FEDERAL GOVERNMENT OF NIGERIA

FEDERAL MINISTRY OF WATER RESOURCES

SUSTAINABLE POWER AND IRRIGATION IN NIGERIA (SPIN) PROJECT

PEST MANAGEMENT PLAN (PMP)

FINAL REPORT

JULY 2024

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LIST OF ACRONYMS AND ABBREVIATIONS

AEHE	Agricultural Equipment Hiring Enterprise
AESA	Agricultural Ecosystem Analyses
AfDB	African Development Bank
AI	Access to Information Policy
ATA	Agricultural Transformation Agenda
BIP	Bakolori Irrigation Project
BIS	Bakolori Irrigation Scheme
BP	Business Policy
CADP	Commercial Agriculture Development Project
CBN	Central Bank of Nigeria
CMO	Catchment Management Office
CPS	Country Partnership Strategy
CSO	Civil Society Organization
DA	Designated Accounts
DFID	UK Department for International Development
EA	Environmental Assessment
EAP	Emergency Preparedness and Action Plans
ECOWAS	Economic Community of West African States
EFCC	Economic and Financial Crimes Commission
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FEPA	Federal Environmental Protection Agency
FGN	Federal Government of Nigeria
FM	Financial Management
FMARD	Federal Ministry of Agriculture and Rural Development
FMEnv	Federal Ministry of Environment
FMLP	Federal Ministry of Labour and Productivity
FMoF	Federal Ministry of Finance
FMP	Federal Ministry of Power
FMWR	Federal Ministry of Water Resources
FPR	Farmer Participatory Learning
GDP	Gross Domestic Product
HA	Hydrological Area
IBRD	International Bank for Reconstruction and Development
IDA	International Development Association
IFC	International Finance Corporation
IMA	Irrigation Management Association
IPM	Integrated Pest Management
IUCN	International Union for the Conservation of Nature
IWMI	International Water Management Institute
IWRM	Integrated Water Resources Management
JICA	Japan International Cooperation Agency
LBRBDA	Lower Benue River Basin Development Authoriy
LUA	Land Use Act
LUAC	Land Use Allocation Committee
M&E	Monitoring and Evaluation
MDG	Millennium Development Goal
MIS	Management Information System
MOF	Ministry of Finance

NAFDAC	National Agency for Food and Drugs Administration and Control
NBA	Niger Basin Authority
NBS	National Bureau of Statistics
NCA	National Council on Agriculture
NCB	National Competitive Bidding
NCWR	National Council on Water Resources
NEPAD	New Partnership for Africa's Development
NEWMAP	National Erosion and Watershed Management Project
NGO	Non-Governmental Organization
NIC	National Irrigation Commission
NIWRMC	Nigeria Water Resources Management Commission
NIWRMP	National Irrigation and Water Resources Management Project
O&M	Operations and Maintenance
OP	Operational Policy
PAD	Project Appraisal Document
PCU	Project Coordination Unit
PDO	Project Development Objective
PIM	Participatory Irrigation Management
PL	Participatory learning
POP	Persistent Organic Pollutants
PPE	Personal Protective Equipment
PMP	Pest Management Plan
PTS	Pesticides and Toxic Substances
RAMP II	Nigeria's Rural Access and Mobility Project
RBA	River Basin Authority
RBDA	River Basin Development Authority
RPF	Resettlement policy Framework
RBMC	River Basin Management Commission
SCPZ	Staple Crop Processing Zones
SDR	Special Drawing Rights
SPRI	Small-scale Private Irrigation Schemes
SRFP	Standard Request for Proposal
SRRBA	Sokoto-Rima River Basin Authority
TA	Transformation Agenda
TAC	Technical Advisory Committee
TRIMING	Transforming Irrigation Management in Nigeria
TtT	Training the Trainer
UBRBA	Upper Benue River Basin Authority
UNDP	United Nations Development Program
WHO	World Health Organization
WRB	Water Resources Bill
WUA	Water User Association
WUAF	Water User Association Federation

EXECUTIVE SUMMARY

1.0 Background and Introduction

Nigeria, the largest economy in Sub-Saharan Africa, is implementing a project to address water resources management, food security, and energy security. The project, aligned with the World Bank's Country Partnership Strategy, will optimize water use, enhance hydropower generation capacity, and support institutional strengthening. The project will integrate water and storage management, strengthen coordination between ministries, and use hydropower for productive purposes.

The project will have four components, including:

i. Institutional strengthening and capacity building for Irrigation, Hydropower and Storage Management
ii. Irrigation Management and Modernization
iii. Improvement in Dam operations and Enhancing dam safety.
iv. Project Management.

Nigeria has abundant resources and factors for agricultural productivity and hydro power generation, but neglect of the agricultural sector over the last three decades has led to a significant deterioration. Efforts to increase power generation, transmission, and distribution have been ineffective. To improve agricultural development and power generation, various projects have been initiated and implemented by the World Bank and other Multilateral Development Banks. The Sustainable Power and Irrigation in Nigeria (SPIN) project aims to build on the gains from the TRIMING project by improving existing facilities, rehabilitating dams, incorporating hydro components, and expanding agricultural productivity through increased irrigation agriculture. This Pest Management Plan (PMP) has been prepared to support the ESMF is being prepared for the SPIN, along with a Pest Management Plan, Resettlement Policy Framework, Gender Policy, Labour Management Plan, and Environmental and Social Due Diligence reports for Naka, Doma and Wuro Keso Dams respectively. The PMP consists of mitigation, monitoring, and institutional measures to eliminate adverse environmental impacts.

2.0 Overview of the Planned SPIN Project

The Project Development Objective is to strengthen dam safety and improve management of water resources for hydropower and irrigation in selected areas of Nigeria.

The objective of this project is to address water resources management, food security, and energy security challenges in Nigeria through investments in irrigation, dams, storage infrastructure, and hydropower facilities. By mobilizing water for productive purposes, optimizing the use of existing storage facilities, and enhancing hydropower generation capacity, the project aims to promote sustainable development, efficient water resource utilization, and strengthen integrated water resources management practices. The proposed project includes four main components (the US$ amounts for each component are indicative at this stage, and may vary substantially during preparation, in particular between components 2 and 3). Building upon the lessons learned and achievements of past projects such as TRIMING, the project moves to promoting a more holistic water usage and storage management by the inclusion of hydropower sector and supporting institutional strengthening, such as on dam safety regulations and guidelines. The project components and related interventions would be chosen through economic, technical and geographical criteria, to act synergistically and promote an integrated water and storage management. It would also strengthen institutional coordination on storage and water management between the related ministries and departments. T

3.0 Administrative and Legal Framework for Pest Management

A number of laws and policies are applicable to this PMP and include national and local laws as well as international regulations. A summary is presented below:

National Laws and Policies

- Federal Ministry of Agriculture & Rural Development (1988)
- National Policy on the environment, 1989
- FEPA Act 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.
- NAFDAC Pesticide Registration Regulations (S.I. 83 of 2021)

International conventions & Treaties

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

Other regulations include those of the World Bank, especially ESS3 on Resource Efficiency and Pollution Prevention

4.0 Baseline Information on Pest and Pest Management Practices in the Area

Based on information obtained from recent field visits and consultations in the area, an updated list of pests in the area has been prepared and shows the most critical pests in terms of economic injury, based on information obtained from the site and consultations with stakeholders in the area (See Table 4.3)

5.0 Potential Impacts of Pests and Pest Management Activities and Mitigation Measures for Negative Impacts

Impacts are discussed under two key headers: Impacts of pests, and impacts of pest management activities. The key impact of pests is a reduction in agricultural yield, and by extension, economic returns. Impacts of pest management activities include: Increased production costs due to cost of intervention and pest control; possible lethal effects on man and other non-target organisms; contamination of soil, surface and groundwater; and other secondary effects.

Mitigation measures revolve primarily around the application of IPM and the use of pesticides with low mammalian toxicity. For safety during pesticide applications, the use of the appropriate Personal Protective Equipment (PPEs), including coveralls, face and nose masks, boots, etc. are recommended.

6.0 Pest Management Plan

The specific objectives of the PMP are to:

- Assist farmers to plan and design location specific IPM activities.
- Promote participatory approaches in IPM for farmers to learn, test, select and implement “best-bet” IPM options to reduce losses due to arthropod pests, diseases and weeds.
- Promote biodiversity monitoring to serve as early warning systems on pest status, alien invasive species, beneficial species, and migratory pests.

- Establish linkages to develop a national IPM policy to promote IPM and compliance with international conventions and guidelines on pesticide use in agriculture.
- Monitor and evaluate the benefits of IPM including its impact on food security, the environment and health.

7.0 Implementation Strategy, Workplan and Budget

The strategy for implementing the PMP revolves around building local capacity to handle the various components of the plan and strengthening existing institutions to be able to function more effectively. The primary strengthening tools in this regard is training in the appropriate areas, and entrenching IPM.

Training at different levels and at different times in the course of implementing the SPIN project over a 6-year period will include: Training on Integrated Pest Management (IPM); Training on Identification of Pests and Integrated Pest Management; Training on First aid and emergency response for pesticide poisoning; and Training on Monitoring and Evaluation. An overview of total budgetary estimates for implementing this plan over the 6-year period the project is expected to run, amounts to US$450,000.00.

8.0 Disclosure Requirements

In line with the World Bank's Access to Information (AI) policy, all information relating to the SPIN project, including this PMP will be displayed in the Bank's Infoshop, before being accepted for implementation.

9.0 Conclusion

Based on all of the foregoing, it is concluded that the SPIN project will give an overall positive effect on various aspects of the local and national economy. Specifics include contributions to:

i. Improving agricultural productivity in Nigeria;
ii. Improving sustainable power generation and utilization in Nigeria
iii. Alleviating unemployment;
iv. Improve capacity and facilities utilization in various parts of northern Nigeria;
v. Enlighten and strengthen local farmers on water use and IPM;
vi. Strengthen capacity in agriculture and pest management.

1.0. BACKGROUND AND INTRODUCTION

1.1 Background

Nigeria, the most populous country and largest economy in Sub-Saharan Africa, grapples with significant economic challenges, climate vulnerability, and socio-political complexities. In response to the pressing need for policy actions and sustained economic growth, a pivotal project has been conceptualized, aligning with the World Bank's Country Partnership Strategy (CPS, FY21 – FY25) for Nigeria. This project aims to address critical issues related to water resources management, food security, and energy security in Nigeria by mobilizing water for productive purposes, optimizing the use of existing storage facilities, and enhancing hydropower generation capacity.

Building upon the lessons learned and achievements of past projects such as the Transforming Irrigation Management in Nigeria (TRIMING), the project moves to promoting a more holistic water usage and storage management by the inclusion of hydropower sector and supporting institutional strengthening, such as on dam safety regulations and guidelines. The project components and related interventions would be chosen through economic, technical and geographical criteria, to act synergistically and promote an integrated water and storage management. It would also strengthen institutional coordination on storage and water management between the related ministries and departments.

