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REPUBLIC OF MALAWI

Ministry of Agriculture, Irrigation and Water Development

Agricultural Sector Wide Approach Support Project II (ASWAp-SP II)

PEST MANAGEMENT PLAN

DRAFT REPORT

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CONTENTS

ACRONMYS AND ABBREVIATIONS

ADD	Agricultural Development Division
ADMARC	Agriculture Development and Marketing Corporation
AEDO	Agriculture Extension Development Officer
AEZ	Agricultural Ecological Zones
BP	Bank Policy
DDC	District Development Committee
DEC	District Executive Committee
DAES	Department of Agricultural Extension Services
DADO	District Agriculture Development Officer
DARS	Department of Agricultural Research
DEA	Director of Environmental Affairs
DHO	District Health Officer
EAD	Environmental Affairs Department
EDO	Environmental District Officer
EIA	Environmental Impact Assessment
EMC	Executive Management Committee
EMP	Environmental management plan
EPA	Extension Planning Area
ESIA	Environmental and Social Impact Assessment
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
GMO	Genetically Modified Organisms
GoM	Government of Malawi
IGA	Income Generating Activities
IPM	Integrated Pest Management
IPMP	Integrated Pest Management Plan
IPPC	International Plant Protection Convention
IRLADP	Irrigation, Rural Livelihoods and Agricultural Development Project
ISP	Input Subsidy Program
LGB	Large Grain Borer
LRCO	Land Resources Conservation Officer
MAWTCO	Malawi Agricultural Warehousing and Trading Company
MBS	Malawi Bureau of Standards
MGDS	Malawi Growth and Development Strategy
MoAIWD	Ministry of Agriculture, Irrigation and Water Development
MoLGRD	Ministry of Local Government and Rural Development
MPRS	Malawi Poverty and Reduction Strategy
MSV	Maize Streak Virus
NEAP	National Environmental Action Plan
OIE	Office International Epizootie (World Animal Health Organization)
OP	Operational Policy
OPC	Office of the President and Cabinet

PCB	Pesticide Control Board
SADC	Southern African Development committee
SFFRFM	Smallholder Farmers' Fertilizer Revolving Fund of Malawi
SWG	Sector Working Group
TCE	Technical Committee on the Environment
TWG	Technical Working Group
WB	World Bank
ASWAp-SP II	Agricultural Sector wide Approach Project II
BBTV	Banana Bunchy Top Virus Disease

EXECUTIVE SUMMARY

Introduction

The Multi Donor Trust Fund through the World Bank will support the Government of Malawi (GoM) in the implementation of the Malawi Agriculture Sector wide Approach Support Project II (ASWAp-SP II). The programme will be implemented by the Ministry of Agriculture, Irrigation and Water Development, Ministry of Lands Housing and Urban Development, Ministry of Transport and the Ministry of Trade, Industry and Tourism. The programme stems from MDTF ASWAp-SP which closed on 30 June 2017. The project achieved institutions capacity building, strengthening policy framework, responding to agricultural production and diversification challenges. Government of Malawi requested for a second phase of ASWAp-SP that will meet the objective of improving productivity, diversification and market access of selected agriculture commodities in the project targeted districts to support small holder farmers. The project would also contribute to the high level objectives of poverty reduction, improved gender and climate change mitigation and adaptation through supported Climate Smart Agriculture (CSA) initiatives. The project will achieve its objectives through the components below:

Component 1: Sustainable agricultural productivity and diversification

This component addresses constraints related to limited agricultural productivity and diversification which has been adversely affected by climate change, whereby limiting agricultural growth and food security. Key constraints include: (i) weak agricultural extension services, leading to low adoption of improved agricultural technologies, (ii) inadequate utilization of productive assets such as land and water – leading to unsustainable agricultural practices, (iii) limited access to finance, compounding to limited input use; (iv) soil erosion and low soil fertility, (v) pests and disease outbreak, and (vi) climate change. The broad areas under this project component include (i) Farm Inputs Subsidy Programme (FISP), in promoting access to improved maize, other cereals and legume seeds, (ii) crop diversification through strengthening seed systems (bananas, legumes, sorghum/millet, cassava and sweet potatoes), (iii) integrated soil fertility management, (iv) plant protection, pest and disease control, and (v) poultry production.

Sub-Component 1.1: Farm Input Subsidy Programme:

This sub-component will support (i) direct support to the seed component of the FISP as a vehicle to improve crop productivity and diversification - the seed component traditionally comprises of approximately 900,000 smallholder farmers annually, each provided with 5kg maize hybrid seeds (or approximately 8kg open pollinated varieties) and 2kg certified legume seeds. As part of the reforms, the Ministry announced that from 2017/18 agriculture season, the programme will be extended to other cereals like sorghum and rice, hence expanding crop diversification options; (ii) operations of the Logistics Unit, an independent entity responsible for farm family updating, beneficiary registry, input monitoring and verification of FISP payments, (iii) implementation of FISP reforms, aimed at improving efficiency and effectiveness of the programme, and (iv) independent monitoring/evaluation as well as improving coupon security and innovativeness, in line with the FISP reforms.

Sub-Component 1.2: Promotion of diversified crop production systems.

The project will support (i) micro propagation of clean banana planting materials, in response to the banana bunchy top virus (BBTV) disease and ensuring that smallholder farmers access clean banana planting materials, (ii) production of breeder and foundation legumes seeds (in response to demand), while ensuring that the legumes seed revolving fund that was established under previous project is functional to sustain future basic legume seed demands, (iii) production of improved breeder and foundation seeds for new varieties of sorghum/millet, while promoting demand and utilization by farmers and other sectors, (iv) farmers' access to clean planting materials for cassava and sweet potatoes (highly productive and drought resilient) through private sector decentralized multipliers, working closely with NGOs, plus additional support to conserve and promote genetic resources, in addition to promoting modern nutritious crop varieties, and (v) development and provision of agricultural extension and messages integrated in relation to delivering the above agricultural production systems.

Sub-Component 1.3: Integrated Soil Fertility Management.

The project will support (i) scaling up of climate smart agriculture practices among the smallholder farmers in order to enhance the resilience of agricultural production systems to climatic change shocks – these will include conservation agriculture, agroforestry and other integrated sustainable land and water management practices (such as improving soil fertility and combating erosion, reclamation of degraded landscapes and watershed management), (ii) support development of area specific fertilizer recommendations and other good agronomic practices based on soil analysis, ensuring dissemination of the messages and exploring to piloting the recommendations in specific districts, in line with findings from the soil maps.

Sub-Component 1.4: Pests/diseases and plant protection:

The project will respond to emerging pests and diseases that greatly affect agricultural production, in line with the value chains supported. Specific support will be provided in the following areas: (i) support awareness and surveillance of pests and disease outbreak (ii) procurement of required pesticides, in line with safeguards policies, (iii) support operations of plant clinics, while linking such efforts to the district agricultural extension service system, (iv) support knowledge sharing and learning, and (v) institutional support for pest control (plant protection directorate, pesticide control board, department of agricultural research services) to effectively carry out their mandates.

Sub-Component 1.5: Poultry production:

As part of promoting agricultural diversification and improving nutrition status of farmers, the project will support (i) hatcheries in government farm for production and distribution of 6 weeks Black Astralop chickens at cost recovery basis. Special support will be provided for the acquisition of solar equipment to allow continuous production of chicks in hatcheries that has been affected by load shedding, (ii) procurement of vaccination drugs/kits (e.g. new castle vaccines), while putting in place effective drug revolving fund mechanisms at community level, and (iii) promotion of nutrition education and awareness, particularly on the consumption of eggs at household level.

Component 2: Improvement of Rural Roads to enhance access to markets

This component will contribute towards market access to facilitate commercialization of agricultural production. Support will include rehabilitation of rural roads using labor-intensive methods and

upgrading works through the Low Volume Sealing Methods in 12 selected districts. This will be a continuation of similar interventions under the first ASWAp-SP in selected districts but now with emphasis on providing more income to the local communities through the rural road works and building capacity for contract management in the District Councils in order to provide proper environment for decentralization. This component will be implemented in complementarity with an EU project being implemented by the National Authorizing Officer Support Unit (NAO-SU) under the Rural Roads Infrastructure Programme, which is aiming at analysing capacity gaps in the 12 District Councils and providing them with capacity building in areas where they are lacking. Selection of district and roads will be done using criteria agreed between the Government and the Trust Fund Donors, targeting districts of good agricultural productivity where initiatives to increase agricultural production are evident.

Component 3: Institutional Development and Capacity building for Implementation of NAIP

The objective of this component is to continue building capacity in the Ministry of Agriculture for improved agricultural sector planning and investment management. This will consolidate the gains achieved so far through the implementation of the first ASWAp SP and scale up activities that had positive impact. Particularly, the project will continue to play a catalytic role in harmonizing government and donor investments in support of a medium-term investment strategy, the National Agriculture Investment Plan (NAIP). The ASWAp Secretariat through the ASWAP SP II will continue to provide support to the process of coordinating, strengthening the harmonized investment framework of the MoAIWD.

Sub-Component 3.1 Institutional Development, Capacity Building and Coordination:

The ASWAp Secretariat in MoAIWD still remain relevant and essential to strengthen the foundation for the harmonized investment strategy. The project will continue to support and strengthening the Secretariat to address the gaps identified during the implementation of the first ASWAp SP. The ASWAp SP II will also focus on improving the capacity of MoAIWD's staff in planning and alignment of the Ministry's budgeting to the NAIP framework. Further, the project will continue to provide support towards improving sector coordination through the Joint Sector Reviews (JSR), Agriculture Sector Working Group (ASWG), Technical working Groups (TWGs), and in monitoring and evaluation of public investments in the agricultural sector. The TWGs modalities will be reviewed to reflect the NAIP framework at the same time to make them more effective as discussion fora for the technical issues in the sector.

Sub-Component 3.2 Strengthening Agricultural Planning and Agricultural Statistics

This sub-component will provide support towards strengthening the capacity of Planning Department to enhance their ability for strategic planning and enhance monitoring and evaluation functions of the Ministry at all levels. Special attention will be on the development of the agricultural statistics systems and establish a repository where all data in the sector will be stored and retrieved easily. Specifically, the project will focus, on the implementation of the recommendations on crop estimation methodologies; development of agricultural statistics data bank; food security monitoring and reporting; capacity building in planning, annual work plan and budgeting and conducting studies that will inform policy formulation.

Sub-Component 3.3 Technical and Skills Development

Under the technical development and skills development sub-component, the Ministry developed a training plan following the completion of the CFA study. The CFA identified some technical and skills gaps and support will be provided towards training officers at Masters and Diploma levels at LUANAR and Natural Resources College respectively. In order to enhance fiduciary capacity in the Ministry, the project will also support capacity building in financial management and procurement at all levels. Further support will be provided to develop capacity in human resource planning and enable the Ministry to undertake human resource audits of MoAIWD that will help to mainstream gender and HIV/AIDS in the human resources plan.

Sub-Component 3.4 Activities under Retroactive Financing

This sub-component will facilitate the completion of a number of studies and contracts on-going from the previous ASWAp SP. There were consultancies that were in progress during the time the project was closing. However, most of the studies were very relevant to inform a number of reforms being initiated in the sector. These studies include; i) operationalization of the electronic permit system; ii) up-scaling identification of idle estates; iii) redesigning and development of the Land Information Management Systems (LIMS); iv) digitalization of land and deeds registry records; v) systematic regularization of land tenure; vi) the development of the agricultural extension strategy; and vii) functional review of ADMARC. The activities will be taken aboard through the retroactive financing arrangements (refer to the whole list activities under this arrangement in annex xxx).

Component 4: Project Coordination and Management

This component will finance activities of the Project Coordination Unit (PCU) that would be established in the Ministry of Agriculture, using the existing Ministry structures with some additional Technical Assistance to augment the Ministry's capacity. The PCU will oversee the implementation of project activities, monitor project progress, and coordinate between implementing entities, ensure sound fiduciary management including coordinating and accounting for the project funds utilization, ensure social and environmental safeguards compliance, and engage in communication and reporting. The main responsibility of the PCU will be to comply with the World Bank's fiduciary reporting requirements. This includes submitting a project implementation progress report on a semi-annual basis. In addition, the PCU would be responsible for implementing the calls for proposals, management of contracts and consultancies. A Project Steering Committee (PSC) will be established to provide overall guidance and will include the National Authorizing Officer (Chair); Ministry of Transport and Public Works; Ministry of Local Government and Rural Development; Ministry of Agriculture, Irrigation and Water Development; Road Fund Administration; Roads Authority; NCIC; Farmers Union of Malawi (FUM); EU Delegation to the Republic of Malawi; The World Bank Office in Malawi; TA Team (observer status).

Objectives of PMP

The activities proposed under ASWAP-SP II do trigger the World Bank safeguard policy on Pest Management (OP.4.09) and as such a standalone Pest Management Plan (PMP) has been prepared to meet the requirement. The objectives of the PMP include:

- Promote the use of environmentally friendly practices in pest control,
- Monitor pesticide use during implementation of ASWAP-SP II activities,

- Ensure that project activities comply with Malawi's laws and regulations on use of pesticides, and World Bank safeguard policy OP 4.09, and
- Provide an integrated pest management action plan which can be easily implemented in the event that pest management issues are encountered during implementation of proposed ASWAP-SP II activities.

Strategies to developing IPM

This PMP outlines steps towards the establishment of IPM approaches in the ASWAP-SP II project impact locations as follows:

1. Identification of the implementation team;
2. Deciding on scale of implementation;
3. Setting goals and measurable objectives for the IPM program;
4. Analysis of current housekeeping, maintenance and pest control practices;
5. Establishing a system for regular IPM inspections;
6. Defining treatment selection policy;
7. Establishing communication protocols;
8. Developing worker training plans and policies; and
9. Participatory monitoring and evaluation

This PMP investigates several alternatives, including biological treatment, mechanical and manual methods for pesticide control, which are recommended for use, with the ultimate objective of progressive reduction in the application of chemical pesticides, by replacing them with the more environmentally friendly options. The PMP discusses these opportunities and makes recommendations for implementation. For ASWAP-SP II a strong capacity building program will be required to manage and monitor the use of pesticides that may be used by farmers to scale up their production, especially in the areas which were affected by the Banana Bunchy Top Virus (BBTV) as well as in storage of produce and livestock handling as is outlined in activities under component 1 of the project.

CHAPTER ONE: INTRODUCTION AND BACKGROUND

1.1 OVERVIEW OF THE AGRICULTURE SECTOR

Agriculture remains the backbone of Malawi's economy. Agriculture accounts for 30% of Gross Domestic Product (GDP) and generates over 80% of national export earnings. Between 2005 and 2011, over 80% of the country's total exports were agricultural commodities, primarily tobacco, sugar and tea. Tobacco alone however, represents on average 60% of Malawi´s total exports. Agriculture employs 64.1% of the country's workforce comprising mostly the smallholder subsistence farmers. Agriculture also significantly contributes to the national and household food security and nutrition.

The agriculture sector in Malawi comprises of smallholder and the estate subsectors, with more than 99% of households involved in smallholder subsectors which contribute 80% of overall production and 70% of agricultural GDP. The smallholder cultivates 6.5 million ha of land which constitutes 85% of the total land. These farmers mostly grow food crops (including maize, rice, cassava, sweet potatoes, Irish potatoes, and legumes), some cash crops such as tea, tobacco, sugarcane, coffee and rear livestock such as cattle, goats, poultry, pigs, sheep and some non-conventional livestock like rabbits, doves, guinea fowls.

Agricultural production and productivity remains low. For example, maize yields are still far below yield potentials of between five and ten mt/ha (5-10 mt/ha), implying a yield gap of three to eight mt/ha. In the case of oilseeds, average yields are approximately one mt/ ha compared to the potential of about two mt/ha. Although Malawi has allocated considerable resources to agriculture over years, production and productivity of the sector has generally been below the country's potential and not sufficient to match growing domestic demand and export markets. This has been because of both climatic and systematic factors. Most of the areas of the country have been exposed to climatic shocks of floods and prolonged dry spells with the occurrences of the La Nina and El Nino phenomena. In addition, the systematic factors such as low adoption of agricultural technologies, low access to farm inputs, low mechanization, low technical labour skills, poor access to finance, weak linkages to markets, and limited irrigation among smallholder farmers have been responsible for the low productivity. Furthermore, land for agriculture in Malawi is becoming limited. Smallholder farmers cultivate small and fragmented land holdings of less than one hectare (on average 0.61 ha) and produce lower crop yields than those in the estate subsector.

