platforms for improving behaviors related to health, sanitation, and climate adaptation.

Component 2: Livelihood Program (US$272 million)
This component aims to facilitate improvement in the livelihood opportunities of WAG members through the CIF and promotion of LCs.

Subcomponent 2.1: Community Investment Fund (US$176.2 million equivalent)
A Community Investment Fund (CIF) is a grant to WAGs that will enable WAG members to invest in productive assets for low-carbon, climate-resilient livelihood activities at the household level based on Micro Investment Plans (MIPs).
Subcomponent 2.2: Support to Livelihood Collectives (US$79 million)
The aim of this subcomponent is to leverage economies of scale and enhance the bargaining power of the WAG members and their households. This subcomponent will support the formation and strengthening of LCs and provide them with livelihood grants based on approved business plans.

Subcomponent 2.3: Technical Assistance and Innovations for Livelihoods Programs (US$16.8 million equivalent)
The subcomponent will support improving the supply of key support and technical services for the community institutions and LCs in the areas of institution building, financial management/services, climate and disaster risk management and livelihood enhancement (including enhancing the climate resilience of livelihood activities).

Component 3: Project Management, Monitoring and Evaluation, and Learning (US$50 million)
This component will finance project management, monitoring, evaluation, and learning at both federal and state levels and will build government capacity to facilitate the implementation of Project activities and consequently ensure sustainability.

Due to the activities to be supported under component 2.2 in particular, the project will support agricultural livelihoods and while it will not procure pesticides directly, beneficiaries will be guided into best approach to management of pests by implementing this IPMP.

Rationale for the IPMP
The Integrated Pest Management (IPM) harmonizes the best practice approach from a combination of the best strategies of all control methods that pertain to a given concern created by the activities of pests and will be applied for the use of pesticides that (a) have negligible adverse effects on human health, (b) have demonstrated effectiveness against the target pests and (c) have minimal effect on non-target species and the natural environment.

Scope of IPMP
This IPMP covers the existing national and international legislations on the use of chemicals for pest management. It also assesses the Nigerian experience in pest management and capacity on integrated pest management approach. Other areas addressed by it include training and awareness for the public and users of pesticides on safety measures, description of pesticides banned for use in Nigeria as well as those approved for use. Specifically, it also identifies

institutional responsibility with regards to mitigation measures and monitoring indicators to be observed in order to evaluate the performance and effectiveness of the IPMP.

Specific IPMP Objectives

- Assist the 12 participating State Governments to plan and design location specific IPM activities.
- Promote participatory approaches in IPM to learn, test, select and implement "best-bet" IPM options.
- Promote biodiversity monitoring to serve as early warning systems on pest status, alien invasive species, beneficial species, and migratory pests.
- Monitor and evaluate the benefits of IPM including its impact on the environment and health

Regulatory framework

There are some legislations and institutional framework in Nigeria that exist for the regulation of the distribution and use of pesticides in Nigeria. Such as:

- Nigerian Agricultural Policy (1988)
- National Policy on the Environment 1989
- Federal Environmental Protection Agency Act 58 of 1988 as amended by Decree 59 of 1992
- National Environmental Standards and Regulations Enforcement Agency (NESREA) Act 2007
- The National Agency for Food and Drug Administration and Control (NAFDAC)
- The Factories Act 1990
- The Harmful Wastes (Special Criminal Provision) Act 42 of 1988
- International conventions and treaties relevant to pest management in Nigeria
- The Rotterdam convention
- Basel convention
- The World Bank ESS3

Project locations

The participating States selected for this study represent the six geo-political zones of the project area and they are Akwa Ibom, Ogun, Taraba, Niger, Abia and Kebbi States representing one each of the six geopolitical zones of Nigeria.

Pest Management Concerns And Control Measures In Nigeria

Pests and disease vectors constitute serious hazards to public health, food security and general welfare of the citizenry in Nigeria. It is estimated that agricultural pests destroy over half of the yield of crops, fruits, ornamental plants, vegetables and livestock annually. Household pests also destroy property such as furniture items, clothing, books, etc. Estimated cost of damage caused by pests runs into millions of Naira annually. Unfortunately, the flooding problems experienced in Nigeria in the fourth quarter of 2022 and the accompanying widespread pest management concerns will further exacerbate these problems.

Pest and disease problems of agriculture in Nigeria

Vectors transmit several diseases of public health importance in Nigeria. These diseases have resulted in depopulation of many fertile farming areas thus contributing significantly to food insecurity and poverty. Lassa fever and Yellow fever transmitted by *M. natalensis* (rats) and *Aedes* mosquitoes respectively have been reported to occur in epidemic proportions in some parts of Nigeria.

Control methods of pests and diseases in Nigeria

Pest management methods in Nigeria vary with the type of pests and agricultural activities undertaken. Most of the pest control operations in Nigeria today are by the use of pesticides. Pesticides were once seen as the only answer to most of the pest problems. Pest management controls used in Nigeria include:

- Cultural control
- Biological Control
- Chemical control

Assessment of Capacity of Nigeria on Integrated Pest Management

Many cultural practices and physical control measures to pest control are currently in use in Nigeria and have been for several farming generations, however, some of them have not provided sufficient and environmentally friendly options for pest management. For instance,

bush burning as a way of controlling pest accelerates deforestation and loss of biodiversity and therefore should be discouraged. In addition, the flooding problems experienced in Nigeria from October into November 2022 and the accompanying widespread pest management concerns will require that the issues of pest be given adequate attention on this project.

Identification of Potentially Adverse Impacts of Pesticides

Pesticides are toxic substances released most times intentionally into our environment. This includes substances that kill weeds (herbicides), insects (insecticides), fungus (fungicides), rodents (rodenticides), and others.

Persistent Organic Pollutants (POPs)

Nigeria became a signatory to the Stockholm Convention on Persistent Organic Pollutants, In May 2001. This was ratified in 2004. Under Annex A (listed for Elimination) of the convention, Parties must take measures to **eliminate** the production and use of obsolete chemicals. These obsolete pesticides are characterized by a high persistence in the environment (e.g. half-life for DDT in soil ranges from 22 to 30 years, Toxaphene -14 years, Mirex -12 years, Dieldrin- 7 years, Chlordecone up to 30 years), low water solubility and thus potential to accumulate in fatty tissue of living organisms including humans and toxicity to both human and wildlife.

Pesticides and human health

Pesticides have been linked to a wide range of human health hazards, ranging from short-term impacts such as headaches and nausea to chronic impacts like cancer, reproductive abnormalities, and endocrine disruption.

Identification of potential environmental and health risks associated pesticides

Potential adverse environmental and health risks of pesticides use that are of concern to the proposed for Women project may include:

Environmental Risks

Air Pollution **-** The vaporized form of sprayed pesticides will be released into the air, and if the chemical compound is very stable, the vapor can travel beyond the project intervention sites.

Soil contamination **-** Pesticides, which are used in agricultural land areas in and around the proposed 'for Women' agriculture beneficiary sites could enter soil during spraying resulting in wash-off or run-off into soil.

Surface and Groundwater Contamination **-** Generally, there are four major routes through which pesticides reach the water: they may drift outside of the intended area when sprayed, may percolate, or leach through soil, may be carried to the water as runoff, or may be spilled.

Harm to Non-target Species - The environmental impact of pesticides consists of the effects of pesticides on non-target species.

Health Risks

The health risks are from:

1. Direct inhalation
2. Potential Site-related Health Concerns

Impact mitigation through IPMP

Integrated Pest Management (IPM) is an effective and environmentally sensitive approach to pest management that relies on a combination of multiple practices with a view to reduce reliance on the use of pesticides. More importantly, knowledge of biological, cultural and mechanical control measures that have been used in other agricultural programs in Nigeria is crucial. In comparison with traditional pesticide applications which pose immeasurable health and environmental risks and may result in severe current and future losses (environmental, public, health, occupational health, social and financial), an Integrated Pest Management Plan (IPMP) will be the most appropriate pest management approach for the proposed project. The IPMP for the NFWP SU For Women project will lay down mitigation measures, institutional responsibilities and capacity building needs.

IPMP Implementation and Management

The fundamental areas essential to the successful implementation of this IPMP are:

- Training & Capacity Strengthening - Measures that will ensure capacity building among stakeholders that will implement the IPMP
- Institutional Arrangements
- Monitoring Measures to ensure that POPs pesticides and WHO class I and II pesticides considered to be extremely/highly and moderately hazardous are not procured and/or used;
- Stakeholder Participation measures that will ensure that farmers get the relevant technical aids and education on the implementation of safe and alternative pest control measures rather than the use of chemicals.
- Measures that ensure that pest resistant varieties of the value chains are procured as a better pest control alternative

Integrated Pest Management Plan
The IPMP for this project is designed to reduce dependency on synthetic chemical pesticides thereby mitigating negative impacts on human health and terrestrial, aquatic and atmospheric environments.

This IPMP also recommends practical and cost-effective actions to prevent or reduce significant impacts to tolerable levels. It further establishes institutional arrangements and personnel capacity building needs and shall complement the Environmental and Social Management Framework (ESMF) and other Environmental & Social Framework instruments of the project. The IPMP will promote biodiversity monitoring to serve as early warning systems on pest status, alien invasive species, beneficial species, and migratory pests.

Framework for Implementation
The IPMP identifies implementation arrangements and describes responsibilities at all levels. Institutional Arrangements, effective supervision and monitoring of IPMP implementation will be done through the FPMU in collaboration with the SPMU. An IPM Specialist will develop IPM packages and will provide technical support to Environmental Specialist for all IPM activities.

Capacity Development
Capacity building will be achieved through the collaborative management mechanisms with all key stakeholders represented. The roles of each stakeholder will be clearly defined so as to guaranty efficiency and effectiveness of the process which will help in providing sound technical direction needed for an optimal IPMP implementation.

Budget for Implementation
To effectively implement the IPMP measures suggested, the cost elements that will be vital towards implementing the plan is shown in the budget for implementation is **₦9,350,000.00 or $21,011.00 (NGN1 = USD445.00 on Nov 6, 2022)**

CHAPTER ONE

1.0 Background

This Integrated Pest Management Plan (IPMP) is prepared as an annex to the ESMF of the Nigeria For Women project Scale-up (NFWP-SU) as a requirement of the Nigerian EIA laws and the World Bank Environmental and Social Environmental & Social Framework by which the activities of Component 2 and Component 3, which has triggered six out of the ten environmental & social standards (ESS), among which is ESS3 (resource efficiency and pollution prevention & management), and this has the preparation of an integrated pest management plan (IPMP) as a specific instrument for projects which activities may lead to significant pest and pesticide management issues, or if financing pest control products represent a large component of the project.

1.2 Scope of IPMP

This IPMP covers the existing national and international legislations on the use of chemicals for pest management. It also assesses the Nigerian experience in pest management and capacity on integrated pest management approach. Other areas addressed by it include training and awareness for the public and users of pesticides on safety measures, description of pesticides banned for use in Nigeria as well as those approved for use.

Specifically, it also identifies institutional responsibility with regards to measures and monitoring indicators to be observed in order to evaluate the performance and effectiveness of the IPMP. This IPMP will be an annexure to the NFWP-SU ESMF report.

1.3 Rational for the IPMP

The Integrated Pest Management (IPM) harmonizes the best practice approach from a combination of the best strategies of all control methods that pertain to a given concern created by the activities of pests. IPM has been defined in various ways but a more scientific definition describes it as, "the **practical** manipulation of pest populations using sound **ecological** principles to keep pest populations below a level causing economic injury".

Considering the land mass required for the cultivation, breeding and processing of the different agricultural commodities that are yet to be selected under this project, there is undoubtedly the likelihood of infestation by pests, currently within the proposed area or migratory pests. Consequently, as the project will support agricultural livelihoods and while it will not procure pesticides directly, beneficiaries may use acquire pesticides using productive grants provided by the project. Thus, in line with World Bank Environmental and Social Environmental & Social Framework, an agricultural development project such as this will require compliance with the World Banks ESS3 (resource efficiency and pollution prevention and management) hence the need for an Integrated Pest Management Plan (IPMP) which is the suitable E&S standard for tackling pest management issues. The flowchart representing this IPMP approach is presented in Figure 1.

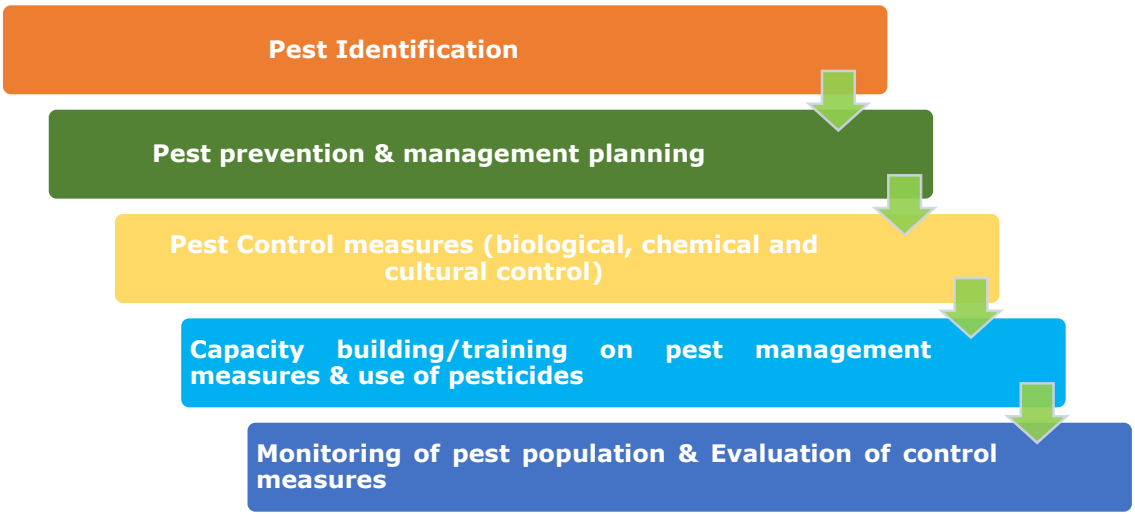

Figure 1: Integrated Pest Management Approach Flowchart

This Integrated Pest Management plan (IPMP) harmonizes the best practice approach from a combination of the best strategies of all control methods that pertain to a given concern created by the activities of pests and will be applied for the use of pesticides that have (a) negligible adverse effects on human health and (b)have demonstrated effectiveness against the target pests (c)they have minimal effect on non-target species and the natural environment.

