Government of Republic of Malawi

Ministry of Finance, Economic Planning and Development

MALAWI FLOODS EMERGENCY RECOVERY PROJECT (MFERP)

Credit: IDA 1431

INTEGRATED PEST MANAGEMENT PLAN (IPMP)

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Lilongwe 3

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Accronyms used in the document

EAD	Environmental Affairs Department
FAO	Food Agriculture Organization
GoM	Government of Malawi
Ha	hectare
IDA	International Development Association
IPMP	Integrated Pest Management Plan
IRLADP	Irrigation Rural Livelihoods Agricultural Development Project
MFERP	Malawi Floods Emergency Recovery Project
OP	Operational Policy
PCB	Pesticide Control Board
PIU	Project Implementation Unit
POP	Persistent Organic Pollutants
WUA	Water Users Association

EXECUTIVE SUMMARY

This document serves as an Integrated Pest Management Plan for Malawi Floods Emergency Recovery Project. Government of Malawi has received a grant of US$80.00 million from the International Development Association of the World Bank Group for the project. The aim of the project to provide immediate support to the affected populations in restoring their livelihoods, as well as rehabilitating critical infrastructure essential for the restoration of public service delivery and sustainable economic recovery in the flood-affected areas. In addition, the project will also seek to increase the institutional capacity of the Government's post-disaster recovery system and promote long-term. The proposed period of the project is 4 years, from 2015 to 2018.

This Integrated Pest Management Plan will guide on appropriate measures for control of pests on rehabilitated irrigation schemes in the 15 flood affected districts. Rehabilitation and re-construction of damaged irrigation schemes is one of major component of the Malawi Floods Emergency Recovery Project. Main crops grown in the damaged irrigation schemes are maize, rice, beans and horticultural crops.

It should be highlighted here that World Bank Operational Policy Pest Management (OP 4:09), does not allow funds from World Bank to be used for procurement of pesticides as a measure to reduce pesticide's negative risks in the environment and public health. And in line with Pest Management Policy, funds from the credit for Malawi Floods Emergency Recovery Project will not be used to procurement of pesticides for use in irrigation schemes or any other related project activities. Pest Management Policy supports safe, affective, and environmentally sound pest management system for World Bank funded projects. Recommended strategy in management of pests is to use Integrated Pest Management (IPM) techniques including biological and mechanical methods. The policy also aims at assisting stakeholders to reduce reliance on synthetic chemical pesticides.

2.0 SUMMARY OF COMPONENTS OF THE PROJECT**.**

Malawi Floods Emergency Recovery Project has four components, and each component has sub-components which focus on specific areas of recovery in the flood affected districts. An outline of the components and sub-components is as follows:

Component 1: Livelihoods Restoration and Food Security: This component will support rehabilitation of community infrastructure through labour intensive public works programmes. Labour intensive activities will create jobs and provide immediate assistance for livelihood-supporting and income-generating activities. The component will support beneficiaries in meeting household income and basic needs. The other sub-component is Restocking of the Strategic Grain Reserves **.**The component will support the procurement of more maize – about 40,000 metric tonnes - for the grain reserve. Budget for the component is US$ 29 million.

Component 2: Infrastructure Rehabilitation and Reconstruction of public infrastructure. This component will cover rehabilitation of damaged roads, bridges, schools, health centers, irrigation schemes and water facilities in the 15 flood affected districts. Budget for the component is US$43 million

Component 3: Promotion of Disaster Resilience. One component is Institutional Strengthening of Department of Disaster Management Affairs**:** It will provide technical assistance to strengthen the institutional set-up and operational capacities of Department of Disaster Management Affairs for post-disaster response and recovery. Activities will include: (a)

improving data preparedness and capacity development for post-disaster needs assessment; (b) strengthening recovery planning and implementation; (c) developing community mapping and improve land use planning; (d) enhancing disaster response systems; and (e) carrying out a study to assess the viability of railways rehabilitation.

The other sub-component is Multi-sector Design of Disaster Resilient Infrastructure. This sub-component will provide technical assistance to different departments and ministries for the development and institutionalization of disaster and climate-resilient design standards for infrastructure construction in the future. This could include the design of roads, drainage infrastructure and public buildings, such as schools, health centers and government offices. Budget for the component is US$4 million.