The gender gaps in the agriculture sector in Malawi are as follows: a) On average, plots managed by women produce 25% less (in terms of gross value of output) per hectare than plots managed by men, b) Women use lower levels of agricultural inputs – including improved seeds, inorganic fertilizer and extension services – on their plots compared with men. This disparity accounts for more than 80% of Malawi's gender gap in agricultural productivity. Differences in the quality of these inputs and the returns they yield drive the remainder of the gap and c) The agricultural labour comprises of 70% of women, but only 32% of the land holders are women. To address these gaps, policy interventions aimed at alleviating the gender gap should focus on ensuring equal access to and use of agricultural inputs, and should take into consideration women's child-care responsibilities. The annual gender gap in Malawi is estimated to be $100 million. These estimates can help policy makers understand the scale of the gains

that could be made from designing better policies to improve women's ability to use agriculture to lift themselves and their families out of poverty and contribute to economic growth.

The climate of Malawi has been exposed to repetitive risks and shocks in the recent years which have necessitated increasing levels of humanitarian response. The country has experienced floods and prolonged dry spells in most of the areas because of the occurrences of the La Nina and El Nino phenomena. This has also resulted in having unstable and unreliable water balance, especially if population is factored into the climate change paradigm. Therefore, in order to break the cycles of disaster and food security for greater developmental impact, the government has launched the National Resilience Master Plan. The agriculture and food security strategy of the Plan will focus on among others, diversifying agricultural production.

1.2 PROJECT BACKGROUND

The Multi Donor Trust Fund through the World Bank will support the Government of Malawi (GoM) in the implementation of the Malawi Agriculture Sector wide Approach Support Project II (ASWAp-SP II). The programme will be implemented by the Ministry of Agriculture, Irrigation and Water Development, Ministry of Lands Housing and Urban Development and Ministry of Transport and the Ministry of Trade, Industry and Tourism. The programme stems from MDTF ASWAp-SP which closed on 30 June 2017. The project achieved institutions capacity building, strengthening policy framework, responding to agricultural production and diversification challenges. Government of Malawi is developing successor of ASWAp-SP that will meet the objective of improving productivity, diversification and market access of selected agriculture commodities in the project targeted districts to support small holder farmers. The project would also contribute to the high level objectives of poverty reduction, improved gender and climate change mitigation and adaptation through supported Climate Smart Agriculture (CSA) initiatives.

1.3. PROJECT IMPLEMENTING AGENCY

Project Coordination and Oversight Arrangements:

Consistent with the previous ASWAp SP , the project will be fully executed through the existing organizational structures of the responsible Government institutions in Malawi. It will be integrated into the official NAIP management structure as shown in Annex 1. The Executive Management Committee (EMC) will act as the steering committee for the ASWAp-SP II. The EMC includes Ministry of Agriculture (chaired by Principal Secretary or designate), Ministry of Lands, Ministry of Transport, Ministry of Finance and Ministry of Local Government. The EMC will have overall strategic oversight of the project. The MoAIWD will be responsible for the overall coordination of the project. As in the previous ASWAp SP I, the Project Facilitation Team will be fully embedded within the Ministry of Agriculture and will be led by a government official, supported by technical assistants as follows: Finance Management Specialist (2), Procurement Specialist (2), M&E Specialist (1), Project Coordination Assistant (1), Communication Specialist (1), Documentation Officer (1) Environmental and social safeguards specialist (1) and Justification Assistants (6). Final approval of the annual work plans and budgets will be made by the Trust Fund Management Committee, submitted by World Bank as Trust Fund Administrator.

Project Implementation Arrangements: Implementation responsibility will lie with the line Ministries in charge of their respective sectors. On the ground, the project will support Agricultural Development Divisions (ADDs) in strengthening their coordination efforts whilst also supporting the district councils in strengthening their oversight and implementation. The implementation of the roads component will remain under the responsibility of Ministry of Transport and Public Works (MoTPW), who will be

responsible for the provision of policy direction, overall component/sub-project coordination and liaison with MoAIWD related to the road component and oversight of the executing agencies. In accordance with the institutional framework for the sector, the Ministry of Transport and Public Works delegates its powers for the management of the road network to the Roads Authority (RA) and Ministry of Local Government and Rural Development (MLGRD) through the Local Assemblies (LAs). The road works will be carried out through local based methods, with the aim of creating jobs to the communities, while professional supervision contractor will be engaged, including areas that require professional works.

31. Fiduciary Arrangements: The project will be supported by an FM Specialist and an FM assistant (consultants) at national level. Based on fiduciary lessons from ASWAp SP , the use of justification assistants in the ***6 ADDs*** assisted in financial management and control of funds that goes to the districts. A similar approach will be used where funding flow will be made from national level up to the ADD level only, and activities for districts supported based on proper financial documentation. The recruited fiduciary staff will work closely with the relevant staff in the Ministry of Agriculture as part of capacity development.

32. Procurement Arrangement: The project will be implemented by Ministry of Agriculture, Irrigation and Water Development and the Road Authority for road components. Ministry of Agriculture, Irrigation and Water Development will have a dedicated project facilitation team which will be responsible for coordination of all activities except those of the road component. Both Ministry of Agriculture, Irrigation and Water Development and Road Authority have Internal Procurement Committees which will provide procurement oversight functions. The project facilitation team in the Ministry as well as Road Authority have requisite procurement capacity to implement the project as both have undertaken implementation under ASWAP- SP 1. For the road component, the RA will be sending procurement requests directly to the Bank but with a copy to the Procurement Specialist in MoAIWD for information and consolidation.
The facilitation team in the Ministry will include a Project Coordinator appointed by the Ministry, a Financial Management Specialist (2), Procurement Specialist (2), M&E Specialist (1) Project Coordination Assistant (1), Documentation Officer (1) Environmental and Social Safeguards Specialist (1) and Communication Specialist (1). On the other, the team in Road Authority will include a Coordinator provided by the Road Authority, four individual consultant engineers and a Project Accountant for the Road Fund Administration.

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1.4 PROJECT COST ESTIMATES

The total project cost is approximately US$50 million. The project financing plan is as provided in Table 1.1.

Table 1.1 ASWAP-SP II Components

Project Components	Project Cost	Trust Funds	Counterpart Funding
1 Sustainable Agriculture Productivity and Diversification			
2 Improvement of Rural Roads to Enhance Access to Markets			
3 Institutional Development and Capacity building for Implementation of NAIP			
4 Project Coordination and Management			
Total Costs			
Total project Costs			
Physical Contingencies			
Price Contingencies			
Front End Fees			
Total Financing Required			

1.5 INTEGRATED PEST MANAGEMENT

Definitions have been fronted over the years to describe Integrated Pest Management (IPM). Food and Agricultural Organization (FAO) defined IPM as the careful condition of all available pest control techniques and subsequent integration of appropriate measures that discourage the development of pest populations and keep pesticides and other interventions to levels that are economically justified and reduce or minimize risks to human and animal health and/or the environment (FAO, 2014).

Key elements of an IPM program are:

(i) Use of available, suitable, and compatible methods which includes resistant varieties/species, cultural methods (planting time, intercropping and crop rotation); biological control, safe pesticides etc. to maintain pests below levels that cause economic damage and loss;

(ii) Conservation of the ecosystem to enhance and support natural enemies and pollinators;

(iii) Integrating the pest management strategies in the farming system; and (iv) Pests crop and livestock loss assessments

The following are key preconditions for an IPM approach:

(a) Understanding of the ecological relationships within a farming system (crop, livestock, plant, pests organisms and factors influencing their development;

(b) Understanding of economic factors within a production system (infestation: loss ratio, market potential and product prices);

(c) Understanding of socio-cultural decision-making behaviour of the farmers (traditional preferences, risk behaviour);

(d) Involvement of the farmers in the analysis of the pest problems and their management; and

(e) Successive creation of a legislative and agricultural policy framework conducive to a sustainable IPM strategy (plant and animal quarantine legislation, pesticides legislation, pesticide registration, price policy)

1.6 JUSTIFICATION OF THE INTEGRATED PEST MANAGEMENT PLAN

It is anticipated that during the implementation of ASWAP-SP II activities, use of pesticides and agrochemicals will be the last resort after implementing other recommended pest control options to improve crop productivity, therefore an integrated pest management (IPM) that is centered on farmer needs and is sustainable, appropriate, environmentally safe and economic to use is needed. The requirement for adoption of IPM in farming systems is emphasized in the World Bank operational policy, WB OP 4.09, which supports safe, effective, and environmentally sound pest management aspects, such as the use of biological and environmental friendly control methods.

1.7 METHODOLOGY FOR PREPARATION OF THE IPMP

1.7.1 Consultations and Literature Review

The IPMP was prepared by a number of experts from Department of Crop Development, Department of Agricultural Research, Pesticide Control Board, Department of Land Resources Conservation and Environmental Affairs Department,. Appendix 1 gives details of the experts consulted in the development of the IPMP.

The consultations took place in Lilongwe at Ntchisi on 24th October 2017 targeting various staff from selected districts. Key informant and farmer interview questionnaires were specifically developed as data collection tools to gather the relevant primary data required for developing the IPMP. Structured, semi-structured and open-ended interviews with, farmer organizations were also conducted. Appendix 2 provides a list of people and institutions consulted for the ASWAP-SP II Project.

Literature review was undertaken to identify priority concerns on pests/diseases, the legislation; and use of pesticides as well as IPM initiatives currently being undertaken or envisaged. Various project, legislative, and policy documents, including the following were reviewed:

a) The World Bank Safeguard Policy on Pest Management, O.P. 4.09;

b) Environment Management Act of 1996;

c) FAO International code of Conduct on the Distribution and Use of Pesticides, 2002;

d) FAO International code of Conduct on the Pesticide Management, 2014

e) Integrated Pest Management Framework for Kenya Agricultural Productivity and Agribusiness Project (IPMF-KAPAP), 2009; and Livestock Development and Animal Health Project - Pest Management Plan (Volume III); and

f) Bulletin of the World Health Organization, 66 (5): 545-551 (1988)

g) OIE Terrestrial Animal Health Code 2016.

1.8 FORMAT OF THE INTEGRATED PEST MANAGEMENT PLAN

Chapter 1 provides a brief background of the project, highlighting the agricultural sector context and the Malawi Agriculture Sector Wide Approach Support Project II (ASWAp-SP II). The Chapter narrates the four key components of the project. The Chapter also provides details of the project implementing agency, proposed project cost estimates and key elements of an IPM program and objectives as well as justification for preparing the IPMP are provided in this chapter.

Chapter 2 gives an insight of the pest management practices in Malawi. Problems and challenges of chemical pesticides are also presented in this Chapter.

Chapter 3 narrates the non-chemical plant protection approaches of biological control agents, cultural and crop management practices, mechanical control methods, physical control methods and legislative measures. The Chapter narrates how some of these controls are used in Malawi.

Chapter 4 presents the international and national legislation and policies for pesticides management. It also presents regulations for pesticides storage, distribution and disposal.

Chapter 5 highlights the key steps and elements of an Integrated Pest Management Plan. Key elements, among others, include good housekeeping, maintenance and pest control. The Chapter also emphasizes the establishment of a regular system of IPM inspections.

Chapter 6 presents impacts of pest management practices, which are broadly classified as chemical and non-chemical. The non-chemical practices are further grouped into biological, manual and mechanical. Positive and negative impacts, as well as their enhancement/mitigation measures are presented in this Chapter. The Chapter also presents common maize pest problems and the recommended IPM practices to deal with these problems. Principles of selecting pesticides and pesticides to be accepted for the ASWAP-SP II are described in this Chapter. Special focus is also given the recent response on the Banana Bunchy Top Virus (BBTV) implemented under the first ASWAp-SP and Fall Army Worm (FAW) by the Ministry of Agriculture, Irrigation and Water Development. The inclusion of FAW is an attempt to prepare the Ministry to deal with emergencies of this nature. In response to FAW outbreaks The National Fall Armyworm Task Force has developed a plan of action which will be aligned to ASWAp-SP II. This is an important focus of the current IPMP.

Chapter 7 focuses on the Integrated Pest Management and Monitoring Plan, providing the responsible persons or institutions to implement the mitigation measures and monitoring activities.

Chapter 8 presents an overview of the capacity needs, and the necessary training, in order to yield a successful implementation of the IPMP;

Finally, Chapter 9 gives the conclusions and recommendations.

CHAPTER TWO: CURRENT PEST MANAGEMENT PRACTICES IN MALAWI

2.1 AGRICULTURE AND PEST MANAGEMENT IN MALAWI

Production of both crops and livestock in Malawi is limited by a number of factors, which include aspects of weather, low soil fertility, poor agronomic practices and the incidence of insect pests and diseases. Outbreaks of insect pests and diseases in Malawi are currently on the increase as they are known to cause crop losses of up to 30% (Coffman *et al,* 1992).

Malawi, like most of the countries that depend on agriculture, uses considerable amounts of pesticides as one way of combating pest problems. Pesticides used in Malawi include insecticides, fungicides, herbicides, nematicides, Acaricides and rodenticides. Other products such as growth regulators, repellents, molluscicides and parasiticides are also used. In addition, some botanicals have been released.

In Malawi there exists some indigenous knowledge in plant protection. Some farmers have reported that they practice the use of botanical plants to control some insect pests and diseases. For example, leaves from the fish bean plant, *Tephrosia vogelli* have been used to control a number of pests in maize and beans. The neem leaves are used to prevent maize from weevils and dewormer for livestock. Some farmers use Aloe vera leaves as a remedy for some diseases.

Stemming from this knowledge, Malawian entomologists initiated various trials on using botanicals to control insect pests. A concoction of ash-50g; nicotine-50g; and 1/4bar soap-25g has been recommended for the control of red spider mite (*Tetranychus evance*) on tomatoes. The use of neem (*Azadirachta indica A. juss*), Fish beans (*Tephrosia vogelli Hook F.*), M'pungabwi (Sweet basil) have given promising results on the control of diamondback moth (*Plutella xylostella* (L) on crusiferus. *Azadirachta indica A. juss* is also used to control root knot nematodes *Meloidogyne* species on bananas.

Table 2.1: Botanicals being tested for the control of various pests

Scientific Name	Local Name	Pest on which it is used
Combretum ternifolium	Kadale	Storage pests
Elephantorrhiza goetzei	Chiteta	Storage pests
Cassia spp.	Muwawani	Storage pests
Mucuna spp.	Dema	Storage pests
Tephrosia vogelli	Wombwe	Storage pests / cabbage pests
Neem	Nimu	Storage pests / vegetable
		pest
Lasiosiphon kraussianus	Katupe	Storage pests
-	Katswatswata	Storage pests
-	Kangaluche	Storage pests
Dicoma spp.	Somphole	Storage pests

Other non-pesticide control methods being used in Malawi are mostly biological control. Examples include:

(a) *Apoanagyrus lopezzi* on cassava mealy bug;
(b) *Teretrius nigrescens* on Larger Grain Borer (*Prostephamus truncates (Horn)*;
(c) *Cofesia flaripe* on cereal stem borer (*Chilo partellus*);
(d) *Cales noack* on citrus woolly whitefly (*Aleurothixus floccosus*); and
(e) *Tiphlosromolus aripo* on cassava green mite (*Monorychelus tanajoa*)

The major crops grown in Malawi, for which pesticides are used, include tobacco, sugarcane, coffee, maize, cotton and tea. Pesticides are used for these crops to prevent and control various pests and diseases that attack them. Table 2.2 illustrates the estimated use of pesticides in Malawi by crop.

Table 2.2 Pesticides use in Malawi for the Major Crops

CROP	**RANK (1=Mostly used; 6=Least used)**
Tobacco	1
Tea	2
Sugarcane	3
Coffee	4
Cotton	5
Maize	6

Source: Pesticide Control Board 2017

Malawi does not manufacture pesticides hence all pesticides used in the country are imported. There are some chemical companies that import pesticides into the country and in turn supply them to various stakeholders for both crops and livestock production. The most commonly used products are insecticides, followed by herbicides, fungicides and rodenticides. Herbicides are mostly used in sugar plantations, whereas fumigants are mostly dominant in the tobacco industries. Insecticides are mostly used in field crops, particularly maize.