The project includes four (4) components, which are summarized in Table 1.1 below:

Table 1.1: Overview of SPIN Project Components

	Components	Objectives of Component
1	**Institutional strengthening and capacity building for Irrigation, Hydropower and Storage Management**	The objective of this component is to strengthen irrigation, hydropower and storage management and to improve the operation and maintenance of storage infrastructure, irrigation perimeters, and flood management systems at the national and local levels. This will be conducted through two areas of intervention: i) development and adoption of monitoring systems and decision-making institutional framework and tools; ii) institutional and human resources capacity reinforcement. The inclusion of a PBC is considered for this component to promote institutional changes on dam safety (this will be discussed in more detail during preparation).
2	**Irrigation and Agricultural Services Modernization**	This component will support the rehabilitation and revitalization of about 30,000 hectares of irrigated command area. The availability of appropriate water resources will be ensured at all stages through detailed studies on the feasibility, which are also ready from the existing work, such as under TRIMING. Investments under this component will be selected from the list of national irrigation schemes provided by the government using technical and economic selection criteria, which ensure the IWRM support approach of having irrigation, hydropower and dam safety components in the same geographical locations.
3	**Strengthening of Hydropower Storage Infrastructure**	The proposed component focuses on two key sub-components: 1. Enhancing dam and storage safety, and 2. Improving hydropower through studies, improvement measures, investments, and technical assistance. By integrating these elements. This component aims to improve the overall performance and sustainability of hydropower and storage infrastructure, promote responsible investment, and build the technical capacity of stakeholders involved in the sector
4.	**Project Management**	The objective of this component is to effectively implement, monitor, and evaluate project activities. It involves establishing the National Project Management Unit (NPMU) to oversee and coordinate project implementation, as well as setting up a monitoring and evaluation (M&E)

	Components	Objectives of Component
		system. An external M&E agency will be contracted to assess project activities and their impact. The component includes financing for consultancies, training, materials, office equipment, and operating costs. It also provides investment and technical support for a robust management information system (MIS) and ICT system. The Component will also support and strengthen the capacity of the government counterparts on the application of Environmental and Social Framework (ESF) and Citizen Engagement activities. These measures ensure efficient project management, monitoring, and citizen participation, contributing to the successful achievement of project outcomes.

This Draft ESMF Report presents an overview of the ESMF, the basic findings, and recommendations.

1.2 Introduction

Nigeria is adequately blessed with an abundance of all the resources and factors required to excel in agricultural productivity and hydro power generation. Chief among these factors are: Manpower, landmass, edaphic and climatic factors as well as extensive network of waterbodies. However, gross neglect of the agricultural sector over the last three decades or thereabouts, due to comprehensive focus on the petroleum sector, has led to a substantial deterioration of the agricultural sector in Nigeria, to the extent that, from being a mainstay of the Nigerian economy, agriculture has been relegated to the backwaters of irrelevance, until recently. With regards to power, although efforts have been made to increase power generation, transmission and distribution, these have remained largely inadequate and ineffective.

With the realization that there is a need to be more coordinated about agricultural development as well as improvement in power generation and supply, various projects have been originated and implemented, to work on improving agricultural productivity as well as power generation and distribution in Nigeria. A series of projects are currently being assisted by the World Bank and other Multilateral Development Banks (MDBs) such as the African Development Bank (AfDB), the Islamic Development Bank (IsDB), etc. in the agricultural sector and the power sector. Recent interventions by the World Bank include the various Fadama projects, and the one rounding up at the moment, Transforming Irrigation Management in Nigeria (TRIMING) project. The World Bank is also conceptualizing the current project for which this Pest Management Plan (PMP) is being prepared. The project, called Sustainable Power and Irrigation in Nigeria (SPIN), is aimed at building on the gains from the TRIMING project, and will focus on optimization of existing facilities such as rehabilitating existing dams, incorporating hydro components into them, and generally building up Nigeria's renewable power generation, and expanding agricultural productivity through increased irrigation agriculture. The SPIN project is expected to involve, among others, civil works such as construction and/or rehabilitation of infrastructure, and at various stages and levels, pesticide usage.

As a responsible organization, with deep concern for environmental conservation and sustainable development, the World Bank typically applies its Environmental and Social Framework (ESF) to any project it is involved in, directly and/or indirectly. For the current project, several of the World Bank Environmental and Social Standards (ESS) are likely to be triggered. However, since details for most of the projects are not very clear yet, the bank requires the preparation of environmental and social management framework (ESMF) reports for the global project, as well as a Pest Management Plan (PMP), since expanded agricultural activities will, necessarily, involve the use of pesticides. This PMP provides guidelines on the general handling and management of pesticides that will be used during the

project, in order to ensure compliance with the Bank's ESS3 on Resource Efficiency and Pollution Prevention and Management.

1.2 INTRODUCTION

This pest management plan (PMP) has been prepared to support the ESMF for the planned Sustainable Power and Irrigation in Nigeria (SPIN) Project. This is an agricultural and rural development project, with renewable power components incorporated (where feasible), supported by The World Bank. The proposed project seeks to improve performance of irrigated and water resources infrastructure and institutions for enhanced productivity in selected irrigation schemes.

The proposed Project Development Objective (PDO) is to improve utilization of existing storage for irrigation and hydropower generation and strengthen institutional arrangements for integrated water resources management in Nigeria.

The SPIN Project considers the following PDO indicators:

i. Area provided with improved irrigation and drainage services (hectare (ha));
ii. Increased or reoperated water storage capacity (cubic meter (m^3));
iii. Direct project beneficiaries, including the percentage of females benefiting from improved services disaggregated into improved irrigation and allied services, and/or enhanced supply of hydroelectric power (number, percentage); and
iv. Increased number of dams following safe operational procedures and safety measures in place (number).

The Project will directly and indirectly support subsistence farmers and the poor with information, skills, technology, group organizing, and business opportunities that will allow them to pursue micro-enterprises, self-employment, or other opportunities in commercial agriculture as well as assist them through training for improved relevant skills and also, to become employed in market-chain activities. Positive impacts on social and gender development will occur by (i) expanding opportunities for the poor and women to engage in commercial activities, (ii) reducing any vulnerability of disadvantaged groups arising from commercializing agriculture, (iii) Improving sustainable power supply by incorporating hydro power generation, transmission and distribution to existing dams, where feasible, and (iv) enhancing capabilities to engage directly in or benefit indirectly from commercial agriculture. Investment in local infrastructure in the form of access to feeder roads; adoption of appropriate agricultural technologies; access to market information and agribusiness and/or product improvement technology, as well as enhanced overall productivity through improved power supply, will be provided.

The project beneficiary groups include not only small and medium holder farmers, but also agribusiness entrepreneurs, input suppliers, processors, traders, market associations, aquaculture estates and financial institutions. The anticipated growth and commercialization of agriculture through the planned projects is likely to be associated with an increase in the use of pesticides and toxic substances (PTS). Both farming and agro-processing use chemicals that are potentially hazardous.

Potential negative effects of pesticide use include:

- The killing of non-target organisms such as biological control agents that suppress pest populations;
- Pests become more resistant to available pesticides and increasing amounts of the substances need to be used, with associated pollution hazards;
- Contamination of soil and surface and underground water, resulting from the use of these pesticides;
- Loss of ecosystems such as woodlands and wetlands through contamination of the soil and water; and
- The loss of wildlife, fish, birds and even humans though poisoning.

The use of highly persistent and highly toxic chemicals must be avoided to the maximum extent possible and the choice of pesticides used in subprojects must be based on factors as per the *IFC Guidelines on Pesticide Handling and Application*. The Guidelines state that these criteria should be assessed in order of importance:

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

A pest management plan is a comprehensive plan, developed when there are significant pest management issues such as:

1. New land-use development or changed cultivation practices in an area;
2. Significant expansion into new areas;
3. Diversification into new crops in agriculture, particularly if these tend to receive high usage of pesticide, like cotton, vegetables, rice, etc.
4. Intensification of existing low-technology systems;
5. Proposed procurement of relatively hazardous pest control products or methods;

One of objectives of pest management is to assess the capacity of the country's regulatory framework and institutions to promote and support safe, effective, and environmentally sound pest management and to incorporate these into the relevant project components to strengthen such capacity.

Given the foregoing, a Pest Management Plan (PMP) is therefore required to be prepared for such projects as the planned SPIN Project and will complement the Environmental and Social Management Framework (ESMF) and other instruments prepared for the project.

This Pest Management Plan (PMP) for the SPIN project is designed to minimize potential adverse impacts on human health and the environment and to advance ecologically based Integrated Pest Management (IPM). It describes pest and pesticide management issues relevant to the project and provides a strategy and plan for IPM implementation. It determines whether current or proposed use of pesticides is justified under an IPM approach, and whether it is economical. Hazards associated with the transport, storage, handling, use and disposal of pesticides are identified and assessed. Measures are provided to reduce these hazards to a level that can be managed by the envisaged users of the products concerned. Preparation of a PMP also includes screening of pest control products if financing of such products is envisaged

The Bank may finance the purchase of pesticides when their use is justified under an IPM approach and following some criteria concerning selection of pesticides:

a. They must have negligible adverse human health effects.
b. They must be shown to be effective against the target species.
c. They must have minimal effect on non-target species and the natural environment. The methods, timing, and frequency of pesticide application are aimed to minimize damage to natural enemies. Pesticides used in public health programs must be demonstrated to be safe for inhabitants and domestic animals in the treated areas, as well as for personnel applying them.
d. Their use must take into account the need to prevent the development of resistance in pests.

This report presents an overview of the PMP proposed for the SPIN and an implementation plan.

1.3 Report Structure

This report has been prepared to give an overview of the planned project, PMP for proposed projects. The report is arranged as follows:

Section One:	Background and Introduction
Section Two:	Description of the Planned SPIN Project
Section Three:	Administrative and Legal Framework for Pest Management
Section Four:	Baseline Information on Existing pests and Pest Management Practices in The Project Area
Section Five:	Potential Impacts of Pests and Pest Management Activities and Mitigation Measures for Negative Impacts
Section Six:	Pest Management Plan
Section Seven:	Implementation Methods, Workplan and Budget
Section Eight	Disclosure Requirements
Section Nine:	Conclusion

Attachments on necessary themes are also included.

2.0 DESCRIPTION OF THE PLANNED SPIN PROJECT

2.1 Introduction

The Federal Government of Nigeria (FGN) has requested World Bank assistance to prepare the Sustainable Power and Irrigation in Nigeria (SPIN) Project. The proposed project seeks to improve performance of irrigated and water resources infrastructure and institutions for enhanced productivity in selected irrigation schemes.

2.2 The Proposed Project Development Objectives (PDO)

The Project Development Objective is to strengthen dam safety and improve management of water resources for hydropower and irrigation in selected areas of Nigeria. **The objective of this project is to address water resources management, food security, and energy security challenges** in Nigeria through investments in irrigation, dams, storage infrastructure, and hydropower planning. By mobilizing water for productive purposes, optimizing the use of existing storage facilities, the project aims to promote sustainable development, efficient water resource utilization, and strengthen integrated water resources management practices. The proposed project includes four main components (the US$ amounts for each component are indicative at this stage, and may vary substantially during preparation, in particular between components 2 and 3). Building upon the lessons learned and achievements of past projects such as TRIMING, the project moves to promoting a more holistic water usage and storage management by the inclusion of hydropower sector and supporting institutional strengthening, such as on dam safety regulations and guidelines. The project components and related interventions would be chosen through economic, technical and geographical criteria, to act synergistically and promote an integrated water and storage management. It would also strengthen institutional coordination on storage and water management between the related ministries and departments. The proposed project components are:

i. Institutional strengthening and capacity building for Irrigation, Hydropower and Storage Management (potential PBC component);
ii. Irrigation Management Modernization;
iii. Rehabilitation and Improvement of Hydropower and Storage Services; and
iv. Project Management.

A summary description of each component is presented below:

2.2.1 Component 1: Institutional strengthening and capacity building for Water Resources Management (US$30 million)

The objective of this component is to influence an enabling policy environment, strengthen the organizational as well as human resource capacities of entities including the institutional framework for the water resources management at the federal, river basin and state levels.. This will be conducted through two areas of intervention: i) development and adoption of monitoring systems and decision-

making institutional framework and tools; ii) institutional and human resources capacity reinforcement. The inclusion of a PBC is considered for this component to promote institutional changes/reforms on irrigation and dam safety .

The development and adoption of state-of-the-art monitoring systems, technical guidelines, and national standards for dam design and safety (including hydrological, structural and operational safety) and decision-making framework tools will be based on a comprehensive institutional assessment to analyze the current setting and needs to streamline the roles and responsibility of FMWR and FMP for dam safety. Proposed activities include:

i. **Asset management system** for dam/storage facilities, including irrigation and hydropower assets, that will allow a systematic presentation and interpretation of data for effective monitoring of the facility status; establishment of a dam inventory.
ii. **Dam safety arrangements**: assess the gap of policies and regulations on dam safety management and support to the revision/newly preparation of existing guidelines and standards on dam planning, design and operation, maintenance and surveillance, and emergency preparedness, safety assessment methods/procedures for hydropower and dam/storage facilities; and training in hazard and vulnerability assessment and dam-break analysis, and dam operation, maintenance and surveillance. Establishment of dam safety regulatory body by the government will also be supported. This area of intervention could be designed to include PBC to increase the incentive on these transformational changes.
iii. The component will also support the **operationalization of the installed management tools** for the irrigation systems that are being managed under the responsibility of the respective RBDAs. This involves support for surveys, data entry and associated supportive equipment enhancing the effectiveness of the initial investments.