Component 4: Program Management. This component will finance the following activities: (a) incremental operating costs of the Project Implementation Unit; (b) technical designs for the reconstruction and rehabilitation of infrastructure included under various Project components; (c) supervision quality control and contract management of reconstruction and rehabilitation sub-projects; and (d) audit studies and assessments required under various Project components. Budget for the component is US$4 million.

3.0 PROJECT APPRAISAL UNDER WORLD BANK SAFEGUARDS POLICIES.

Support to rehabilitation/re-construction of damaged irrigation schemes in the 15 flood affected districts will trigger Operational Policy 4:09 (Pest Management). This is because the re-construction of irrigation schemes will enhance the uptake of pesticides in the scheme Initial evaluation of Malawi Floods Emergency Recovery Project under World Bank Safeguards Policies, has indicated implications on some negative environmental and social impacts, and the project has been rated under category B of Operational Policy 4:01 (Environmental Assessment). Other safeguards policies triggered are: Operational Policy 4:04 (Natural Habitats), and Operational Policy 4.12 (Involuntary Resettlement).

Potential negative impacts from uptake of pesticides include risks of poisoning of non-target biodiversity, risks of poisoning of farmers, pollution of water resources, and increase in diseases resistance on some crops.

World Bank Pest Management Policy supports safe, affective, and environmentally sound pest management. It promotes the use of biological and environmental control methods. A preferred solution is to use Integrated Pest Management (IPM) techniques and encourage their use in the whole of the sectors concerned. The policy also aims at assisting proponents to manage pests that affect either agriculture or public health, supports a strategy that promotes the use of biological or environmental control methods and reduces reliance on synthetic chemical pesticides. The approaches include as biological control, cultural practices, and the development and use of crop varieties that are resistant or tolerant to the pest. .

Pest Management Policy calls for assessment of the nature and degree of associated risks, taking into account the proposed use and the intended users for procurement of any pesticide in Bank-financed projects. It is a requirement that any pesticides that will be used, will be manufactured, packaged, labeled, handled, stored, disposed of, and applied according to standards acceptable to the World Bank. This plan has included internationally accepted guidelines on storage, labeling, application and disposal of obsolete pesticides.

4.0 OBJECTIVES OF INTEGRATED PEST MANAGEMENT PLAN**.**

The aim of the Integrated Pest Management Plan is to guide on safe, effective and environmentally friendly measures for control and management of pests and diseases on irrigation schemes.

Key specific objectives for the plan are:

a) Identify potential pests and diseases on damaged irrigation schemes in the 15 flood affected districts.

b) To identify and recommend biological, chemical and ecological approaches for farmers to learn, select and implement integrated pest management options for reducing pest and crop losses on irrigation schemes

c) To identify negative impacts and benefits of integrated pest management measures on irrigation schemes including on human health.

d) To outline policy and legal framework for adherence on procurement, storage, distribution and application of pesticides on irrigation schemes under the project.

e) Identify and recommend of training programme scheme irrigation farmers in appropriate use of pesticides and other environmentally friendly methods on irrigation schemes.

f) To recommend appropriate approaches for storage and application of pesticides on irrigation schemes.

5.0 USERS OF THE INTEGRATED PEST MANAGEMENT PLAN.

The integrated pest management plan contains useful information on safe and effective and environmentally friendly measures for control of pests and diseases on irrigation schemes. In addition the plan outlines local and international legal approvals/licences which need to be obtained in order to ensure that the use of pesticides on irrigation schemes adheres to sound environmental management practices stipulated in various policies and pieces of legislation. Such information will be useful in crop production on irrigation schemes. In this regard, the plan will be useful to the following implementing agencies: project implementation unit, schemes farmers (Water Users Associations), District Councils, Ministry of Agriculture, Irrigation and Water Development and Environmental Affairs Department. In addition, the integrated pest management plan will be useful to non – governmental organizations and civil society organizations, development partners such as World Bank.

6.0 APPROACH AND METHODOLOGY ON PREPARATION OF THE PLAN

The Integrated Pest Management Plan has been prepared with information obtained by multi-facetted methods and from different sources. Some information has been obtained through desk studies by review of existing literature with information related to the project. Such document includes census reports, maps, project appraisal documents, preliminary project design plans, government policies and pieces of legislation. Information obtained from literature review includes background information. All these documents have been duly acknowledged in the reference page.