The major importers of pesticides in Malawi are:
(a) Farmers Organizations Limited;
(b) Chemicals World;
(c) Export Trading Group
(d) Osho Chemicals
(e) Agricultural Trading Company (A.T.C); and (f) Fordhan Limited.

2.2 PESTICIDE MANAGEMENT TECHNIQUES APPLIED IN SOME DISTRICTS

During consultations, pest management approaches and techniques in table (Table 2.3) were identified as being used. These approaches and techniques if properly coordinated and managed, would positively contribute to the implementation of IPM.

Table 2.3: Pesticides Management Application Techniques used in Malawi

Approach	Management Techniques
Cultural	Traditionally, farmers in Malawi practice some management techniques to deal with pests and these are • Selection of early maturing plants; Weeding; Proper grain drying before storage; Good crop storage (cement storage units are encouraged); Intercropping; Closed seasons; Crop rotation; Mulching; Ploughing; Field sanitation; Recommended crop spacing and Timely harvesting
Mechanical	Farmers use mechanical means to deal with pests as first response while they are waiting for extension advise on management of a specific pest. Some of which are • Hand-picking and crushing of pests; Netting; Bagging of fruits and Traps
Biological	Use of living organisms to control pests through predation such as parasitoids, predators, pathogens
Botanical	Use of plant extracts to spray pests e.g. neem, mucuna, tephrosia vogelli, acacia, lemon grass etc.
Chemical/ Mechanical composite	Pheromone traps
Genetic	Use of pests and diseases resistant crop varieties
Legislative or regulatory	Such as quarantine

2.3 CHEMICAL PESTICIDE CHALLENGES IN MALAWI AND RECOMMENDATIONS

A representative sample of farmers was consulted to gather information on their experience on local means on management of pests and use of pesticides. Some of the general challenges are that Malawi does not manufacture pesticides and in addition, Malawi does not have ultimate pesticides disposal facilities (such as pesticide incinerators). The issue of pesticide disposal was mentioned in most of the farmers focus group discussions held. Some of the challenges will be addressed in the IPMP while other challenges will seek coordinated efforts and resources from Agriculture Commercialization and Shire Valley e.g. disposal of chemical wastes and outdated crop policy. Other observed challenges with their associated recommendations, are summarized as follows:

2.3.1 Use of Unregulated Pesticides

There has been influx of improperly named pesticides smuggled from neighbouring countries such as Zambia, Mozambique and Tanzania. The presence of such chemicals, coupled with lack of control at community level brings negative effects of the prevalent supply of unscreened chemicals, and these are:

- A threat of the introduction of highly toxic substances into the environment, putting human beings, plant and animals at risk.
- Development of pest resistance and economic loss on the part of the farmers for using substandard chemicals.
- Continuous expansion of Malawi government's regulatory duties and responsibilities; stretching its finances and resources too thin and seriously diluting its role and capacity of chemical pesticide regulation; and rendering it ineffective.
- Limited representation of the Pesticide control board in districts which makes it difficult for farmers to access important information on certain pesticides and enforce pesticide regulations

Recommendation(s):

- Improve presence and enhance capacity of regulatory institutions to facilitate thorough monitoring of unregulated pesticides, in relation to the demands due to the ASWAP-SP II.
- Educate/sensitize farmers on basic relationship between pesticides toxicity, exposure, hazard and safety measures.
- Team up, delegate and collaborate with neighboring countries and share responsibilities to curb sale of illegal pesticides.

2.3.2 ADDs Accessibility and Limited Role:

The ADDs are part of a central governance structure hence are not easily accessible to farmers. They also have limited involvement in the assessment and regulation of pesticides in the sense that they can check, report, but not impound any illegally used pesticides. With limited resources as discussed above, government does not have the capacity to fully regulate pesticides use in Malawi and therefore involvement of ADDs would complement government's efforts.

Recommendation(s):

- Following decentralization policy, set up a team that consists of District Agricultural Development management staff and the government's pesticides inspection team so that inspections are jointly conducted; permitting instantaneous discovery of illicit pesticides, followed by immediate impounding and appropriate legal action. This should be incorporated in the Crop Production policy
- Institute illegal pesticides impounding capacity at district level.

2.3.3 Use of expired pesticides:

During consultations, there were reports of indiscriminate use of expired chemical pesticides by farmers; a problem emanating from shared negligence between the farmers and chemical pesticide marketers. Both parties contribute to the situation partly due to ignorance and negligence Unlicensed chemical pesticide marketers also contribute to the proliferation of expired chemicals.

Recommendation:

i. Build capacity of farmers in:

a) Identification of expired pesticide by training farmers on how to read the label
b) Disadvantages of using expired pesticides, which includes compromised pesticides effectiveness;
c) Acquiring pesticide quantities that are likely to be needed to avoid the potential for creating obsolete stock; and
d) The general environmental risks associated with the use of expired chemical pesticides.

ii. Use visual aids to communicate the negative implications of the application of chemical pesticides (e.g. show videos and documentaries to farmers, on dire consequences of use of unapproved and expired pesticides.
iii. Government must establish reliable systems to screen and monitor registration and business operations of pesticide marketers.

2.3.4 Inadequate protective gear.

Most farmers do not use protective wear when handling or applying pesticides because of affordability in some instances and ignorance of the potential risks associated with chemical pesticides, posing formidable strains on the safety methods of chemical pesticide application.

Recommendation:

i. Adopt a "safety is the number one priority" approach in IPM.
ii. "Safety packages" to be made available to farmers of ASWAP-SP II Project. Packages must include the minimum requirements for safe pesticide application (e.g. gloves and goggles, mouth mask).

iii. Sensitize farmers on the dangers of handling chemical pesticides and equipment without sufficient and appropriate protective gear.

iv. Encourage farmers to engage trained operators to reduce the risk of exposure to pesticides.

2.3.5 Out-dated Crop Policy and Plant Protection Act

An outdated crop production policy (1987) and a plant protection act (1969) are a deterrent to the adoption of progressive and contemporary agricultural methods. The policy aims at ensuring quality in crop production and that there is no risk of pesticides contamination as a result of any use of chemicals. The policy also mentions the need to ensure careful use of pesticides for tobacco, ground nuts, cotton, Irish potato, and vegetables. The crop production policy does not include information on the current trends in the agriculture sector such as changes in agricultural methods, introduction of new pesticides, and regulation on the use of the pesticides. In addition, the plant protection act would also negatively impact on the implementation of an IPMP because of low penalty fees stipulated in the Act. Penalty fees in the Crop Protection Act are not adjusted to reflect inflation and therefore are not a meaningful deterrent. This encourages noncompliance by farmers, since the punitive effects are inconsequential.

In response to the challenges currently being faced, a consultant was engaged to review the outdated Pesticides Act (2000), to reflect the current position in relation to use and management of pesticides. The Registrar has consulted farming communities for necessary information which was included in the updated version of the Act. The revised version was submitted to Cabinet for approval before it is submitted to Parliament for enactment.

The Registrar alluded to the general challenges facing both the implementation of the Pesticides Act and IPMP. These include:

- Lack of capacity (urgent need to scale up)
- Lack of infrastructure (need for lab facilities and equipment for the PCB to conduct independent testing to confirm presence of unregulated pesticides

Recommendation:

Review and update Malawi's crop policy and adjust penalty fees appropriately.

2.3.6 Farmer's/Agricultural Staff Attitude.

Consultations revealed a misinformed approach amongst farmers and some agricultural extensionists, where chemical remedies for pests are sought in the first instance.

Recommendation:

- Use visual aids in communicating the negative implications of overdependence on chemical pesticides.
- Advocate for IPM.

- Equip Agricultural extensionists with knowledge and skills in best practices for integrated management of pest

2.4. EXPERIENCES AND LESSONS LEARNT FROM ASWAp-SP I

Implementation of the Pest Management Plan for ASWAp-SP I has assisted staff and farmers to gather information on how they can implement a successful IPM programme by combining a number of control methods to reduce pest and disease incidences on the farm. ASWAp-SP I has trained a number of staff on the ground who are imparting knowledge and skills in pest and disease management to farmers including safe use of pesticides.

During consultations with farmers it was discovered that they are actually practicing IPM in their farms but there is no systematic approach to the way they are combining the control methods because of coordination challenges among farmers, extension workers and researchers. IPM must be based on a sound understanding of the crop system, local conditions, local culture and pest biology and is therefore location specific. Pesticides should not be used on a calendar basis, but strictly when needed as established by systematic pest monitoring. This PMP has clear roles and responsibilities to allow systematic implementation of PMP. Safeguards specialist, hired at PIU will coordinate implementation of safeguards instruments amongst different players.

Contextualizing training materials has a big impact on utilization of such and adoption of proposed technologies. A training manual on pesticides was produced but too heavy and complicated hence difficult to be used by Trainer of Trainers and lead farmers. This PMP has considered translation to local languages and development of leaflets, posters, brochures and other materials for farmers to read and understand the content.

Concrete silos were developed in ASWAp-SP I as a technology to respond to pests during grain storage. Hermetic bags were explored too on trial basis. Hermetic storage bags were found to be effective, economic and more safe with little maintenance and affordable to farmers. ASWAp-SP II will promote adoption of hermetic storage bags like the Purdue Improved Crop Storage (PICS) bag and the Super Grain Bag (SGB) to reduce grain storage losses at household level.

Orientation of safeguards instruments is key to successful implementation and monitoring of instruments activities. Implementation and monitoring of the Pest Management Plan for ASWAp-SP I was not done according to plan because implementing staff were not adequately oriented to the plan at the onset of the project therefore it was difficult for them to implement some of the activities contained in the plan. In some cases, implementing officers did not know the existence of a PMP in the project. A training plan exists in the PMP for ASWAp-SP II in the initial implementation phase to make sure everyone understands their roles and responsibilities as stipulated in the plan.

Lack of awareness on important pest management issues by controlling officers in cost centers negatively affected implementation of the previous PMP where activities in the plan were allocated limited resources from the funding basket even though the approved budget was sufficient to implement all the planned activities in the plan. Controlling officers either attach little importance to the

activities and are deemed non-priority areas or they are not aware that such a plan exists. This underscores the importance of sensitizing the controlling officers about prioritizing these activities in reducing pest and disease infestation, protecting people and safeguarding the environment.

The Ministry has capacity to implement and monitor the PMP, however, during implementation of ASWAp-SP I there was no clear mandate as to which department was mandated to take lead and provide direction. However, Under the ASWAp-SP II the Department of Crop Development has been mandated to take lead with collaboration from the LRCD.

CHAPTER THREE: NON-CHEMICAL PLANT PROTECTION METHODS

3.1 NON- CHEMICAL PLANT PROTECTION

There are different ways to address pests without using chemicals and below are some of the methods:

3.1.1 Biological Control Agents

Biological control is a method of reducing or eliminating damage inflicted by a pest by means of a biological agent, traditionally a parasite or a predator, or by the introduction of a disease where the causal organism is specific in action." Biological control may also be defined in a much broader sense to include, "the manipulation of other biotic or demographic facets on the system (s) of a specific pest or pest species complex (since rarely do stored grain insects exist as a single species in an infestation) such that the reproductive processes (governing the growth of populations and their consequent abundance) and physiological processes (governing behavioral and developmental aspects) are impaired." FAO Website. Environmentally friendly chemical interventions such as the use of semiochemicals (e.g. pheromones and parapheromones), biopesticides and relatively less toxic insecticides can be used together with biological control agents.

3.1.2 Genetic control measures

Genetic control method is a form of biological control of pest species which exploits the insect's mate-seeking expertise to introduce genetic abnormalities (typically, but not necessarily, dominant lethal mutations) into the eggs of the wild population. They involve production and use of crop varieties or animal breeds which are resistant to pests and/or diseases. These include insect and disease resistant varieties/breeds and rootstock.

3.1.3 Cultural Control Practices

Cultural control means use of usual crop production practices to suppress pest population and damage in the field. These practices include ploughing to expose and kill soil pests, using pest and disease free seed, planting in time, intercropping, timely weeding, mulching, field sanitation and harvesting in time to minimize exposure of the crop to pests and practicing crop rotation.

3.1.4 Mechanical control methods

Mechanical control means using manual devices to suppress pest population and damage. This involves hand picking, netting and bagging of fruits and use of traps.

3.1.5 Physical control methods

Physical control means killing pests or suppressing their population by modifying physical factors of their environment to their detriment. This involves techniques such as irradiation, heat treatment, cold treatment, ultrasonic vibrations and drying.

3.1.6 Legislative measures

This involves setting up and effecting acts and regulations which help in pest management. Examples are quarantine services, seed certification, produce inspection, etc.

3.2 INTEGRATED PEST MANAGEMENT AND ITS ADVANTAGES

Integrated Pest Management (IPM) fundamentally differs from the traditional pest control programs in that IPM emphasizes the growth of a healthy crop with the least possible disruption to agro – ecosystems and encourages natural pest control mechanisms (FAO, 2014) while conventional pest management basically relies on chemical pesticides only.

The advantages of IPM are:

- Environmentally friendly
- Reduces human health risks (exposure to chemical pesticides)
- Relatively economic without compromising its efficacy
- IPM is more effective in controlling pests over long periods.

IPM requires wider knowledge unlike traditional programs. Managing pests with less pesticide requires a strong working knowledge of pest biology and behaviour, current pest control technologies and practices, climate and its effects on pest proliferation, greenhouse and storage structural characteristics and staff behaviour. It embraces action research and learning from others experiences on managing such pest. Without this knowledge, it will be difficult, if not impossible, to prevent infestations.

Investing in IPM programs may initially cost more than traditional methods but for the long-term; IPM is analogous to preventive health maintenance. IPM is more cost-effective in terms of time, personnel and materials to prevent pest problems than the practice of remediating the same problem repeatedly.

CHAPTER FOUR: INTERNATIONAL AND NATIONAL PESTICIDES LEGISLATION AND REGISTRATION

4.1 INTERNATIONAL LEGISLATION AND POLICIES

4.1.1 World Bank Operational Policy on Pest Management, OP 4.09 (1998)

The Bank uses various means to assess pest management in a country and support integrated pest management (IPM) and the safe use of agricultural pesticides. It also supports economic and sector work, sectoral or project-specific environmental assessments, participatory IPM assessments, and adjustment or investment projects and components aimed specifically at supporting the adoption and use of IPM.

In Bank-financed agriculture operations, the Bank advocates pest populations reduction through IPM approaches such as biological control, cultural practices, and the development and use of crop varieties that are resistant or tolerant to the pest.

According to the Bank, rural development and health sector projects have to avoid using harmful pesticides. A preferred solution is to use Integrated Pest Management (IPM) techniques and encourage their use in the sectors concerned.

If pesticides have to be used in crop protection or in the fight against vector-borne diseases, the Bank-funded projects should include a Pest Management Plan (PMP), prepared by the borrower, either as a stand-alone document or as part of an Environmental Assessment.

The procurement of any pesticides in a Bank-financed project is contingent on an assessment of the nature and degree of associated risks, taking into account the proposed use and the intended users. With respect to the classification of pesticides and their specific formulations, the Bank refers to the World Health Organization's Recommended Classification of Pesticides by Hazard and Guidelines to Classification (WHO 2009). The following criteria apply to the selection and use of pesticides in Bank-financed projects:

(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;
(d) The methods, timing, and frequency of pesticide application must aim to minimize damage to natural enemies; and
(e) Their use must take into account the need to prevent the development of resistance in pests.

At a minimum, pesticide production, use and management should comply with FAO's Guidelines for:

i. Packaging and storage;
ii. Good labeling practice; and
iii. Disposal of waste pesticide containers on the farm.

The Bank does not finance formulated products that fall in WHO classes Ia (extremely hazardous) and Ib (highly hazardous); or formulations of products in Class II (Moderately hazardous), if (a) the country lacks restrictions on their distribution and use; or (b) they are likely to be used by; or are accessible to lay personnel, farmers, or others without training, equipment, and facilities to handle, store, and apply these products properly.