The FMP and FMWR will be empowered through institutional and human resources capacity reinforcement, which will include:

i. **Human resources capacity strengthening:** In-country and external training of staff to assist with the development of appropriate skills and modern tools to adequately operate and maintain irrigation, hydropower and dam/storage facilities;
ii. **Institutional knowledge sharing:** attendance at hydropower and dam/storage safety courses; study tours, and linking with foreign country agencies that have advanced hydropower and dam/storage safety programs;
iii. **Improvement and management of knowledge base:** operation of independent dam safety review panels, comprising experts in relevant disciplines; development of capacity to carry out reservoir sedimentation studies; development of Management Information Systems (MIS) and other programs to capture and analyze data for long-term planning and guiding of hydropower and dam/storage operations, especially the multiple storage operations. Support of transboundary authorities, such as Lake Chad Basin Commission and Niger Basin Authority would be sought for the development of MIS.

2.2.2 Component 2: Irrigation Modernization (US$ 350 million)

This component will support the rehabilitation and revitalization of about 40,000 hectares of irrigated command area. The availability of appropriate water resources will be ensured at all stages through detailed studies on the feasibility, which are also ready from the existing work, such as under TRIMING.

Investments under this component will be selected from the list of national irrigation schemes provided by the government using technical and economic selection criteria, which ensure the IWRM support approach of having irrigation, hydropower and dam safety components in the same geographical locations. The potential investment lists include 24 irrigation systems with existing storage with a total service area of 100,000 ha and 4.0 billion m^3 of storage available, and a total of 14 hydropower facilities with a total output of 170 MW.

The Component will include **the assessments of water resources and schemes performance**, including potential changes due to climate change; engineering surveys, investigations, and designs; and rehabilitation and upgrading of the irrigation and drainage infrastructure, incorporating climate resilient designs. Focus will also be put in the **modernization of irrigation management systems** and strengthening of irrigation management institutions in the Project Area.

The component will also promote climate-resilient management strategies for groundwater and surface water, change irrigation management strategies to reduce climate vulnerabilities (e.g. irrigation schedules) and improvement in water and energy efficiency of the rehabilitated systems. The resilience of the communities to water-related disasters such as drought and flood will be also strengthened through the operationalization of the monitoring systems developed under Component 1 of the Project. The developed infrastructures would be accompanied by an analysis of the vulnerability to climate related hazards.

2.2.3 Component 3: Improvements in Dam operations and Enhancing Dam Safety (US$ 100 million)

The main activities under the component are: (i) Dam Safety Portfolio Risk Assessment Exercise including establishing and implementing risk indexing screening method for dams in Nigeria, selecting dams for rehabilitation works; (ii) Preparing an Emergency Action Plan (EAP), an Operation and Maintenance manual (O&M) including operational protocols and dam health monitoring and reporting protocols and an instrumentation plan for dam safety;

(iii) Rehabilitation works including measures for seepage reduction, hydrological and structural safety measures, strengthening main dam body and foundation, and improving basic dam facilities and dam safety instruments; (iv) preparing and implementing of sediment management plans, through bathymetric surveys feasibility studies, piloting of institutional models and plans for treatment of upstream drainage catchments with construction of sediment retaining check-dams and river bank protection structures and (v) application of nature based solutions to dam/reservoir operation and management..

In order to prioritize the rehabilitation works of large dams, dam safety portfolio risk assessment will be conducted for around 200 target dams to determine baseline and target safety status. The objective of this component is to improve the safety of dam/storage of 20-30 prioritized dams. The dams which supply water to the 40,000 hectares of irrigated command area (proposed to rehabilitate under this project) will be taken on priority for their rehabilitation to ensure sustained water supply. Remaining dams to be rehabilitated under the project will be determined based on the dam safety portfolio risk assessment. Rehabilitation works would include, but not limited to, measures for seepage reduction (grouting, geo-membranes, etc.), hydrological and structural safety measures (e.g., additional spillways, fuse plugs), strengthening of dam structures (e.g., gates), repairing foundation damages, strengthening dam sections, and improving basic dam facilities (e.g., access roads). For hydropower facilities,

depending on the owner of facilities, evaluated status of hydro-mechanical assets will be considered for improvement accordingly.

Non-structural measures for dam safety will also be promoted. This includes standardized dam safety instrumentation, monitoring, assessment and reporting protocols for dam health/audit; flood forecasting and early warning systems; integrated reservoir operations including streamflow forecasting for climate resilient dam management; preparation and implementation of Emergency Action Plans (EAPs); and preparation and implementation of sediment management plans for all dams to be rehabilitated under the project. Structural and non-structural measures will be identified in dam rehabilitation plans that are prepared after conducting thorough investigative studies to ensure appropriateness of interventions. Studies include, as relevant, systematic hydrological assessments, stability analyses, geo-technical studies, and geo-physical and bathymetric surveys, in addition to social and environmental assessments.

Rehabilitation of these dams will ensure its ability to mitigate hydrological extremes (flood and droughts) and storing water for potable supply, irrigation, and power generation. The proposed interventions will negate the adverse impact of climate change-induced hydrological uncertainties by revising the hydrology of the dam, developing real-time inflow forecasting system, enhancing spillway capacities, developing an adaptive dam gate operation strategy and implementation of EAPs.

2.2.4 Component 4: Project Management (US$ 20 million)

The objective of this component is to effectively implement, monitor, and evaluate project activities. It involves establishing the National Project Management Unit (NPMU) to oversee and coordinate project implementation, as well as setting up a monitoring and evaluation (M&E) system. An external M&E agency will be contracted to assess project activities and their impact. The component includes financing for consultancies, training, materials, office equipment, and operating costs. It also provides investment and technical support for a robust management information system (MIS) and ICT system. The Component will also support and strengthen the capacity of the government counterparts on the application of Environmental and Social Framework (ESF) and Citizen Engagement activities. These measures ensure efficient project management, monitoring, and citizen participation, contributing to the successful achievement of project outcomes.

Although specific details for most of these projects are still sketchy, concrete details will be finalized prior to project commencement, and project specific E&S documents will be prepared following the protocols laid down in this document.

3.0 ADMINISTRATIVE AND LEGAL FRAMEWORK FOR PEST MANAGEMENT

3.1 Pest Management and Pesticide Use Policy

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.

Towards this end, there are IPM implementation cases amongst the key crops in FADAMA agriculture. For example, for control of root knot nematodes in tomato and okra, farmers are encouraged to integrate resistant crop varieties with seed dressing and compatible crop rotation schemes to prevent build-up of the pests. For downy mildew control in maize, farmer training by the Rice/Maize Centre in Ibadan has promoted the integration of resistant crop varieties with seed dressing (using Apron plus), timely identification, roguing and burning of affected plants and general farm hygiene. Similarly, IPM recommendations for control of the African Rice Gall Midge include combination of resistant crop varieties with seed dressing, timely planting, pest monitoring to guide pesticide applications.

Generally, however, in the responses to actual and potential pest threats to intensified agriculture, the Federal Ministry of Water Resources (FMWR) annually purchases and distributes pesticides (through tender) to the States. A number of national institutions play different roles in the pesticide supply, and the Federal Government had issued a number of legislation and institutional framework using four main organizations (FMEnv, FMH, NAFDAC and FMLP) for the regulation of the distribution and use of pesticides. The current legislative tools are:

National Laws and Policies

- Federal Ministry of Agriculture & Rural Development (1988)
- National Policy on the environment, 1989
- FEPA Act 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 FMEnv.

More recently, a regulation was signed into law on Pesticide Registration. This is the **Pesticide Registration Regulation 2021 (S.1. 83 of 2021)**. This Regulation prohibits the manufacture, formulation, importation, exportation, advertisement, sale or distribution of pesticide in Nigeria unless the pesticide has been registered with the National Agency for Food and Drug Administration and Control (NAFDAC) in accordance with the provisions of these Regulations. Bulk importation of pesticides for farm use only shall be exempted from the requirement of an authorization of the Agency.

No person shall submit an application for the registration of any pesticide unless such pesticide was manufactured or formulated in an establishment acceptable and approved by the Agency.

An efficacy assessment of a pesticide to be introduced into the market shall be carried out to ensure that pesticide approved is efficacious for its intended use. This assessment shall be monitored by the Agency and be carried out for two seasons in two different zones or as may be prescribed by the Agency. The applicant shall state the residue level for the pesticide in all its intended usage in the country and this will be compared with the tolerance level as may be determined by the Agency.

The Regulations set out labelling requirements (including instruction for use) for pesticides. Any person who contravenes any of the provisions of these Regulations shall be guilty of an offence and liable on conviction to prescribed penalties.

Based on the approval of the agencies mentioned above, Annexes 1 and 2 lists current banned and approved Pesticides stocks in Nigeria. This list is updated periodically The Federal Ministry of Agriculture and Rural Development (FMARD) acts upon request of the Federal Pest Control Services which prepares the lists of pesticide needs for its operation. For example, N100 million was allocated on request in year 2001 through the Ecological Disaster Fund. In addition, the Federal Government purchased and distributed spraying equipment and protective gears. This and similar examples of pest related threats to investment projects, such as the Fadama projects, the CADP and the TRIMING, highlight the need for robust Pest Management Plans as an integral component of project implementation.

International conventions & Treaties

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

Applicable World Bank Environmental and Social Standards (ESS)

The Environment and Social Framework (ESF) of the World Bank provides methods and tools for the Borrower to carry out the Environment and Social Assessment (ESA) of programs and projects. Among the methods and tools that could be used by the Borrower, is the Environment and Social Management Framework (ESMF) and Pest Management Plans (PMP), where extensive pesticide usage are expected..

The ESF sets out the World Bank's commitment to sustainable development, through a Bank Policy and a set of Environmental and Social Standards (ESS) that are designed to support Borrowers' projects, with the aim of ending extreme poverty and promoting shared prosperity.

The ESF comprises:

1. A Vision for Sustainable Development, which sets out the Bank's aspirations regarding environmental and social sustainability.

2. The World Bank Environmental and Social Policy for Investment Project Financing, which sets out the mandatory requirements that apply to the Bank; and
3. The Environmental and Social Standards, together with their Annexes, which set out the mandatory requirements that apply to the Borrower and projects.

The World Bank Environmental and Social Policy for Investment Project Financing (IPF) sets out the requirements that the Bank must follow regarding projects it supports through IPF. It also sets out the policy of the Bank to support borrowers to develop and implement environmentally and socially sustainable projects as well as build capacity in the assessment and management of environmental and social impacts and risks associated with the implementation and operation of projects. The World Bank, as part of the ESF also has environmental and social standards that borrowers must comply with for projects to be sustainable, non-discriminatory, transparent, participatory, environmentally, and socially accountable as well as conform to good international practices.

There are ten (10) Environmental and Social Standards (ESS) that establishes the standards that the Borrower and the project will meet throughout the project life cycle. For this PMP, the applicable ESS is ESS3 on Resource Efficiency and Pollution Prevention. 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.

The objectives or the ESS3 are:

- 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 3.
- To avoid or minimize generation of hazardous and non-hazardous waste.
- To minimize and manage the risks and impacts associated with pesticide use.

For a project such as the SPIN, that involves increased agricultural activities and associated pest management measures, the Bank, through ESS3 recommends a preference to integrated pest management (IPM) or integrated vector management (IVM) approaches, using combined or multiple tactics.