Some information was obtained through field surveys in five flood affected districts (Salima, Mangochi, Machinga, Phalombe and Chikwawa) and focus group discussions with selected irrigation scheme farmers in Chikwawa, Mangochi and Phalombe Districts. The field surveys included visits various public infrastructure and areas damaged by floods, visits to six camps of flood affected people. Fields surveys and site visits enabled collection of baseline data on the existing environments of project area. In addition, some information has been obtained through stakeholder consultations with a range of stakeholders. Stakeholders consulted include senior government officials, local government officials, irrigation farmers, local leaders, development partners and selected private sector representatives. These consultations provided opportunities to obtain views on the scope of project, project designs, potential positive and negative impacts as well as mitigation measures for integration in project implementation.

1.1.0 BACKGROUND ON THE PROJECT.

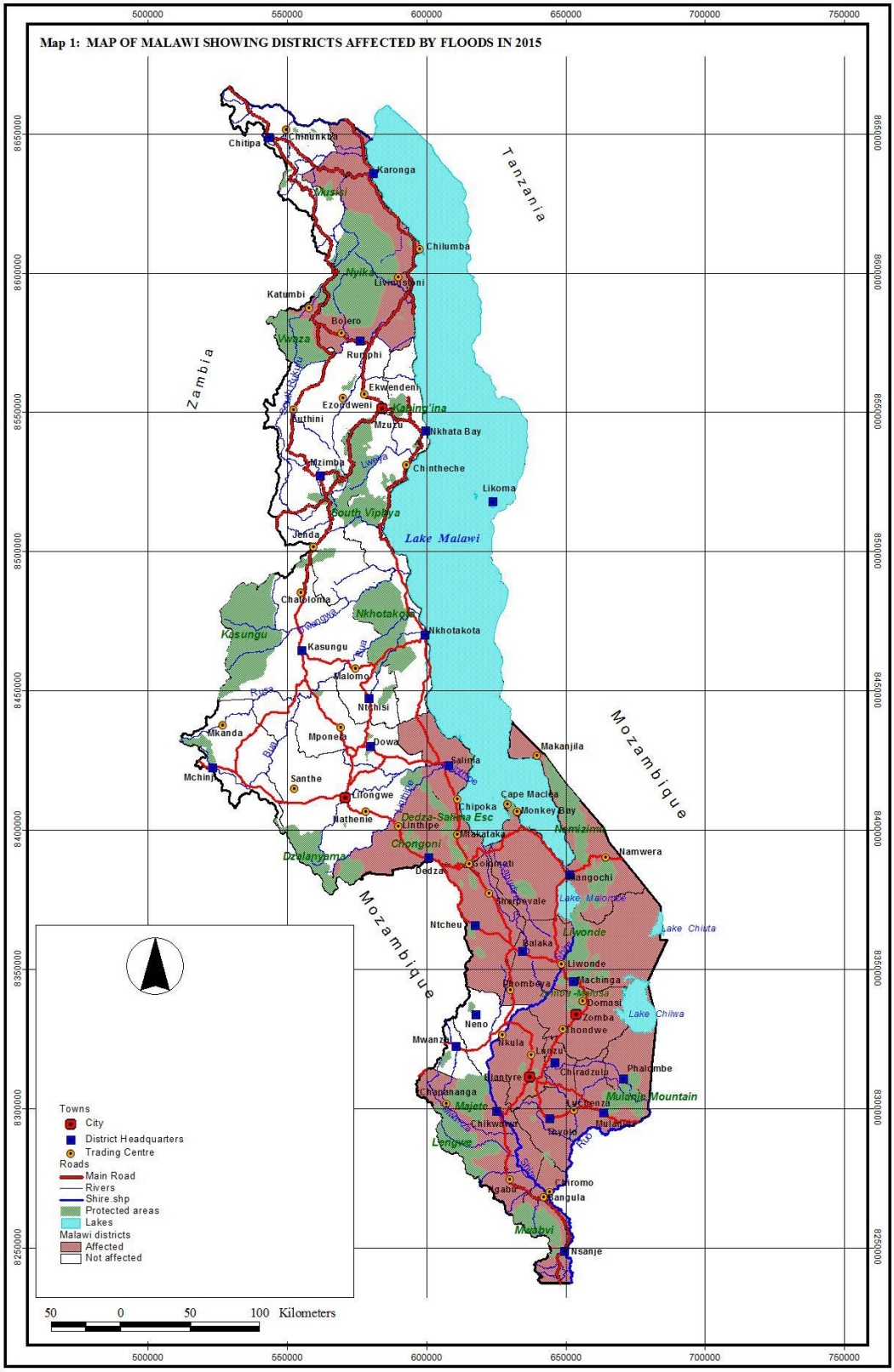
1.1.0 INTRODUCTION ON THE PROJECT.