The proposed project will trigger OP 4.09, since it will support post-harvest pest control, to minimise post-harvest pest damage from eroding crop productivity gained through the program's improved technology adoption by farmers. Demonstrations may require pesticides based on the IPM approach but it should be noted that ASWAP-SP II will not procure pesticides to be supplied to farmers. However, during implementation, particularly demonstrations, maximum caution should be taken into consideration to ensure that local capacity exists to adequately manage their post-harvest environmental and social impacts from use of pesticides, in compliance with OP 4.09 as described above.

4.1.2 Pesticide Protocol based on World Bank Environment Health and Safety Guidelines and Food Production

The implementation of Malawi Agriculture Sector-wide Approach Project II has triggered five safeguard policies, of which Pest Management (OP4:09) is one of them). This PMP suggest mitigation measures for adverse effects to the environment and people. Choice of mitigation measures shall adhere to World Bank Group Environmental, Health and Safety Guidelines for annual crop production. Some of the World Bank Environmental Health and Safety Guidelines to adhere include: pesticide purchase, pesticide use, handling, application and management, fertilizers and community health and safety. The following paragraphs highlight some aspects of environmental health and safety issues to be adhered in implementation of the sub-projects.

a) Pest management

The primary aim of pest management is not to eradicate all organisms but to manage pests including insects pests, diseases and weeds that negatively affect annual crops so that they remain at levels beneath an economically damaging threshold. Integrated Pest management which combine chemical and non-chemical methods to minimize pest impact while minimizing such impacts on the environment will be promoted. Pesticides will be used only to extent necessary under IP and IVM approach and when other pest management methods have failed or proven inefficient. Pest management approaches will include the following: identify main pests, assess risk and determine if strategy and capacity to control is in place; use early warning mechanisms for pests and diseases; use resistant varieties; practice crop rotation; support beneficial bio-control organisms; mechanical weed control; use pesticides to compliment these approaches and prior to procuring pesticides, assess nature and degree of associated risk while considering use and intended users.

b) Pest Purchase and use

These guidelines provide PMP that includes procedures for selection, procurement storage handling, and destruction of out-of-date stocks in accordance with FAO guidelines and country commitments under Stockholm, Rotterdam and Basel conventions. These include. Training to farmers who will be handling or applying pesticides; ensuring that procured pesticides under implementation of ASWAp-SP II are manufactured, formulated, packaged, labelled, handled, disposed of, and applied in accordance with FAO guidelines; ASWAP-SP II will neither purchase, store, use, trade pesticides that fall under WHO

recommended classification of pesticides by Hazard classes 1a or Annexes A and B of the Stockholm Convention; nor use pesticides listed in WHO hazard class II, unless project has control measures; use selective pesticides with low environmental impact quotient.

Pesticides will only be Stored, handled and applied, as guided by FAO, health and safety and WHO recommendations. ASWAp-SP II implementation will apply these requirements whenever pesticides are used.

c) Storage

ASWAp-SP II will implement recommended pesticide storage practices, including:

- Storing all pesticides in a lockable, bunded container or store that has sufficient space in which to capture any spills without contaminating the environment. Stores should be set away from water sources, residential and built-up areas, as well as livestock and food storage areas.
- Procuring spill kits and institute suitable control measures in case of accidental spillage.
- Storing all pesticides in their original, labeled containers, and ensuring that storage instructions are followed.
- Keeping a register of all pesticides procured, recording when they were received, the amount used, the amount remaining in store, and their location.
- Warehouses shall be well ventilated, secondary containment, and emergency showers and kits.

d) Handling

The project will

- ensure that extension workers, lead farmers who are responsible for handling agro-chemicals are able to read, understand, and follow product label directions for safe mixing, application and disposal; Extension workers and lead farmers will therefore be trained to handle critical operations (e.g., mixing, transfers, filling tanks, and application).
- Insist that correct PPE (e.g. gloves, overalls, eye protection) for each exposure route be worn at all times when handling and applying pesticides.
- Mandate that any mixing and filling of pesticide tanks occur in a designated filling area. This will be set away from watercourses and drains
- Ensure that spills are cleaned up immediately using appropriate spill kits; spills will not be washed away into watercourses or drains.

e) Application

During application of pesticides, farmers will give preference to the application method with the lowest EHS risk and ensure non-target organisms are not affected. Farmers with guidance from extension workers will

- Select pesticide application technologies and practices designed to minimize off-site movement or runoff (e.g. low-drift nozzles, using the largest droplet size and lowest pressure that are suitable for the product).
- Establish buffer zones around watercourses, residential and built-up neighborhoods, as well as livestock and food storage areas.
- Aerial application of pesticides will be avoided as much as possible, the boundaries of target areas should be clearly demarcated and all possible nearby communities, livestock, and rivers should be identified in the flight plan. The aerial application of pesticides should not be conducted where there is potential for contamination of organic or otherwise certifiable production.
- Ensure that all equipment is in good condition and properly calibrated to apply the correct dosage.

- Insist that applications occur under suitable weather conditions; avoid wet weather and windy conditions. Possible routes of exposure are skin contact, eye contact, inhalation (respiratory system), and ingestion (swallowing).

f) Disposal

- Any unused dilute pesticide that cannot be applied to the crop—along with rinse water, and out-of-date or no-longer approved pesticides—will be disposed of as a hazardous waste, as per FAO guidelines.
- Empty pesticide containers, foil seals, and lids will be triple rinsed, and washings used in the pesticide tank will be sprayed back onto the field or disposed of as hazardous waste in a manner consistent with FAO guidelines and according to the manufacturer's directions. Containers should be stored safely and securely under cover prior to their safe disposal; they should not be used for other purposes.

g) Fertilizers: These provide guidelines to store, handle and manage fertilizer. Fertilizer will be stored in original packaging, in dedicated locations of which entry is limited to authorized persons; purchased and stored in minimal quantities; understand each crop fertilizer needs and will only apply what is required. Training on handling, transporting, loading, storing and applying fertilizer will be provided to extension workers and lead farmers.

h) Community health and safety Guidelines: These Guidelines provide a framework for protecting farmers/communities during handling, application and disposal of wastes. ASWAp-SP will embrace the following practices: using of alternative products or methods with lower OHS risks; adopt means of collective protection e.g. good ventilation, and use of self-propelled sprayers with closed air filters; use of protective clothing; train farmers and monitor, apply pesticides in harmony with meteorological conditions that are favorable; aerial application will be avoided and other methods will be prioritised, where possible.

4.1.3 International Plant Protection Convention of FAO (1952)

The International Plant Protection Convention (IPPC) is an international treaty to secure action to prevent the spread and introduction of pests of plants and plant products, and to promote appropriate measures for their control. It is governed by the Commission on Phytosanitary Measures (CPM) which adopts International Standards for Phytosanitary Measures (ISPMs).

4.1.4 World Food Security and the Plan of Action of November 1996

This declaration seeks to secure effective prevention and progressive control of plant and animal pests and diseases, especially those which are of transboundary nature, such as rinderpest, cattle tick, foot-and-mouth disease and desert locust, where outbreaks can cause major food shortages, destabilize markets and trigger trade measures. It promotes regional collaboration in plant pests and animal disease control; and widespread development and use of integrated pest management practices.

4.2 NATIONAL LEGISLATION AND POLICIES

Although the amount of pesticides used in Malawi is generally low, as compared with other countries, there has been considerable abuse of these toxic substances. Cumulatively, the impact on environment could be high hence need proper policies, strategies and regulations to manage pesticides. In the absence of a regulatory body, pesticides were just imported by some organizations, as deemed

necessary. As a result, there were more pesticides than actually required. This resulted in the build-up of pesticides products that became obsolete.

The Ministry of Agriculture, Irrigation and Water Development conducted a survey in 1996/97 and subsequently in 1999/2000 crop seasons to take stock of pesticides. The survey revealed that some 127 tonnes and 112 tonnes of pesticides, for the two periods respectively, were of obsolete stocks.

4.2.1 The Pesticides Act, 2000

Upon realisation of the importance of having a regulatory body on the management of pesticides, the Pesticides Act, 2000 for Malawi was approved by Parliament. This Act enables Malawi to have control on the import, export, manufacture, distribution, storage, disposal and use of pesticides.

The establishment of the Pesticides Control Board (PCB) was accomplished and the office of the registrar is now in place. The Pesticides Regulations were gazetted on 22 February 2002, and this resulted in the enforcement of the law on 1 May 2002, with a grace period of 2 years; and its launch took place on 21 November 2002.

The enforcement of the law facilitates the following outputs/results:

(a) Registration of all marketed pesticides in Malawi;
(b) Registration of all pesticides according to the crops and the target pests and diseases;
(c) Documentation of all import permits, export permits, pest control operators and licenses for selling and storage of pesticides;
(d) Conducting stakeholders' workshops to create awareness to the general public on the Pesticides Act;
(e) Encouragement on safe usage of pesticides;
(f) Carrying out quality control in collaboration with the Malawi Bureau of Standards;
(g) Harmonization of pesticides registration through international bodies such as SADC;
(h) Labeling of pesticides containers according to international standards; and
(i) Carrying out proper disposal of obsolete pesticides stock.

The general goal of having the PCB is that all pesticides used in Malawi should be registered and that all importers and dealers should be licensed. The benefits from this are:

1. Only safe and effective pesticides will be marketed;
2. There will be less risk for farmers, consumers and the environment; 3. There will be higher export opportunities for agricultural products.

4.2.2 Regulation of Pesticides Storage, Distribution and Disposal

The office of the Registrar is mandated to ensure that all registered and licensed pesticide dealers conform to the regulations for safe handling of the pesticides. Pesticides dealers should follow the "safety" guidelines on transportation, distribution, application, storage and disposal of pesticides as guided in the pesticide protocal.

The PCB must ensure that all stakeholders observe safe handling of pesticides. The Registrar is mandated to make frequent checks in all premises where pesticides are stored to ensure safety. The Registrar is also mandated to take stock of obsolete pesticides in all premises.

The PCB will advise the Malawi Government on how to dispose of obsolete stock. This will involve collecting obsolete stocks from all premises and arranging for disposal.

CHAPTER FIVE: STEPS IN SETTING UP INTEGRATED PEST MANAGEMENT

5.1 IDENTIFY THE IMPLEMENTATION TEAM

Though IPM is the most preferred method to managing pests, it has got its own requirements and investments. Firstly, a diverse, action-oriented IPM Committee[1]that is environmentally conscious should be established and be made part of the District Development Committee lead by the District Agricultural Development Officer (DADO) as a member of the District Development Committee (DDC). A representative of the Farming Group will be a member of this Committee. The leader of this team should be familiar with pests, pesticides and pesticide regulations. This arrangement is appropriate, because implementation of an IPM program can be tracked as a performance indicator.

IPM leadership is guided by pest management principles and environmental issues. Leadership with such academic background and experience qualifies to serve as an authority to supervise IPM implementation. Other team members include Environmental District Officer (EDO), agronomists, crop protection experts (entomologists, pathologists) and District Health Officer (DHO).

5.2 DECIDE ON THE SCALE OF IMPLEMENTATION

To determine the scale of implementation, a strategic approach will be taken. IPM will be clearly defined and discussed by the DDC as is done for all other development projects. A representative of the EMC of the ASWAP-SP II must attend these meetings to help explain the IPM approach and give examples of similar documented success studies. Through these discussions comprehension will be achieved, and potential objections will be addressed with successful practical examples.

5.3 REVIEW AND SET MEASURABLE OBJECTIVES FOR THE IPMP

The IPM Committee will set measurable objectives and refine the IPM indicators to be relevant to their district; and determining factors such as:

- When the IPM program will start
- How much it will cost
- What will be accomplished by choosing IPM
- How success shall be monitored

The determination above must be done prior to IPM implementation.
Additionally, measurable goals will be set, to track:

- Pest management costs;
- Monitoring of pest activity before and after implementation of the IPM program;
- Number of calls related to pest problems and toxic chemical use reduction.

[1] The ministry will only set one committee for all projects for easy coordination and documentation of results. This is economical and organized.

Furthermore, the time when the shift to IPM will occur must be discussed and agreed upon prior to implementation. The initial step will be to establish an implementation timeline that includes time to execute all of the steps outlined in the implementation plan. It is imperative to include time to organize the administration of the IPM and conduct any farmer training as well as manage the IPM process.

The IPM Committee will gather information on previously implemented or currently being implemented IPM programs; the time it took to develop them and how successful they have been. They will obtain the budgetary and any technical information for the previously implemented IPM programs and analyse the elements to establish lessons to learn. Field visits to currently running programmes will be conducted to get a practical insight.

Reduced pesticide use is the substantive yardstick in measuring an IPM's ability to create a safer environment. Baseline study will be conducted and therefore an information database that includes annual quantities of pesticides used will be designed to enable comparative analysis to the previous years. The goal will be a downward trend over time or ideally, a specific reduction amount, ultimately leading to a scant usage of highly toxic pest control chemicals.

5.4 ANALYSE CURRENT HOUSEKEEPING, MAINTENANCE AND PEST CONTROL PRACTICES

While preparing to make a transition to IPM, the IPM Committee will familiarize itself with the organization's current policies and practices with respect to structural maintenance, sanitation and pest control. Occasionally, current practice may be consistent with IPM principles. Familiarization will provide the flexibility necessary to adapt to, and prepare for the necessary changes.

Structural maintenance is arguably the most efficient way to keep pests out of a facility because it physically stops pests from entering wherever possible. Structural maintenance will therefore be a regular part of the IPM. Cracks, crevices or other unnecessary openings in the building exterior that can be used by pests as harbourage areas or entry points regardless of size, will be sealed appropriately.

Sanitation deprives pests of food and water. A sanitation plan must therefore be accounted for in the development of an IPM. Staff must be provided with special sanitation training

5.5 ESTABLISH A SYSTEM OF REGULAR IPM INSPECTIONS

IPM's central focus is regular facility inspections. Such inspections are the "lifeblood" for a continuous cycle of IPM activities that may or may not include chemical treatments. Activities will include:

a) Routine Inspections
b) Pest Identification
c) Selection of Control Methods
d) Monitoring and Evaluation

IPM inspections must emphasize on the four "zones" of pest activity:

(1) Entry points
(2) Water sources
(3) Food sources

(4) Harborage areas.

During inspections, all existing pest issues and potential problem areas, inside and outside, must be noted for follow-up.

For in-house IPM programs, the greatest inspection challenge will be establishing routine, proactive surveillance by trained specialists. To ensure this is done, the EMC or an independent consultant will conduct inspections and audits twice a year.

5.6 DEFINE THE TREATMENT POLICY SELECTION

A clear written policy on how the facility will respond to pests when they appear must be developed. Included in the policy will be definitions of both non-chemical and chemical treatment options and the sequence or prioritization in which they will be considered. It should be unequivocal on when and where chemical treatments are appropriate. Finally, it should include an "approved materials" list to ensure informed choices when chemical treatments are applied.

The key to an effective IPM is to correctly identify pests that have invaded the area before. Due to pest behaviour variations from one species to the other, the appropriate response will vary accordingly.

Once the pest is identified and the source of activity is pinpointed, the treatment policy will call for habitat modifications such as exclusion, repair or better sanitation. These counter measures can drastically minimize pest presence before chemical responses are considered. Additional treatment options—chemical and nonchemical—can then be tailored to the biology and behaviour of the target pest.

The final step in the pest response cycle is Monitoring. The information gained through on-going monitoring of the problem will facilitate determination of supplemental treatment options if required.

5.7 ESTABLISH COMMUNICATION PROTOCOLS

Communication protocols must be developed to assist environmental services, facility maintenance, facility management and service providers. IPM is a cooperative effort and therefore effective communication between various parties is essential for success. IPM Committee and farmers must document pest sightings. The IPM Committee will make recommendations and notify ASWAP-SP II of pesticide treatments. They will also communicate with the maintenance team to make the necessary repairs.

5.8 DEVELOP FARMER TRAINING PLANS AND POLICIES

The Farmer Groups will serve as a pool of "inspectors" charged with reporting pest sightings to expedite response times and help limit the scope of new infestations. Training sessions will be conducted to acquaint farmers with IPM principles and their responsibilities for the success of the IPM program.