CHAPTER TWO

Project Description

2.0 Project description

The proposed program builds on the successful Nigeria for Women Project (NFWP – P161364), which is currently being implemented in six states[3] across Nigeria. The original project tested the WAG model as a platform for addressing key constraints to women's social and economic empowerment at the societal, community, and household levels. This program will scale up NFWP and integrate lessons learned as it is expanded into a national program. The program is structured around three components. The first focuses on building community institutions by creating WAGs at the community level and federating these at higher levels (village level and local government area [LGA] level) to take advantages of economies of scale to build linkages to markets and access to finance. The second component supports improvement of livelihood opportunities for WAG members through Community Investment Fund (CIF) and livelihood collective (LC) grants to enable women to increase income and enhance livelihood opportunities. The third component covers project management, monitoring and evaluation, and adaptive learning.

2.1 Overview of the Nigeria for Women Scale up project

The core strategy of the program is to build vibrant and bankable women-led community institutions in the form of WAGs and their federations. Following initial grant support to well performing WAGs from the Project, these groups are expected to become self-sustaining organizations through member savings, internal loaning and regular repayments, with proceeds used to support asset creation. The federation of WAGs into village organizations (VOs) and cluster-level federations (CLFs) will allow for their partnerships with service providers and also their functioning as agents for financial institutions and insurance companies, procurement franchises for private sector corporations, and delivery mechanisms for a variety of government programs. The extensive membership base of these community institutions will be used to advance behavior change related to social norms, health, and sanitation practices, and to support climate adaptation to advance the sustainable economic empowerment of women.

2.1.1 Objectives of the Nigeria-for women scale up project (NFWP-SU)

To institutionalize Women's Affinity Groups and other platforms for women's economic empowerment and enhance the economic opportunities of unbanked women. The following key results will measure progress toward the Project Development Objective:

(h) Number of women who are members of WAGs (disaggregated by state);
(i) Number of WAGs that are in operation for more than one year;
(j) Number of higher-level federations established and in operation for at least one year;
(k) Policies and programs at the state level to support the functioning of WAGs;
(l) Savings mobilized by WAGs per year before share out;
(m) Number of unbanked women[4]; and

[3] Abia, Akwa Ibom, Ogun, Niger, Kebbi and Taraba States.

[4] This indicator measures the Project's effect on the overall number of unbanked women in Nigeria (this is defined as women without bank accounts or mobile wallets, as measured in the Global Findex). The Project expects to open accounts or wallets for about 3.1 million women, therefore this would bring down the number of unbanked women in Nigeria from approximately 37 million to 34 million.

(n) Increase in the number of livelihood sources per household.

The NFWP-SU components comprise:

Component 1: Building Community Institutions (US$168 million)

This component aims to leverage existing practices of mutual help among women to address gender inequalities and create economic opportunities. Specifically, activities under this component will support the creation of WAGs that will build on practices of mutual help and leverage these as an institutional platform to support access to finance, enhance women's voice and agency, and drive behavior change. Activities under this Component will be implemented through three subcomponents: (i) Women Affinity Groups and Federations; (ii) Platforms for Behavior Change in Health, Sanitation, and Climate Adaptation, and (iii) Influencing Social Norms.

Subcomponent 1.1: Influencing Social Norms (US$14.9 million equivalent)

This subcomponent will finance Operational Project Communication (OPC), as well as activities to facilitate positive shifts in norms, behaviors, and attitudes to reduce gender stereotypes detrimental to women's socioeconomic engagement, household decision-making, and resilience to climate change. The OPC will have an overall objective of awareness generation and will leverage communication tools and activities to strategically support and strengthen achievement of the PDO and to disseminate project information, including project intended activities and benefits. This will enhance project buy-in and facilitate the identification of project "champions" at the federal, state, LGA, and community levels. Given the scope of the Project, the approaches to shifting social norms will entail investment in two types of approaches: (i) foundational social and behavior change communication (SBCC) approaches to support an enabling environment for WAGs and related activities in all Project areas; and (ii) targeted pilots to explore opportunities for structural community-based social norms approaches to create synergies with WAG activities.

Subcomponent 1.2: Women Affinity Groups and Federations (US$144.4 million equivalent)
As in the original project, this subcomponent is the core investment of the Project in developing and strengthening community institutions (WAGs, VOs, and CLFs) and will be implemented in a phased manner.
The Project will support strengthening the organizational capabilities of the VOs and CLFs in livelihood promotion, climate and disaster risk management, developing linkages with public and private service providers, and building a knowledge base and skills at the grassroots level by developing a cadre of good-quality community resource persons (CRPs)—community-managed bookkeepers, livelihood associates, and other VO- and CLF-level functionaries.

Subcomponent 1.3: Platforms for Behavior Change in Health, Sanitation, and Climate Adaptation (US$8.7 million equivalent) This subcomponent will finance the mobilization of mature WAGs, VOs, and CLFs as platforms for improving behaviors related to health, sanitation, and climate adaptation.

Component 2: Livelihood Program (US$272 million)
This component aims to facilitate improvement in the livelihood opportunities of WAG members through the CIF and promotion of LCs.
Subcomponent 2.1: Community Investment Fund (US$176.2 million equivalent)
A Community Investment Fund (CIF) is a grant to WAGs that will enable WAG members to invest in productive assets for low-carbon, climate-resilient livelihood activities at the household level based on Micro Investment Plans (MIPs).

Subcomponent 2.2: Support to Livelihood Collectives (US$79 million)
The aim of this subcomponent is to leverage economies of scale and enhance the bargaining power of the WAG members and their households. This subcomponent will support the formation and strengthening of LCs and provide them with livelihood grants based on approved business plans.

The grants financing LC business plans can be utilized toward input purchasing, post-production processing equipment or small-scale infrastructure,[5] adoption of modern technology,[6] building common economic assets or infrastructure, and reducing the risk of entry or enabling moving along the value chain to achieve higher gains.

Subcomponent 2.3: Technical Assistance and Innovations for Livelihoods Programs (US$16.8 million equivalent)
The subcomponent will support improving the supply of key support and technical services for the community institutions and LCs in the areas of institution building, financial management/services, climate and disaster risk management and livelihood enhancement (including enhancing the climate resilience of livelihood activities).

Component 3: Project Management, Monitoring and Evaluation, and Learning (US$50 million)
This component will finance project management, monitoring, evaluation, and learning at both federal and state levels and will build government capacity to facilitate the implementation of Project activities and consequently ensure sustainability.

The activities that have necessitated the preparation of this IPMP are highlighted in the Table 1.

Table 1: Comparison between NFWP & NFWP SU

Component (NFWP-SU)	Activities under NFWP-SU	NFWP Activities
Component 1: Building Community Institutions (US$160 million)	• Influencing Social Norms • Women Affinity Groups and Federations • Strengthening WAGs as Platforms for Improved Human Development Outcomes	Building Social capital (building critical social capital by strengthening and galvanizing the formation of WAGs that can serve as institutional platforms for women in Nigeria)

[5] Such as drying floors, pack house, milk testing equipment, bulk milk coolers, weighing machines, moisture meters as well as small-scale primary processing equipment, marketing infrastructure with cleaning, grading, sorting, cold storage, and other similar facilities.
[6] Including those that support lower emission, such as solar panels, rainwater collection, greywater and blackwater reuse at the building and local level, climate-resilient agricultural inputs, technologies, and processes for relevant collective activities.

Component (NFWP-SU)	Activities under NFWP-SU	NFWP Activities
Component 2: Livelihood Program (US$270 million)	• Expanding the livelihoods base of the WAG members • investment in higher-order economic assets (such as processing units, drying yards, input supplies, etc.), • developing specific skills, technology, and • working systematically on selected climate smart commodity value chains (e.g., agriculture, dairying, fisheries, horticulture, and non-farm sectors) for value addition and establishing market linkages. • Farm cultivation • Vocational work • Cosmetic Making, • **Agricultural farming - Fertilizer use/application** • **Agricultural farming – use of pesticides** • Finance the activity/business plans of livelihood collectives, and these plans will include working capital, purchasing of equipment, processing machineries, constructing of small infrastructure (such as a storage or drying facility)	• Support economically active women in the WAGs through provision of livelihoods grants and holistic as well as targeted skills trainings to include psycho-emotional entrepreneurship, market responsive technical skills and life skills; based on sound analysis of the livelihood sectors and market demand involving: • Land-use/land take for establishing access to markets for women • Site clearing for rehabilitation of vocational Centers • Farm cultivation • Vocational work • Cosmetic Making, • **Agricultural farming - Fertilizer use/application** • **Agricultural farming – use of pesticides** • Generation of waste from agricultural & vocational activities
Component 3: Project Management, Citizen Engagement, Monitoring and Evaluation, and Learning (US$60 million)	• The Project will utilize participatory decision making and planning approaches, consultations, and focus groups to put women and girls in the driver's seat in designing activities that reflect their needs. Women's CE capabilities will also be enhanced by the training on elections and decision making provided under Component 1. • An India-Nigeria Learning Platform will be established to enable the Government of Nigeria to learn directly from the Government of	• This component aims to utilize "Nigeria's talent pool" to support innovations that can (i) transform women's social and livelihood outcomes and (ii) improve project delivery and overall impact • Farming & Vocational Learning

Component (NFWP-SU)	Activities under NFWP-SU	NFWP Activities
	India.	

2.2 Environmental & Social Standards (ESS)

The Environmental & Social Framework standards (ESSs) applicable to the NFWP-SU Scale-up include six out of the ten (10) E&S standards compliance standards (ESS1-10). These applicable Standards are:

- Environmental and Social Standard 1 (ESS1): Assessment and management of Environmental and Social Risks and Impacts;
- Environmental and Social Standard 2 (ESS2): Labor and Working Conditions;
- **Environmental and Social Standard 3 (ESS3): Resource Efficiency and Pollution Prevention and Management;**
- Environmental and Social Standard 4 (ESS4): Community Health and Safety;
- Environmental and Social Standard 5 (ESS5): Land Acquisition, Restrictions on Land Use and Involuntary Resettlement
- Environmental and Social Standard 10 (ESS10): Stakeholder engagement & information disclosure.

This IPMP has been prepared in compliance with the requirements contained in ESS3, which is presented in detail in section 3.3.1.

CHAPTER THREE

Regulatory Framework

Applicable national and international guidelines on use of pesticides or chemicals for pest management that are relevant to the NFWP-SU are highlighted in this Chapter.

3.1 Extant Laws of Nigeria on Pesticides Management

There are some legislations and institutional framework in Nigeria that exist for the regulation of the distribution and use of pesticides in Nigeria. The existing legislative tools are:

- Federal Ministry of Agriculture & Rural Development (1988)
- National Policy on the environment, 1989
- FEPA Decree 58 of 1988 as amended by Decree 59 of 1992 and 1999 but complemented by rules and regulations such as FEPA S.1.5, FEPA S.1.9 dealing with disposal and distribution/use of pesticides.
- NAFDAC Decree 15 of 1993, as amended by Decree 19 of 1999.
- The Factories Acts 1990 being implemented by the Factories Inspectorate Division of FMLP.
- The Harmful Waste (Special Criminal Provisions etc) Decree 42 of 1988 being implemented by FMEV.

3.1.1 Nigerian Agricultural Policy (1988)

The general pest control objectives in the existing (1988) agricultural policy for Nigeria are to:

- Control, and/or eradicate and maintain good surveillance of the major economic pests whose outbreaks are responsible for large-scale damage/loss to agricultural production.
- Provide protection to man and animals against vectors of deadly diseases.

3.1.2 National Policy on the Environment 1989

This Policy aims to achieve sustainable development in Nigeria, and in particular to:

- Secure a quality of environment adequate for good health and wellbeing;
- Conserve and use the environment and natural resources for the benefit of present and future generations;
- Restore, maintain and enhance the ecosystems and ecological processes essential for the functioning of the biosphere to preserve biological diversity and the principle of optimum sustainable yield in the use of living natural resources and ecosystems;
- Raise public awareness and promote understanding of the essential linkages between the environment, resources and development, and encourage individuals and community participation in environmental improvement efforts; and
- Co-operate with other countries, international organizations and agencies to achieve optimal use of trans-boundary natural resources and effective prevention or abatement of trans-boundary environmental degradation.

3.1.3 Federal Environmental Protection Agency Act 58 of 1988 as amended by Decree 59 of 1992

This Act specifies the guideline and rules guiding the dealing with distribution, use and disposal of pesticides in Nigeria. The Act also mandates the Agency to establish instruments for air quality standards, water quality standards, atmospheric protection and ozone layer protection. In discharging the mandate, the FEPA in 1991 published a number of regulations for the protection of the

environment, including the waste management and Hazardous Waste Regulation- which provides a comprehensive list of chemicals and chemical wastes by toxicity classification.

3.1.4 National Environmental Standards and Regulations Enforcement Agency (NESREA) Act 2007

NESREA is charged with the responsibility for the protection and development of the environment, biodiversity conservation and sustainable development of Nigeria's natural resources in general and environmental technology, including coordination and liaison with relevant stakeholders within and outside Nigeria on matters of enforcement of environmental standards, regulations, rules, laws, policies and guidelines.

3.1.5 The National Agency for Food and Drug Administration and Control (NAFDAC)

NAFDAC was established by Decree 15 of 1993 as amended by Decree 19 of 1999 and now Act Cap N1 Laws of the Federation of Nigeria (LFN) 2004, to regulate and control the manufacture, importation, exportation, distribution, advertisement, sale and use of food, drugs, cosmetics, chemicals, medical devices and packaged water in Nigeria for the protection of human health. In discharge of its statutory responsibility, NAFADAC has approved the list of chemicals allowed in Nigeria for the control of pest. This list is attached in the annex 2 of this report.