This Integrated Pest Management Plan covers the Malawi Floods Emergency Recovery Project (MFERP). The aim of the project is provide immediate support to the affected populations in restoring their livelihoods, as well as rehabilitating critical infrastructure essential for the restoration of public service delivery and sustainable economic recovery in the flood-affected areas. The proposed period of the project is 4 years, from 2015 to 2018. Government of Malawi is seeking a grant of US$80 million from the International Development Association (IDA) of the World Bank Group for project.

The Integrated Pest Management Plan will be more useful in planning and implementation of rehabilitation works on damaged irrigation schemes. The rehabilitation and operation of schemes would trigger the uptake of pesticides on the schemes. Funds from the World Bank for project will not be used to procure pesticides for use on the irrigation schemes. Government of Malawi will ensure effective integrated pesticide management plans are in place for all irrigation schemes to be rehabilitated under this project

1.2.0 PROJECT IMPACT AREAS.

Rehabilitation of damaged irrigation schemes will cover 15 flood affected districts in Malawi. These include Karonga, Salima, Mangochi, Ntcheu, Zomba, Chiradzulu, Phalombe , Mulanje, Chikwawa, Nsanje, Machinga, Dedza, Balaka, Blantyre, Rumphi, Thyolo. In general, the districts are within Rift Valley Floor, Shire Highlands and Lower Shire Valley regions. These regions are among the densely populated areas in Malawi. Rain - fed agriculture is the main economic activity for the people in the 15 flood affected districts. The map of Malawi below shows locations of flood affected districts in the country.


Map 1: MAP OF MALAWI SHOWING DISTRICTS AFFECTED BY FLOODS IN 2015
500000
550000
600000
650000
700000
750000
8650000
8600000
8550000
8500000
8450000
8400000
8350000
8300000
8250000
Tanzania
Zambia
Mozambique
Mozambique
Lake Malawi
Lake Malombe
Lake Chiuta
Lake Chilwa
Mulanje Mountain
Chitipa
Karonga
Chilumba
Nyika
Livingstonia
Katumbi
Bolero
Vwaza
Rumphi
Ekwendeni
Ezondweni
Kaning'ina
Luthini
Mzuzu
Nkhata Bay
Mzimba
Lwipa
Chintheche
Likoma
South Viphya
Jenda
Chatoloma
Nkhotakota
Kasungu
Kasungu
Phongolo River
Malomo
Ntchisi
Mkanda
Mponela
Dowa
Salima
Mchinji
Santhe
Lilongwe
Nathenje
Linthipe
Dedza-Salima Esc
Chipoka
Cape Maclea
Monkey Bay
Makanjila
Nkhotakota
Nyamizimi
Mtakataka
Chongoni
Dzalanyama
Dedza
Golomoti
Namwera
Mangochi
Sharpevale
Ntcheu
Balaka
Liwonde
Machinga
Phombeya
Domasi
Zomba
Neno
Mwanza
Thondwe
Ntcheu
Lunzu
Blantyre
Chiradzulu
Phalombe
Chikwawa
Majete
Chenzo
Mulanje
Nsanje
Chiromo
Ngabu
Tangula
Mwabvi
Lengwe
Towns
City
District Headquarters
Trading Centre
Roads
Main Road
Rivers
Shire.shp
Protected areas
Lakes
Malawi districts
Affected
Not affected
50 0 50 100 Kilometers

1.3.0 PROPONENT AND IMPLEMENTING AGENCIES.

The proponent of the proposed Malawi Floods Emergency Recovery Project is Government of Republic of Malawi. Contact details and addresses of the proponent are as follows:

Proponent Name	:	Secretary to Treasury
	:	Ministry of Finance, Economic Planning and Development
Postal address	:	P.O. Box 30049, Capital City, Capital Hill, Lilongwe 3, Malawi.
Telephone	:	265-01-789 355
Facsimile	:	265-01-789 185
E-mail	:	finance@gov.mw.net
Project Contact	:	Dr Ronald Mangani