5.9 TRACK PROGRESS AND REWARD SUCCESS

Measurable objectives set at the beginning, must be measured against the IPM program's performance at least once a year. Documentation to facilitate the evaluation process is as follows:

a. Detailed description of the parameters and service protocols of the IPM program, stating the ground rules;
b. Specific locations where pest management work was performed;
c. Dates of service;
d. Activity descriptions, e.g., baiting, crack-and crevice treatment, trapping, structural repair; and
e. Log of any pesticide applications, including:

- Target pest(s);
- The brand names and active ingredients of any pesticides applied;
- PCB registration numbers of pesticides applied;
- Percentages of mix used in dilution;
- Volume of pesticides used expressed in kilograms of active ingredient;
- Applicator's name(s) and certification identity (copy of original certification and recertification should be maintained);
- Facility floor plan on which all pest control devices mapped and numbered;
- Pest tracking logs (sightings and trap counts);
- Action plans, including structural and sanitation plans, to correct any pest problems;
- Pest sighting memos for IPM Committee to use in reporting pest presence to DEC; and
- Using these records, and the goals of the IPM program (increased efficacy, lower costs and reduced pesticide use), the IPM Committee must see:
  - Fewer pest sightings and farmer complaints;
  - Lower monitoring-station counts over time;
  - Lower costs after the first 12-18 months, once IPM's efficacy advantage has had time to take effect; and
  - Downward trend in volume or frequency of chemical pesticide usage

IPM is a team effort. Therefore, the IPM Committee will track and report the program's successes following each evaluation; and encourage good practices by recognizing farmers who played a role. Communicating the success of the program in reducing toxic chemical use and exposure, reducing pest complaints and lowering costs will help farmers to understand the purpose of the program and appreciate its success. The more they understand, the more likely they will participate willingly in helping expand and institutionalize the IPMP.

After the program has been in place for long enough to show significant results, it is recommended for the IPM Committee to work with ASWAP-SP II to publicize successes more broadly and to demonstrate the environmentally responsible approach to effective pest management and control. IPM Committee and ASWAP-SP II will lead by example by sharing success with other stakeholders.

CHAPTER SIX: IMPACTS OF PEST MANAGEMENT PRACTICES

IPM will play a key role in the agricultural productivity; leading to a wide range of socio-economic impacts and overall economic development of the country. Agricultural productivity in Malawi is closely related to reduction of poverty and malnutrition. Hence, small-scale farmers in particular, will play an important role in reducing poverty and malnutrition and creating widespread growth through the implementation of IPM for the ASWAP-SP II.

On the other hand pest management practices, if not implemented properly, will have negative impacts on the environment as well as harmful effects on human beings and animals. The following sections provide positive and negative impacts of pest management practices.

6.1 POSITIVE IMPACTS OF CHEMICAL PESTICIDES

In as much as chemical pesticides may be seen to be a quicker method of dealing with pests and covering big area, it has to be known that continued application of chemical pesticides results in long term negative impacts which are presented in Section 6.2. Chemical pesticides may improve yields in the short term, although this is to the detriment of the soil quality in the long term. The short term positive impacts of chemical pesticides are as follows:

Increase in crop yields

Application of chemical pesticides will protect crops from damaging pests. This will lead to an increase in crop yields, for the short term.

Enhancement measures

Apply chemical pesticides in accordance with recommendations of the IPMP to sustain crop productivity. Adhere to the IPMP recommendations to progressively reduce the use of chemical pesticides.

Increase in economic growth

Increase in crop yields will lead to food self-sufficiency as well as surplus crop for sale; thereby contributing to the overall economic growth of the country, albeit for the short term.

Enhancement measures

Assist farmers in marketing produce and maintain access roads to markets. Train farmers in IPM practices to retain good soil quality and to progressively reduce use of chemical pesticides.

Quick reaction to pests

Produces quick results hence ideal in outbreaks.

Enhancement

Apply chemicals in accordance with recommendations of IPMP to avoid threatening non-targeted species.

6.2 NEGATIVE IMPACTS OF CHEMICAL PESTICIDES

Soil degradation

Frequent and continuous application of chemical pesticides to agricultural fields will lower the soil potential for good crop yields. This would negatively affect soil health, crop growth and productivity in the long term.

Mitigation measures

- Apply soil conditioning measures which would also be part of IPM
- Train farmers in proper handling and application of chemical pesticides as recommended by the IPMP and ASWAP-SP II

Poisoning of non-target species

Poisoning of non-target flora and fauna species may occur due to negligence or lack of knowledge of chemical pesticide potency; equipment malfunction and use of wrong type of equipment; wrong time and method of application (spraying). Chemical pesticides and residues can be dangerous to non-target wild animals; fish and invertebrates as well as aquatic arthropods.

Mitigation Measures

- Supervise and control use of chemical pesticides to ensure that only approved and recommended ones are used;
- Use recommended equipment and approved methods of application;
- Use recommended rates of application
- Regularly maintain and clean the equipment as recommended in the IPMP
- Use recommended and appropriate protective clothing;
- Conduct training seminars in IPM; and
- Clean equipment and dispose old equipment as recommended by manufacturer.

Water, soil and environmental pollution

Water, soil and environmental pollution may occur due to spillage during loading and offloading of vessels and during storage. This can also result from farmers' carelessness as they use the pesticides e.g. washing sprayers in water streams, poor disposal of empty pesticide containers and expired pesticides.

Mitigation measures

- Provide suitable storage warehouse;
- Use bio-beds, draining channels and draining dams for waste pesticides treatment;
- Use chemical remains to re-spray crops;
- Clean equipment in one place designated for such activities;

- Take regular stock of pesticides for early tracking of leaks and waste;
- Provide farmers and other relevant authorities with information on appropriate remediation measures in case of spills and accidents,
- Apply Integrated Pesticide Management; and
- Train staff and farmers in proper handling and use of pesticides.

Health and safety risks

People around pesticides storage facilities, farmers handling pesticides and spray service providers may be exposed to hazardous pesticides. Lack of appropriate knowledge in handling of pesticides may also increase health and safety risks to humans due to misuse, underuse or overuse of these pesticides. Pesticides, if not stored correctly, will result in corroded containers, lost labels and release of the chemicals into the environment. Pesticide stockpiles pose a very serious health and safety risk of contaminating drinking water, food or the air.

Mitigation Measures

- Provide personal protective equipment to workers and ensure its good use
- Inspect pesticides handling and storage facilities regularly;
- Train staff and farmers in proper handling of chemical pesticides and conduct routine medical examination for workers; and
- Promote IPM to replace harmful pesticides
- Encourage farmers to only acquire pesticide quantities that are likely to be needed to avoid potential for creating obsolete stocks
- Pesticides whose handling and application require use of PPE that is uncomfortable, expensive or not readily available should be avoided.
- Washed and emptied containers that the pesticide supplier does not intend to reuse should be punctured or otherwise rendered unusable for any other purpose.
- Empty containers and pesticide-related waste should not be burnt, dumped or buried but returned to source
- Introduce pesticides in ready-to-use containers
- Discourage farmers from buying and using decanted pesticides
- Initiate education programmes that will be run by farmer cooperatives, Farmer Field Schools, NGOs, extension services to raise awareness of the correct use of pesticides and disposal of the empty containers

Accidental or intentional poisoning

Improper labelling and storage of chemical pesticides may increase chances of accidental poisoning. Availability of pesticides and increased accessibility by staff and farmers may increase the risk of poisoning to kill intentionally or commit suicide due to social pressures and frustration.

Mitigation Measures

- Label and store chemicals in properly labeled shelves;
- Ensure responsible, mentally sound and mature persons are given charge and control of approved chemical pesticides;
- Restrict accessibility to chemical pesticides; and conduct regular spot checks to balance stock;
- Pesticides should be kept in secure place to which children, animals, or unauthorised personnel do not have access;
- Pesticides should never be transferred into containers other than those they were supplied; and
- Pesticides must be stored safely and securely away from food and water supplies.

Pest resistance

Lack of appropriate knowledge in pesticide may result in incorrect pesticide application. This may reduce effectiveness of the pesticides on pests, thereby promoting development of pest resistance.

Mitigation Measures

- Train staff and farmers in correct application of pesticides
- Initiate education programmes that will be run by farmer cooperatives, Farmer Field Schools, NGOs, extension services to raise awareness of the correct use of pesticides

6.3 POSITIVE IMPACTS OF NON CHEMICAL PEST CONTROL

Nonchemical pest control which include biological control agents, physical measure, cultural measure, genetic, and mechanical methods of managing pests entails the use of environmentally and socially acceptable methods on the host, to eliminate pests or diseases. The only setback is that their response is not immediate, hence requires proactive other than reactive. However, if the farmers are consistent in building integrated pest management system, the benefits are huge, environmentally, socially and economically.

6.3.1 Biological control agents

Reduced environmental and health risks

The use of natural enemies in controlling pests is more environmentally friendly in comparison with chemical control methods. It requires action research and active participation of farmers.

Enhancement Measures

Establish demonstration plots to disseminate information on environmental and health benefits of biological control agents to the communities for them to appreciate the advantages.

Reduction in time spent on application of pesticides

Planting of pest resistant crops in a particular growing season guarantees the farmer of effective pest control for several growing seasons. This reduces the time spent by the farmer in applying pesticides to

the same agricultural fields for a good number of growing seasons during which the biological control will be effective. Biological control methods can also be easily integrated in other IPM control methods.

Enhancement measures

Prepare an inventory of indigenous and established biological control methods and conduct community awareness seminars to enhance and exchange community knowledge base.

Increase in soil stability and reduction in soil erosion

The wider environmental benefits of increasing tree cover as biological control of pests will result in increase in soil stability and reduction of erosion.

Enhancement measures

Conduct awareness campaigns on the importance of using new and improved pest resistant seed varieties in controlling pests.

Resistance to pests through improved varieties

The use of resistant clones in the control of diseases; and adoption of fast methods of propagating plantings has environmental benefits as well as advantages of crop resistance to pests.

Tissue culture technology also has the potential to increase biodiversity by replacing the stocks of rare and endangered tree species. The wider environmental benefits of increasing biodiversity and tree cover include improving soil stability, reducing erosion, preventing desertification and stabilizing global climate.

Enhancement measures

Rural people have a tendency of resisting to introduction of new varieties and sticking to traditional seed varieties. Awareness campaigns on the benefits of new and improved seed varieties, which are resistant to pest will help reduce application of chemical pesticides.

Cost effective in the long term

The investment in biological control methods (genetic)could be high on spot but cheap in the long run as compared to pesticides which has cost of the pesticides, protective wear, disposal etc. every time they are bought. Some of the biological methods (cultural) attracts very minimal budget hence affordable and technology is accessible to farmers.

Enhancement measures

- Build capacity in farmers on how they can build biological controls incrementally so that they do not face the challenge of huge cost at once.
- Consider cheaper options within biological methods.

6.3.2 Mechanical methods

Reduced pollution on the environment

Use of labour with simple implements/tools is environmentally friendly in the sense that it has no significant impacts on water or air pollution.

Enhancement measures

Train farmers on the appropriate and efficient use of simple farm implements to significantly minimize environmental pollution; and

6.4 NEGATIVE IMPACTS OF NON CHEMICAL CONTROL METHODS

6.4.1 Mechanical methods

Human health risk

Hand picking of insect pests may be risky to the farmer since some pests may be injurious.

Presence of other injurious non pest organisms e.g. snakes in the field can pose as a health risk to the farmer

Mitigation measures

Encourage use of PPE when hand picking pests.

Poor crop development

Mechanical control of pests by fruit bagging may lead to poor development of the fruits due to shading from light for instance green bananas need to photosynthesize as they develop.

Mitigation measures

Encourage use of transparent bags to allow entry of light.

6.4.2 Physical methods

Human health risk

Accidental exposure to radiation in the process of treating planting materials against pests may be a risk to human health

Mitigation measure

Training in proper use of the technique

Damage to planting materials

Accidental overheating of planting materials during hot water treatment can render them unviable

Mitigation measure

Training in proper use of the technique

6.5 POSITIVE IMPACTS OF IPM

Increase in agricultural yields

IPM practices will contribute to an increase in agricultural yields through prevention of crop damage and preservation of produce.

Enhancement measures

Train farmers in the use of appropriate IPM techniques to protect crops from pest damage.

Contribution to Food Security

Application of IPM will result in enhanced food security, yields and efficient preservation of produce, subsequently providing and contributing to the overall national goals on food security.

Enhancement measures

- Train pesticides marketers in selection and handling of IPM-compatible pesticides;
- Train farmers in appropriate application of the various IPM techniques; and
- Educate farmers on how to preserve natural enemies and timeframes of different integrated pest management options.

Saving in foreign exchange

Promotion and increased application of non-chemical pesticides will result in reduced importation of chemical pesticides thereby saving foreign exchange.

Enhancement measures

- Train suppliers in selection of appropriate pesticides to be eligible for supplying to ASWAP-SP II
- Train farmers in appropriate application of the various IPM practices to reduce application of chemical pesticides; and

Contribution to offsetting rural/ urban migration

Increase in farm income-generating opportunities due to better yields and availability of surplus produce for sale in the rural areas will help offset rural – urban migration.

Enhancement measures

Assist local communities to establish cooperatives and to market produce to potential markets for additional income.

Improved environmental protection

Increased application of IPM, through the use of biological controls, mechanical methods and indigenous control mechanisms will mean reduced application of polluting chemicals such as organochlorides, pyrethroids and triazines which are harmful to the environment. It will also help reduce application of banned pesticides such as DDT and dieldrin, which are sometimes smuggled across the borders. Non-targeted species will not threatened but survive in their natural habitat.

Enhancement Measures

- Enforce regulation prohibiting importation of banned chemical pesticides;
- Sensitize pesticides users on the dangers of using prohibited pesticides; and
- Educate farmers on harmful consequences of banned chemical pesticides.
- Prepare farmers to incorporate IPM practices as a way of farming

6.6 PRINCIPLES GOVERNING SELECTION OF PESTICIDES

Selection of pesticides, under the ASWAP-SP II project will be guided by the consideration of several pest management approaches for cultural, physical and biological measures before resorting to application of chemical pesticides.

The use of pesticides must be guided by the principles of cost efficiency, safety to humans, the bio-physical environment and effectiveness in controlling the pests. Pesticides selection will be made in accordance with the World Bank guidelines for the selection of pesticides (World Bank Operational Manual, GP 4.03) as follows:

(i) Pesticides requiring special precautions should not be used if the requirements are not likely to be met;

(ii) Pesticides to be selected from approved list, taking into consideration of: toxicity, persistence, user experience, local regulatory capabilities, type of formulation, proposed use, and available alternatives;

(iii) Type and degree of hazard and availability of alternatives; and the following criteria will be used to restrict or disallow types of pesticides under Bank loans:

a. **Toxicity**: acute mammalian toxicity, chronic health effects, environmental persistence and toxicity to non-target organisms;

b. **Registration status** in the country and capability to evaluate long-term health and environmental impacts of pesticides.

6.7 PESTICIDES TO BE ACCEPTABLE TO ASWAP-SP II

The selection of pesticides to be acceptable under the project will be in line with (a) the World Bank Safeguard Policy OP 4.09 on pest management, and will depend on (b) the hazards and risks associated with pesticide use, and (c) the availability of newer and less hazardous products and techniques such as biopesticides.

In addition to the toxic characteristics of the pesticide, the hazards associated with pesticide use depend on how the pesticides are handled. Precautions to minimize environmental contamination and excess human exposure are needed at all stages from manufacture, packaging and labelling, transportation, and storage to actual use and final disposal of unused and contaminated containers.
The guidelines in Appendix 2 provide internationally accepted standards on pesticides to minimize the hazards associated with pesticide use.

The use of pesticides under the project will also be guided by the FAO Publication on International Code of Conduct, on the Distribution and Use of Pesticides 1991; *FAO Guidelines for the Packaging, Storage, Good Labeling Practice, Transportation and Disposal of Waste Pesticide and Pesticide Containers 1985*.