3.1.6 The Factories Act 1990

The Factories decree 1990 was a landmark in legislation in occupational health in Nigeria. It provides a substantial revision of the colonial legislation, Factories Act 1958, in which the definition of a factory was changed from an enterprise with 10 or more workers to a premise with one or more workers thereby providing oversight for the numerous small-scale enterprises that engage the majority of the workforce in Nigeria. It stipulates the enforcement of compliance on factories, industries and organizations that employ labour on the protection of the right of workers to friendly environment, health and safety.

3.1.7 The Harmful Wastes (Special Criminal Provision) Act 42 of 1988

This Act, which was established on The 25th of November 1988, was necessitated by the illegal use and dumping of toxic wastes in the port town of Koko in Southern Nigeria. The Act defines harmful waste to mean any injuries, poisonous or toxic substances, which are capable of subjecting anybody to the risk of health. As contained in the section 1, it is an offence to purchase, sale, import, transit, transport, deposit and/or store any banned or obsolete chemical or any other form of wastes in the Nigeria territory or water.

3.2 International Conventions & Treaties Relevant to Pest Management in Nigeria

Nigeria is a signatory to many conventions on the protection of the environment, which lay credence to the IPMP under study. Some of these conventions pertinent to this study include:

- Montreal Protocol
- Bamako Convention on Hazardous Wastes
- Basel Convention on Transboundary Movements of Hazardous Wastes and their Disposal
- Stockholm Convention on Persistent Organic Pollutants (POPs)
- International Code of Conduct for the Distribution and Use of Pesticides
- Rotterdam Convention

Among the aforementioned conventions, a certain number of them have a direct importance with pesticides and the fight against pollution, particularly the Stockholm Convention on persistent organic pollutants. This convention, in accordance with Principle 15 of the Rio Declaration on Environmental and Development, aims at protecting human health and the environment from persistent organic pollutants such as aldrin, dieldrin, chlordane, endrin, heptacholic, hexachlorobenzene, mirex, toxaphene, DDT and PCBs. It is a global treaty to protect human health and the environment from highly dangerous, long-lasting chemicals by restricting and ultimately eliminating their production, use, trade, release and storage. The Convention was adopted in Stockholm, Sweden on May 22, 2001. It calls for outright banning and destruction of 12 Persistent Organic Pollutants, 9 of which are pesticides. These are: Pesticides POPs: Aldrin, Chlordane, DDT, Dieldrin, Endrin, Heptachlor, Hexachlorobenzene, Mirex, Toxaphene. The Industrial POPs: Dioxins, Furans, Polychlorinated biphenyls (PCBs).

3.2.1 The Rotterdam Convention

The Rotterdam Convention on the Prior Informed Consent on Procedure for Certain Hazardous Chemicals and Pesticides in International Trade is a global treaty that came into force in February 2004. It is designed to protect public health and the environment by promoting informed decision–making by importing countries in relation to products that have been banned or severely restricted by at least two other Parties to the Convention. It formalizes the voluntary principles established in the International Code of Conduct.

The *Rotterdam Convention on Prior Informed Consent (PIC)* aims to help participating countries make informed decisions about the potentially hazardous chemicals that might be shipped to them, and to facilitate communication of these decisions to other countries. The Convention requires exporting Parties to honour the decisions of importing Parties.

The key principles of PIC are:

- International shipment of a pesticide included in the PIC list should not occur against the wishes of the importing country.
- In the absence of a decision from an importing country, the export may proceed if the pesticide is registered in the country, or if it has previously been used or imported into the country.
- If an importing country decides not to consent to further imports, the decision must be applied to imports from all sources, and domestic manufacturing and use must cease.;
- Recommendations for inclusion of banned and severely restricted chemicals in the PIC procedure must be supported by risk evaluations reflecting prevailing conditions at the national level.

3.2.2 Basel Convention

The Basel Convention on the Control of Transboundary Movements of - Hazardous Wastes and their Disposal was concluded in Basel, Switzerland on March 22, 1989, and entered into force in May 1992. The Basel Convention contains specific provisions for the monitoring of implementation and compliance. A number of articles in the Convention oblige Parties (national governments which have acceded to the Convention) to take appropriate measures to implement and enforce its provisions, including measures to prevent and punish conduct in contravention of the Convention. The key principles/outcomes of the Basel convention are:

- In order to minimize the threat, hazardous wastes should be dealt with as close to where they are produced as possible.

- Trans-boundary movements of hazardous wastes or other wastes can take place only upon prior written notification by the State of export to the competent authorities of the States of import and transit (if appropriate).
- Each shipment of hazardous waste or other waste must be accompanied by a movement document from the point at which a trans-boundary movement begins to the point of disposal. Hazardous waste shipments made without such documents are illegal.
- Outright bans on the export of these wastes to certain countries; however, Trans-boundary movements can take place, if the state of export does not have the capability of managing or disposing of the hazardous waste in an environmentally sound manner.

There is also the support for the document of harmonization of rules governing the pesticide agreement in the ECOWAS zone adopted at the 60th ordinary session of the ECOWAS Council of Ministers held at Abuja on 17 and 18 May 2008. The aim of this common regulation is to:

- Protect the West African populations and environment against the potential hazards of pesticide use;
- Facilitate intra and inter-state trade in pesticides through the establishment of rules and principles accepted by common consent at the regional level to remove the trade barriers;
- Facilitate an appropriate and timely access by farmers to quality pesticides;
- Contribute to the creation of a suitable environment for private investment in the pesticide industry, and;
- Promote public-private sector partnership.

3.3 World Bank's Environmental and Social Guidelines

The environmental and social standards of World Bank applicable to the implementation of this IPMP is the **Environmental and Social Standard 3 (ESS3)**: Resource Efficiency and Pollution Prevention and Management;

3.3.1 World Bank ESS3: Resource efficiency and pollution prevention & management

This E&S standard, ESS3, recognizes that economic activity and urbanization often generate pollution to air, water, and land, and consume finite resources that may threaten people, ecosystem services and the environment at the local, regional, and global levels. The current and projected atmospheric concentration of greenhouse gases (GHG) threatens the welfare of current and future generations. At the same time, more efficient and effective resource use, pollution prevention and GHG emission avoidance, and mitigation technologies and practices have become more accessible and achievable. This ESS sets out the requirements to address resource efficiency and pollution prevention and management throughout the project life cycle consistent with GIIP.

- To promote the sustainable use of resources, including energy, water and raw materials.
- To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities.
- To avoid or minimize project-related emissions of short and long-lived climate pollutants.
- To avoid or minimize generation of hazardous and non-hazardous waste. **In particular and with proper reference to the need for which this IPMP has been prepared, this is necessary to minimize and manage the risks and impacts associated with pesticide use.**

The NFWP-SU will consider ambient conditions and apply technically and financially feasible resource efficiency and pollution prevention measures in accordance with the mitigation hierarchy. The measures will be proportionate to the risks and impacts associated with the project and consistent with GIIP, in the first instance the EHSGs. NFWP-SU will implement technically and financially feasible measures for improving efficient consumption of energy, water and raw materials, as well as other resources. Such measures will integrate the principles of cleaner production into product design and production processes to conserve raw materials, energy and water, as well as other resources. Where benchmarking data are available, the NFWP-SU will make a comparison to establish the relative level of efficiency.

The ESS3 principles provide general guidance that will be followed during appraisal on how to address pest management issues in different categories of projects to which this E&S standard applies. These are provided as follows:

3.3.1.1 **Do no harm**

The do-no-harm principle applies to all projects under any circumstances. Its concerns entail that pest management activities in Bank projects are sustainable and that health and environmental risks of pesticide use are minimized and can properly be managed by the user.

Projects that directly or indirectly finance pesticides: For pesticides, directly or indirectly procured under Bank financed projects the policy states that it needs to be established that their use is justified under an IPM approach. It stipulates that optimum use should be made of available non-chemical pest management techniques to reduce reliance on synthetic chemical pesticides and that adequate measures be incorporated in the project design to reduce risks associated with the handling and use of pesticides to a level that can be managed by the users. The policy encourages monitoring of the effectiveness of these measures in order to achieve project objectives.

Projects that do not finance pesticides, but nevertheless indirectly increase or alter pesticide use, or affect pest management: If no pesticides are procured under the project, but if the project nevertheless affects pest management by maintaining or expanding pest management practices that are unsustainable, not based on an IPM approach, and/or pose significant health and environmental risks, then it would be appropriate to set out clear targets for moving current practices towards IPM and to provide the necessary support to this process. Immediate measures may be required to reduce risks associated with the handling and use of pesticides to a level that can be managed by the users. These may be addressed through the following:

- Determining justification of pesticide use (that is whether pesticides use is justified under an IPM approach;
- Determining if pesticides use is justified in economic terms;
- Determining appropriateness or otherwise through selection and procurement of pesticides
- Identification of risks and risk management to mitigate environmental and health concerns.

3.3.1.2 Do-Good Principle

The do-good principle calls for enhancing policy reform and strengthening the regulatory framework and institutional capacity for the implementation of IPM and the control of pesticides. The expected level of project involvement depends

on the circumstances and the scope of the project. Relevant factors in this respect are the:

- Magnitude of the activity involving or affecting pest management.
- Nature of the risks involved.
- Size of the gap between actual practices and good practices.
- Geographical scope of the project.
- Degree to which policy reform and capacity building fit in the project.

CHAPTER FOUR

Pest Management Concerns And Control Measures In Nigeria

4.0 Introduction

Pests and disease vectors constitute serious hazards to public health, food security and general welfare of the citizenry in Nigeria. It is estimated that agricultural pests destroy over half of the yield of crops, fruits, ornamental plants, vegetables and livestock annually. Household pests also destroy property such as furniture items, clothing, books, etc. Estimated cost of damage caused by pests runs into millions of Naira annually.

4.1 Pest and diseases Problems of Agriculture in Nigeria

Vectors transmit several diseases of public health importance in Nigeria. These diseases have resulted in depopulation of many fertile farming areas thus contributing significantly to food insecurity and poverty. For example, in recent times in Nigeria, Lassa fever and Yellow fever transmitted by *M. natalensis* (rats) and *Aedes* mosquitoes respectively have been reported to occur in epidemic proportions in some parts of Nigeria.

Farmers often respond to pest infestations in crops by heavy applications of pesticides, which threaten environmental quality and pose risks to human and livestock health. Pesticides used in vegetable agro-ecosystems, for example, include WHO toxicity Class 1a materials such as ***parathion***, and Class 1b materials such as ***Furadan/carbofuran***. The incautious dependence on chemical pest control options undermines national economic growth through farmers' non-compliance with trade barriers on pesticide residues in export produce. According to EC directive 91/414, for example, approximately 80% of the active ingredients used in Africa will be banned for use in Europe, and IPM is a fast-emerging trade policy issue.

4.2 Control methods of pests and diseases in Nigeria

Pest management methods in Nigeria vary with the type of pests and agriculture. Most of the pest control operations in Nigeria today are by the use of pesticides (Annex 1 presents the Good Management Practices Guide and Pesticides Management Measures). Pesticides were once seen as the only answer to most of the pest problems. Now, due to the increasing concerns about the environment, the development of pest resistance to pesticides and the increasing economic pressures on farming and the food Industry they are increasingly being seen as just one of a range of control measures available. The pest management controls used in Nigeria include:

4.2.1 Cultural control

These are the adjustments made to agricultural practises and crop husbandry techniques by the farmer. These to a minimum include:

- Crop Rotation
- Alteration of planting date
- Disposal of crop residues
- Choice of resistant crop variety
- Management of Irrigation

4.2.2 Biological Control

This approach involves either encouraging or introducing natural means for the control of the pest or employing natural means to disrupt the life cycle of the pest.

4.2.3 Chemical controls

Chemical controls employ the use of toxic pesticides to kill pests.

4.3 Assessment of Capacity of Nigeria on Integrated Pest Management

Many cultural practices and physical control measures to pest control are currently in use in Nigeria and have been for several farming generations, however, some of them have not provided sufficient and environmentally friendly options for pest management. For instance, bush burning as a way of controlling pest causes deforestation and loss of biodiversity and therefore should be discouraged. In addition, the flooding problems experienced in Nigeria from October into November 2022 and the accompanying widespread pest management concerns will require that the issues of pest be given adequate attention.

The conventional chemical control has been the means generally used to control crop invasions by pests in large agricultural programs in Nigeria. This approach has led to numerous cases of recorded intoxications each year, the resistance of numerous pests to many chemicals (case of *Helicoverpa armigera* to pyrethroids), the destruction of useful species, the perturbation of the ecological balance, the dependence towards synthetic chemical pesticides and the growing debt of farmers compelled to use increasingly expensive products, the deviances in the use of cotton pesticides on some food crops such as cowpea, etc.

In order to reduce the incidences of pest in Nigeria a number of project-based interventions have been carried out on IPM. Some of these are:

- IPM for pest control in the Commercial Agriculture Development Project (CADP)
- Farmer's training on IPM under the Transforming Irrigation Management in Nigeria (TRIMING) project.
- Cocoa farmers training on the use of IPM to pest control and the IPM for pest control in the National FADAMA Agricultural Development in Nigeria

4.4 Assessment of Collaboration on IPM

As it has been established under the NFWP, the NFWP-SU will enjoy IPMP collaborative benefit and lessons learned from other existing world-bank/donor funded projects, currently being implemented in Nigeria. This is quite beneficial and possible, considering the fact that a lot of experience and success has been gained in Nigeria under CADP, FADAMA II and III projects, and WAAPP (West Africa Agricultural Productivity Project) including application of IPM operations.

In addition, this collaboration will take into account the experiences that can be shared by the National Plant Protection Organization of Nigeria (NPPON) & Nigerian Agricultural Quarantine Service (NAQS). Consequently, the project stands to gain from shared experience and capacity with these existing bodies in terms of challenges and success drivers of IPM operations, which will, for instance, take into consideration international standards for phytosanitary measures, phytosanitary treatment and diagnostic protocols and other similar areas. As such, NFWP-SU project beneficiaries will enjoy knowledge transfer on IPM implementation.