A central project implementation unit based in Lilongwe will coordinate implementation of Integrated Pest Management Plan under the Malawi Floods Emergency Recovery Project. The unit will be supported by sectoral ministries and these will include: Ministry of Agriculture, Irrigation and Water Development, Ministry of Lands, Housing and Urban Development, Ministry of Local Government and Rural Development, Ministry of Natural Resources, Energy and Mining, Ministry of Transport and Public Infrastructure, Roads Authority, Department of Disaster Management Affairs, Ministry of Health, Department of Irrigation Services, Ministry of Education, Science and Technology. There will be number of consultants and contractors will be hired in the design and rehabilitate damaged irrigation schemes.

1.4.0 AIM AND OBJECTIVES OF INTEGRATED PEST MANAGEMENT PLAN.

The aim of the Integrated Pest Management Plan is to guide on safe, effective and environmentally friendly measures for control and management of pests and diseases on irrigation schemes.

Key specific objectives for the plan are:

g) Identify potential pests and diseases on damaged irrigation schemes in the 15 flood affected districts.

h) To identify and recommend biological, chemical and ecological approaches for farmers to learn, select and implement integrated pest management options for reducing pest and crop losses on irrigation schemes

i) To identify negative impacts and benefits of integrated pest management measures on irrigation schemes including on human health.

j) To outline policy and legal framework for adherence on procurement, storage, distribution and application of pesticides on irrigation schemes under the project.

k) Identify and recommend of training programme scheme irrigation farmers in appropriate use of pesticides and other environmentally friendly methods on irrigation schemes.

l) To recommend appropriate approaches for storage and application of pesticides on irrigation schemes.

1.50 APPROACH IN PREPARATION OF INTEGRATED PEST MANAGEMENT PLAN

The aim of the exercise was to identify strategies which can guide on safe, effective and environmentally friendly measures for control and management of pests and diseases on irrigation schemes to be rehabilitated under the project.

In order to achieve these targets, various methods (such as interviews of selected stakeholders, site visits to selected irrigation schemes, literature review,) were adopted in the assignment.

Step 1: Review of existing literature.

This step involved a review of some existing literature and documents with information and data related to the project. Documents reviewed included: Malawi's Pesticide Act (2000). Malawi's Pesticides Regulations (2002), World Bank Operational Policy 4:09 (Pest Management), environmental profiles in Malawi, national environmental and social related policies and pieces of legislation as well as other pest management plans. Examples of data and information obtained from such sources include background information on project, background information on Malawi's environmental policies and pieces of legislation. All these documents have been duly acknowledged in the reference page of this integrated pest management plan.

Step 2: Field surveys in the project area.

This step involved field surveys in four flood affected districts which were Salima, Mangochi, Phalombe and Chikwawa. The objectives of the field surveys were to observe the activities on the irrigation schemes, crops being grown, existing problems of pests on irrigation schemes, the extent of use of pesticides among others. The field surveys also assisted to capture baseline data on the components of the environments. In addition, the field surveys provided opportunities to characterize the scale/extent of potential impacts and effects from construction/rehabilitation works.

Step 3: Stakeholder Consultations and Participation.

This step involved soliciting views from selected stakeholders. Selected stakeholders to the project were consulted and these include the following.

- Consultations with senior officials at various government ministries and departments. These included Pesticide Control Board, Ministry of Finance, Economic Planning and Development, Ministry of Education, Science and Technology, Ministry of Health, district council officials among others. The discussions centered on aim and objectives of the project, the scope of the project, design and modalities of implementation. Consultations took place in Lilongwe on 18 -27 March 2015. List is attached in annex 3.
- Interviews and discussions with local government officials in four selected district councils. The four selected district councils are among the 15 flood affected districts. List of all officials consulted is attached in annex 3.
- Interviews and discussions with selected irrigation scheme farmers in selected sites of four selected flood affected districts.

2.0.0 REHABILITATION ACTIVITIES OF IRRIGATION SCHEMES.

Rehabilitation of damaged irrigation schemes has been incorporated in the Malawi Floods Emergency Recovery project as one strategy to enhance the restoration of livelihoods and food security for households in the flood affected districts. Thirty –six irrigation schemes have been chosen to for rehabilitation.