In the procurement of any pesticide the Borrower will assess the nature and degree of associated risks, taking into account the proposed use and the intended users.20 The Borrower will not use any pesticides or pesticide products or formulations unless such use is in compliance with the EHSGs. In addition, the Borrower will also not use any pesticide products that contain active ingredients that are restricted under applicable international conventions or their protocols or that are listed in, or meeting, the criteria of their annexes, unless for an acceptable purpose as defined by such conventions, their protocols or annexes, or if an exemption has been obtained by the Borrower under such conventions, their protocol or annexes, consistent with Borrower commitments under these and other applicable international agreements. The Borrower will also not use any formulated pesticide products that meet

the criteria of carcinogenicity, mutagenicity, or reproductive toxicity as set forth by relevant international agencies.

For any other pesticide products that poses other potentially serious risk to human health or the environment and that are identified in internationally recognized classification and labelling systems, the Borrower will not use pesticide formulations of products if: (a) the country lacks restrictions on their distribution, management and use; or (b) they are likely to be used by, or be accessible to, lay personnel, farmers, or others without training, equipment, and facilities to handle, store, and apply these products properly.

The following additional criteria apply to the selection and use of such pesticides: (a) they will have negligible adverse human health effects; (b) they will be shown to be effective against the target species; (c) they will have minimal effect on non-target species and the natural environment. The methods, timing, and frequency of pesticide application are aimed to minimize damage to natural enemies. Pesticides used in public health programs will be demonstrated to be safe for inhabitants and domestic animals in the treated areas, as well as for personnel applying them; (d) their use will take into account the need to prevent the development of resistance in pests; (e) where registration is required, all pesticides will be registered or otherwise authorized for use on the crops and livestock, or for the use patterns, for which they are intended under the project.

The national extant laws in Nigeria are consistent with the international laws and the World Bank ESS3. However, in the event of any discordance between the existing laws in Nigeria and the World Bank ESS, the more stringent will take precedence.

4.0 BASELINE INFORMATION ON EXISTING PESTS AND PEST MANAGEMENT PRACTICES IN THE AREA

4.1 Introduction

Information presented in this section of the report is based on a combination of literature information, field data collection and personal experience of the consultants on pest status in the area. Actual site visits were conducted to the selected Pilot Dams for the SPIN project (Gassol, Naka and Doma Dams), and specific discussions were held with relevant stakeholders, based on which information were obtained. Stakeholders consulted in the course of field visits for this project include farmers, Water Users' Associations (WUAs) and River Basin Development Authorities (RBDAs).

4.2 Agricultural Activities in the Project Area

Based on the field visits and consultations held as part of this project, information on agricultural activities of the pilot dams is presented in Table 4.1. Generally, crops within each agricultural zone are similar, but vary slightly from dam to dam.

Table 4.1: Overview of Agricultural Activities in the Covered Irrigation Schemes

S/N	DAM AREA AND RELEVANT RBDA	MAIN AGRICULTURAL ACTIVITIES	
		CROPS	LIVESTOCK
1.	Niger River Basin Development Authority (Covering: Doma Dam in Nassarawa State)	Irrigated Areas: Rice mainly, with vegetables Upland areas: Maize, guinea corn, millet, cowpea and groundnuts. Yams and cassava. Vegetables such as onions, garlic, ginger pepper and tomatoes are also grown.	Main livestock is cattle although poultry farming is also practiced. In addition, some sheep and goats are kept
2.	Lower Benue River Basin Development Authority (covering Gassol and Naka Dams)	Irrigated Areas: Rice, wheat, maize and vegetables Upland areas: cereals (maize, guinea corn, wheat, rice); legumes (groundnuts, cowpea, soya beans); tubers (sweet potatoes, Irish potatoes yams and cassava), sesame and vegetables such as pepper, tomatoes, onions, garlic, ginger, cucumbers cabbage, sugar cane and Hibiscus. A lot of tree crops such as citrus, cashew and mangoes also grown in this area	Livestock mainly cattle, with some poultry, sheep and goat

Source: Consultations around the SPIN Project area (February, 2024)

4.3 Pest Situation in Northern Nigeria

In 1994, a technical review workshop on the fadama lands summarized that the “lack of data to define the importance of pests and diseases in fadama agriculture has retarded the progress of crop protection”. The development situation has not changed much since then. The only comprehensive pest list of agriculture is still the one produced for the Northern Nigeria in 1994. This is shown in Table 4.2.

Table 4.2: Overview of Pest Problems in Northern Nigeria

Crop	Pest	Disease
Vegetables		
1. Tomatoes	Nematodes (*Meloidogyne* spp)	Bunchy top diseases
	Crikets	Leaf curl disease
	Fruitworm (*Heliothis* spp)	Bushy stunt disease
	Whiteflies	Vascular wilt (*Pseudomonas solanacearum*)
		Fusarium spp
		Sclerotium spp
2. Onion	Crickets	Grey leaf blotch (*Alternaria alternata*)
	Thrips	Purple blotch (*Alternaria porri*)
		Onion anthracnose (*Colletotrichum cingulata*)
		Onion rot (*Fusarium oxysporium*)
3. Okra	Flea beetle (*Podagrica* spp)	Powdery mildew (*Erysiphe cichoracearum*)
	Cotton bollworm (*Dysdercus* spp)	Leaf mosaic
	Nematodes (*Meloidogyne* spp)	Leaf mosaic virus
Cereals		
1. Rice	Nematodes (*Aphelenchoides besseyi*; *Hirshmanniella grazilis*; *H. oryza*; *H. spinicaudata)*	Blast (*Pyricularia oryzae*)
	Stem borers (Sesamia calamitis; Chilo zacconius; Maliarpha separetella)	Brown leaf spot (*Cochliobolus miyabeanus*)
		Black kernel (*Curvularia* spp)
2. Wheat	Quelea birds (Quelea quelea)	Foot and root rot (*Drechsera rostrata; fusarium equiseti; F. culmorum; F. acuminatum*)
	Grasshoppers (*Hieroglypus daganensis; Aiolopus similatrix; Oedaleus senegalensis; Namadacris septemfaciata*)	Rusts (Stem rust, brown rust and leaf rust)
	Nematodes (*Meloidogyna incognita; Javancia*)	Smut: loose smut
	Termites (*Microtermes lepidus*)	
	Aphids (*Rhoplasosiphum maidis; Methapolophium spp; Microsiphum* spp)	
	Stem borer (*Sesamia calamistis*)	

Source: TRIMING PMP (2014)

Based on field data collection for this project, and previous experience of the consultant, pests and pathogens in northern Nigeria (including the SPIN pilot project areas) include microbes (fungi and bacteria), nematodes; insects and vertebrates. A comprehensive consultation process, accompanied with field visits for visual observation was carried out. The findings of these visits and consultations confirm the information presented in Table 4.2 above. In addition however, specific information on pests and pathogens in the SPIN project areas from consultations during fieldwork in February 2024 shows that while some pests are not so significant, others, are gradually becoming more critical and therefore requires a revised strategy for their management. Based on the foregoing, an updated pest list for the SPIN project area has been drawn, showing the pest types, their effects on different crops as well as the typical control measures employed for them in the project area. This is presented in Table 4.3 below.

Table 4.3: Updated List of Pests in the SPIN Project Area

S/N	PEST	TYPES AND EFFECTS ON CROPS	CONTROL MEASURES		
			CHEMICAL	PHYSICAL	CULTURAL
1.	Nematodes	Cereals like rice, maize, guineacorn, etc., which are common around the SPIN project areas, are commonly afflicted by similar nematode pests. Based on surveys, there are two main nematodes that affect rice and other cereals in the area: The Rice root nematode (*Hirschmanniela spinicaudata*.) and the root knot nematode (*Meloidogyne incognita*). The main symptom of rice root nematode infection is rotting of roots, leading to lower height and yield in infected plants. The main symptoms of root knot nematode infection include patchiness; chlorosis (yellowing of leaves), dwarfed or stunted plants and regular wilting, especially in hot weather.	Chemical control, apart from being very expensive, also requires specialized handling, thus is rarely used, except in experimental farms or those where there is government or international body intervention	Physical methods include removal and destruction, mostly burning, of infected plant tissues	Land fallow and the planting of trap crops is a method regularly used. *Cyperus spp*.
3.	Insects:	Stem borers and aphids. **APHIDS** The key aphid is *Aphis craccivora*. Cowpea aphid injects a powerful toxin into the plant while feeding and, when populations are large, this can stunt or kill plants. **STEM BORERS** Stem borers: *Anoplocnemis curvipes* and *Clavigralla tomentosicollis*. They cause substantial damage to leaves and pods of legumes, leading to substantial yield loss.	Insecticides such as Termakill, Cypermethrin, Buthachlor, etc are used.	Hand-picking of insects and actual destruction of their eggs is effective, although it involves a lot of drudgery	
		Flea beetles (*Podagrica spp.*). These attack leaves and fruits and lead to substantial economic losses, especially in leafy vegetables.	Insecticides such as Termakill, Cypermethrin, Buthachlor, etc are used.	Hand-picking of insects and actual destruction of their eggs is effective, although it involves a lot of drudgery	
		Crickets are also major insect pests in the project area. The main crickets are: *Acheta spp.* And *Gryllotalpa sp*. The main damage they cause is to the roots of most plants, especially cereals and legumes.	Insecticides such as Termakill, Cypermethrin, Buthachlor, etc are used.	Hand-picking of insects and actual destruction of their eggs is effective, although it involves a	

S/N	PEST	TYPES AND EFFECTS ON CROPS	CONTROL MEASURES		
			CHEMICAL	PHYSICAL	CULTURAL
				lot of drudgery	
	Locusts	Locusts (*Locusta migratoria)* are only recorded occasionally around the Upper Benue region. They are rare to hardly occurring in the Hadeija Jamare and Sokoto Rima basins. Where they occur, they could cause massive economic damage, but the population levels recorded, where they occur, is minimal	Insecticides such as Termakill, Cypermethrin, Buthachlor, etc are used	Physical destruction of anthills is a method generally used in the area.	
	Termites	*Macrotermis bellicosus* is a minor pest, which feed extensively on underground part of plants from the several termitarium (anthills) that dot the savannahs of the project area			
	White flies and mealybug complex	White flies (*Bemisia tabacci*) usually occurs in a complex with mealybugs. In many plants such as cassava, the white flies occur along with the cassava mealybug (*Phenacoccus manihoti*), and together, they cause severe damages, including wilting, chlorosis and dieback.	Foliar sprays of insecticides are not as effective on this complex, because they occur on the underside of the plant leaves, and so systemic insecticides are better suited for this complex		
4.	Birds	Quail (*Quellea quellea*) is a major pest of rice and wheat, causing substantial damage to yield potential. Depending on level of infestation, they can cause complete crop failure.	Chemical control is mostly by aerial sprays to kill the birds at their roosting locations, but this is usually too expensive for local farmers to apply and thus they depend on interventions by FMARD, or other bodies	Traps are set regularly to catch these birds (see plate 1). Also, fishing nets are bought and spread over the entire area of the rice farms, to prevent them from gaining access into rice fields	Cultural control methods include the use of scare-crows to chase the birds away. In the course of consultations for this assignment, it was also learnt that children are sometimes asked to keep moving around the rice fields, to scare away the birds, hence skip school
		Village Weaver Birds (*Ploceus cucculatus*). Apart from feeding on grains on the field, a much greater damage arising from weaver infestation of farms is defoliation of the plants, leading to reduction in yield.	Chemical control is mostly by aerial sprays to kill the birds at their roosting locations, but this is usually too expensive for local farmers to apply and thus they depend on interventions by FMARD, or other bodies	Traps are set regularly to catch these birds. Their nests on trees are also destroyed, to reduce their populations.	Cultural control methods include the use of scare-crows to chase the birds away. In the course of consultations for this assignment, it was also learnt that children are sometimes asked to keep moving around the rice fields, to scare away the birds.
		Double-spurred Francolin (*Francolinus bicalcaratus)* and the helmeted guinea fowl (*Numida meleagris*) are also recorded as pests, although not major,	Chemical control is mostly by aerial sprays to kill the birds at their roosting locations, but this is	Traps are set regularly to catch these birds.	