CHAPTER FIVE

Pests & Pesticide Management

5.1 Concerns on the Use of Pesticides

Pesticides are toxic substances released most times intentionally into our environment. This includes substances that kill weeds (herbicides), insects (insecticides), fungus (fungicides), rodents (rodenticides), and others. Though they could be very useful in managing pest problems, they are also a great environmental and health risk.

5.1.1 Persistent Organic Pollutants (POPs)

Nigeria became a signatory to the Stockholm Convention on Persistent Organic Pollutants, In May 2001 and the commitment was ratified in 2004. Under Annex A (listed for Elimination) of the convention, Parties must take measures to eliminate the production and use of obsolete chemicals. These obsolete pesticides are characterized by a high persistence in the environment (e.g. half-life for DDT in soil ranges from 22 to 30 years, Toxaphene -14 years, Mirex -12 years, Dieldrin-7 years, Chlordecone up to 30 years), low water solubility and thus potential to accumulate in fatty tissue of living organisms including humans and toxicity to both human and wildlife. Due to intensive releases to the environment in past several decades, and tendency to long-range trans-boundary atmospheric transport, they are now widely distributed and are found around a globe. Most agricultural pesticides could constitute any of the POPs chemicals, which if are in use pose adverse environmental, animal and human health risks.

Considering that Nigeria is a Signatory, the country is compelled to stop the use of POPs pesticides if still in use. For other pesticides, which are not POPs, the issues of toxicity still remain and the consequence of application on agricultural farmland and resultant wider environmental and social impacts.

5.2 Pesticides and Human Health

According to the 2022 Wet Season Agricultural Performance Survey in Nigeria reported by the National Agricultural Extension & Research Liaison (NAERLS)[7] have revealed that pests and diseases have caused crop loss up to eighty percent in some farms in Nigeria ad an estimation of 1.5 to 200,000ha of land in 2022. This shows that pests are destructive, and these yield gaps depend on use of pesticides to close them.

Pesticides have been linked to a wide range of human health hazards, ranging from short-term impacts such as headaches and nausea to chronic impacts like cancer, reproductive abnormalities, and endocrine disruption. Unfortunately, chronic health effects may occur years after even minimal exposure to pesticides in the environment, or result from the pesticide residues, which we ingest through our food and water. Pesticides can cause many types of cancer in humans. Some of the most prevalent forms include leukemia, non-Hodgkin's lymphoma, brain, bone, breast, ovarian, prostate, testicular and liver cancers.

5.3Identification of Potential Environmental and Health Risks Associated with Pesticides

Potential adverse environmental and health risks of pesticides applications that are of concern to the proposed For Women project may include:

5.3.1 Environmental Risks

The risks associated with the use or application of pesticides are:

[7] Leadership Newspaper, October 28, 2022

5.3.1.1 Air Pollution

The vaporized form of sprayed pesticides will be released into the air, and if the chemical compound is very stable, the vapor can travel beyond the project intervention sites. Whether pesticides are applied by spraying or by surface application, air is the usual medium through which the chemicals move to their intended and unintended targets. While some of the active ingredients in pesticides stay in the atmosphere for only a short while, others may last longer and may have the potential to contaminate the air, affecting humans and animals. Reliable data on how pesticides behave in air, such as distance travelled, are lacking, because adequate monitoring tools are unavailable.

5.3.1.2 Soil contamination

Pesticides which are still used in agricultural land in and around the proposed sites could enter soil during spraying resulting in wash-off or run-off into soil. Some pesticides such as soil fumigants and nematicides which are applied directly into soil to control pests and plant diseases are often retained in the soil. Long-term excessive use of pesticides will cause higher pesticide residues in the soil, which will cause soil contamination within the area.

5.3.1.3 Surface and Groundwater Contamination

Generally, there are four major routes through which pesticides reach the water: they may drift outside of the intended area when sprayed, may percolate, or leach through soil, may be carried to the water as runoff, or may be spilled. Pesticides typically enter surface water when rainfall or irrigation water exceeds the infiltration capacity of soil and resulting runoff then transports pesticides to streams, rivers, and other surface-water bodies. Groundwater contamination may occur when pesticide residue in surface water such as drainages, streams, and municipal wastewater is leached downward into groundwater. Also, if pesticide applications are adopted by the project as the most preferred measure for pest management. Groundwater contamination may also occur from pesticide residue in surface water, such as drainages, streams, and municipal wastewater.

5.3.1.4Harm to Non-target Species

The environmental impact of pesticides consists of the effects of pesticides on non-target species. Over 98% of sprayed insecticides and 95% of herbicides reach a destination other than their target species, because they are sprayed or spread across entire agricultural fields. Runoff can carry pesticides into aquatic environments while wind can carry them to other fields, grazing areas, human settlements and undeveloped areas, potentially affecting other species. Other problems emerge from poor production, transport and storage practices. Over time, repeated application increases pest resistance, while its effects on other species can facilitate the pest's resurgence.

5.3.2 Health Risks

The health risks could result from:

5.3.2.1 Direct inhalation Concerns

Pesticides can enter the body through inhalation of aerosols, dust and vapour that contain pesticides; through oral exposure by consuming food and water; and through skin exposure by direct contact. The effects of pesticides on human health depend on the toxicity of the chemical and the length and magnitude of exposure. Farmer, farm workers and their families experience the greatest exposure to agricultural pesticides through direct contact. Bioaccumulation of pesticides in the body over time and toxicity increases as a consequence of this cumulative impact.

5.3.2.2 Potential Site-related Health Concerns

The concerns are:

A. Consumption of crops and plants grown under chemical pest control could cause health hazards to humans and animals within and around the project site.

B. Certain kinds of chemical intoxication especially after drinking pesticide-contaminated water is a medium to high likelihood. This is a crucial potential impact considering that most of the locals get drinking water from surface and groundwater sources.
C. Skin, eye, and nose irritation
D. Possibility of cancers, neurologic, endocrine and reproductive problems form direct and indirect exposure to pesticides.
E. Occupational health and safety risks. Long term inhalation of toxic pesticides sprayed, could eventually result in respiratory illnesses or disease conditions.

Table 2 presents details of the WHO Classified Pesticides and their Effects.

Table 2: WHO Classified Pesticides and their Effects

Pesticides	Outcome of accidental exposure		
	WHO Class	**Effects of acute intoxication**	**Effects of chronic intoxication**
Clorpyriphos ethyle (1)	II (Moderately dangerous)	Nausea. Dizziness. Vomiting. Cough. Loss of consciousness. Convulsions. Constriction of the pupil. Muscle cramps. Salivation. A severe exposure may cause inhibition of cholinesterase Exposure above the Occupational Exposure Limit (OEL) may result in death	The substance may have effects on the nervous system, cholinesterase inhibitor
Fenitrothion (1)	II (Moderately dangerous)	Cramps. Diarrhea. Dizziness. Headache. Nausea. Loss of consciousness. A severe exposure may cause inhibition of cholinesterase exposure above the OEL may result in death	The substance may have effects on the nervous system, cholinesterase inhibitor
Malathion (1)	III (Slightly hazardous)	The substance may have effects on the nervous system, causing convulsions, muscle cramps, vomiting, diarrhea, excessive salivation, sweating, difficulty breathing, loss of consciousness. A severe exposure may cause inhibition of cholinesterase Exposure above the OEL may result in death.	A prolonged or repeated contact may cause skin sensitization. Cholinesterase inhibitor; possibility of cumulative effects
Dizinon	II (moderately hazardous)	The main symptom of soft acute diazinon poisoning are headache, nausea, dizziness, pinpoint pupils, blurred vision, tightness in the chest, difficulty in breathing, muscle weakness or twitching, difficulty in walking, vomiting abdominal cramps and diarrhea Effects on the central nervous system may include confusion, anxiety, drowsiness, depression, difficulty in concentrating, slurred speech, poor recall, insomnia, nightmares and a form of toxic psychosis resulting in bizarre behavior.	Cholinstrase inhibitor. Accumulation of acetylcholine at junctions between nerves and glands results in gland secretion; and accumulation between nerves in the brain causes sensory and behavioral disturbances.
Cypermethrin	II (moderately hazardous)	Symptoms of acute poisoning include abnormal facial sensations, dizziness, headache, nausea,	Chronic symptoms include brain and locomotry disorders, polyneurophasy and

Pesticides	Outcome of accidental exposure		
	WHO Class	**Effects of acute intoxication**	**Effects of chronic intoxication**
		anorexia and fatigue, vomiting and increased stomach secretion	immuno-suppression and resembles the multiple chemical sensitivity syndrome
Carbosulfan	II (Moderately hazardous	The acute symptoms of carbosulfan in humans are characteristics of other organophosphate and carbamate insecticides. Signs include dizziness, salivation, excess salivation, nausea, abdominal cramps, vomiting, diarrhea, blurred vision, pi-point pupils, difficulty breathing and muscle twitching	Not applicable
Carbaryl	II (Moderately hazardous	Inhalation or ingestion of very large amounts can be toxic to the nervous and respiratory systems resulting in nausea, stomach cramps, diarrhea and excessive salivation.	Not applicable
Profenofos	II (Moderately hazardous	Muscarinic, nicotinic and central nervous system manifestations	There is no available data concerning chronic toxicity of profenofos

5.4 Impact Mitigation through IPMP

Integrated Pest Management (IPM) is an effective and environmentally sensitive approach to pest management that relies on a combination of multiple practices with a view to reduce reliance or use of pesticides. IPM programs use current, comprehensive information on the life cycles of pests and their interaction with the environment. This information, in combination with available pest control methods, is used to manage pest damage by the most economical means, and with the least possible hazard to people, property, and the environment. By applying basic IPM principles historical and future pest with respect to the proposed project site will be managed in an environmentally safe manner thus reducing increased dependency on pesticides or other environmentally unsafe approaches.

Furthermore, transfer of knowledge on biological, cultural and mechanical control measures that have been used in other agricultural programs in Nigeria (such as the FADAMA projects, IITA, FAO, CADP, TRIMING project etc.), while experiences that can be shared by the National Plant Protection Organization of Nigeria (NPPON) & Nigerian Agricultural Quarantine Service (NAQS) shall offer a strong platform for proffering practicable safe measures towards mitigating adverse impacts of identified pests in the project area.

In comparison with traditional pesticide applications which pose immeasurable health and environmental risks and may result in severe current and future losses (environmental, public, health, occupational health, social and financial), an Integrated Pest Management Plan (IPMP) will be the most appropriate pest management approach for the proposed project. The IPMP for the NFWP-SU project will lay down mitigation measures, institutional responsibilities and capacity building needs.

CHAPTER SIX

6.0 Integrated Pest Management Plan

Even though the site locations and activities are yet to be identified, this Integrated Pest Management Plan (IPMP) is intended to anticipate and thereafter provide the guidelines required to manage the adverse effects of identified pests and pesticides that are likely to be encountered on the project sites to acceptable levels. This plan is designed to minimize potential adverse impacts on human health and the environment and to advance ecologically based IPM.

6.1 Review of IPM Initiatives

The IPMP further provides a proper basis for stakeholder groups to establish functional mechanisms enabling the NFWP-SU's beneficiary farmers to identify, understand and manage pest and vector problems in the further development of agriculture, reduce personal and environmental health risks associated with pesticide use, and protect beneficial biodiversity such as natural enemies of pests and pollinators in the farmers' efforts to increase productivity.

For effectiveness, the IPMP recommends practical and cost-effective actions to prevent or reduce significant impacts to tolerable levels. It also establishes institutional arrangements and personnel capacity building needs. It shall complement the Environmental and Social Management Framework (ESMF) and other Environmental & Social Framework instruments of the project and has been designed to reduce dependency on pesticides and encourage integrated pest control methods such as biological, cultural, physical, chemical methods and design a program for capacity building in IPM.

6.2 Specific IPMP Objectives

Specific objectives of this IPMP are:

- Assist the NFWP SU in agriculture for Women project beneficiaries of the 12 participating State Governments to plan and design location specific integrated pest management (IPM) activities.
- Promote participatory approaches in IPM to learn, test, select and implement best practice IPM options.
- Promote biodiversity monitoring to serve as early warning systems on pest status, alien invasive species, beneficial species, and migratory pests.
- Monitor and evaluate the benefits of IPM including its impact on the environment and health

Table 3 outlines the matrix of activities, expected results, milestones and performance indicators of the PMP.

Table 3: Matrix of Activities, Expected Outcomes, Milestones & Key Performance Indicators

Overarching Target	Expected Outcome	Key Performance Indicators (KPIs)	Assumptions/Risks
Empower crop and livestock farmers to contribute significantly to household and national economies through environmentally friendly pest management practices.	Food security enhanced, environmental quality improved, crop and livestock productivity and farmers' income increased	Evidence of improvements in food availability, level of poverty, and environmental protection in areas implementing the for Women project	• National security remains stable • Government policies continue to food security programme
1.In the immediate future, halt and reverse losses from pest attacks with an aim of increasing food security by enhancing agricultural productivity and revenue from agriculture. 2.In the long run, strengthen national and local capacity to reduce environmental and health risks associated with pest management practices in the selected States.	Farmers that are beneficiaries of the 'for Women' project will adopt ecologically and environmentally friendly options to reduce crop and livestock losses with minimal personal and environmental health risks. For Women Project decision makers provided with clearer guidelines and embrace world class IPM approaches, thereby enabling then to promote IPM approaches and options in agriculture Establish collaboration linkages to develop a statewide IPM mechanism to promote compliance with international conventions and guidelines on pesticide use	Strengthened food security Improved perception of collaborating state agencies regarding the value of IPM in agricultural practices. Level of compliance with World Bank etc. Level of chemical control practices Types and level of use of alternatives to synthetic pesticides	

6.3 Overview of Potential Impacts of Pest Management Activities

In implementing IPM for the proposed project, the use of highly persistent and highly toxic chemicals must be avoided in pest management. Natural pest control methods should be employed to effectively reduce or eliminate pest or disease infestation without harming humans, animals, crops and other ecosystems. The *IFC Guidelines on Pesticide Handling and Application* provides a criterion for choosing pesticides based on the following factors in decreasing order of importance:

- Biodegradability;
- Toxicity to mammals and fish;
- Occupational health and safety risks; and
- Costs

6.4 Pest management Practices & Challenges

Effective control methods (cultural, biological and chemical) for managing common pests and diseases of the agricultural activities have been identified in the selected States. The combination of two or more natural methods may produce a more effective result. The various pests, the locations and their control measures are presented in Table 4, while Table 5 shows the different diseases and controls.