The recent unprecedented floods have caused tremendous damage to irrigation infrastructures and irrigated crop land in the 15 flood affected districts. Examples of common damages on irrigation infrastructure observed during field surveys include over-topping erosion and headwork's failure. There has been inundation of main canals and these effects have caused breaches in most cases and wash away of pipelines. In addition, the surge of overland flow impacted irrigation land close to the point of failure with sand deposits and the concentrated 'dam break' flows also damaged infield irrigation structures, scheme roads & related structures, flood protection bunds, water storage reservoirs etc.

Although other areas are still inaccessible hence difficult to quantify the damage to irrigation infrastructure, initial assessment puts the replacement cost to flood damaged irrigation infrastructure over MK 3 billion. This figure includes only the damage to infrastructure, and it excludes loss of land due to erosion, sand deposits and loss of livelihood. Table 1 shows the quantities of damaged irrigation infrastructure with the estimated replacement cost

Table 1: The quantities of damaged irrigation infrastructure in the 15 flood affected districts.

Headwork's	56	No	805,149,150.00
Flood Protection Embankments/Bunds	173	No	134,191,525.00
Irrigation Canals	46,776	m	268,383,050.00
Dams/NSR	13	No	322,059,660.00
Pipes	16,317	No	214,706,440.00
Pumping Stations	121	No	134,191,525.00
Infield Structures	663	No	80,514,915.00
Wells	2,707	No	456,251,185.00
Scheme roads	1,078	km	134,191,525.00
Scheme roads infrastructures	51	No	80,514,915.00
Drainage canals	280	m	26,838,305.00
Drainage structures	42	No	26,838,305.00

Government of Malawi has identified 36 irrigation schemes from the identified lists as part the package to be rehabilitated in the first phase of the Malawi Floods Emergency Recovery Project. The 36 damaged irrigation schemes are located in various sites in the 15 flood affected districts.

Main impact of damaged irrigation infrastructure and flooding of irrigation areas is suspension of irrigation crop production/winter farming. This is a major drawback for flood displaced people and surrounding communities because winter farming contributes to food security in the areas around the scheme. Reconstruction and in some cases repairs to damaged infrastructure have to be urgently implemented in order to mitigate the impacts of floods in the medium to long-term. Irrigation development in Malawi remains a pillar for food security and improved nutrition.

There are two sub-components under Malawi Floods Emergency Recovery Project which will fund the rehabilitation of damaged irrigation schemes. These are as follows:

2.1.0 Rehabilitation of Irrigation schemes.

This sub-component will fund the operational restoration of selected and prioritized irrigation schemes that have been destroyed or damaged by the floods. This will entail the design, supervision, repair and rehabilitation of: headworks, flood protection bunds, main canal sections, drains and in-field infrastructure. All of the irrigation schemes proposed to be rehabilitated are community infrastructures that are smallholder farmer managed and range from mini schemes (below 10 hectares) to about 400 hectares. Permanent repair will be required especially for recently constructed and revived schemes that were showing high productivity and have incurred a significant setback.

2.2.0 Labor-Intensive Community Infrastructure Repair

This sub-component will also contribute to rehabilitation/repair of of small scale community infrastructure including mini-irrigation schemes. These activities will be done through input for asset approach by local communities. The component is intended to provide immediate assistance for livelihood-supporting and income-generating activities. It will enable beneficiaries to meet their basic requirements by providing farm inputs for the next season and other in-kind assistance in return for their participation in labor-intensive community infrastructure repair schemes. These interventions will create jobs while simultaneously repair and restore community infrastructure as well as indirectly regenerate farmers' agricultural production. This will allow beneficiaries to meet their food and basic household needs, while the restoration of community assets will also support more diversified and sustainable livelihoods.

Sub-project activities will involve repair and reconstruction of flood-damaged community assets or new assets that increase resilience to future flooding and that have wide public benefit. Examples of sub-projects will be rural feeder roads; soil conservation and afforestation works; storm and road drainage works; reservoirs; embankments; market collection centers; community grain banks; and small-scale irrigation schemes.