S/N	PEST	TYPES AND EFFECTS ON CROPS	CONTROL MEASURES		
			CHEMICAL	PHYSICAL	CULTURAL
		compared to weavers and quail. They, also, attack grain crops at various stages, starting from planting, up till the crops are due for harvest.	usually too expensive for local farmers to apply and thus they depend on interventions by FMARD, or other bodies. For these birds, which feed on even freshly planted grains, seed dressing, using Aldrex T or other chemicals seems effective in reducing damage to planted seeds.		
4.	Mammals	Mammal pests in the area are mostly small rodents, although some large rodents occur also. The key rodents observed/reported include Nile Harsh-furred rats (*Arvicanthes niloticus*), the spotted grass rat (*Lemniscomys striatus*) and the multi-mammate rats (*Rattus natalensis*). The ground squirrel, *Xerus erythroupus,* is also known in the area. Larger rodents such as the Greater cane rat (*Thyronomys swinderianus*) is also known to occur in parts of the area. Porcupines, especially the crested porcupine (*IHystrix cristata)* is also another mammalian pest of crops in the area.	Seed treatment with various chemicals seems to be the only effective chemical control method	Traps (including live traps) are set around farms, where rodents are found, to catch them and thus limit their population and the associated damage.	Cultural methods include proper farm sanitation, especially regular weeding. This removes hiding places for rodents and makes it easier to find their nests and burrows,

5.0 POTENTIAL IMPACTS OF PESTS AND PEST MANAGEMENT ACTIVITIES AND MITIGATION MEASURES FOR NEGATIVE IMPACTS

5.1 Introduction

This section of the report presents an overview of the potential impacts of pest and pest management activities as well as mitigation measures for the negative impacts identified. The information presented here has been obtained from a combination of sources, including: literature, personal experience of the consultant, and information obtained during consultations with the stakeholders in the various project areas.

5.2 Associated and Potential Impacts and Mitigation Measures

For ease of comprehension, the impacts are separated into impacts of pests and impacts of pest management activities.

5.2.1 Impacts of Pests

The main impact of pest on the proposed SPIN is a reduction in expected yield, if management and control measures are not included and/or properly implemented. Pests generally destroy the useful parts of crops and livestock, directly or indirectly and this results in economic or nutritional losses. The implication is that original estimates of rate of returns on projects may be thrown off balance.

In order to mitigate this, the SPIN project must take due cognizance of pest issues in the various projects and build the capacity of local personnel to handle pest issues effectively. Details of anticipated capacity building needs for this project are presented in a separate section of this report.

5.2.2 Impacts of Pest Management Activities

Given the issues associated with pests, especially the one highlighted in 5.2.1 above, it becomes essential to undertake pest management activities. Generally, pest management can be chemical, biological, physical and cultural. Chemical interventions are usually the most efficient in terms of prompt action and desirable results. However, issues with mammalian and other animal toxicity, as well as the high costs of chemical interventions have, over the years resulted in other methods, and combinations being developed. This is referred to as Integrated Pest Management (IPM).

A number of impacts have been identified to be associated with pesticide use as part of pest management. These are briefly described below:

1. **Increased production costs**

This is obviously the first and probably most obvious impact of pesticide use to the farmer. The need to use pesticides, for pest control means that there is an increase in the farmer's costs. This will ultimately lead to increased cost of final products.

Obviously, the best mitigation for this kind of issue is to minimize need for pesticide use by employing other control options, especially physical and biological options. Chemical control should only be used as a last resort, to avoid economic losses from pest damage.

2. Possible lethal effects on man

If adequate personnel protection equipment (PPE) are not used, pesticides may cause poisoning to farmers applying them and eventually cause mortality. Many of the pesticides that are used in agriculture are known to have high mammalian toxicity and as such, care must be taken in their applications. In the course of consultations for this project, it was learnt that one or two mortality cases have been recorded in the Sokoto Rima Basin area, due to non-use of proper PPEs during pesticide application

In order to mitigate this impact, a number of options must be applied:

- Provide training and equipment (especially PPEs) to farmers;
- Use pesticides that have low mammalian toxicity, such as pyrethrins and pyrethroids
- Adequate medical facilities (especially first aid) need to be provided, to cater for accidental poisoning from pesticide use/applications.
- Use only crop and livestock protection products approved for use by NAFDAC,

3. Contamination of Soil, Surface and Groundwater and Killing of non-target Organisms.

Because most pesticides have broad spectrum action, non-target organisms often end up being affected by pesticide use. This could lead to disruption of ecological equilibrium within farmlands and in areas downwind. Also, because many of these pesticides are inorganic and therefore not biodegradable, they tend to be persistent, and eventually cause soil and water contamination.

Mitigation measures will include minimal pesticide use and the use of biodegradable pesticides or those with low mammalian toxicity. Plans must also be made for remediation of affected land and/or water bodies.

4. Other Impacts

Pesticides could cause secondary effects such as creating off flavours in crops or tainting the flesh of fish and livestock, which are not target organisms in the first instance. Also, effects on non-target areas could lead to substantial ecological modification and loss (for agriculture) of contaminated lands.

Also, accidental poisoning of people who use containers for pesticides could happen. Generally, people tend to convert empty pesticide containers such as bottles and buckets for domestic usage (as water bottles or food storage) and if the containers are not properly washed before being used

As indicated earlier, very little can be done to outrightly discontinue the use of pesticides, thus, IPM and the use of environment-friendly pesticides would be a mitigation measure. In addition, remediation of affected areas should be undertaken, if and when these kind of impacts occur.

In addition, adequate enlightenment activities should be undertaken to educate farmers on the dangers associated with pesticides and especially, the conversion of empty pesticide containers for domestic use.

6.0 PEST MANAGEMENT PLAN

6.1 Introduction

This Pest Management Plan (PMP) addresses the SPIN project. It stresses the need to monitor and mitigate negative environmental and social impacts of the project and promote ecosystem management.

The PMP provides an information basis for stakeholder groups to establish functional mechanisms enabling commercial 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.

It further raises the need for commercial farmers and associations to understand and respond to the external IPM environment affecting farmers' livelihoods. For example, quarantine pests, alien invasive species and stringent minimum pesticide residue levels limit the potential for farmers to benefit from international trade opportunities. Collaborative linkages between the project and international IPM groups will help to bring relevant expertise and supporting IPM resources developed elsewhere to strengthen national and local capacity to address pest problems faced by farmers, develop a national IPM policy to encourage national and local compliance with international conventions and guidelines on pesticides, and to further develop IPM.

6.2 Objectives

Table 6.1 summarizes the PMP matrix of objectives and activities. The PMP will enable the SPIN project to monitor pests and disease vectors and mitigate negative environmental and social impacts associated with pest/vector control in agriculture and promote agroecosytem management. The plan provides decision-makers with clearer guidelines on integrated pest management (IPM) approaches and options to reduce crop and livestock losses with minimal personal and environmental health risks. Overall, the PMP will empower crop and livestock farmer groups to contribute significantly to household and national economies.

The specific objectives of the PMP are to:

- Assist farmers to plan and design location specific IPM activities.
- Promote participatory approaches in IPM for farmers to learn, test, select and implement "best-bet" IPM options to reduce losses due to arthropod pests, diseases and weeds.
- Promote biodiversity monitoring to serve as early warning systems on pest status, alien invasive species, beneficial species, and migratory pests.
- Establish linkages to develop a national IPM policy to promote IPM and compliance with international conventions and guidelines on pesticide use in agriculture.
- Monitor and evaluate the benefits of IPM including its impact on food security, the environment and health.

ACTIVITIES AND RESULTS

Table 6.1 outlines the matrix of activities, expected results, milestones and performance indicators of the PMP, while Table 6.2 shows the component activities and expected results of the PMP.

Table 6.1: Outline of Activities and Summary of Expected Results

Narrative summary	Expected results	Performance indicators	Assumptions/risks
Goal: 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 covered by SPIN project	• National security improves in the states, which are currently dealing with heightened insecurity • Government policies continue to support food security programme
Purpose 1. In the immediate future, halt and reverse losses caused by pests in order to increase profitability of agriculture. 2. In the longer term, strengthen national and local capacity to reduce environmental and health risks associated with pest management practices in the dam aeas.	**Medium-term results/outcomes** • Farmers in SPIN zones prioritize their pest problems and identify IPM opportunities to mitigate/minimize negative environmental and social impacts associated with pesticides by making pesticide use a last resort • Farmers in SPIN adopt ecologically sound options to reduce crop and livestock losses with minimal personal and environmental health risks. • SPIN decision makers provided with clearer guidelines enabling then to promote IPM approaches and options in agriculture • Collaborate linkages established to develop a national IPM policy to promote compliance with international conventions and guidelines on pesticide use	Availability of sufficient food. • Perception of state agencies regarding the value of IPM in commercial agriculture. • Level of compliance with World Bank etc. • Level of chemical control practices • Types and level of use of alternatives to synthetic pesticides	

Table 6.2: Components activities and expected results of the PMP

Activities	Expected results	Milestones	Performance indicators	Assumptions/risks
1. Record stakeholders' overviews on crop and livestock pests. 2. Conduct field diagnosis to specify pests that undermine agriculture. 2. Identify farmers' coping mechanisms and researcher recommended IPM options against the pests. 3. Develop and explain historical profile of pesticide use and other pest control practices in the SPIN zones. 5. Specify partnership opportunities at local, national and international levels to assist in the implementation of the PMP	**Result 1:** Members of Water Users' Associations (WUAs) and other relevant 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 • PMP implementation mechanism developed by each cluster of 10 neighbouring FCAs	• Type and nature of participatory methods for problem analysis • 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 build up of named pest species • Type of composting and mulching as alternatives to mineral fertilizers • List of principal actors and of partners	Social, economic political situation remain stable Security situation in the states improve substantially
1. Develop participatory learning modules (PLM) in line with farmers identified training needs 2. Conduct short to medium term training of farmer support groups on skills relevant to the PLMs 3. Organize international study visits on specialized IPM skills of relevance to the PLMs 4. Intensify training of men and women farmers in IPM knowledge and skills. 5. Promote farmer-led extension to increase secondary adoption of proven IPM options 6. Strengthen researcher-farmer-extension linkages through participatory research on issues	**Result 2**: Human resource capacity for IPM delivery and implementation developed. *In partnership with Nigeria/FAO project TCP/NIR/2903 (T) on sustainable legumes and cereal production through integrated production and pest management for synergy of efforts in participatory learning approaches, and with the CGIAR Systemwide Program on IPM (SP-IPM) for supporting IPM resources.*	One IPM orientation workshop per group of WUA organized in yr 1 • PLM for crop/livestock and pest management practices developed and adapted to suit local needs • 3 sets of 1week training of trainers courses for 30 extension agents (10 per dam site of Domka, Naka and Gassol) completed • At least 3 sets of study visits organized for at most 12 technical support staff Farmers accurately relate pests to respective damage symptoms; recognize natural enemies/biological control agents against the pests; test a range of IPM options and select "best-bet" options to implement and adopt. • At least 30% of trained farmers undertake	• Type and number of PLMs developed • Type of IPM skills covered in study visits by agric staff • Number of farmers' learning groups implemented • Gender and number of extension agents and of farmers trained. • Gender and number of trained farmers engaged in participatory extension • Extent to which new knowledge/skills are used by extension agents & farmers to promote adoption of IPM options • Number & type of IPM information materials developed/disseminated • Number and type of new IPM	Farmers adopt and apply new improved technologies. WUAs and their service providers comply with international conventions guiding pesticide use and MRLs in trade Critical mass of staff trained remain within the communities