Table 4: Pests and Control methods in Nigeria

Crops	Cultivated in these States Visited	Pests	Control Methods		
			Cultural	Biological	Chemical
Horticulture (fruits & Vegetables)	Abia - Abia South Kebbi - Zuru & Yauri Emirates	Nematode Caterpillars (Moths and Butterflies) Beetles Grasshoppers Stem borers	Use of resistant species Adoption of crop rotation techniques.	Soil solarisation	Not applicable
Maize	Kebbi - Zulu & Yauri Emirates	Quelea birds Grass cutters Rats Bush fowls Termites and Mole cricket Stem borers Shoot flies Armyworms	Bird scaring using Scare-crows Use of traps for rats, grass cutters, bush fowls Removal and destruction of infested plants and plant residue (applicable to Stem borers, armyworms & termites)	Encouraging or introducing natural enemies of the pest or interfering with the life cycle of the pest	Aerial spraying of organophosphorus pesticides
Rice	Abia - Zacordi & Bende Kebbi - Arugungu LGA	Nematodes (Apelenchoides besseyi; Hirshmanniella grazilis; H. oryza;H.spinicaudata) Stem borers	Land fallow and planting of trap crops Adopting crop rotation techniques	Encouraging or introducing natural enemies of the pest or interfering with the life cycle of the pest	Not applicable
Cassava	Cultivated Statewide – Abia	Green mite Cassava mealy bug Variegated grasshopper.	Crop Rotation Alteration of planting date	Encouraging or introducing natural enemies of the pest or interfering with	Not applicable

			Disposal of crop residues Choice of resistant crop variety Management of Irrigation.	the life cycle of the pest	
Soya bean	Zuru & Yauri LGAs	Caterpillars Whitefly	Adopting crop rotation techniques Removal and destruction of infested plants and plant residues	Encouraging or introducing natural enemies of the pest or interfering with the life cycle of the pest.	Not applicable
Fish	Arugungu LGA	• Flukes • Leeches • Anchor worm • Lice • Nematode	Avoid introduction of raw plants or snails	Not applicable	Use of organophosphates Potassium Permanganate bath against freshwater parasites or saltwater bath for freshwater parasites
Oil Palm	Abia South – Palm oil processing	Mealy Bugs (Dysmicoccus brevipes)	Not applicable	Mealy bugs can potentially be controlled by the introduction of natural enemies such as lady beetles	Not applicable
		Rhinoceros beetle (Oryctes rhinoceros)	Destroying of any decaying logs in plantation by chopping and burning to kill any larvae that may be inside Removal of any dead trees from plantation and destroy by burning	Not applicable	Not applicable

			Planting of cover crop to deter egg laying by females as they do not lay eggs in areas covered by vegetation Hooked wire can be used to extract larvae that are boring into young crowns		
Yam	Abia - Abia North	Mealy bugs (Rastrococcus Spp)	Pruning out of heavily infested branches	Introduction of natural Mealy Bug enemies like Ants etc.	Horticultural oils or soapy solutions can be used to treat heavy infestations It is not advised to use chemicals for control, as they may decrease the population of natural enemies, leading to Mealy bug outbreak
		White Scale insects – Aspidiella hartii	Inspection of yams in storage regularly, and removal of scale infested tubers Use of scale-free seed-yam for planting	Not applicable	Use of white oil (made from vegetable oils), soap solution or horticultural oil (made from petroleum) on yams infested with scale: (i) after harvest and before yams are stored; (ii) during storage, on yams when infestations begin; and (iii) at the time of planting before the tubers are cut Commercial horticultural oil can also be used. White oil, soap and horticultural oil-sprays work by blocking the breathing holes of insects

					causing suffocation and death. Spraying the undersides of leaves; the oils must contact the insects. The application of *malathion* is useful against scales insects, but it is likely to kill natural enemies
Cowpea	Kebbi – Arewa Emirates	Cowpea aphid *Aphis craccivora*	Use insect resistant varieties Multiplication plots and environs should be weed and ants free	Not applicable	Spray using pesticides like *Bacillus thuringiensis* (branded as Cyber Force or Cyber Diforce)
		Cowpea pod borer Maruca vitrata	Not applicable	Not applicable	Spray using pesticides like *Bacillus thuringiensis* (branded as Cyber Force or Cyber Diforce)
		Cowpea Weevil Callosobruchus spp	Host-Plant Resistance. Resistant varieties are available at Research Institutes in Nigeria Harvesting at the right time to prevent infestation of pods in the field Cold storage at 4 degrees Celsius	Not applicable	Fumigation of the storage facility Seed treatment with Phostoxin

		Army worms Spodoptera exigua	Not applicable	Biological control by natural enemies which parasitize the larvae	Use available chemicals such as Bifenthrin
		Corn earworm Helicoverpa zea	Monitor plants for eggs and young larvae	Biological control of natural enemies that could be damaged by chemicals	*Bacillus thuringiensis* or Entrust SC may be applied to control the insects on organically grown plants
Cashew	Abia State	Tea Mosquite Helopaltis antonii	Dead trees and those which are beyond recovery should be removed from the plantation	Not applicable	Not applicable
		Cashew weevil Mecicorynus loripes	Remove bark from infested areas and destroy any larvae or pupae found, this process should be repeated every month for up to six months; severely infested trees should be removed and destroyed; remove all adult weevils from tree prior to destruction and also remove bark and kill all larvae and pupae	Not applicable	Not applicable
		Helopeltis bugs Helopeltis schoutedeni	Monitor crop regularly for signs of damage. avoid interplanting cashew with other crops which are hosts for helopeltis bugs such as tea and cotton	Conserve populations of natural enemies, weaver ants can reduce populations African weaver ants (*Oecophylla longinoda*) have proved to be very effective as bioagents to Helopeltis and other sucking bug control	Not applicable

		Stem borers Mecocorynus loripes	Control approach is basically physical confrontation to adults and larvae	Not applicable	Not applicable
		Mealy bug Pseudococcus longispinus	Not applicable	Use of bioagents such as Ladybird beetles (*Chilocorus spp*) and Lacewing flies (*Chrysopa spp*) have proved to be useful	Not applicable
Sesame	Kebbi – Zuru & Yauri Emirates	Hawk Moth	Deep ploughing exposes the pupae for predation to insectivorous birds. • Hand picking (collection) and destruction of caterpillars	Use common biological practices	Not applicable
		Bihar hairy caterpillar	Dig the trenches of 1 inch depth between the fields to kill the larvae in pits. Irrigate once to avoid prolonged mid-season drought to prevent pre-harvest infestation	Use common biological practices	Not applicable
		Gall Fly	Use common Cultural methods	Use common biological practices	Not applicable
		Leaf Roller	Use common Cultural methods	Use common biological practices	Not applicable
		Leaf Hopper	Use common Cultural methods	Use common biological practices	Application of Oxydemeton–methyl
Tomato	Kebbi – Zuru & Yauri Emirates	Cutworms	Elimination of weeds around garden beds at least two weeks before planting. Hand-picking cutworms at night may help	Not applicable	Not applicable

		Aphids	Crushing aphids by hand or blasting them off with a strong jet of water	Not applicable	Not applicable
Groundnuts		Aphids (Aphis craccivora)	Crushing aphids by hand & cultivating with cowpea	Use common biological practices	Application of Phosphamidon 0.03%, M-O-D 0.025%, Dimethoate 0.03%

Table 5: Diseases and Control methods in Nigeria

Crops	Diseases	Control Methods		
		Cultural	**Biological**	**Chemical**
Maize	Rust Turcicum blight Curvularia leaf spot Maydis blight Smut. Nematode	Use of crop rotation Planting technique. Removal and burning of infected plants	Use of resistant varieties	Spraying with systemic fungicides eg. Benomyl and Dithane M45. Seed dressing with Furadan or Apron plus. Use of Furadan 3G and other fumigant nematicides
Rice	Blast (Pyricularia oryza) Brown leaf spot (Cochliobolus miyabeanus) Black kernel (Curvularia spp)	Adopting crop rotation techniques	Not applicable	Not applicable
Cassava	Cassava Mosaic Bacterial blight	Crop Rotation	Not applicable	Not applicable

	Anthracnose Root rot	Alteration of planting date Disposal of crop residues Choice of resistant crop variety		
Soya bean	Rust Bacterial pustule Phytophthora seedling blight and root and stem rot Frogeye leaf spot Cowpea mild mottle Soyabean mottle mosaic	Use of Crop rotation planting techniques	Plant resistant varieties	Use of Foliar fungicide Treatment of seeds with systemic insecticides and application of one or two foliar sprays of insecticides to reduce the insect vector during pre-flowering stage
Fish	Coccidiosis Hexamitosis Streptococcosis Dropsy Vibrio	Not applicable	Not applicable	Use of coccidiostat monensin, sulfamidimine or amprolium
Oil palm	**Bacterial Bud rot –** *Erwinia Spp*	Plant oil palm varieties with resistance to the bacteria Rotting tissue on spear leaves should be removed to prevent	Not applicable	Palm buds can be protected using copper-based fungicides

		bacteria spreading to buds		
	Ganoderma butt rot – *Ganoderma Spp*	Palms should be monitored closely for signs of disease, especially if a palm has died or been removed nearby as fungi can colonize old stumps and release spores Avoidance of replanting palm in soil where an infected palm has been removed	Not applicable	Not applicable
	Oil Palm Witt – *Fusarium oxysporum*	Dead or dying trees should be felled and burned to prevent spread in plantations If palms are replanted, then new palm should be planted a distance of 3.9m from infested stump	Not applicable	Treatment of soil within a 3m radius of infested stumps with *dazomet,* and subsequent covering with leaves for a period of 30 days
	Pestalotiopsis Leaf spot – *Pestalotiopsis Spp*	Removal and destruction of severely diseased palms from plantation, Adequate spacing during planting of palms to allow air to circulate between trees Removal of weeds from palm plantation	Not applicable	Application of appropriate broad spectrum foliar fungicides can be used as a chemical method for control of Leaf Spot disease
Yam	**Anthracnose -** *Colletotrichum gleosporoides*	The most effective method of controlling the disease is to plant yam varieties that are	Not applicable	The use of Benomyl, thiabendazole as a chemical method of control of yam

		resistant to anthracnose such as TDA 291 or TDA 297		anthracnose had been proven effective
	Dry rot disease – Scutellonema bradys	Treating tubers with hot water for 40 min at 50-55 C before sowing and after harvest to reduce disease both in field and storage Follow crop rotation with non-host or antagonist crops like ground nut, sorghum, maize, chill pepper etc.	Not applicable	Not applicable
	Yam Mosaic diseases – *Yam Mosaic potyvirus*	Use of healthy, large and disease free tubers or setts for planting Regular weeding of farmland Collection and destruction of crop debris		
Cowpea	**Antracnose** (Collectotrichum spp)	Use of resistant varieties for planting is the best method of control practice of good field sanitation such as removing crop debris from field after harvest to reduce levels of inoculum	Not applicable	Not applicable
	Bacteria blight (Fungi) *Xanthomonas campestris*	Use of certified seeds and resistant varieties	Not applicable	Spraying of plants with an appropriate protective copper based fungicide before

				appearance of symptoms Treatment of seeds with an appropriate antibiotic prior to planting to kill off bacteria
	Brown blotch (Fungi) *Collectrichum capsici*	Use of resistant varieties for planting is the best method of control Use of only certified disease-free seed Good field sanitation practice such as removing crop debris from field after harvest to reduce levels of inoculum	Not applicable	Not applicable
	Brown Rust (Fungi) *Uromyces spp*	Not applicable	Not applicable	Sprays of sulphur or potassium carbonate can help to control the disease
Cashew	**Anthracnose** *Collectotrichum gloeospoides*	Not applicable	Not applicable	A protective coating of copper-based fungicide on susceptible parts of plant can prevent the disease. Fungicide should be applied when buds begin to expand through to fruit set but are not required during dry periods

	Die Back or Pink Disease	This disease can be controlled by the pruning of the affected branches below the spot of infection and destroying them, protecting the cut surface by application of Bordeaux paste and spraying of Bordeaux mixture 1% twice in May - June and the second in October.	Not applicable	Not applicable
	Damping off of Seedling	It can be controlled by provision of adequate drainage in the nursery and dranching the beds/polybags with *0.*1 % Cersen, Bordeaux mixture 1%, Diathane - M-45 0.25% or Feltef 0.1%.	Not applicable	Not applicable
	Powdery Mildew disease	Not applicable	Not applicable	Powdery is basically controlled by use of Sulphur dust, but due to likely environmental acidification problems, alternative fungicides have been tested and registered for use in Nigeria
	Leaf and nut blight disease	Not applicable	Not applicable	Not applicable
Ginger	**Bacterial Wilt**	Use of disease-free seeds. Sowing should be done on disease free land based on previous history.		Treatment with trichoderma viride or T. Herzianum + Pseudomonas