2.3.0 APPROACH ON REHABILITATION OF DAMAGED IRRIGATION SCHEMES

The damaged schemes to be rehabilitated will include those schemes which were recently rehabilitated by Irrigation Rural Livelihoods Development Project 2012-2014). The schemes will be categorized into three groups based on size and scope of civil works as follows:

Category one will be mini irrigation schemes. Mini schemes are small (less than 10 hectares), and therefore, the investment is basic. In many cases, it is only the water intake that is made out of concrete and the rest of the field canals are earthen. In some cases, the intake and the main canal are brick lined and the rest of the canals (secondary and tertiary) are earthen. Most of the damage therefore will be expected at the water intake and that is where external assistance in terms of repair would be expected.

Category two will be small-scale irrigation schemes_ The small-scale irrigation schemes cover sizes of 10-50 hectares in size and have have substantial investments covering the intake, main canal and in many cases the secondary canals. The intake usually is complex requiring more attention by Water User Associations (WUA) in terms of operation and maintenance work. Organizational structure in small-scale irrigation is more elaborate because of the size of the scheme and number of farmers involved.

Category three will cover large-scale schemes. These are schemes over 50 hectares and above: These schemes attract relatively large investments and any damage to both intake and in-field structures mean high cost.

Scheme farmers will participate in rehabilitation of damaged irrigation schemes. The role of the Water Users Association in scheme rehabilitation or reconstruction will be to determine the level of damage that has occurred to the schemes or related sections. When this determination or assessment is completed, the community invites the District Irrigation Officer (DIO), who then reviews the assessment report and prepares the Bills of Quantities (BOQ), which is then submitted to the District Executive Committee for approval and inclusion in the district's Annual Plan. Considering that the schemes damaged have already been identified, communities or WUA/G should be approached to properly determine the areas of damage that can be repaired by outside institutions (through project resources) and the parts of the damaged scheme that can be repaired by the community itself. Water Users Association will then approach the DIO to produce BOQs for submission to the district committees. The district will submit the BOQs to the DOI and PIU for cost estimates to determine the method of repairing the scheme. If upon assessment and costing it is determined to engage a contractor, then bid documents will be prepared and the appropriate procurement procedures will be followed to engage both a supervising engineer and contractor. If they are small works, local contractors or artisans will be recruited through community contracting.

3.0 POLICY AND LEGAL FRAMEWORK FOR INTEGRATED PEST MANAGEMENT PLAN.

The use of integrated pest control measures in irrigation schemes has to adhere to various policies and laws in Malawi as well and World Bank Environmental Safeguard Policies. Examples of environmental related policies and laws in Malawi include Pesticide Act (2000), Pesticide Regulations (2002), National Environmental Policy (2004), Plant Protection Act among others. Operational Policy 4:09 (Pest Management) is the main World Bank Safeguard Policy which guides integrated pest management plan for projects which triggers pesticide usage.

The following paragraphs highlight requirements for adherences from various policies and legislation.

3.1 The National Environmental Policy (2004)

The National Environmental Policy focuses on the satisfaction of basic needs for humans and protecting the environment in the cause of development. The policy also recognizes the need to ensure food security and eradication of rural poverty through the promotion of production systems, technologies and practices that are environmentally sound. The policy has identified several environmental issues in the country. These are land degradation, water pollution, air pollution, loss of wildlife habitats, deterioration of aquatic systems and deforestation. The IPMP as a planning tool shall be used to integrate environmental considerations in the decision making process in order to ensure sustainability. The plan will also address the following policy objectives with respect to environmental management in agriculture: i) to ensure sustainability, security, equitable and sustainable use of natural resources; ii) to prevent and control degradation of land, water, vegetation, and air; iii) to conserve biological diversity of the unique ecosystems the country; iv) to raise public awareness and understanding of the essential linkages between environment and development; and, v) to promote individual and community participation in environmental action.

3.2 World Bank Safeguard Policies – Pest Management Policy (OP 4.09)

The policy supports safe, affective, and environmentally sound pest management. It promotes the use of biological and environmental control methods. A preferred solution is to use Integrated Pest Management (IPM) techniques and encourage their use in the whole of the sectors concerned. The policy also aims at assisting proponents to manage pests that affect either agriculture or public health, supports a strategy that promotes the use of biological or environmental control methods and reduces reliance on synthetic chemical pesticides. Operational Policy (OP 4:09) recommends that integrated pest management plans for World Bank funded agriculture related projects. The approaches include as biological control, cultural practices, and the development and use of crop varieties that are resistant or tolerant to the pest. .