Activities	Expected results	Milestones	Performance indicators	Assumptions/risks
emerging from farmer training 7. Develop/disseminate IPM decision-support information resources for field agents, farmers, policy makers, and the general public		participatory extension; and at least 50% farmers adopt new IPM options in targeted crop or livestock At least 70% of information materials developed is disseminated and used by extension agents and farmers. • Significant reduction in pest damage by at least 30% of baseline data in target crop/livestock	options introduced and adopted. Gender and number of farmers adopting IPM technologies. • Area of crops under IPM • Incremental benefits due to pest control • Type and number of user-friendly taxonomic keys for pest and natural enemy recognition	
1. Test and promote botanical alternatives to synthetic pesticides. 2. Test and promote microbial alternatives to synthetic pesticides 3. Develop/update a national IPM policy including legislation to govern the manufacture, importation, distribution and use of pesticides 4. Establish a national IPM advisory and oversight committee to guide national and local compliance with World Bank ESS31 and ESS3 and other international conventions concerning pesticide use 5. Sensitize the population on IPM issues and activities through formal and informal educational channels and public awareness campaigns	**Result 3**: Harmful pesticide regimes replaced by environmentally friendly alternatives *In partnership with the:* *1. SP-IPM for sustainable access to microbial pesticides.* *2. FAO Regional Crop Protection Office, FAORAFA in Ghana and the Global IPM Facility for assistance to develop a national IPM policy document and establish a national IPM advisory and oversight committee (multi-stakeholder composition).* *3. Nigeria node (at IAR/ABU) of the West African Network for Taxonomy (WAFRINET) and IITA biodiversity center for identification services*	• Local commercial enterprises initiated and/or strengthened to produce and/or market botanical pesticides • At least one botanical pesticide widely used in place of chemical pesticides • At least one microbial pesticide registered and widely used in place of chemical pesticides • Surveillance systems to protect agriculture from banned/harmful pesticide regimes is fully operational • Existing pesticide regulations are fully enforced • A multi-stakeholder National IPM advisory and oversight committee established to guide compliance with international conventions and guidelines on pesticide use, and promote the IPM development • Radio and other public campaigns on impact of pesticides in agriculture, environment and health conducted through radio and TV spots, mass field days, rural market days, information workshops, and focus groups discussions	• Level of reduction in chemical pesticide use; type and number of pesticides replaced by botanical or microbial pesticides Number of commercial enterprises engaged in the production of botanical pesticides; and quality of the products Volume of sale of microbial and botanical pesticides Level of compliance with World Bank safeguard policies by farmers and pesticide dealers/service providers Effectiveness of the IPM advisory and oversight committee Number of pest surveillance groups and pesticide law enforcement mechanisms • Effectiveness of public awareness of campaign	Government and development partners remain committed to international conventions and guidelines on safe pesticide use Critical mass of staff trained remain within the communities

7.0 IMPLEMENTATION STRATEGY, WORKPLAN AND BUDGET

7.1 Introduction

This section presents an overview of the work plan and strategy that will be adopted for a smooth and effective implementation of the Pest management plan (PMP) for the proposed NIWRMP. It also presents an overview of budgetary allocations for the implementation of the plan.

7.2 Capacity Building

7.2.1 Assessment of the Capacity of Nigeria on the Implementation of PMP

In order to reduce the incidences of pest in Nigeria a number of project-based interventions have been implemented, including those funded by the World Bank and FAO on IPM. They include the 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. More recently, IPM trainings and knowledge dissemination activities were carried out as part of the project implementation. There are also other IPM implementation cases amongst the key crops in Nigeria, for example, for control of root knot nematodes in tomato and for downy mildew control in maize. Similarly, IPM recommendations for control of the African Rice Gall Midge include combination of resistant crop varieties with seed dressing, timely planting, pest monitoring to guide pesticide applications. Based on the successes recorded in the aforementioned IPM case studies, it can be concluded that there exists capacity within the country on the use of IPM.

However, for this SPIN project additional training and awareness creation will be required as detailed in this report. The success of IPM depends largely on developing and sustaining institutional and human capacity to facilitate informed decision making by farmers, and empower farmers to integrate scientific and traditional knowledge to solve location-specific problems, and respond to market opportunities. Poor communication between farmers, extension agents and researchers has often led to poorly-targeted research or to poor adoption of promising options generated by research. The full benefits of investments in agricultural research thereby remain untapped under these circumstances. Farmer participatory research (FPR) and participatory learning (PL) approaches in capacity building efforts help to bridge this gap and make research results more understandable and useful by farmers. This is particularly the case in knowledge intensive disciplines such as IPM.

In IPM, there is the need for farmers to accurately identify and diagnose pests and pest problems, understand trophic relationships that underpin biological control opportunities, and use such knowledge to guide pesticide and other kinds of interventions. Through participatory approaches the proposed project will build local capacity to ensure rapid spread and adoption of ecologically sound and environmentally friendly management practices. The farmers will learn biological and ecological processes underpinning IPM options, and use the newly acquired knowledge to choose compatible methods to reduce losses in production and post-harvest storage.

A foundation element of the capacity building exercise is diagnosis of pest problem and IPM opportunities to provide baseline information that will enable stakeholder groups to develop a shared

vision on felt needs and IPM strategies. Through informal interviews, field visits, and planning meetings, stakeholder groups will develop joint understanding of the key issues affecting production and develop a common IPM plan based on agreed concerns.

The PMP implementation will be anchored at RBDA level with field action by farmer groups which will receive training and advisory services from appropriate NGOs, other groups (local and international, and community leaders who would have graduated from **Training the Trainers (TtT)** sessions. Training at all levels will be based on participatory learning modules for capacity building in IPM information delivery. The participants will be equipped with skills in facilitation, group dynamics, and informal education methods to encourage adult learning. Farmer training will focus on **farmers' group learning** for informed decision making on IPM issues. Group learning will be experiential through farmer-led field trials and discussions on practical aspects of crop and livestock production and pest management including indigenous knowledge/technologies. Farmer group learning will be facilitated by TtT trained men and women extension agents.

Group decision making will be achieved through Agro Ecosystem Analysis (AESA) involving a comparison of IPM practices with normal farmer practices. At each AESA, farmers observe, record and monitor changes in soil, crop/livestock and trophic relationships affecting crop/livestock growth. Farmers analyse and discuss their findings and recommend corrective action based on the results of their own analyses. Group learning helps to increase scientific literacy, ownership of biological and ecological information and knowledge, and informed decisions making habits in the communities. For **participatory extension**, the FCA will establish new farmer learning groups in the community. Also trained farmers will be expected to promote secondary adoption of proven options. For example, each farmer trained will train at least 10 new farmers through demonstrations and farm visits. Additionally the farmers will organize field days to train other farmers and explain new/improved IPM practices they have learnt. Field day participants will include representatives of national and local policy makers from government, development agencies, NGOs, rural and national press media, researcher institutes, and national extension services.

A summary of the anticipated training modules, the organizers, parties involved/to be trained and the cost of such training is indicated in Table 7.1 below. Also, a tabular list of pesticides used in Nigeria, their trade/common names and their uses is presented in Attachment 3. Attachment 4 presents general information on transportation, storage and handling of pesticides, as well as handling of wastes from pesticides.

7.3 Institutional Arrangements

Annual work plans will be developed in consultation with the WUAs and RBDAs in line with their respective local action plans to indicate institutions and networks that will be required to provide research and development support. The principal actors will include a number of local institutions directly involved in implementing the PMP while other agencies (partners) will include international and national institutions to provide technical and other support for implementation of the plan. An overview of the actors and partners is presented in Table 7.2.

Table 7.1: Training Modules Identified, Participants, Responsibilities and Budget

S/N	TITLE OF TRAINING MODULE	TARGET AUDIENCE	RESPONSIBILITY	FREQUENCY	BUDGET (US$)						
					Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Total
1.	Training on Integrated Pest Management (IPM)	RBDAs (developing a pool of IPM workers who will in turn disseminate information down the line)	SPIN in collaboration with established IPM institutions	Annually for 6 years (First year will be a 5 day training, which will require selected personnel to be trained on the principles and applications of IPM. Subsequent annual trainings will be refreshers and updates and will last 1 day only. The assumption is that for each year, there will be 30 trainees, with 10 representing each of the project sites picked	30,000.00	7.500.00	7.500.00	7.500.00	7.500.00	7.500.00	67,500.00
2.	Training on Identification of Pests and Integrated Pest Management	Farmers Associations and WUAs	This will be coordinated by staff of RBDAs who have been trained in module 1. Information and knowledge will be disseminated. They will undertake training of selected WUA and farmers' association heads, who will in turn be expected to pass training down the line.	Annually. Such training should be targeted to come up just before the beginning of the major cropping season, so that information passed across will remain fresh in the minds of trainees, into the planting season. The first year will be a 2-day event and subsequent years will be one day.	15,000.00	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00	40,000.00
3.	Training on First aid, Personal Protective Equipment	Farmers and WUAs who have to use pesticides for pest management. Aim	RBAs, working in conjunction with SPIN NPCU and other organizations such as	This will take place 3 times in the course of the project, the first at the beginning (first	5,000.00	-	5,000.00		5,000.00	-	15,000.00

S/N	TITLE OF TRAINING MODULE	TARGET AUDIENCE	RESPONSIBILITY	FREQUENCY	BUDGET (US$)						
					Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Total
	(PPE) and emergency response for pesticide poisoning	would be to teach them best practices on pesticide handling and first aid activities in case of poisoning	the Red Cross, etc.	year), second in the third year and the last in the fifth year.							
4.	Training on Monitoring and Evaluation	RBDA staff and Heads of WUAs	The SPIN project will work with the RBDAs to undertake training of farmers on monitoring and evaluation. Such training will enable them to evaluate the efficacy or otherwise of their pest management activities, and highlight areas where there are deficiencies, so that corrective actions can be taken appropriately.	This will happen at the beginning of the project, the third year, and the fifth year. The training at the fifth year will also focus on key issues relating to project close-out monitoring and evaluation For this project, there will be a total of 3 training sessions. Each training will be for 2 days	5,000.00		5,000.00		5,000.00		15,000.00
				Total							**137,500.00**

Table 7.2: Overview of Actors and Partners in Institutional Arrangements

Actors	Partners
The actors will collaborate with Federal Pest Control Services (FPCS) and National Coordinating Desk (NCD) of the Federal Ministry of Agriculture and Rural Development (FMARD) to: • Contribute field staff to be trained as IPM Trainers. • Organize its members into farmer groups for training and promotion of IPM practices. • Facilitate extension and farmer training • Prepare and produce field guides and other relevant IPM information materials • Provide policy guidance/oversight for implementation of the PMP • Monitor, supervise and coordinate IPM activities • Document user compliance on pesticide use Examples of actors: 1. FPCS 2. NCD 3. PCU, Research Institutes and Universities 4. Federal Ministry of Health (FMH) 5. National Agency for Food and Drug Administration and Control (NAFDAC) 6 Water users Association (as the principal beneficiaries) 7. State Commercial Agriculture Development Offices 8. Federal Ministry of Health (for disease vector control) 9. Federal Ministry of Environment, 10. Federal Ministry of Agriculture and Rural Development (for environmental management) 10. NAERLS (for materials production)	The partners will be IPM experts who: • Serve as technical reviewers for sub-projects • Provide technical support in pest and natural enemy identification • Assist to organize study tours and networking with international IPM groups. • Provide expertise in planning, training and field implementation of IPM Examples of partners: 1. The CGIAR System wide Program on Integrated Pest Management (SP-IPM) which is dedicated to breaking isolation barriers to the full realization of IPM research results 2. The Global IPM Facility which assists interested Governments and NGOs to initiate, develop and expand IPM programmes mostly through farmer field school training. 3. Research institutes/universities (e.g., IAR/ABU for research support) and thematic networks (e.g., the Nigeria node of the West Africa Network for Taxonomy, (WAFRINET-Nigeria, supported by IITA biodiversity center for pest and natural enemy identification and assessment) 4. NGOs

7.4 Coordination Responsibilities

Project Coordination Unit (PCU) responsibilities are to standardize training needs assessment across sites; and organize national workshops to develop participatory learning modules. The primary responsibility will fall on the Project Desk Officer, but will be supervised by the Project Coordinator in the PCU.

RBA and WUAs responsibilities are to liaise with SPIN project NPCU to plan training implementation; provide technical support such as in preparing and delivering specific training materials, and evaluating resource materials; identify and select suitable local training resource persons and materials; and prepare training progress reports. RBDAs will collaborate with WUAs to identify and organize farmers groups for training; prepare, organize and supervise training implementation plan; verify reports of persisting pest problems and farmers training needs; monitor performance of farmer trainers and post-training assignments; and prepare training progress reports.