		4 to 5 years of crop rotation will prevent disease incidence Provide proper drainage will prevent water stagnation		florescens before sowing.
	Dry Rot	Seed rhizomes are to be selected from disease free garden	Not applicable	Application of Trichoderma harzianum along with neem cake @ 1 kg/bed helps in preventing the disease. Use Bordeaux mixture or copper fungicides@ 2.5 gm / lit water as spot drenching
	Soft Rot	Use disease free, healthy rhizome for planting. Provision of good drainage	Bio fumigation with residues of cruciferous crops like mustard, toria, rapeseed	Application of neem cake @ 2.5 quintals along with Trichoderma viride @ 2.5 kg/ha at the time of planting. Drenching with Bordeaux mixture @1% or COC @0.3% for effective management of the disease.
	Leaf Spot	Growing the crop under partial shade	Not applicable	Application of Bordeaux mixture at 1% or COC at 0.3%
Sesame	**Alternaria leaf blight**	Avoid planting overlapping crops in adjacent area. Crop rotations, viz.,	Use resistant/tolerant varieties. Use healthy, certified and weed seed free seeds.	Treatment with Trichoderma @ 4 g/Kg of seed, Pseudomonas fluorescens @ 2 g/Kg

		sesame-maize cabbage, okra- sesame - maize, maize - sesame -maize and sesame - finger millet-eggplant are reported to be effective in reducing disease incidence. Crop rotation with non-host crops, particularly with paddy. Provide good drainage	Use sowing in lines to facilitate inters culture operations. Adopt stale seedbed technique to control early germinating weeds. Use straw mulch to control weed growth and to conserve soil moisture	seed or Bacillus subtilis @ 2 g/Kg seed or NSKE 4%
	Phytophthora blight	Avoid planting overlapping crops in adjacent areas. Crop rotations, viz., sesame-maize cabbage, okra- sesame - maize, maize - sesame -maize and sesame - finger millet-eggplant are reported to be effective in reducing disease incidence. Crop rotation with non-host crops, particularly with paddy. Provide good drainage	Use resistant/tolerant varieties. Use healthy, certified and weed seed free seeds. Use sowing in lines to facilitate inters culture operations. Adopt stale seedbed technique to control early germinating weeds. Use straw mulch to control weed growth and to conserve soil moisture	Treatment with Trichoderma @ 4 g/Kg of seed, Pseudomonas fluorescens @ 2 g/Kg seed or Bacillus subtilis @ 2 g/Kg seed or NSKE 4%
	Dry root rot	Avoid planting overlapping crops in adjacent area. Crop rotations, viz., sesame-maize cabbage, okra-sesame - maize, maize - sesame -maize and	Use resistant/tolerant varieties. Use healthy, certified and weed seed free seeds. Use sowing in lines to facilitate inter culture operations.	Treatment with Trichoderma @ 4 g/Kg of seed, Pseudomonas fluorescens @ 2 g/Kg seed or Bacillus subtilis @ 2 g/Kg seed or NSKE 4%

		sesame - finger millet-eggplant are reported effective in reducing disease incidence. Crop rotation with non-host crops, particularly with paddy. Provide good drainage	Adopt stale seed bed technique to control early germinating weeds. Use straw mulch to control weed growth and to conserve soil moisture	
	Phyllody	Intercropping of sesamum + redgram (6 : 1)	Use common biological practices	Spray neem oil @ 5 ml/l for vector (leaf hopper) control
	Prussic acid poisoning	During grazing management: use certified seed select varieties low in prussic acid follow fertilizer application recommendations do not begin grazing until plants have reached a height of 18 to 20 inches allow frosted sudangrass to thoroughly dry before pasturing dilute intake of infected material with hay and other forages	Not applicable	Not applicable
	Acetonaemia (ketosis)	Prevention depends on adequate feeding and management practices	When using corticosteroids, it is important to supply an adequate amount of glucose either as a high carbohydrate diet and/or	A quick-acting glucose supplement is required immediately. Follow-up treatment is aimed at providing a long term supply of glucose.

			propylene glycol drenches to prevent excessive breakdown of muscle protein	
Tomatoes	**Early Blight**	Avoid getting water on the leaves whenever possible, change the locations where you plant your tomatoes, mulch well around each plant, and clear away all dead or infected plant material at the end of each season. Picking off infected leaves may slow the progression of the disease until the weather is more favorable	Not applicable	Not applicable
	Speck and Spot	Prevent and control these diseases as you would Early Blight, above. Bacterial spots stop spreading in dry, warm weather.	Not applicable	Chemical controls are usually not needed.
	Late Blight	Avoid sprinkler irrigation, very dense planting, or other things which keep humidity high. Remove volunteer potatoes or tomatoes, and clean up debris at the end of the season. Mulching may help prevent initial infection	Not applicable	Not applicable

	Fusarium Wilt	Cleaning up all tomato debris, including old roots, and solarizing the soil may help.	The typical solution in an infected garden is to grow resistant varieties	Not applicable
	Powdery Mildew	Not applicable	Not applicable	No control is necessary on mature plants, but in the case of young or severely affected plants, sulfur dust (1) provides good control.

6.5 Personal Protective Equipment (PPE)

It is vital that the people who will be involved in the application and handling of pesticides under the 'for women' project wear and use appropriate personal protective gears in the course of their activities. Wearing PPE can greatly reduce the potential for dermal, inhalation, eye, and oral exposure, of humans to pesticides and thereby significantly reduce the chances of a pesticide poisoning. PPEs to use when applying pesticides include the following:

- Chemical Goggles: It is important to use chemical goggles, which are specially developed to prevent chemical related accidents, rather than general safety goggles
- Gloves: Unlined, full-length plastic or rubber gloves should be used. If gloves are lined residue can become trapped in the lining and is hard to remove.
- Hat: The absorption rate of pesticides is also very high on the scalp and forehead. Plastic caps are recommended as they are waterproof and prevent absorption.
- Boots: rubber boots are suggested since they prevent absorption and are easy to clean
- Coveralls/Apron or Long-Sleeved shirt and full trousers made from closely woven fabric
- Respiratory Masks
- Ear Protection: Earplugs prevent pesticide exposure via the ear canal.

It is mandatory that pesticide contaminated clothing be kept from other fabric. PPE should be cleaned and dried in a well-ventilated place before storage.

Guide to Responsible Use and Storage of Pesticides

- Do not store pesticides in unlocked cabinets that are within the reach of children. Pesticides are extremely toxic to children.
- Do not transfer pesticides into containers that could be associated as something else such as food.
- Do not apply insect repellents over cuts, irritated skin, eyes, mouth, hands, or directly over the face
- Do not store unnecessary amounts of pesticides. Purchase only what you need at that time.
- Apply an appropriate level of caution to those who might come into contact and become exposed.
- Look for pesticide alternatives.

6.6 Patterns of functional Surveillance in Selected States

Patterns of the functional surveillance for early warning on alien invasive species and migratory pests for the NFWP that are still applicable under the NFWP-SU IPM is as shown in Table 6.

Table 6: Patterns of functional surveillance

Activities	Expected results	Milestones	Performance Indicators	Assumptions
• Record stakeholders' overviews on crop and livestock pests. • Conduct field diagnosis to specify pests that undermine agricultural activities. • Identify local coping mechanisms and researcher recommended IPM options against the pests. • Develop and explain historical profile of pesticide use and other pest control practices for the for Women project. • 5. Specify partnership opportunities at local, national and international levels to assist in the implementation of the PMP	Stakeholder groups develop common understanding of key pest problems and agree on corrective action.	• Pest problems diagnosed and related IPM opportunities identified • Potential constraints farmers may face in the use of the technologies specified • Pest lists including quarantine pests and alien invasive species developed. • Potential for improving existing pest control practices assessed • Pest monitoring schemes for early warning on alien invasive species and migratory pests are organized and functional Action plan for location-specific IPM activities developed	• Documented information on the status of pests and natural enemies of pest and pollinators in agriculture. • Inventory of alien invasive species and quarantine pests • Types and availability of natural enemies for use in biological control of named pest • Types and availability of microbial pesticides and botanical pesticides to replace chemical pesticides • Type and number of crop rotation schemes to reduce buildup of named pest species • Type of composting and mulching as alternatives to mineral fertilizers • List of principal actors and of partners	Social, economic and political situation remain stable Major security threats to agricultural activities such as herdsmen problems are effectively resolved.

CHAPTER SEVEN

IPMP Implementation and Management

7.0 Introduction

The fundamental areas essential to the successful implementation of this IPMP are:

- Measures that ensure that banned pesticides are not procured for the project.
- Training & Capacity Development - Measures that will ensure capacity building among stakeholders that will implement the IPMP
- Institutional Arrangements
- Monitoring Measures to ensure that POPs pesticides and WHO class I and II pesticides considered to be extremely/highly and moderately hazardous respectively are not procured and/or used;
- Stakeholder Participation measures that will ensure that farmers get the relevant technical aids and education on the implementation of safe and alternative pest control measures rather than the use of chemicals.

7.1 IPMP recommendations for Implementing the NFWP SU

The following recommendations shall guide the implementation of the IPM:

1. Capacity development and training for key project personnel such as environmental & Social Framework specialist, monitoring team & also 'for women' project beneficiaries that will be involved in agricultural activities in the following key areas:

- Environmental Assessment & basic concept of Environment
- Environmental Regulations and Statutory requirements with focus on Government and World bank
- Introduction to Environmental & Social Environmental & Social Framework
- Occupational Health and Safety (OHS) and importance of Personal Protective Equipment
- Train on the biological and cultural pest control options and prohibition of use of Bank funds to procure unacceptable pesticides and why.
- Developing Safe Practices in the Management & Handling of Chemical Pesticides (transportation, storage, handling, storage of empty pesticide containers
- Patterns of functional pest surveillance & early warning systems
- IPM Implementation and Monitoring (with field exercises) to enable the beneficiaries have a proper hands-on knowledge of best practice pest control methods that do not involve use of chemicals.

It is also vital that this training communicates measures to ensure that unacceptable pesticides are not procured with the Bank's funds, which will be verified by the environmental safeguard's specialist at the State level.

2. Ensure provision of PPE by purchase of special protective clothing for pesticide use & handling - hand gloves, gas mask, safety boot and coverall.
3. The SPMU shall ensure proper Compliance Monitoring of IPMP requirements according to the IPMP monitoring plan.
4. Carry out the disclosure of Copies of this IPMP, like other Environmental & Social Framework instruments to enable stakeholders review and make inputs, where necessary.

7.2 Measures for Ensuring harmful pesticides (WHO Class 1 & Class 2) are not procured

For this IPM to be effective, measures to ensure that unacceptable pesticides are not procured with Bank's fund will be verified by the environmental safeguard's specialist at the State level. The environmental specialists at the SPCU will screen the pesticides procurement list prior to procurement and ensure that only pesticides that are acceptable and approved by the Bank/WHO/NAFDAC are procured. The outcome of the screening will be sent to the World Bank for concurrence.

Other measures for the overall success of IPM are:

- SPCU will consider subsidizing IPM products to the target beneficiaries in order to discourage the use of chemical and harmful pesticides. If the alternative to chemical control to pest is available and cost effective the tendency to use chemicals will be minimized, and that way, the proliferation of WHO Class 1 and Class 11 pesticides would have been avoided. A list of banned pesticides is presented in Annex 2.

- There will be adequate an awareness program to educate farmers and stakeholders including sellers, users and farm workers on the adverse impact/risk associated with the use of certain chemicals by WHO. Names and chemical classes of banned chemicals will be brought to the attention of project beneficiaries through various awareness programs. Also, farmers will be educated on the types and classes of pesticides that are approved for use. Annex 3 presents a list of crop and livestock protection products approved for use by NAFDAC.

- The SPCU in the respective States will ensure that the IPM options (materials, species, equipment, etc.) are distributed to beneficiaries early enough for timely implementation There will be engagement of advisors (extension workers, etc.) to assist farmers with technical know-how of the IPM in the formative years of operation;

7.3 Assessment of Capacity Development & Support Needs

Training and Capacity Development is a fundamental component of the IPMP. A series of trainings have been proposed and are as presented in Table 7:

Table 7: Training & Capacity Development

Modules	Targets	Responsibility	Budget
Environmental Assessment • Basic Concept of Environment • Environmental Regulations and Statutory requirements with focus on Government and World bank • E&S practices: from NFWP to Scale up.	FPCU/SPCU Environmental & Social Framework Unit, Environmental/Environmental & Social Framework Unit, Procurements & other relevant groups, MoWASD, MoE/EPA	Environmental & Social Specialists of Design Consultant/External Agency engaged for capacity building	Covered by ESMF implementation
Introduction to Environmental & Social Standards • Review of ESS3: Resource efficiency and pollution prevention and mgt – spotlight on pest management planning. • Decision making on the selection of IPM approaches or options	FPCU/SPCU Environmental & Social Framework Unit, MoE/EPA (Technical unit)	Environmental & Social Specialists of Design Consultant/External Agency engaged for capacity building	2,500,000.00
Occupational Health and Safety (OHS) Basics in chemical pest applications.	SPCU Environmental & Social Framework Unit, MoE/EPA (Technical unit), For Women beneficiaries in Agric	IPM Consultant	See ESMF budget
Developing Safe Practices in the Management & Handling of Chemical Pesticides (transportation, storage, handling, storage of empty pesticide containers and final disposal)	SPCU Environmental & Social Framework Unit, MoE/EPA (Technical unit), For Women beneficiaries in Agric	IPM Consultant	2,500,000.00

Modules	Targets	Responsibility	Budget
IPM Implementation and Monitoring (with field exercises)	SPCU Environmental & Social Framework Unit, MoE/EPA (Technical unit), For Women beneficiaries in Agric	IPM Consultant	1,000,000.00
TOTAL			**6,000,000.00**

7.4 Institutional Arrangements and Framework for Implementation

The need for institutions to collaborate is necessary for a successful implementation of the IPMP. It is vital that the FPMU collaborates with other supporting institutions, to appropriately utilize the capacity within the institutions to deploy or use the IPMP as an important portion of the ESMF, necessary for accomplishing environmental and pest management goals.

7.4.1 ESF Roles and Responsibilities of Institutions

The roles and responsibilities of these levels of institutions are outlined in Table 8.