CHAPTER SEVEN: PEST MANAGEMENT AND MONITORING PLANS

7.1 PEST MANAGEMENT PLAN

This section stems from section 2.2 and table 2.3 that discusses current non-chemical pest management practices in Malawi in addressing challenges identified chapter 6. This includes a brief review of techniques for biological control, cultural control, chemical control, mechanical control and botanical which are recommended for the IPMP. Table 7.1 summarizes the benefits and potential risks of various methods.

7.1.1 Biological Control

Biological control involves the use of biological agents and predators to control pests and diseases. It involves conservation or optimization of the impact of living agents that already exist in the ecosystem, artificially increasing the number of natural enemies in the agro-ecosystem, introducing the new natural enemies' species where they were none before.

Every living organism has its natural enemies and diseases which keep its population at equilibrium. The natural enemies include predators, parasitoids, nematodes, fungi, bacteria, viruses etc. The use of predators, parasitoids, nematodes, fungi, bacteria and viruses to maintain the population density of pests at a lower level than would occur in their absence is a common method under biological control (bio-control).

There are some good examples of biological controls in Malawi, however, documentation has not been done on these methods. Most of the biological methods have indigenous knowledge background hence it is orally recorded. Again, such practices are not spread national wide but are confined to specific traditional grouping. Research institutions have also used biological control through the pursuit of host plant resistance. This is principally sought in the application of selection pressure in crop breeding programs or in the selection of new varieties with stronger resistance to common pests.

Resistance to pests is the rule rather than the exception in the plant kingdom. In the co-evolution of pests and hosts, plants have evolved defence mechanisms. Such mechanisms may be either physical (waxy surface, hairy or bitter leaves etc.) or chemical (production of secondary metabolites) in nature. Pest-resistant crop varieties either suppress pest abundance or elevate the damage tolerance level of the plant. In other words, genetic resistance alters the relationship between pest and host. The inherent genetically based resistance of a plant can protect it against pests or diseases without recourse to pesticides. Moreover to use it the farmer has no need to buy extra equipment or learn new techniques.

Breeding and selecting for resistance to serious pest problems is an issue mandated to the National Agricultural Research programmes. These programmes have produced substantial results in terms of releasing varieties with necessary qualities and tolerance/resistance to a wide range of otherwise devastating pests of cotton, maize, sorghum, beans and cassava. Therefore, the Directorate of Agriculture Research Services based at Chitedze in Lilongwe the capacity and infrastructure to contribute HPR materials to farmers given the necessary logistical support.

7.1.2 Cultural Practices

Pests may also be controlled through the adoption of improved cultural practices. Practices applied in Malawi include:

a) **Crop rotation:** This practice is used to depress weeds and/insect pests and diseases in some crops.
b) **Intercropping:** The field is used to grow two or more crops at the same time; mostly, maize with climbing plants or legumes
c) **Relay cropping:** For example, banana is relayed with mucuna to reduce the infestation of weevils.
d) **Fallow:** The field is not cultivated for some years in order to control various parasitic weeds.
e) **Cover crops:** These are leguminous crops, which are grown to suppress weeds in the field. They can be intercropped or not and they protect and cover the field e.g. pumpkins, canavallia etc.
f) **Mulching:** This is covering of crop fields by dry grasses to control weeds and conserve soil moisture (e.g. in coffee, banana, tomato field etc).
g) **Hand pulling and hoes weeding:** These practices are the most common and being used by small-scale farmers.
h) **Fertilizer/manure application:** The application of nutrients in the form of either inorganic fertilizer or farm-yard manure reduces both the infestation of fields by weeds (e.g. Striga) and losses in crop yield.

In Malawi there exists some indigenous knowledge in plant protection after harvesting. Some farmers have reported that they practice the use of botanical plants to control some insect pests and diseases. For example, leaves from the fish bean plant, *Tephrosia vogelli* , neem leaves and ash have been used to control a number of pests in maize and beans.

Stemming from this knowledge, Malawian entomologists initiated various trials on using botanicals to control insect pests. A concoction of ash-50g; nicotine-50g; and 1/4bar soap-25g has been recommended for the control of red spider mite (*Tetranychus evance*) on tomatoes. The use of Neem (*Azadirachta indica A. juss*), Fish beans (*Tephrosia vogelli Hook F.*), M'pungabwi (Sweet basil) have given promising results on the control of diamondback moth (*Plutella xylostella* (L) on crusiferus. Neem (*Azadirachta indica A. juss*) is also used to control root knot nematodes *Meloidogyne* species on bananas. Table 7 shows botanicals that are being tested for the control of various pests.

7.1.3 Physical and Mechanical Control

Physical and mechanical controls are measures that kill the insect pest, disrupt its physiology or adversely affect the environment of the pest. These differ from cultural control in that the devices or actions are directed against the insect pest instead of modifying agricultural practices. For examples, hand picking of cotton strainers from cotton plants, banana weevils from banana pseudo stems, tailed caterpillars from coffee, killing stem borers in coffee or American bollworm from

tomato plants are the forms of physical control while use of a fly swatter against annoying flies is a form of mechanical control.

7.1.4 Chemical Control

Chemical control involves the use of herbicides, insecticides and fungicides to manage weeds, pests and diseases. They can be applied as liquid spray, in the form of granules, powder or fumigation in stores. Chemical fertilizer can be recommended as a component of IPM packages but to be applied when all other options have been tried and failed.

It may be noticed that Malawi ratified the Convention on Persistent Organic Pesticides (POP) and banned the highly hazardous pesticides (WHO classes Ia, Ib, II). It is strongly recommended that, the Registrar of pesticides review the current list of registered pesticides in line with the WHO guidelines. Pesticides classified as among the "dirty dozen" (e.g. Paraquat) and those classified by WHO as Ib should be deregistered immediately. ASWAp-SP II will not finance, or support the use of, any of these pesticides.

7.2 PEST MONITORING PLAN

Successful implementation of the ASWAP-SP II Integrated Pest Management Plan in the project locations will require regular monitoring and evaluation of activities undertaken by the farmers to be involved in the project. The focus of monitoring and evaluation will be to assess the build-up of IPM capacity among the farmers and the extent to which IPM techniques are being adopted in agricultural production, and the economic benefits that farmers derive by adopting IPM. It is also crucial to evaluate the prevailing trends in the benefits of reducing pesticide distribution, application and misuse.

Indicators that require regular monitoring and evaluation during the programme implementation include the following:

1 Number of farmers engaged in IPM capacity building in the project locations:
2 Number of farmers who have successfully received IPM training in IPM methods
3 Number of trainees practicing IPM according to the training instructions
4 Number of women as a percentage of total participating in IPM and successfully trained
5 Number of youth as a percentage of total participating in IPM and successfully trained
6 Number of farmers as a percentage of total applying IPM
7 Rate of IPM adoption (number of people as a percent of total) every year
8 Improvement in farm production due to adoption of IPM as a percent of production without IPM
9 Increase in farm revenue resulting from adoption of IPM practices, compared with revenue from conventional practices
10 Improvement in the health status of farmers
11 Extent to which crops and livestock are produced using chemical pesticides compared with total crop production

12 Efficiency of pesticide use and handling

13 Reduction in chemical pesticide poisoning and environmental contamination

14 Number of IPM participatory research project completed

15 Overall assessment of activities that are going according to IPMP; activities that need improvement; and remedial actions required

7.3 ESTIMATED COSTS FOR PEST MANAGEMENT AND MONITORING

Estimated costs for managing and monitoring some of the recommended enhancement and mitigation measures are summarized in Table 7.2. As it can be noted for Table 7.1, not all the mitigation measures have been assigned costs. It is assumed that some of the mitigation measures will be part of the normal responsibility of the respective government ministries, agro-dealers, transporters, farmers and other relevant stakeholders, within their institutional mandates and budgets.

It is important to appreciate that some of the stakeholder institutions may not have sufficient capacity to manage environmental and social impacts of pesticides and to adequately monitor implementation of the enhancement and mitigation measures. Therefore, it is necessary to train them. The cost of training for the managing impacts has been provided for table 8.1. The table also includes costs for conducting awareness and sensitization campaigns on pesticides application, management and adoption of IPM in the project areas. Costs for setting-up, adoption and use of IPM by farmers are provided in table 8.2. The costs for managing and monitoring various mitigation and enhancement measures provided in tables 7.1 and 7.2 are estimated for 1 year.

Table 7.1: Summary of positive and negative impacts and recommended mitigation measures on various methods of pest control and monitoring plan

Control method	Impact and challenges	cause	Mitigation/enhancement measure	Responsibility	Monitoring institution	Frequency
Cultural •Weeding •Intercropping •Closed seasons •Crop rotation •Mulching •Ploughing •Field sanitation Proper grain drying before storage •Good crop storage (cement storage units are encouraged)	-Pulling of weeds have minimum impacts to the environment -Improves the health of the crop and its ability to fight pests and diseases -Improves soil condition and helps to minimize weed infestation -Use of herbicides will have an impact on environment -Use of pesticides is minimized and hence beneficial to environment		• Incorporating Indigenous knowledge sharing in training sessions and modules and best practices • Supply farmers with simple but inexpensive equipment such as meteorological charts and rain gauges to facilitate forecasting.	ASWAP-SP II, participating institutions and farmers **Cost included in the IPMP overall cost**	ASWAP-SP II	Quarterly
Mechanical •Hand-picking and crushing of pests •Netting •Bagging of fruits •Traps	-Involves no use of pesticides, hence friendly to environment -High labor costs -May impose danger to laborers (snake bites, etc)		-If any accident occurs, rush the affected to hospital or nearby dispensary for treatment	Farmers Extension workers	ASWAp-SP II AEDC	Quarterly
Biological	•Pest specific. •Process takes a long time.		Train rural farmers on the general principles of biological	ASWAp-SP II Extension	ASWAp-SP II	Quarterly

	•System requires expansive technical knowhow. May be too complicated and expensive for most rural farmers. •Difficult to measure results with certainty.		control methods, and how to best maximize the benefit of biological methods of pest control when applied in the farmers' respective areas. Identify some practical examples of biological methods working in the area.	Workers MoAIWD		
Botanical	Use of plant extracts to spray pests e.g. neem, mucuna, tephrosia vogelli, acacia, lemon grass etc. however, skills are required to avoid tampering with whole living organism. Cumbersome process, labor intensive.		Train farmers on easier methods of obtaining extracts, such as boiling (where appropriate)	ASWAp-SP II Extension Workers MoAIWD	ASWAp-SP II	Quartely
Genetic	Use of pests and diseases resistant crop varieties hence friendly to the environment.		Equip research institutions with financial resources and technical capacity	MoAIWD	ASWAp-SP II	Quarterly
Chemical	Soil degradation Imbalanced soil health and structure	Persistent use of chemical pesticides	•Apply soil conditioning measures which include IPM • Train farmers in proper handling and application of pesticides Maintain cultural methods such as crop rotation, manure application, intercropping.	Farmers	ASWAP-SP II EMC	Quarterly
	Poisoning on non-target species	•Lack of knowledge of chemical pesticide potency •Equipment malfunction •Use of wrong type	-Supervise and control use of chemical pesticides so that only approved and recommended ones are used - Provide PM equipment - Regularly maintain and clean	ASWAP-SP II and participating farmers 21000	MoAIWD ASWAP-SP II EMC PCB 5000	Quarterly

		of equipment •Wrong time and method of application (spraying)	equipment as recommended by supplier -Dispose old equipment as recommended by manufacturer. -Provide recommended protective gear -Use recommended and appropriate protective gear -Conduct trainings in IPM -Consider proper timing of pesticides application	30,000		
	Water, soil and air pollution	•Cleaning of equipment, •Disposal of remains of pesticides •Disposal of containers and equipment	•Construct suitable warehouse •Use chemical remains to respray. •Clean equipment in one designated place. •Use biological methods Train farmers not to spray toxic chemicals close to water sources	•Pesticides Transporters and Suppliers •ASWAP-SP II EMC •Farmers Cost for five district warehouses 150,000.00	-Environmental Affairs -PCB -ASWAP-SP II 5,000.00	Semi annually
	Pest resistance	Lack of appropriate knowledge in pesticides application	•Train farmers in correct application of pesticides •Initiate education programmes	Farmers ASWAP-SP II	PCB	Bi annual
	Use of unregulated pesticide (risks introduction of highly toxic substances into the environment, putting human beings, plant and animals at risk.	•dysfunctional chemical pesticide regulation body. •Limited representation of	•Improve presence and enhance capacity of regulatory institutions to facilitate thorough monitoring of unregulated pesticides, in	ASWAp-SP Agcom SVTP PCB DA	PCB AEDC	Biannual

	•Development of pest resistance and economic loss on the part of the farmers for using substandard chemicals)	the Pesticide control board in districts	relation to the demands due to the ASWAP-SP II. •Educate/sensitize farmers on basic relationship between pesticides toxicity, exposure, hazard and safety measures. •Team up, delegate and collaborate with neighboring countries and share responsibilities to curb sale of illegal pesticides.	Foreign Affairs EAD		
	Use of expired pesticides	shared negligence between the farmers and chemical pesticide marketers due to ignorance.	Build capacity of farmers in: a) pesticide and label Identification b) Disadvantages of using expired pesticides, which includes compromised pesticides effectiveness; c) Acquiring pesticide quantities that are likely to be needed to avoid the potential for creating obsolete stock; and d) The general environmental risks associated with the use of expired chemical pesticides. iii.Government must establish reliable systems to screen and monitor registration and business operations of pesticide marketers	Agro dealers Extension workers Farmers PCB EAD ASWAp-SP	PCB AEDC	Biannually
	Inadequate protective wear and	Exposure to	•Provide protective clothing	•Agro-dealers	-Min. of Labour.	Biannually

	Health and Safety	pesticides •Bad housekeeping •Multipurpose use of warehouse	and ensure it is used. •Train farmers in proper pesticides handling. •Routine medical examination •Promote alternative methods e.g. cultural, biological, mechanical means.	•Transporters •Farmers Cost for five districts on farmer random sampling basis 10,000.00	-PCB -DA -ASWAP-SP II 5,000.00	
	Outdated crop policy and plant protection act	-Changes in agricultural methods, introduction of new pesticides, and regulation on the use of the pesticides are not included in the crop act. Low penalty fees inadequate to deter malpractices.	Review crop production policy to reflect current agricultural sector situation Adjust penalty fees appropriately.	MoAIWD PCB Ministry of Justice	ASWAp-SP SVTP AGCOM	Quarterly
	Attitude of farmers and extension workers for agro- chemicals against cultural practices	Length of time taken to deal with emergent pests when using cultural methods versus chemical methods	•Use visual aids in communicating the negative implications of overdependence on chemical pesticides. •Advocate for IPM. •Equip Agricultural extensionists with knowledge and skills in best practices for integrated management of pest	Farmers Extension workers	PCB -DA -ASWAP-SP II	biannually

Table 7.2 Summary of Management and Monitoring Costs for 1 Year

Activity	Management Costs (US$)	Monitoring Costs (US$)
Provide PM equipment (sprayers)	9,000.00	
Provide recommended protective gear	30,000.00	
Pesticide inspection, sampling and testing		8,000.00
Routine medical examination	10,000.00	5,000.00
Rehabilitation of laboratories	100,000.00	
Construct bio-beds, draining channels and draining dams.	20,000.00	
Disposal of chemical pesticides remains according to supplier recommendations		5,000.00
Enforce regulation prohibiting importation of banned chemical pesticides		4,000.00
Policy review process	3,000.00	
Grand Total	**172,000.00**	**22,000.00**

CHAPTER EIGHT: CAPACITY, TRAINING NEEDS AND BUDGET FOR IMPLEMENTATION OF THE IPMP

8.1 CAPACITY NEEDS

IPMP is a knowledge intensive and interactive methodology. It calls for a precise identification and diagnosis of pests and pest problems. Comprehending ecosystem interplays equips farmers with biological and ecological control knowledge and assists them in making pragmatic pest control decisions. It therefore follows experiential learning and/or action research.

The success of IPMP is largely dependent on developing and sustaining institutional and human capacity to facilitate experiential learning. Experiential learning is a prerequisite to making informed decisions in integrating scientific and indigenous knowledge. This assists in tackling district, ward and village specific problems.