7.5 Monitoring and Evaluation

The following indicators will be incorporated into a participatory monitoring and evaluation plan.

Capacity to inform: Types and number of participatory learning modules (PLM) delivered; category and number of extension agents and farmers trained and reached with each PLM; category and number of participants reached beyond baseline figures; practical skills/techniques most frequently demanded by extension agents and farmers; and crop/livestock management practices preferred by farmers.

Capacity to motivate: Category and number of farmers who correctly apply the skills they had learnt; new management practices adopted most by farmers; category and number of other farmers trained by project trained farmers; types of farmer-innovations implemented**;** level of pest damage and losses**;** rate of adoption of IPM practices; impact of the adoption of IPM on production performance of Commercial farmers

Major benefits: Increase in crop/livestock production; increase in farm revenue; social benefits: e.g., improvement in the health status of farmers; level of reduction of pesticide purchase and use; and number of WUA families using preventive mechanisms against diseases.

Framework for Monitoring and Evaluation

The success of this PMP is hinged on several factors, including regular monitoring and evaluation. Therefore, a framework for monitoring and evaluation is critical. To this end, annual monitoring and evaluation visits will be conducted to selected areas within the project coverage. The aim of such visits shall be to examine the implementation of the PMP and the successes being recorded. Measurement indices will include: reduction in pest populations and damages caused; corresponding increase in agricultural yields; familiarity of pesticide users with all safety processes required.

A compliance checklist for each site using the pesticides and other agro-chemicals is presented in Attachment Six. The checklist shall be filled out as part of regular monitoring process and reported to the PCU Environmental Officer. In case of non-compliance, the site may require additional training and/or equipment.

An annual budget has been provided for monitoring and evaluation and this is indicated in Item 4 of Table 7.3.

7.6 Sustainability of Processes and Results

Short-term technical study visits (to other West African countries with proven experience in IPM development and implementation) for hands-on laboratory and field training, and farmer participatory learning will help to create favourable conditions for continuity of IPM processes and results. The tour will involve both the regulatory authorities (e.g., FPCS and PCU) and members of the RBAs and WUAs. Scientific information, adapted into user-friendly format will strengthen training and extension delivery, and increase IPM literacy in communities. Strategic alliances with international IPM groups will strengthen national capacities to integrate new IPM options in crop and livestock production. Farmer-educational activities will be central to the exit strategy which will feature increased roles and

responsibilities of committed national and local communities to take primary responsibilities in the development of action plans and expertise exchange for IPM development and promotion.

To support these gains, the project will seek the assistance of FAO Regional Crop Protection office, FAORAFA Accra and the Global IPM Facility to develop/update a national IPM policy including national legislations governing the manufacture, importation, distribution and use of banned pesticides. Additionally a national IPM advisory and oversight committee (multi-stakeholder composition) will be established to promote national and local compliance with international conventions and guidelines on pesticides, and encourage the further development of IPM.

7.7 WORKPLAN AND BUDGET

Annual work plan will be developed in consultation with the FCA in line with their respective LDP. Estimates of budgetary requirements for the various capacity building and other services are presented in Table 7.3. It must be noted that waste management issues, especially as they relate to empty pesticides containers, disused PPEs such as hand gloves, face masks, coveralls, etc. must be covered by the advisory services that will be provided as part of the implementation of this PMP. This is covered in Item 2.3 on Table 7.3 below. Such advisory services will include sensitization and enlightenment on the handling of these various hazardous materials. As much as possible, such training shall use the material provided as Attachment 4 of this PMP, which focuses on General Information on Pesticide Transportation, Storage and Handling of Wastes and First Aid in Case of Poisoning.

The estimates in the table cover the total period of 6years for which the SPIN project is estimated to run.

Table 7.3: Overview of Budgetary Requirements for Capacity Building on the SPIN Project for Six Years

Line item	BUDGET (US$)						
	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6	Total
1. Capacity building							
Capacity building training on IPM (details in Table 7.1)	30,000.00	7.500.00	7.500.00	7.500.00	7.500.00	7.500.00	67,500.00
Study and coordination visits by SPIN NPCU	10,000.00	7,500.00	7,500.00	7,500.00	7,500.00	7,500.00	47,500.00
Sub-total	*40,000.00*	*15,000.00*	*15,000.00*	*15,000.00*	*15,000.00*	*15,000.00*	***115,000.00***
2. Advisory services							
IPM problem diagnosis	10,000.00	8,000.00	8,000.00	8,000.00	8,000.00	8,000.00	**50,000.00**
Field guides/IPM materials	5,000.00	3,000.00	3,000.00	3,000.00	3,000.00	3,000.00	**20,000.00**
Public awareness/sensitization campaigns	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00	**30,000.00**
Pest/vector surveillance	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00	**30,000.00**
Sub-total	*25,000.00*	*21,000.00*	*21,000.00*	*21,000.00*	*21,000.00*	*21,000.00*	***135,000.00***
3. Environmental management							
Equipment; bed nets; chemicals, neem	5000.00	10,000.00	**10,000.00**	5000.00	5000.00	5000.00	**40,000.00**
Occupational health and safety materials and equipment (PPE) (nose masks, mouth guards, coveralls, boots, first aid kits, etc.)	10,000.00	10,000.00	5000.00	5000.00	5,000.00	5,000.00	**40,000.00**
Support to IPM research and development	10,000.00	10,000.00	**10,000.00**	10,000.00	10,000.00	10,000.00	**60,000.00**
Sub-total	*25,000.00*	*30,000.00*	*25,000.00*	*20,000.00*	*20,000.00*	*20,000.00*	***140,000.00***
4. Project management							
PMP coordination	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	**30,000.00**
Monitoring and evaluation	5000.00	5000.00	5000.00	5000.00	5000.00	5000.00	**30,000.00**
Sub-total	*10,000.00*	*10,000.00*	*10,000.00*	*10,000.00*	*10,000.00*	*10,000.00*	***60,000.00***
Grand total	100,000.00	76,000.00	81,000.00	66,000.00	66,000.00	66,000.00	**450,000.00**

8.0 DISCLOSURE REQUIREMENTS

The sharing of information is essential for sustainable development. It stimulates public debate on, and broadens understanding of development issues, and enhances transparency and accountability in the development process. It also strengthens public support for efforts to improve the lives of people in developing countries, facilitates collaboration among the many parties involved in development, and improves the quality of assistance projects and programs.

On April 3, 2013 the World Bank's Board approved revisions to the Policy on Access to Information. The new World Bank Policy on Access to Information, effective July 1, 2013, supersedes the World Bank Policy on Access to Information (AI) dated July 1, 2010. The changes to the AI policy are clearly aligned with the World Bank Group's commitment to greater transparency, accountability and access to information.

The AI Policy endeavors to strike an appropriate balance. It is based on the following five principles:

1. Maximizing access to information;
2. Setting out a clear list of exceptions;
3. Safeguarding the deliberative process;
4. Providing clear procedures for making information available;
5. Recognizing requesters' right to an appeals process.

This PMP has been prepared in consultation with the TRIMING NPCU, Federal and State MDAs, CBOs/NGOs, RBDAs, WUA and other relevant stakeholders. The PMP is expected to be disclosed publicly as a separate and stand-alone document for review and comment through the Federal/State Ministries of Environment at designated locations at Federal and in the participating States, and in World Bank Info-Shop. Individual ESIAs/ESMPs will be prepared for each sub-project based on the guidelines and procedures highlighted in the ESMF, and, on a needs basis, other documents such as standalone PMPs, Biodiversity Management Plans, etc and would be disclosed in like manner.

9.0 CONCLUSION

This document has presented an overview of the planned SPIN project, including summaries of the various components. It has examined the regulatory framework for pesticide management in Nigeria and the baseline pest situation in the project area covered by the SPIN project. It has also identified possible impacts of pest management and pesticide use in the project area and recommended mitigation measures for negative impacts.

Capacity building and institutional strengthening needs have been identified and budgeted for in this document. Given the foregoing therefore, and our knowledge of the project area, mostly obtained during field visits for the purpose of this project, it is obvious that the SPIN project is one that can substantially improve agriculture and sustainable power in Nigeria. Apart from this, it will also ensure the optimal utilization of irrigation facilities on which huge sums of money have been invested but that are currently either wasting away or substantially under-performing.

It is therefore expected that with proper implementation, the SPIN project can contribute substantially towards:

i. Improving agricultural productivity in Nigeria;
ii. Alleviating unemployment;
iii. Improving renewable power generation and utilization in Nigeria
iv. Improve capacity and facilities utilization in various parts of Nigeria;
v. Enlighten and strengthen local farmers on water use and IPM;
vi. Strengthen capacity in agriculture and pest management.

ATTACHMENTS

ATTACHMENT ONE: LIST OF BANNED PESTICIDES

VETERINARY MEDICINE AND ALLIED PRODUCTS DIRECTORATE (VMAP)
PLOT 1, 3rd FLOOR ISOLO INDUSTRIAL ESTATE, OSHODI-APAPA EXPRESS WAY ISOLO, LAGOS STATE.
vmap@nafdac.gov.ng, vmapnafdac@gmail.com

NATIONAL AGENCY FOR FOOD AND DRUG ADMINISTRATION AND CONTROL (NAFDAC)
LIST OF BANNED PESTICIDE IN NIGERIA

S/N	PESTICIDE	CATEGORY	STATUS
1	ALDRIN	INSECTICIDE	BANNED
2	BINAPACRYL	FUNGICIDE	BANNED
3	CAPTAFOL	FUNGICIDE	BANNED
4	CHLORDANE	INSECTICIDE	BANNED
5	CHLORDIMEFORM	INSECTICIDE	BANNED
6	DDT	INSECTICIDE	BANNED
7	DIELDRIN	INSECTICIDE	BANNED
8	DINOSEB & DINOSEB SALTS	HERBICIDE	BANNED
9	HEPTACHLOR	HERBICIDE	BANNED
10	LINDANE	INSECTICIDE	BANNED
11	ETHYLENE DICHLORIDE	FUMIGANTS	BANNED
12	PARATHION	INSECTICIDE	BANNED
13	METHYL PARATHION	INSECTICIDE	BANNED
14	PHOSPHAMIDON	INSECTICIDE	BANNED
15	MONOCROPTOPHOS	INSECTICIDE	BANNED
16	METHAMIDOPHOS	INSECTICIDE	BANNED
17	CHLOROBENZILATE	INSECTICIDE	BANNED
18	TOXAPHENE	INSECTICIDE	BANNED
19	PENTACHLOROPHENOL	HERBICIDE, INSECTICIDE	BANNED
20	ETHYLENE OXIDE	FUMIGANT, DISINFECTANT	BANNED
21	HCF (MIXED ISOMERS)/BHC	INSECTICIDE	BANNED
22	EDB(1,2-DIBROMOETHENE)	FUMIGANT	BANNED
23	2,4,5 TRICHLOROPHENOXY ACETIC ACID	HERBICIDE	BANNED
24	ENDRIN	INSECTICIDE	BANNED
24	MIREX	INSECTICIDE	BANNED
26	ETHYLENE DIBROMIDE	FUMIGANT	BANNED
27	HEXACHLOROBENZENE	FUNGICIDE	BANNED
28	ENDOSULPHAN	ACARICIDE, INSECTICIDE	BANNED
29	DELTA HCH	AGRICUTURAL INSECTICIDE	BANNED
30	FLOURACETAMIDE	RODENTICIDE	BANNED