Table 8: IPMP Roles & Responsibilities

Category	Roles & Responsibilities
Federal Government MDAs (Federal Ministry of Environment and other agencies (Such as NESREA)	• Lead role in provision of advice on screening, scoping, review of draft EA/ESMF, ESMP & IPMP Environmental & Social Framework instruments (in liaison with State Ministry of Environment), receiving comments from stakeholders, public hearing of the project proposals, and convening a technical decision-making panel, Project categorization for EA, Applicable standards, Environmental and social liability investigations, Monitoring and evaluation process and criteria, liaison with relevant stakeholders within and outside Nigeria on matter of enforcement of environmental standards, regulations, rules, laws, policies and guidelines. Disclosure of documents, where required.
State Government MDAs (Ministry of Lands, Survey and Urban Development, Ministry of Environment, etc. Other MDAs	• Provide project related policy decisions and guidance regarding the ESMF/IPMP, through the State Technical Committee (STC) • Ensuring compliance at State Level, on matters of Environmental Assessment and Pest Management • Set up a functional Environmental & Social Framework Unit in the SPMU that will be responsible for IPMP management and compliance monitoring.
	• Pursue mandates related to the core responsibility of the ministries, departments and agencies. • Intervene when relevant areas or resources under their jurisdiction or management are likely to be affected by or implicated sub-projects. • Participate in the EA, ESS3 pest management planning processes and in project decision-making that helps prevent or minimize impacts and to mitigate them.
World Bank	• Assess implementation process and ensure funds are not used for purchase of chemicals/pesticides • Recommend additional measures for strengthening the IPMP and implementation performance.
SPMU Environmental & Social Framework Unit	• Liaise closely with Ministry of Environment in preparing a coordinated response on Pest Management activities and ensure they are in compliance with guidelines provided in IPMP and ensure adequacy under the World Bank Environmental & Social Framework.

Category	Roles & Responsibilities
	• Ensure that the project design and specifications adequately reflect the recommendations of the IPMPs; • Develop, organize and deliver Environmental & Social Framework training program that comprises an IPM component for the SPMU staff, the contractors and others involved in the project implementation, in collaboration with the SPMU • Develop and implement IPMP monitoring plan to ensure compliance • Ensures that project beneficiaries do not procure pesticides with bank funds provided
Local government	• Liaising with the SPMU to set up LGA Implementation Units and Ward Facilitation Teams that will ensure compliance with IPMP requirements among the rural participants of the project.
NGOs/CSOs	• Assisting in their respective ways to ensure effective response actions, conducting scientific researches alongside government groups to evolve and devise sustainable IPMP strategies and rehabilitation techniques.
The General Public	• Same as above

7.5Monitoring and Evaluation

The objectives of monitoring and evaluation for the IPMP are as follows:

- Providing timely information about the compliance with or otherwise, of the for Women IPM operation process outlined in this report. This will ensure continuous improvement in the project areas
- To make a final evaluation in order to determine whether the mitigation measures incorporated in the IPMP have been successful.

The monitoring requirements for the environmental and health impacts of the pesticide's management activities are articulated under this management component. Monitoring and evaluation of the agricultural support IPMP will be mainstreamed into the overall monitoring and evaluation system for the project's ESMF. The key issues to be considered in the monitoring process are whether a pesticides procurement checklist is available and used during procurement and screening to carry out the following:

- Ensure that POPs pesticides and WHO class (Ia) and (Ib) pesticides are not procured or used.

- Monitor the progress of the IPM implementation.

Specifically, the following are monitoring indicators (see annex for checklist) required to achieving IPM project development objectives:

- Level of understanding of World Bank operational policy on pest management among Women farmers involved in agricultural activities under the For Women
- Level of involvement of youth and women in agriculture activities

7.6 Participation / Consultation Measures

The FPCU, coordinating activities through the SPMU will be largely responsible for ensuring participation of the relevant stakeholders/community at sub-project level. Involvement of the stakeholders/community should not be limited to interactions with the community but also disclosing relevant information pertaining to the project tasks.

7.7 Budgets for the IPMP

To effectively implement the IPMP measures suggested, the cost elements that will be vital towards implementing the plan is shown in the budget contained in Table 9.

Table 9: Budget for implementing IPMP

1	IPMP Requirements	Considerations	Total Cost per State/Year (N)
A	**Training & Capacity Strengthening**		
a.	Capacity Building for FPMU & SPMU Personnel	Training Programs (from Table 7)	6,000.000.00
	Capacity Strengthening for relevant Stakeholders/MDA's	Workshops to be held in individual States.	
B	**Mitigation & Management**		
a.	PPE - Occupational Health & Safety.	Purchase of special protective clothing for pesticide use & handling - hand gloves, gas mask, safety boot and coverall wear	2,500,000.00
C	**Environmental & Social Monitoring**		
a.	Monitoring Compliance IPMP requirements	Mainstream into ESMF	Covered by ESMF implementation
	Total Estimated Budget		**8,500,000.00**
	Contingency	**10% of sub-total**	850,000.00
Total			**9,350,000.00**

7.8 Disclosure of IPMP

Copies of this IPMP, like other Environmental & Social Framework instruments (such as ESIAs/ESMFs etc.) that would be prepared for the NFWP-SU and its sub-projects will be made available to the public by the FPCU.

The FPCU will disclose the IPMP as required by the Nigeria EIA public notice and review procedures as well as the ESS10 (Stakeholder engagement and information disclosure) at the World Bank Infoshop. Copies of other Environmental & Social Framework instruments (such as ESMFs/RPFs etc.) are required to be disclosed in this similar manner. Table 10 outlines documents to be disclosed and the pathway for disclosure.

Table 10: Disclosure approach for IPMP

Topic	Documents to be disclosed	Frequency	Media
Public Consultation	Minutes of Formal Public Consultation Meetings	Within two weeks of Meeting	World Bank's Info-shop, Implementation agency's website/ Project Management Unit & Project Implementation Units (FPCU), Ministry of Environment, Local government Secretariat
Environment Management	IPMP, ESMF, ESIA, EMP with Key Actions, Environmental & Social Framework Monitoring reports, and audit	Prior to awarding works and to remain on website	World Bank's Info-shop. Implementation agency's website/ Project Management Unit (FPCU/SPCU) & Ministry of Environment, Local government Secretariat

References

IPMP for Nigerian Agro Processing, Productivity Enhancement and Livelihood Support Project –APPELISP (2016)
The Agricultural Promotion Policy, Policy and Strategy Document – FMARD (2016)
IPMP for the Youth Empowerment Social Support Operation –YESSO (2012)
IPMP National FADAMA 2 PMP for Nigeria (2005)
IPMP of the West African Agricultural Productivity Programme (2010)
IPMP Transforming Irrigation Management in Nigeria - TRIMING (2013)
Pest Control in Cassava Farms; IPM Guide for Field Extension Agent –IITA (2000)
EHS Guidelines for Pesticide Handling and Application, IFC

Annexes

Annex 1

Good Management Practices Guide and Pesticides Management Measures

a. **Required measures for the reduction of pesticides-related risks**

Safe use of pesticides

Pesticides are toxic for pests and for humans. However, if sufficient precautions are taken, they should not constitute a threat either for the population or for non-targeted animal species. Most of them can have harmful effects if swallowed or in case of prolonged contact with the skin. When a pesticide is sprayed in the form of fine particles, there is a risk of absorbing them with the air we breathe. There is also a risk of water, food and soil contamination.

Specific precautions should therefore be taken during the transportation, storage and handling of pesticides. The spraying equipment should be regularly cleaned and well maintained to avoid leakages. The individuals using pesticides should learn how to use them safely.

Insecticides registration

Reinforce the registration process of insecticides by ensuring:

- Streamlining, between the national pesticides registration system and other products used in Public Health;
- Adoption of WHO specifications applicable to pesticides for national registration process purposes;
- Reinforcement of the pilot regulatory body;
- Collection and publication of data relating to imported and manufactured products;
- Periodical review of registration.

When planning to buy pesticides to control vectors, consult the guiding principles issued by WHO. For the acquisition of insecticides intended for public health use, the following guidelines are recommended:

- Develop national guidelines applicable to the purchase of products intended for vector control and ensure that all the agencies buying them strictly comply with those guidelines;
- Use synthetic Pyrethroids: Deltamethrin SC, Permethrin EC, Vectron, Icon, Cyfluthrin, as recommended by the national policy;
- Refer to the guiding principles issued by WHO or FAO on calls for tenders, to FAO recommendations regarding labeling and to WHO recommendations regarding products (for indoor spraying);
- Include in calls for tenders, the details regarding technical support, maintenance, training and products recycling that will be part of the after-sale service committing manufacturers; apply the back-to-sender principle;
- Control the quality and quantity of each lot of insecticides and impregnated supports before receiving the orders;
- Ensure that the products are clearly labeled in French and if possible in local language and in the strict respect of national requirements;
- Specify which type of package will guarantee efficiency, preservation duration as well the human and environmental security of handling packaged products while strictly complying with national requirements;
- Ensure that donated pesticides intended for public health, comply with the requirements of the registration process in Mali (CSP) and can be used before their expiry date;
- Establish a consultation, before receiving a donation, between the ministries, agencies concerned and the donors for a sound use of the product;
- Request users to wear protective clothes and equipment recommended in order to reduce their exposition to insecticides to the strict minimum;
- Obtain from the manufacturer a physic-chemical analysis report and the product acceptability certification;
- Request the manufacturer to submit an analysis report of the product and of its formulation along with guidelines to follow in case of intoxication;
- Request the buying agency to perform a physic-chemical analysis of the product before shipping and arrival.

Precautions
Labeling
Pesticides should be packaged and labeled according to WHO standards. The label should be written in **English** and in the local language (**Hausa, Igbo and Yoruba** as applicable); it should indicate the content, the safety instruction (warning) and any action to be taken in case of accidental ingestion or contamination. The product should always remain in its original container. Take all appropriate precautionary measures and wear protective clothes in accordance with recommendations.

Storage and transportation
Pesticides should be stored in a place that can be locked up and is not accessible to unauthorized individuals or children. The pesticides, should, in no event, be stored in a place where they could be mistaken for food or beverage. They should be kept dry and out of the sun. They should not be transported in a vehicle that also carries food products.
In order to ensure safety during storage and transportation, the public or private agency in charge of managing purchased insecticides and insecticide-impregnated supports, should comply with the current regulations as well as the conservation conditions recommended by the manufacturer regarding:

- Preservation of the original label;
- Prevention of accidental pouring or overflowing;
- Use of appropriate containers;
- Appropriate marking of stored products;
- Specifications regarding the local population;
- Products separation;
- Protection against humidity and contamination by other products;
- Restricted access to storage facilities;
- Locked storage facilities to guarantee product integrity and safety.
- Pesticides warehouses should be located far from human residences or animal shelters, water supplies, wells and channels. They should be located on an elevated surface and secured with fences with restricted access for authorized individuals only.
- Pesticides should not be stored in places where they could be exposed to sunlight, to water or to humidity, which could harm their stability. Warehouses should be secured and well ventilated.
- Pesticides should not be transported in the same vehicle with agricultural products, food products, clothes, toys or cosmetics as these products could become dangerous in case of contamination.
- Pesticides containers should be loaded in vehicles in order to avoid damages during transportation, so that their labels will not tear off or and slip off and fall on roads with uneven surfaces. Vehicles transporting pesticides should bear a warning sign placed conspicuously and indicating the nature of the cargo.

Distribution
Distribution should be based on the following guidelines:

- Packaging (original or new packaging) should ensure safety during the distribution and avoid the unauthorized sale or distribution of products intended for vector control;
- The distributor should be informed and made aware of the dangerous nature of the cargo;
- The distributor should complete delivery within the agreed deadlines;
- The distribution system of insecticides and impregnated supports should enable to reduce the risks associated with the numerous handlings and transportations;
- In the event the purchasing department is not able to ensure the transportation of the products and materials, it should be stipulated in the call for tenders that the supplier is expected to transport the insecticides and impregnated supported up to the warehouse;
- All pesticides and spraying equipment distributors should have an exploitation permit in accordance with the current regulation in Mali.

Safe Disposal of Pesticides

- Avoid disposing of pesticides whenever possible:

- Mix up only enough pesticide for the job.
- Use up small amounts of excess pesticides - apply them according to the directions on the label.
- If you cannot use it, ask your neighbors if they have a similar pest control problem and can use it up.

- Follow all disposal instructions on the pesticide label.
- Check with your local solid waste management authority, environmental agency or health department to find out whether your community has a household hazardous waste collection program or a similar program for getting rid of unwanted, leftover pesticides. These authorities can also inform you of any local requirements for pesticide waste disposal.
- Never reuse empty pesticide containers. Pesticide residues can contaminate the new contents and cause serious harm.
- Never pour pesticides down the sink, toilet, sewer, or street drain.

Cleaning of empty pesticide packaging and containers

Re-using empty pesticide containers are risky and it is not recommended to do so. However, it is estimated that some pesticide containers are very useful to be simply thrown away after use.

Can we therefore clean and re-use such containers? This depends both on the material and the content. In principle, the label should indicate the possibilities for re-using containers and how to clean them.

Containers having contained pesticides classified as hazardous or extremely dangerous should **not** be re-used. Under certain conditions, containers of pesticides classified as dangerous or that do not present any risk under normal use, can be re-used unless they are not used as food or drink containers or as food containers for animal food. Containers made of materials such as polyethylene that preferentially absorb pesticides, must not be re-used if they have contained pesticides whose active ingredient has been classified as moderately or extremely dangerous regardless of the formulation. Once a recipient is empty, it should be rinsed, then filled completely with water and allowed to stand for 24 hours. Then it should be emptied, and this process should be done over again.

General Hygiene

Do not eat, drink or smoke when handling insecticides. Food should be placed in tightly closed containers. Measurement, dilution and transfer of insecticides should be done with the adequate material. Do not shake or take liquid with unprotected hands. If the nozzle is blocked, press the pump valve or unblock the opening with a flexible rod. After each fill, wash hands and face with water and soap. Eat and drink only after washing hands and face. Take a shower or a bath at the end of the day.

Individual protection

- Adapted coveralls covering hands and legs
- Dust, gas and respirator masks, based on the type of treatment and product used
- Gloves
- Goggles
- Hoods (facial shield)

Protection of the population

- Minimize the exposure of local populations and livestock
- Cover wells and other reservoirs
- Sensitize populations on risks

Protective clothing

Treatments inside homes:

Operators should wear coveralls or a long-sleeved shirt over a pair of pants, a flapped hat, a turban or any other type of headgear as well as boots or big shoes. Sandals are not suitable.

Nose and mouth should be protected using a simple method, for example a disposable paper mask, a disposable surgical or washable mask or a clean cotton cloth. Once the fabric is wet, it should be changed. Clothing must be in cotton for easy washing and drying. It must cover the body and contain no opening. In hot and humid climates, it can be uncomfortable to wear additional protective clothing; therefore, one will be forced to spray pesticides during hours when it is very hot.