Ineffective communication between farmers, extension agents and researchers from research institutes and universities has often translated into poorly-targeted research or to poor adoption of promising options generated by research. Essentially, the full potential of agricultural research is compromised.

Closer farmer-research investigator interaction, adaptive research and participatory learning approaches in capacity building efforts serves as a remedy to narrowing this gap, making research results more applicable to farmers. Farmers must at least be trained in:

(a) Biological and ecological processes underpinning IPM options;
(b) The practical application of newly acquired knowledge, to choose compatible methods to reduce production and post-harvest losses, through frequent field visits, meetings and demonstrations; and (c) Adaptive research trails.

Capacity building will be achieved through farmer-based collaborative management mechanisms where all key stakeholders shall be regarded as equal partners. Beneficiary farmers shall be the principal actors facilitated by other actors from research institutes, academic institutions, sector ministries, NGOs, etc. as partners whose role will be to facilitate the process and provide technical direction and any other support necessary for the implementation of IPM. Pilot IPMP implementation must be built on and to some extent strengthen existing national capacities for the promotion and implementation of IPM.

The major actors and partners will include the following:

The programme beneficiary farmers: As the principal beneficiaries, they will be organized into Farmer Groups for training and adoption of IPM practices. The farmers will receive assistance from Community IPM Action Committees, to coordinate IPM activities in their areas.

At the District level, the ***District Development Committees,*** through the District Agricultural Officers, will assist the farmers to form the Farmer Groups through whom IPM activities will be implemented. The District Agricultural Officer will provide the technical assistance to the Farmer Groups.

The ***Agricultural Development Divisions (ADD's)*** will backstop the District Development Committees and assist them with the technological advancements in IPM development. They will coordinate with research institutions and organize field days to disseminate the information.

The MoAIWD will provide logistical and technical support to the ASWAP-SP II EMC. They will thus provide capacity and policy guidance and oversight for implementation of the IPM at National level. MoAIWD will, through the ASWAP-SP II, provide the necessary budgetary support and overall monitoring of the IPM activities. ***The MoAIWD*** and the respective districts will provide staff for training local farmers and play a major role with NGOs/CBOs in the public awareness campaigns, production of extension materials, radio and television programs in the respective districts. The IPMP will be implemented and monitored by MoAIWD and its departments and EAD while coordination for IPMP activities will be the responsibility of a PIU that will be housed at MoAIWD.

Department of Agricultural Research Services (DARS) will provide information on the latest technology advancements in IPM to extension departments who will work with staff and farmers to adopt the technologies. The department will work with DCD and DAES to get feedback from farmers and get problem areas in pest management to do further research. Researchers will mount trials on station and on farm with farmers to test the technologies before they are released for adoption.

Department of Crop Development (DCD) will be responsible for coming up with training content and protocols for staff and farmers to implement successful IPM programmes. The department will do surveillance, monitoring and control of migratory pests like Fall armyworm and red locusts to reduce crop losses in affected areas. They will upscale community based armyworm and red locust forecasting to empower communities to do surveillance and monitoring of migratory pests. In order to increase adoption of IPM technologies DCD will work with DAES to create farmer field schools and mount on farm demonstrations to disseminate and diffuse the technologies. The department will oversee the implementation of the PMP in collaboration with Land Resources Conservation Department (LRCD) to make sure that all activities are being implemented on time and according to World Bank safeguard's Standards.

Department of Agricultural Extension Services (DAES) will facilitate training of staff and farmers in pest management and assist in designing and packaging relevant messages for dissemination to farmers. The department will be responsible for organising farmers in groups to enhance adoption of technologies and assist in input distribution through farmer field schools and other approaches. They will be responsible for multimedia campaigns through mobile vans, radio/television programmes, leaflets, brochures, posters, comedy and others.

Land Resources Conservation Department (LRCD) will collaborate with DCD to make sure that World Bank Safeguards standards are observed during implementation of ASWAp-SP II and offer

technical expertise to staff and farmers on safeguards issues. They will train staff and farmers in environmental and social safeguards.

ASWAP-SP II will undertake to build the capacities of extension workers to train farmers and community leaders in promoting IPM activities. They will also facilitate information sharing with local farmers.

The Pesticides Control Board will provide the necessary information on pesticides and train the Farmer Groups in all aspects of pesticides including application rates, methods, storage and disposal of residues. They will also monitor pesticides stocks and potency at the dealers. Studies will be done to review some of the outdated Policies and Acts to include current developments in the management of pests and diseases in the country.

The Environmental Affairs Department (EAD)*:* Through the Environmental District Officers in liason with District Officers (Crops, Extension and Land Resource and Conservation Offiers), will conduct environmental monitoring in relation to IPM. EAD will contribute towards monitoring and providing policy direction regarding World Bank Policies.

The Ministry of Health (MoH)*:* through the District Health Officers, will set up databases on incidence of poisoning, effect of pesticides on human health and environmental contamination. This data will then be used to measure and validate the ameliorating effects of IPM adoption and implementation that is expected to reduce risks to pesticides exposure.

Ministry of Justice and Constitutional Affairs: they have a national mandate to review laws They provide the legal advice on legal instruments that need to be reviewed. They will be engaged to review the outdated policies and Acts dealing with crop production and pest management.

The Ministry of Transport and Public Works: through the department of civil aviation will assist in control of migratory pests by issuing block clearance for aircraft to carry out aerial surveys and control operations

Partners in capacity building and training will include ***Agriculture Services Providers and NGOs*** that are providing services to farmers and improving agricultural productivity, environmental management and rural health matters will be identified to provide services and technical support in the implementation of IPM.

8.2 TRAINING

8.2.1 Training Content

Training key role players and stakeholders in IPM is necessary to ensure that they possess appropriate skills for IPMP implementation. The IPMP training program is designed for four levels as presented in the following sections and the training areas for key role players and stakeholders of IPM are provided in Table 8.1.

National level workshop

A total of 30 participants including representatives from the institutions listed in table 8.1 will attend a one day training workshop in Lilongwe. Members from these key stakeholder institutions will prepare and make presentation on their specific areas of expertise and demonstrate how their technical know-how would be applied in the implementation of IPMP. The main focus of the training workshop will be to establish institutional coordination for implementation of the IPMP.

Training of trainers

25 people will participate in the 3-day training of trainers in IPM. The main objective of this training will be for the participants to acquire and share the necessary knowledge to be able to train district staff and extension workers in the ASWAP-SP II participating districts. Participants will be drawn from ASWAP-SP II and District Executive Committees of the project districts, selected IPM Trainers from Agricultural Research and Development Service Providers and NGOs including pesticides marketers.

Training at district level

Training at the districts level will be targeted to district staff, extension workers, members of the Area Executive Committee (AEC) and community leaders. This group of participants, with the assistance of the trainers, will be responsible for imparting the IPM knowledge and practices to the farmers. 35 participants, with the extension workers being the majority (more than fifty percent of the participants) will be trained to assist the farmers in skills to implement the IPMP.

Community level (farmers)

Being beneficiaries, 50 lead farmers from each of the five districts, will be selected to participate farmer community training in IPM to be conducted in three strategic areas of the district. Lead farmers will work closely with frontline staff to train other farmers through Farmer Field Schools and demonstrations. Areas of training focus will be to inform the farmers about the IPMP implementation and general discussions on indigenous as well as formal pest management practices currently in use.

Table 8.1: Training areas for key role players and stakeholders of IPM

Participants in the training	Roles of participants in IPMP	Training content	Cost US$ and Duration	Trainer
National level institutions • Department of Agricultural Research Services • Land Resources Conservation Department (LRCD) • MoAIWD • ASWAP-SP II EMC • Ministry of Health (MoH) • Environmental Affairs Department (EAD) • Pesticides Control Board (PCB) • DCD • MBS • DAES	• Providing capacity and policy guidance and/or oversight for IPMP implementation • Monitoring and evaluation of IPMP implementation • Providing logistical and technical support for ASWAP-SP II training • Training IPM trainers. • Institutional coordination • Monitoring of IPM inputs supply by the dealers • Monitoring illegal stock of pesticides in boarder regions of Malawi	• General overview of the project • Roles of IPMP stakeholders • Institutional IPMP supportive roles in IPMP implementation • IPMP and environmental and social management • pesticide regulation on: imports, transportation, use, registration and disposal of residues	Cost for 1 day training workshop $16,354	PIU (head of secretariat/ Safeguard specialist/Consultant

Training of Trainers • ASWAP-SP II • PCB • DEC • IPM Trainers • Agricultural Research Services	• Supervising IPMP implementation • Preparation of IPM training materials • Training extension workers • To be fully abreast with ASWAP-SP IIs IPMP and to conduct research in	• General overview of the project and the IPMP for the ASWAP-SP II • IPMP stakeholders and their roles • Pesticides (types,	Cost for a 3-day training: $9,784	PIU (M&E Specialist, Safeguards, LRCD

Participants in the training	Roles of participants in IPMP	Training content	Cost US$ and Duration	Trainer
• Development Service Providers and NGOs • Pesticides marketers • PCB	IPM. • To engage farmers in participatory learning and knowledge sharing • To foster Farmer/trainer coordination • To maintain Databases on incidence of poisoning, effects of pesticides on human health and environmental contamination. • To conduct IPMP scientific study, data collection, analysis and storage	classification, labelling registration etc.) • Leadership and training for IPMP • Pesticides and environmental and social impacts; and mitigation measures • Safety and precautionary measures for handling pesticides • IPM tools, indigenous, contemporary and other pest management practices and methods • Management of outbreak and migratory pests. • Pesticide regulations on: imports, registration, transportation, use and disposal of residues • Farmer/Trainer coordination		

District level • District staff • Extension workers • Members of the AEC	• Supervision of farmers and provision of extension support • Preparation of farmer training materials, leaflets, demonstration material, radio and TV messages etc	• General overview of the project and the IPMP for the ASWAP-SP II • IPMP stakeholders and their roles	Cost for a 3- day training $5,000 Cost for training in the 5 districts:	PIU
Lead Farmers	• Training farmers and community leaders in IPM and safety • Organising farmers for participatory learning and knowledge sharing events	• Pesticides (types, classification, labelling registration etc.) • Skills in preparing IPMP work plans and budgets. • Pesticides and environmental and social impacts; and mitigation measures • Indigenous and other pest management methods • Safety and precautionary measures while handling pesticides • Management of outbreak and migratory pests. • Pesticide regulation on: imports, transportation, use, registration and disposal of residues • Farmer/Trainer coordination	$ 25,000	Extension workers

Participants in the training	Roles of participants in IPMP	Training content	Cost US$ and Duration	
Community level (farmers)	• Attending IPM trainings and demonstrations • IPMP implementation	• General overview of the project and the IPMP for the ASWAP-SP II • IPMP stakeholders and their roles • Pesticides (types, classification, labelling registration etc.) • Pesticides and environmental and social impacts; and mitigation measures • Indigenous and other pest management methods • Safety and precautionary measures while handling pesticides • Management of outbreak and migratory pests. • pesticide regulation on: imports, transportation, use, registration and disposal of residues • Farmer/Trainer cooperation	Cost for a farmer community training in one district: $5,000 Cost for training in 5 districts: $25,000	Extension workers and Lead farmers
Total			**76,138**	

CHAPTER NINE: CONCLUSIONS AND RECOMMENDATIONS

Among other things, this IPMP has established that there are some initiatives in the use of indigenous knowledge and non-chemical practices for pest management. The IPMP has also proposed activities that need to be carried out to set up IPM practices in the ASWAP-SP II target districts.

It is noted that not all IPM practices would be applicable for the ASWAP-SP II in the short term. Specifically, mechanical methods may be difficult to implement in small scale farming communities where heavy machinery for weeding will be inappropriate. Biological methods are a possible option under the ASWAP-SP II but they take a long time and they need technical know-how as well as patience to adopt. Generally, IPM practices take some time to adopt and to bear the required results. However, IPM practices are highly recommended for long term and sustainable agricultural productivity. ASWAP-SP II should therefore:

i. Introduce the IPM in the ASWAP-SP II target districts by using the systematic approach presented in Chapter 5. This will ensure application of all appropriate alternatives prior to resorting to chemical pesticides as remedy for pests;
ii. Adopt a collective community effort and dissemination of appropriate tools and training. This will maximize IPMP implementation and accelerate progress towards reaching both measurable and tangible results in pest management;
iii. Adopt a use of chemicals as a last resort approach to prioritize IPM remedies, consistent with sound environmentally sustainable practices;
iv. Set up a team that incorporates ADD's management staff with the government's pesticides inspection team so that inspections are jointly conducted, permitting instantaneous discovery of illicit pesticides, followed by immediate impounding and appropriate legal action;
v. Train farmers in (a) identifying approved pesticide; (b) acceptable disposal practices for expired chemical pesticides; and (c) the general environmental risks associated with the use of expired chemical pesticides;
vi. Adopt a "safety is the number one priority" approach in IPM approach
vii. Equip ADDs with "safety packages" to be made available to farmers for free under ASWAP-SP II. Packages must include the minimum requirements for pesticide application such as gloves and eyewear, nose mask; and
viii. Thoroughly inform farmers on the dangers of handling chemical pesticides and equipment without sufficient and appropriate protective gear

As the process of pesticides registration in Malawi continues, it is proposed that the following factors, spearheaded by the PCB, must be implemented:

1. Priority list and importance of pesticides by crop must be supplied to government by farming organizations, to assist government in setting up quantity limits for importation;

2. The Malawi Bureau of Standards (MBS) must conduct pesticides residue and quality control tests in products; and
3. The programme should assist with the disposal of the farmers and household's pesticides related waste by establishing infrastructures for the collection and appropriate management of small quantities of pesticides and contaminated materials.

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ANNEXES

ANNEX 1 IPMP DEVELOPMENT TEAM

Id	Name	Post	Institution
1	John Mussa	Director	Land Resources Conservation Department
2	Gilbert Kupunda	Deputy Director	Land Resources Conservation Department
3	Joseph Kanyangalazi	Principal Land Resources Conservation Officer	Land Resources Conservation Department
4	Kefasi Kamoyo	Land Resources Conservation Officer	Land Resources Conservation Department
5	George Lungu	Principal Agricultural Officer (Crop Protection)	Department of Crop Development
6	Dr Donald Kachigamba	Entomologist	Department of Agricultural Research Services
7	Walunji Msiska	Environmental Officer	Environmental Affairs Department
8	Young Chakana		Pesticide Control Board
9	Rexy Tolani	Assistant Project Coordinator	ASWAp Secretariat
10	Dr Eviness Nyalugwe	Deputy Director-	Department of Crop Development
11	Gertrude Kambauwa	Deputy Director	Land Resources Conservation Department

ANNEX 2: PEOPLE AND INSTITUTIONS CONSULTED

2a. List of Staff

Districts : Lilongwe Date: 24th October, 2017

NO.	NAME OF PARTICIPANT	ORGANISATION	POSITION	PHONE NO.
1.	Francis Mlongo	Agric	DAHLDO	0888628468
2.	Manuel Kasenza	Public Works	DRS	0888758968
3.	Joseph Katema	Agric	AEDC	0998915339
4.	Joseph Nanthambwe	Agric	AEDC	0999190060
5.	Smith Mkwapatira	Agric	AEDO	0888655322
6.	Gift Matiya	Agric	AEDC	0999736643
7.	Gloria Lidamlendo	Agric	Crops Officer	0994898178
8.	Japhet Zingani	Agric	ABO	0999669457
9.	Siliro Magomero	Agric	EMO	0999228228
10.	Hyacinthe M. Jere	Agric	DADO	0991588792
11.	Ian Saini	Agric	AGRESO	0999023477
12.	Henry Hunga	DLRC	PLRCO	0999380377
13.	Fred Nyirenda	KADD-MU	SLRCO	0999450891
14.	Richard Mzumara	KADD-MU	PAO-CP	0888505193
15.	Salim Mdoka	NS DAO	AO -C	0994643777
16.	Davie Kaonga	NS DAO	LRCO	0888552216
17.	Habil Kalumo	NOYD-NGO	M & E Officer	0999673920
18.	Henderson Chikamaulanga	NASFAM-FO	District Manager	0991011614
19.	David Ng'oma	NS DAO	AO- Legumes	0991521763
20.	Eviness Nyalugwe	DCD-MoAIWD	DCD - HO	0994025165
21.	John Ng'ambi	Roads Authority	Social Specialist	0995411473
22.	Rexy Tolani	MoAIWD	PCA	
23.	Sydney Nyanda	Agric	ALRCO	0994760222
24.	McSosten Chikwatula	Agric	ADAELLA	0999557238
25.	Chrispin Chilowe	Agric	AEDO	0993643679
26.	Bright Kangachepe	Agric	FA	0999192680
27.	Olive Kubwalo	Agric	SALRCO	0888126304
28.	Beatrice Kalipinde	Agric	AEDO	0999971283
29.	Vincent Kachilili	Agric	AEDO	0991165087
30.	Angella Kakolo	LAFORD-NGO	PO	0881259606
31.	Blessings Zembani	Farm Concern International-NGO	MTO	0888597822
32.	Memory Saka	Agric	AEDO	0888618363
33.	Cyben Kondowe	Agric	CPO	0881627373
34.	Mike Nkhonjera	Agric	AEDO	0888517043
35.	Gift Njolomole	WV-NGO	DF	0992653668
36.	Eliza Ziba	Agric	Student	0996515230
37.	Benson Chasambira	TAPP-NGO	Field Officer	0999044839
38.	Christopher Chinkhadze	Agric	AEDO	0994350167
39.	Gift Kapota	Agric	AEDO	0999059674
40.	Eliza Wickson	Agric	Field Assistant	0884350774
41.	Howard Mwambakulu	Agric	Enumerator	0884188449