ATTACHMENT TWO: LIST OF PESTICIDES APPROVED BY NAFDAC

ATTACHMENT THREE: LIST OF PESTICIDES COMMONLY USED IN NIGERIA AND THEIR COMMON/TRADE NAMES

Table: Common Names of Pesticides in Nigeria and their uses

Common name	Trade names of pesticide, as sold in Nigeria	Uses
Paraquat	Gramoxone, Bret-P, Paraforce, Weedoff, Weedcrusher, Dragon, Dizmaxone, Lasher, Miazone, Weedex, Ravage, etc.	General weed control (by contact) in all crops
Atrazine	Atrazine, Delzine, Atrataf, Atraforce, Xtrazine,	For the control of grass weeds in cereals
Butachlor	Butachlor, Butacrop, Butastar, Butacot, Butaclear, Risene, Teer, Butaforce, Cleweed	For the control of broadleaf and grass weeds in rice, and some legume crops
Propanil	Propanil, Propacare, Propan, Rhonil, Orizo, Propaforce, etc.	For post- emergence weed control in rice
Pendimenthalin	Stomp, Pendilin	For pre-emergence weed control in rice, maize and some legume crops
Oxidiaxone	Ronstar, Riceforce, Unicrown	For pre-emergence weed control in rice
Alachlor	Lasso, Alachlor, etc.	For pre-emergence weed control in maize and some legume crops
Glyphosate	Roundup, Glycel, Wipeout, Clearweed, Bushfire, Forceup, Sarosate, Rhonasate, Delsate, Glyphosate, Touchdown forte, etc.	Systemic herbicide for general weed control before land preparation
2,4-D Amine	Aminoforce, Delmin-forte, 2,4-D-Amine, Select, etc.	For pre- and post-emergence control of broadleaf weeds
Lamdacyhalothrin	Karate, Laraforce, Attack, Karto, Zap, etc.	Systemic insecticide for many crops
Cypermethrin	Cypermethrin, Suraksha, Superthrin, Best, Cymbush, Cypercot, etc.	Contact insecticide for many crops
Dichlovos	Nuvan, Pestoff, Rhonclov, Dash, Smash, Delvap, Wonder, Shooter, Nopest, Clepest, DDforce, VIP, etc.	Contact insecticide for the control of insects in storage and in houses. It is combined with Actellic and used to protect grains in storage.
Mancozeb	Z-force, Hi-shield, Mancozeb, Mycotrin, etc.	Contact fungicide for disease control in many crops

Source:

Consultations (February, 2024) and IITA, 2008.

ATTACHMENT FOUR: GENERAL INFORMATION ON PESTICIDE TRANSPORTATION, STORAGE AND HANDLING OF WASTES AND FIRST AID IN CASE OF POISONING

GENERAL INFORMATION ON PESTICIDE HANDLING AND SAFETY PRECAUTIONS

1. Precautions when transporting pesticides

When transporting pesticides, do not load pesticides into a vehicle carrying passengers, animals, foodstuff and/or animals feeds. Do not place heavy objects or sharp or protruding materials such as nails on or near pesticides. Load and unload pesticides with care and always clean the vehicle before transporting other items.

2. Precautions when storing pesticides

Do not store pesticides with foodstuff or animal feeds. Never store pesticides in living rooms, kitchen, animal house or toilets. Do not buy pesticides too early in the growing season, to avoid storing pesticides for a long period. Always keep pesticides stored under lock and key.

Keep herbicides separate from other types of pesticides. Check any pesticides you are storing regularly for sign of damage or leakages. Always keep pesticides in their original containers that have manufacturers' labels.

Keep all pesticides away from children and other members of the family. Keep pesticides away from source of drinking water, wells, and streams. Burn or bury split or unsalvageable material and used packages at designated sites away from people.

3. When measuring and mixing pesticides

Always wear protective clothing such as overalls, boots, gloves, respirator, and goggles. Ensure proper ventilation and avoid contamination of skin and splashes. Do not mix or measure herbicides and pesticides at home, but on the farm site where the spraying will be done. Keep children and animals far away from mixing area. Stand opposite to wind direction and handle dusts and wettable powders carefully. Use buckets and sticks for mixing (do not use your hands) and use funnels to pour liquids into sprayers to avoid spillage and splashes.

4. When spraying and after spraying pesticides

Do not apply pesticides without adequate training. Read the manufacturers' labels on the pesticide containers before spraying pesticides. Wear protective clothing such as overalls, boots, gloves, respirator, and goggles before commencement of spraying. Avoid spraying mist and drift as much as possible. Pesticides should not be applied when the wind is blowing towards an adjoining susceptible crop or a crop in a vulnerable stage of growth. The wind should be blowing away from the susceptible crop or the field should not be treated until the wind is still. You can observe the wind direction by raising dust or a piece of cloth, and then spray away from the wind.

Do not eat, drink or smoke while operating a sprayer on the farm. Hold the sprayer nozzle 50 cm above ground or at knee height when spraying. Take care not to spray the same area twice and not to leave gaps when spraying. Do not allow children, animals, and non-workers to enter the sprayed area for at least 24 hours after spraying.

Do not eat, drink or smoke with contaminated hands during or after spraying. Wash your hands thoroughly with soap after handling pesticides and keep all remaining pesticides, baits, and dressed seeds away from foodstuff and children. Close all packages securely after use to prevent leaks or contamination and store safely. Always keep pesticides in their original containers. Wash your equipment three times with soap and water and then rinse with water properly after use. Wash your body and working clothes properly with clean water and soap after spraying. Drink sour lemon or milk or palm oil and sit in an open well-ventilated place for at least 1 hour after spraying to reduce the immediate effect of any pesticide inhaled accidentally. Contract sprayers are advised to have medical check-ups at monthly intervals.

5. Types of sprayers and their maintenance

Most sprayers have nozzles, a container (tank) to hold the spray, and a pump to force the spray through the nozzles. Other accessories usually found in sprayers are filters or strainers, pressure gauges and regulators, a shut-off valve, and connecting hoses. The nozzle is probably the most important part of the sprayer. Other parts exist only to help the nozzles
operate properly. Nozzles determine uniformity of spray application, the rate of application, and the spray drift. Most commonly used nozzles are flooding or polijet nozzles (green, yellow, and red) for spraying herbicides and hollow cone nozzles for spraying insecticides. These are best used for knapsack sprayers.

Some sprayers are hand-operated and others are power-driven models with motors. All hand-operated sprayers are suitable for small plot work and generally have tank capacity of 1 to 20 liters. There are six main types of sprayers that can be used for spraying pesticides. These
include:

- Lancet,
- Falcon,
- Knapsack,
- Motorized mist blower,
- Ultra Low
- Volume (ULV), and
- Electrodyne sprayers.

Knapsack sprayers are the most commonly used in the field and they are easy to use as they have an adjustable pressure gauge inside the tank. Turn the pressure gauge to L or low when you intend to spray herbicides or H or high when you intend to spray insecticides or fungicides.

The tank capacity can range from 15 to 20 liters and can be used for spraying fairly large areas. The CP 15 or Dami 16 can hold 15 liters, while CP 3 or Jacto has a 20-liter tank capacity. Note that the tank capacity determines the volume of pesticides that makes up a load.

Maintenance of sprayers

The inside and exposed parts of the sprayer should be thoroughly cleaned after each use and before storage. As a rule, first wash the tank with soap and water and then rinse with water. Wettable powders and solutions are easily cleaned from sprayers by rinsing thoroughly with water. Clean the sprayer as follows:

- Fill the tank half full with clean water and shake vigorously. Flush out the cleaning water through the nozzle by operating the sprayer;
- Repeat the procedure above;
- Remove nozzle tips and screens. Clean them in kerosene or detergent solution using a soft brush;
- Do not use a knife, wire, or any hard materials to clean the nozzle tips and never blow into them with your mouth;
- Fill the tank again to about half full with water and add a small amount of household soap;
- Operate the pump to circulate the soap solution through the sprayer, and then flush it out through the sprayer nozzle;
- At the end of the spraying season, follow the cleaning operations listed above and finally rinse the sprayer with a light oil to protect the metal and rubber parts from corrosion;
- Remove nozzle tips, strainers and screens and apply a coating of light oil before storage.

6. Disposal of empty containers and Other Waste from Pesticide Use

Empty pesticide containers should be safely disposed off immediately in a way that will not cause hazard to man, animals, and valuable plants. Dispose of containers by burning or burying them. Do not leave empty paper containers lying about as they may be blown away and end up in the wrong location. Burn empty paper packages and cartons unless there is an instruction not to do so on the package. Bury the ashes. Pesticides should not be burnt except in incinerators designed for this purpose. Fumes from burning pesticides could be poisonous, so avoid inhaling them. Punch holes in pesticide containers, flatten them and then bury them deep in the ground in locations where the possibility of contaminating a water supply is minimal. Glass containers should be broken and then buried. It is dangerous to use pesticide containers for other purposes, so you should always destroy them.

Other wastes such as disused PPEs (hand gloves, face masks, coveralls, etc.) that have been used in the process of applying pesticides are equally hazardous and must therefore be handled with care. To this end, coveralls, and fabric materials must be thoroughly washed before re-use and/or storage, while disposable materials such as masks, gloves, etc. should be handled in a manner similar to that prescribed for empty containers and packaging materials.

7. Signs and symptoms of pesticide poisoning

Pesticide poisoning can occur in many different ways due to the types of pesticides and different routes of absorption. Other infections or conditions caused by excess heat can mimic pesticide poisoning symptoms. Seek medical attention immediately when you notice any of the following symptoms:

- General: extreme weakness and fatigue;
- Skin: irritation, burning, excessive sweating or discoloration;
- Eyes: itching, burning, watering, difficult or blurred vision, narrowed or widened pupils;
- Digestive system: burning in mouth and throat, extreme salivation, nausea, vomiting, abdominal pain, and diarrhea;
- Nervous system: reaction such as headaches, dizziness, confusion, restlessness, muscle twitching, staggering gait, blurred speech, fits and unconsciousness, sometimes death.

8. First aid for victims of poisoning

- Remain calm to avoid contamination;
- Maintain the breathing of the patient through artificial respiration if unconscious;
- Remove the patient from the scene of the contamination;
- Remove any contaminated clothing immediately;
- Wash all the affected parts of the body with clean water or wipe with a piece of cloth if available, or even with paper or leaves;
- Convey the patient and the pesticide container to the nearest hospital or clinic for medical attention. (The pesticide container can help medical staff identify the poisoning and the appropriate treatment).

ATTACHMENT FIVE: METHODOLOGY FOR DEVELOPMENT OF PMP

The PMP development methodology

This Pest Management Plan (PMP) was prepared primarily by reviewing and updating existing PMPs for various projects, including the Fadama II, the Commercial Agriculture Development Project (CADP), and the Transforming Irrigation Management in Nigeria (TRIMING) Projects.

In addition, consultation discussions were held with experts in Pest Control from the University of Ibadan and the IITA, Ibadan. Consultations with various stakeholders on-site in some selected schemes within the project area were held, and from these, information was obtained that was used to update the pest situation in the area.

Literature information from the Word Bank and Federal Ministry of Water Resources (FMWR) were also reviewed and useful information from there incorporated into this PMP.

ATTACHMENT SIX: PESTICIDE HANDLING COMPLIANCE CHECKLIST

CHECKLIST FOR PESTICIDE HANDLING COMPLIANCE

YES	NO	Questions
☐	☐	1.1 Is there a person who has received training in Pesticide Handling charge of pesticide operations?
☐	☐	1.2 Is the Pesticide Safety Information posted and available to employees?
☐	☐	1.3 Are the pesticides which may be used by the project listed on the record?
☐	☐	1.4 Is the date of training shown on the record?
☐	☐	1.5 Are training records kept for 1 year?
☐	☐	1.6 Are all employees trained prior to using pesticides?
☐	☐	1.7 Is there a written program for worker safety training?
☐	☐	1.8 Are the following topics covered in training?
☐	☐	a) Potential and long term health hazards
☐	☐	b) Safety procedures
☐	☐	c) Use of clothing and personal protective equipment
☐	☐	d) Use, care, maintenance, and limitations or respiratory equipment
☐	☐	e) Laws, regulations, and label requirements
☐	☐	f) Need for immediate decontamination of skin and eyes
☐	☐	g) Common pesticide poisoning symptoms
☐	☐	1.9 Is the name, address, and phone number of the emergency care facility posted in a manner accessible to workers?