Preparation of suspensions

People responsible for bagging insecticides and preparing suspensions, particularly for the treatment of mosquito bed net units must take special precautions. In addition to the abovementioned protective clothing, they must wear gloves, an apron and eye protection, for example a facial shield or glasses. Facial shields protect the entire face and keep less warm. Nose and mouth should be covered as indicated for treatment in homes. They should ensure that they do not touch any part of their body with gloves during pesticide handling.

Treatment of nets

To treat mosquito nets, clothes, grills or with tsetse traps with insecticides, it is necessary to wear long rubber gloves. In some cases, additional protection is required, for example against vapours, dusts or insecticide dusting that could be dangerous. These additional protective accessories should be mentioned on the product label and may consist of aprons, boots, facial masks, coveralls and hats.
Maintenance
Protective clothing should always be impeccably maintained and should be checked periodically to verify tearing, wearing that could lead to skin contamination. Protective clothing and equipment should be washed daily with water and soap. Particular attention should be paid to gloves and they must be replaced once they are torn or show signs of wear. After usage, they should be rinsed in water before removing them. At the end of each working day, they will need to be washed inside and outside.

Safety measures
During spraying
Spurt form the sprayer must not be directed towards a part of the body. A leaking sprayer must be repaired and skin must be washed if it is accidentally contaminated. The household and animals must stay outside during the whole spraying activity. Avoid treating a room where there is a person — a sick person for example — who cannot be taken outside. Before starting spraying activities, kitchen utensils should be taken out and all utensils as well as dishes containing drinks and food. They can be gathered in the centre of the room and covered with plastic film. Hammocks and paintings should not be treated. The bottom part of furniture and the side against the wall should be treated while ensuring that surfaces are effectively treated. Sweep or wash the floor after spraying. Occupants should avoid contact with walls.

Clothing and equipment should be washed every day. Avoid spraying organophosphate or carbamate for more than 5 to 6 hours daily and wash hands after each filling. If Fenitrothion is used or old stocks of Malathion are used, operators should control the level of cholinesterase in their blood every week.

Monitoring exposure to organophosphate
There are country kits available on the market to control cholinesterase activity in the blood. If this activity is low, it can be concluded that their excessive exposure to organophosphate insecticide. These dosages should be done every week with people handling such products. Any person whose cholinesterase activity is very low should be stopped from working until it returns to normal.

Fabric spraying
When handling insecticide concentrates, or preparing suspensions, gloves should be worn. Attention should be paid particularly to spraying in the eyes. A big bowl not too high should be used and the room should be well ventilated to avoid inhaling smokes.
b. Measures to minimize transportation, storage, handling and usage risks

Annex 2

List of banned pesticides

1. Aldrin
2. Chlordane
3. DDT (Dichlochphenyl trichloroethane)
4. Dieldrin
5. Endrin
6. Heptachlor
7. Toxaphene
8. Chlordimeform
9. Mercury Compounds
10. Lindane
11. Parathion
12. Methyl Parathion
13. Methyl bromide
14. Hexachlorobenzene

Annex 3

List of crop and livestock protection products approved for use by NAFDAC

a) Insecticides

Organochlorines insecticides
1. Endosulfan 2. Helptachlor
3.Lindane (Restricted to use on Cocoa only)
Organophosphorus insecticides
Organophosphorus i 1. Diazinon
2. Dichlorvos (DDVP)
3. Chlorpyrifos
4. Chlorpyrifos – Methyl
5. Dicrotophos
6. Dimethoate
7. Monocrotophos
8. Perimiphos – Ethyl
9. Perimiphos – Methyl
Carbamates
1. Carbaryl 2. Carbofuran 3. Propoxur 4. Carbosulfan 5. Furathiocarb 6. Temik (Aldicarb
Pyrethroids
1. Lambda – Cyhalothrin
2. Cypermethrin 3. Deltamethrin 4. Phenothrin 5. Permethrin
6. Tetramethrin 7. Cyfluthrin 8. Allethrin
10. Ethion
11. Rugby (Cadusofas)
12. Malathion
13. Temeguard (Temephos)
14. Isazofos 15. Parathion – 31 Methyl
16. Phosphamidon
17. Methidathion

b) Herbicides and fungicides
Organophosphorus Organophosphorus 1. Anilofos 2. Piperophos
3. Glyphosate
4. Glyphosate Trimesium (Touchdown or Sulfosate)
5. Amideherbicides (Acetochlor; Alachlor; Propanil; Butachlor; Metalochlor)
Triazines and Triazoles
Carbamates
1. Asulam
Other herbicides
1. Dimethachlor 2. Metazachlor
3. Monosodium Methyl Arsonate (MSMA)
4. Fluxixpyr 5. Imazaquine
6. Triassulfuran (Amber)
7. Osethoxydim
8. Oxadiazon (Ronster)
9. Clomaone
10. Trifluralin
11. Stamp 500 (pendimethalin)
12. Fluazifop – P.butyl

Fungicides
1. Benomyl (Nitroheterocyclic Compound)
2. Dazomet (Thiadiazine Fungicide)
3. Folpet (Phthalimide Fungicide)
4. Metalaxyl (Acylalamine Fungcide)

5. Cyproconazole (Alto – 100SL)
6. Bavistin (Carbon) – Benzimide
7. Triadmenol (Bayfidon GR Conzole Fungicide)

(Atrazine; Desmetryn; Terbuthalazine; Terbutrex Terbutryne)
Chlorophenoxy herbicides (Prometryn; Simazine; 2.4-D (2.4 Dichlorphenoxy acetiacid)
7. **Urea and guadinidines** ; (Diuron ; Linurex (=Linuron); Fluometurone; Chloroxuron; Neburon)
Quaternary nitrogen compounds (paraquat; diquat)
Ametryn;

Annex 4

IPM Screening Checklist

S/n	Description of Screening Parameters	Please Tick		Information Details
		Yes	No	
1	Is there a pest problem on farms in the community?			
2	Number of farmers and stakeholders aware of the pollution, contamination and toxicity associated with pesticides?			
3	Do we have any women farmers or female farmers association using biological methods of pest control?			
4	Number of persons trained in the method of spraying and handling of chemical pesticides			
5	The reported incidences of pest and herbicides concerns among farmers			
6	The level of use of resistant and improved species of crops among farmers			
7	Medical reports/incidences of toxicity among farmers			
8	Improvement in production/harvest of crops/livestock from use of IPM			
9	Level of understanding of IPM processes			
10	Level of understanding of World Bank operational policy			
	Level of involvement of youth and women in agriculture activities			

Annex 5

Pests and Control methods in Nigeria

Crops	Some of Cultivation Locations in States Visited	Pests	Control Methods		
			Cultural	Biological	Chemical
Horticulture (fruits & Vegetables)	Abia - Abia South Kebbi - Zuru & Yauri Emirates	Nematode Caterpillars (Moths and Butterflies) Beetles Grasshoppers Stem borers	Use of resistant species Adoption of crop rotation techniques.	Soil solarisation	-
Maize	Kebbi - Zulu & Yauri Emirates	Quelea birds Grass cutters Rats Bush fowls Termites and Mole cricket Stem borers Shoot flies Armyworms	Bird scaring using Scare-crows Use of traps for rats, grass cutters, bush fowls Removal and destruction of infested plants and plant residue (applicable to Stem borers, armyworms & termites)	Encouraging or introducing natural enemies of the pest or interfering with the life cycle of the pest	Aerial spraying of organophosphorus pesticides
Rice	Abia - Zacordi & Bende Kebbi - Arugungu LGA	Nematodes (Apelenchoides besseyi; Hirshmanniella grazilis; H.oryza;H.spinicaudata) Stem borers	Land fallow and planting of trap crops Adopting crop rotation techniques	Encouraging or introducing natural enemies of the pest or interfering with the life cycle of the pest	-
Cassava	Cultivated Statewide – Abia	Green mite Cassava mealy bug Variegated grasshopper.	Crop Rotation Alteration of planting date Disposal of crop residues Choice of resistant crop variety Management of Irrigation.	Encouraging or introducing natural enemies of the pest or interfering with the life cycle of the pest	-
Soya bean	Zuru & Yauri LGAs	Caterpillars Whitefly	Adopting crop rotation techniques	Encouraging or introducing natural enemies	--

Crops	Some of Cultivation Locations in States Visited	Pests	Control Methods		
			Cultural	Biological	Chemical
			Removal and destruction of infested plants and plant residues	of the pest or interfering with the life cycle of the pest.	
Fish	Arugungu LGA	• Flukes • Leeches • Anchor worm • Lice • Nematode	Avoid introduction of raw plants or snails	--	Use of organophosphates Potassium Permanganate bath against fresh water parasites or salt water bath for fresh water parasites
Oil Palm	Abia South – Palm oil processing	Mealy Bugs (Dysmicoccus brevipes)	--	Mealy bugs can potentially be controlled by the introduction of natural enemies such as lady beetles	--
		Rhinoceros beetle (Oryctes rhinoceros)	Destroying of any decaying logs in plantation by chopping and burning to kill any larvae that may be inside Removal of any dead trees from plantation and destroy by burning Planting of cover crop to deter egg laying by females as they do not lay eggs in areas covered by vegetation Hooked wire can be used to extract larvae that are boring into young crowns	--	--
Yam	Abia - Abia North	Mealy bugs (Rastrococcus Spp)	Pruning out of heavily infested branches	Introduction of natural Mealy Bug enemies like Ants etc.	Horticultural oils or soapy solutions can be used to treat

Crops	Some of Cultivation Locations in States Visited	Pests	Control Methods		
			Cultural	**Biological**	**Chemical**
					heavy infestations It is not advised to use chemicals for control, as they may decrease the population of natural enemies, leading to Mealy bug outbreak
		White Scale insects – Aspidiella hartii	Inspection of yams in storage regularly, and removal of scale infested tubers Use of scale-free seed-yam for planting	--	Use of white oil (made from vegetable oils), soap solution or horticultural oil (made from petroleum) on yams infested with scale: (i) after harvest and before yams are stored; (ii) during storage, on yams when infestations begin; and (iii) at the time of planting before the tubers are cut Commercial horticultural oil can also be used. White oil, soap and horticultural oil-sprays work by blocking the breathing holes of insects causing suffocation and death. Spraying the undersides of leaves; the oils must contact the insects.

Crops	Some of Cultivation Locations in States Visited	Pests	Control Methods		
			Cultural	**Biological**	**Chemical**
					The application of *malathion* is useful against scales insects, but it is likely to kill natural enemies
Cowpea	Kebbi – Arewa Emirates	Cowpea aphid *Aphis craccivora*	Use insect resistant varieties Multiplication plots and environs should be weed and ants free	--	Spray using pesticides like *Bacillus thuringiensis* (b randed as Cyber Force or Cyber Diforce)
		Cowpea pod borer Maruca vitrata	--	--	Spray using pesticides like *Bacillus thuringiensis* (b randed as Cyber Force or Cyber Diforce)
		Cowpea Weevil Callosobruchus s pp	Host-Plant Resistance. Resistant varieties are available at Research Institutes in Nigeria Harvesting at the right time to prevent infestation of pods in the field Cold storage at 4 degrees Celsius	--	Fumigation of the storage facility Seed treatment with Phostoxin
		Army worms Spodoptera exigua	--	Biological control by natural enemies which parasitize the larvae	Use available chemicals such as Bifenthrin
		Corn earworm Helicoverpa zea	Monitor plants for eggs and young larvae	Biological control of natural enemies that could be damaged by chemicals	*Bacillus thuringiensis* or Entrust SC may be applied to control the insects on organically grown plants

Crops	Some of Cultivation Locations in States Visited	Pests	Control Methods		
			Cultural	Biological	Chemical
Cashew	Abia State	Tea Mosquite Helopaltis antonii	Dead trees and those which are beyond recovery should be removed from the plantation	--	--
		Cashew weevil Mecicorynus loripes	Remove bark from infested areas and destroy any larvae or pupae found, this process should be repeated every month for up to six months; severely infested trees should be removed and destroyed; remove all adult weevils from tree prior to destruction and also remove bark and kill all larvae and pupae	--	--
		Helopeltis bugs Helopeltis schoutedeni	Monitor crop regularly for signs of damage. avoid interplanting cashew with other crops which are hosts for helopeltis bugs such as tea and cotton	Conserve populations of natural enemies, weaver ants can reduce populations African weaver ants (*Oecophylla long inoda*) have proved to be very effective as bioagents to Helopeltis and other sucking bug control	--
		Stem borers Mecocorynus loripes	Control approach is basically physical confrontation to adults and larvae	--	--
		Mealy bug Pseudococcus longispinus	--	Use of bioagents such as Ladybird beetles (*Chilocorus spp*) and Lacewing flies (*Chrysopa spp*) have proved to be useful	--

Crops	Some of Cultivation Locations in States Visited	Pests	Control Methods		
			Cultural	Biological	Chemical
Sesame	Kebbi – Zuru & Yauri Emirates	Hawk Moth	Deep ploughing exposes the pupae for predation to insectivorous birds. • Hand picking (collection) and destruction of caterpillars	Use common biological practices	--
		Bihar hairy caterpillar	Dig the trenches of 1 inch depth between the fields to kill the larvae in pits. Irrigate once to avoid prolonged mid-season drought to prevent pre-harvest infestation	Use common biological practices	--
		Gall Fly	Use common Cultural methods	Use common biological practices	--
		Leaf Roller	Use common Cultural methods	Use common biological practices	--
		Leaf Hopper	Use common Cultural methods	Use common biological practices	Application of Oxydemeton–methyl
Tomato	Kebbi – Zuru & Yauri Emirates	Cutworms	Elimination of weeds around garden beds at least two weeks before planting. Hand-picking cutworms at night may help	--	--
		Aphids	Crushing aphids by hand or blasting them off with a strong jet of water	--	--
Groundnuts		Aphids (Aphis craccivora)	Crushing aphids by hand & cultivating with cowpea	Use common biological practices	Application of Phosphamidon 0.03%, M-O-D 0.025%, Dimethoate 0.03%