District ; Lilongwe Date : 24th October,2017

NO.	NAME OF PARTICIPANT	ORGANISATION	POSITION	PHONE NO.
1.	Anthony T.M. Banda	Agric	AEDO	0999007062
2.	Chifundo Mkanda	BASENDA	Field facilitator	0991492273
3.	Christian Msachina	Agric	DAH	0884230722
4.	Redson Sudzulani	Agric	DAH	0884399364
5.	Andrew Madzi	Agric	DAH	0881886758
6.	Simplex Joseph	Agric	FA	0888709398
7.	Edwin Mphonde	Agric	DAH	0999616104
8.	Uledi Isaac	Agric	V. Scout	0995416073
9.	Hodges Nkhoma	Agric	AEDC	0999645991
10.	Stanford Nkhonjera	Agric	AEDO	0996325403
11.	Athanasius Foster	Agric	AEDO	0884326222
12.	Clement C. Tumba	Agric	FA	0884780367
13.	Joseoh Chakwanila	Agric	DAH	0991235858
14.	Allan Kaziputa	Roads Authority	Enumerator	0888639441
15.	George Lungu	DCD	PAO	0995662550
16.	Gertrude Kambauwa	DLRC	DDECE	0888321562
17.	Nixon Nyalugwe	LADD	PAO-CP	0995497477
18.	Mercy Malumelo	LL DAO West	EMO	0999893634
19.	Jacob Ngwira	Agric	AEDO	0888745377

2b: List of Farmers

District: Lilongwe and Ntchisi Date : 24th October,2017

SR NO	DZINA/NAME	UDINDO/POSITION	FONI NO
1.	Dustan Solomon	Secretary	08881311759/0999490109
2.	Steven Nkhoma	Member	0999749599
3.	Makiliwani Chisemphe	Oyanganira Msika	0999749599
4.	Anna Singo	Lidi farm	-
5.	Aginesi Mapulanga	Vice Secretary	09992525954
6.	Malita Jelemiya	Lidi Farm	
7.	Marcy Mapulanga	Settitarr	
8.	Fuloresi Steven	Member	0995359449
9.	Florence Kalowa	Member	
10.	Martha Chisinga	Chair Lady	0991958148
11.	Sadrack folochiya	Member	0996566717
12.	Emma Kandaidi	Member	0998498768
13.	Mikiel Missi		0995654663
14.	Misheck Chawia	Member	0991487852
15.	Manford Katonge	Farm leader	09999190020

16.	Evely Chigoli	Treasurer	0991521570
17.	Spiano Kamwala	Chairman	0991487852
18.	Emmanuel Silvesta	Member	0997937939
19.	Medson Mzelezea	Member	
20.	Yona Matewere	Member	
21.	Lunia Bowa	Member	
22.	Mercy Mapulanga	Member	
23.	Zecharia Chitsamba	Member	
24.	Cliford Banda	Member	
25.	Veronica Kamwala	Member	
26.	Mercy Jeptala	Member	
27.	Trexa Chananga	Member	
28.	Anna Singo	Member	
29.	Generate Jonathan	Member	
30.	Chisomo Banda	Member	
31.	Elia Sambo	Member	
32.	Gladwell Malipenga	Member	
33.	Grace Chifu	Member	
34.	Esta Batison	Member	
35.	Regina James	Member	
36.	Joyce Jekapu	Member	
37.	Colleta Banda	Member	
38.	Stella Wilson	Member	
39.	Magrete Tomas	Member	
40.	Mpasulana Mpinganjira	Member	
41.	Sana Chitute	Member	
42.	Getrude Zezala	Member	
43.	Grace Andrea	Member	
44.	Eveness Majamanda	Member	
45	Agnsess Chikanamba	Member	
46.	Lucy Daniel	Farmer	
47.	Alice Paliani	Farmer	
48	Likiness Yakobe	Member	
59.	Wadson Bello	Member	
50.	Davie Ngwende	Member	
51.	Peter Kavumbula	Member	
52.	Bertha Zimba	Member	
53.	Jossam Lumbe	Member	
54.	Hellens Kalowanjombe	Member	
55.	Marria Mwale	Member	
56.	Matco Richard	Member	
57.	Juliasi Phiri	Member	
58.	Aganess Kamwala	Member	
59.	Gift Banda	Member	
60.	Agartha Mrluntha	Member	
61.	Janet Benjamin	Member	

62.	Olipa Banda	Member	
63.	Sinolia Nthenda	Member	
64.	Alice Paliani	Member	
65.	Sara Chitute	Member	
66.	Stella Wilson	Member	
67.	Agness nthala	Member	
68.	Malita Jeremia	Member	
69.	Rose Kachepa	Member	
70.	Felestina Mayembe	Member	
71.	Lustia Mvula	Member	
72.	Agness Cholamokanda	Member	
73.	Sambo Kapophinda	Member	
74.	Ganizani Chuma	Member	
75.	Levison Malitano	Chairperson	0996020794
76.	Kaneneni Machila	Member	
78.	Ephraim Gwaza	Member	
79.	Chiwoko	Member	
80.	Samuel Chiwango	Member	
81.	Kachoka Elisa	Secretary	**0993178060**
82.	Harrison Chilamba	Member	
83.	Essau Richard		
84.	Daniel Chibwe	Member	
85.	Patrick Khumutche	Member	
86.	Amon chizu	Member	
87.	Dominic Lesio	Member	
88.	Jambulani Banda	Member	
89.	Foster Banda	Member	
90.	Mgona Chilambo	Member	
91	Joel Malithano	Member	
92.	Mark Phiri	Member	
93.	James Mbande	Member	
94.	Mkoma Shawa	Member	
95.	Khalidwe Chiwaula	Member	
96.	Joven Divala	Member	
97.	Samson Mandala	Member	
98.	Enelesi Chilamba	Member	**0995134637**
99.	Christina Manuel	Member	
100.	Agness Banda	Member	**0999132819**
101.	Lingison Kafelo	Member	**0998742860**
102.	Grace Jeriko	Member	**0996015603**
103.	Enelesi Nkolola	Member	**0992110554**
104.	Sisiliya Shawa	Member	**0997528639**
105.	Chrissy Dzozi	Member	**0992880460**
106.	Lesita Chiwengo	Member	
107	Faneki Soko	Member	

108	Mary Banda	Member	
109	Likistina Soko	Member	
110	Everesi Thauzeni	Member	
111	Agness Kasimpha	Member	
112	Alefa Chrford	Member	
113	Eniliya Banda	Member	
114	Mercy Chikalipo	Member	
115	Getrude Banda	Farmer	
116	Aida Makuta	Farmer	
117	Agness Mikiri	Farmer	
118	Magadalene Banda	Farmer	
119	Velentina Jossamu	Farmer	
120	Layina Tambala	Farmer	
121	Alefa Dzodzi	Farmer	
122	Zelinati Banda	Farmer	
123	Diseliya Sitaliki	Farmer	
124	Anna Jezala	Farmer	
125	CHRISSA Banda	VH	**0996566539**
126	Victoria Chiramba	VH	
128	Foster Banda	VH	
129	Mgona Chirambo	VH	
130	Joel Malithano	VH	
131	Marko Phiri	VH	
132	James Mbande	VH	**0995213914**
133	Mkoma Shawa	VH	
134	Khalidwe Chiwaula	VH	
135	Javeni Divala	VH	
136	Samson Mandala	VH	
137	James Bruce	VH Mbende	
138	Joevison Malitano	VH Kadzidzi	
139	Kachoka Elisa Pasipantima	GV Josam	
140	Efraim Gwaza	VH Jenala	
141	Samuel Chiwengo	VH Masiya	
142	Kaneneni Machira	VH Jaka	
143	Lingson James	VH Chikuhgwa	
144	Mkoma Shawa	VH	
145	Khalidwe Shawa	VH	
146	Khalidwe Chiwaula	VH	
147	Jambulani Banda	VH	
148	Maliko Phiri	VH	
149	Domoniko Lesiyo	VH	
150	Rabson LIpenga	VH	
151	Gidion Dambwe	VH	
152	Mgona Chilambo	VH	
153	Mary Banda	Farmer	
154	Enelesi Mkolole	Farmer	
155	Richard Masarti	Farmer	

156	Paul Soko	Farmer	
157	Delivalia Shaliko	Farmer	
158	Malikesi Makiri	Farmer	
160	Jerina Thole	Farmer	
161	Elizabeth Chikugwa	Farmer	
162	Teleza Mngulu	Farmer	
163	Elizabeth Sitifano	Farmer	
164	Cathren Byson	Farmer	
165	Feliya Clement	Farmer	
166	Rosemary	Farmer	
167	Monika	Farmer	
168	Mesita Libisson	Farmer	
169	Rosemary Gladson	Farmer	
170	Eliasi Fiala	Farmer	
171	Vasco Kadzakuwani	Farmer	
172	Tchalesi Lekesoni	Farmer	
173	Zifa Kasintikita	Farmer	
174	Nebat Dambo	Farmer	
175	Esitele Biziwaki	Farmer	
176	Thom Fesitala	Farmer	

ANNEX 3: REPORT OF THE MEETINGS HELD WITH PROJECT STAKEHOLDERS
(Government staff, NGOs, Farmer Organizations and Farmers)

1.0	**Opening Remarks** • The meetings were conducted in Lilongwe and Ntchisi districts .These are the two districts of the 12 project districts.Three meetings for farmers and two meetings for district staff that included civil servants and NGOS and the communities included traditional leaders. 1.1. The meetings were organized for government staff and NGOs at district level and for farmers and traditional leaders in the expected project sites. 1.2. The District Agriculture Development Officers opened the meetings with a word of prayer and welcomed the consultation team and members of the district and the farmers to the meetings; 1.3. The DADOs requested the consulting team to introduce itself and to brief the gathering why they had requested for the meeting. The DADOs also requested the participants to make self introductions.
2.0	**Objectives of the meetings** 2.1. The teams were led by Dr Eviness Nyalugwe and Mrs. Getrude Kambauwa in Ntchisi and Lilongwe respectively. The team leaders informed the people gathered at the meetings that the meetings were organized in order to: a) Inform them about the project; b) Provide an opportunity for them to discuss their opinions and concerns; c) Manage their expectations and misconceptions regarding the project; d) Verify the significance of some of the potential social impacts the project might cause; e) Disseminate concepts of the proposed Project activities with a view to provoking Project interest amongst the communities; f) Promote sense of ownership for the Project; and informing the process of developing appropriate mitigation measures for ESMF, RPF and PPM. 2.2 During the meetings, general information about the project was discussed and a number of issues were raised pertaining to how the project will affect the people. The two teams prepared and administered the checklists for ESMF, RPF and PPM and these guide the discussions.
3.0	**Briefing on the project** 3.1 Mr.Rexy Tolani and Mr.Nelson Mataka briefed the participants that Malawi Government, through the Ministry of Agriculture, Irrigation, and Water Development would like to implement the Agriculture Sector wide Approach II project in 12 districts of the country. The project will be implemented for a period of two and half years starting from 2017/2018 to 2019/2020. The Project seeks to improve the productivity and diversification of selected agricultural commodities in the project targeted areas in a sustainable manner. The teams informed the participants of the main components of the project and how the project is going to be implemented. The participants were also informed that the major component of the project is the road component and hence the interaction was mainly to get more information on the social

	and environmental effects due to the road works and how the communities will participate in the works.

4.0	GENERAL ISSUES DISCUSSED DURING THE CONSULTATIVE MEETINGS	
	ISSUE	**RESPONSE**
4.1	The district and EPA staff wanted to know the project duration and when the project will start	The members were informed that the project will start in December, 2017 and will be concluded in June 2020.
4.2	The district staff wanted to know the project cost and how	The consulting team member informed the staff that the total cost of the project is USD50 Million and the major part is for road component.
4.3	The officers from the district wanted to know the criteria used in selecting the 12 districts	The consulting team members explained that the selection of the districts was based on the agricultural productivity of the district and status of the road infrastructure.
4.4	The district members of staff wanted to know why livestock is not included as a component or subcomponent in the project	The members were informed that Livestock will be fully covered in sister project of Agriculture Commercialization Project being prepared by the MoAIWD.
	ISSUES RELATED TO PMP	
	ISSUE	**RESPONSE**
	Lack of personal protective gear for both staff and farmers	The project will provide protective equipment for demonstrations to staff and farmers
	Lack of knowledge and skills in handling pesticides common for both staff and farmers	Staff and farmers will be trained on safe use of pesticides
	Lack of refresher courses on pest and disease management	Training will be done to build capacity for staff and farmers in pest and disease management
	Lack of information and knowledge on the registered pesticides in the country	Awareness on registered pesticides in the country will be done and reference materials will be produced for distribution in all districts
	Poor enforcement of pesticide regulations which leads to importation of unregistered pesticides in border areas	Pesticide Control Board will be working with local frontline to inspect unregulated pesticides in all districts
	Attitude of farmers to always rely on pesticides instead of practicing IPM approach to pest and disease	Farmers will be given special training on IPM to understand that pesticides should be used as a last resort after other control methods have failed.

	management	

ANNEX 4: CHECKLIST FOR STAFF AND FARMER CONSULTATIONS

(a) Checklist for Staff

- List common pests and diseases prevalent in the area
- What are the crops affected by the pests and diseases listed above
- Seasonal occurrence of these diseases and pests (When do they occur?)
- List control measures of pests and diseases
- Do farmers use chemicals? what type of chemicals do they apply to control pests and diseases?
- Accessibility and affordability of the chemicals
- Have they ever been trained on safe use of the pesticides?
- Do farmers know how to mix and apply the pesticides?
- Do they know how to read the pesticide label? Even the expiry date.
- How do they protect the environment and human beings?
- Do farmers know IPM?
- How do the farmers implement IPM?
- List the cultural practices that they follow to reduce pest and disease incidences
- Do they know botanical pesticides? What type of botanical pesticides do they use in their fields?
- What challenges do farmers face in managing these pests and diseases?

(b) Checklist for farmer organisations

- List common pests and diseases prevalent in the area
- What are the crops affected by the pests and diseases listed above
- Seasonal occurrence of these diseases and pests (When do they occur?)
- List control measures of pests and diseases
- If they are using the chemicals, what type of chemicals do they apply to control pests and diseases
- Ask the farmer whether the chemicals are accessible and affordable
- Have they ever been trained in safe use of the pesticides?
- Do farmers know how to mix and apply the pesticides?
- Do they know how to read the pesticide label? Even expiry date.
- How do they protect the environment and human beings?

- Do farmers know IPM?
- List the cultural practices that they follow to reduce pest and disease incidences
- Do they know botanical pesticides? What type of botanical pesticides do they use in their fields?
- How do the farmers implement IPM
- What challenges do farmers face in managing these pests and diseases?