The policy calls for assessment of the nature and degree of associated risks, taking into account the proposed use and the intended users for procurement of any pesticide in Bank-financed projects. It is a requirement that any pesticides that will be used, will be manufactured, packaged, labeled, handled, stored, disposed of, and applied according to standards acceptable to the World Bank. This plan has included internationally accepted guidelines on storage, labeling, application and disposal of obsolete pesticides.

In line with requirement under this policy, this Integrated Pest Management Plan has included in annex 2 detailed guidelines for storage of pesticides, distribution of pesticides, application of pesticides on irrigation schemes and guidelines on disposal of obsolete pesticides. In addition

the plan includes recommended guidelines on protective clothing /equipment for those farmers to be involved in application of pesticides on irrigation schemes.

Funds from the World Bank for project will not be used to procure pesticides for use on the irrigation schemes. Government of Malawi will ensure effective integrated pesticide management plans are in place for all irrigation schemes to be rehabilitated under this project.

LEGAL FRAMEWORK

3.3 The Pesticide Act (2000)

Pesticide Act provides for the life-cycle management of pesticides, regulating the manufacture, formulation, importation into and exportation from the country, transport, storage, distribution, sale, use and disposal of pesticides and to regulate other matters connected thereto. This Act will establish the Pesticides Control Board which responsible for monitoring the trade and use of pesticides, and collecting statistical and other information concerning the import, export, manufacture, distribution, sale and use of pesticides, about pesticide residues and safe use. The act prohibits the importation, manufacturing, formulating, transportation, distribution, exportation or sell of banned, obsolete pesticides and any other pesticide banned or severely restricted in the country of origin under any circumstances within the country or any pesticide for which is not in the category/group currently under use.

In relation to Integrated Pest Management Plan Pesticide Control Board recommends availability of safer alternatives to existing pesticides as per latest global research and development without compromising the importation of biological control agents as allowed in the biological control agents protocol developed within the Plant Protection Act (1974).

3.4 Pesticides Regulations (2002)

Pesticide Regulations were put in place to guide on the implementation of provisions of Pesticide Act. The objectives include – (i) to ensure the effectiveness of pesticides used in Malawi for the production of food and for the protection of public health and safety: (ii) to protect against possible harmful effects of pesticides including: (a) impairment of the health of persona handling pesticides or using or consuming products or substance treated with pesticides; (b) impairment of the health of domestic animals including honey bees from direct application or pesticides or from the consumption of plant or animals treated with pesticides (c) damage to cultivated plants from direct application or pesticides or from persistent soil residues and (d) damage to the natural environment including impairment of the health of wildlife and contamination of waterway lakes and other water bodies

3.5 The Environment Management Act (60:02)

Environmental Affairs Department established under Environment Management Act has responsibilities of; i) advising and implementing policies of the government on the protection and management of environment; ii) coordinating activities related to the environment; iii) ensure that environmental concerns are integrated into the development planning and project implementation in a way which protects the environment; iv) prepare and coordinate the implementation of environmental action plans at the national and local levels; v) and, vi) ensure that environmental standards are environmentally sound.

In relation to the management of dangerous materials and processes, of which agricultural chemicals may fall, the Minister shall have the power to make regulations pertaining to persistent organic pollutants (POP) and pesticides issues, to ensure that they are in compliance with the Stockholm Convention on POP of 2001 and Rotterdam Convention on the Prior

Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade of 1998.

Furthermore, the Minister has the powers to make regulations regarding the prevention and control of pollution. This mainly relates to the discharge of hazardous substances such as chemicals or mixtures containing oil in water or any other segment of the environment, except in accordance with guidelines prescribed under this Act or any other written law. In this context, services that relate to the regulation of agricultural chemicals in the Ministry of Agriculture, Irrigation and Food Security shall be at the forefront to ensure the judicial use of pesticides in agriculture.

3.6 The Water Resource Act (2013)

The Act provides for institutional and legal integrated pest management plan for sustainable management and development of water resources; outlines principles for water resources management; for prevention and control of water pollution; and provides for participation of stakeholders and general public in implementation of the National Water Policy (2005). Its main objective is to ensure that the country's water resources are protected, used, developed, conserved, managed and controlled in ways that meet the basic human needs of present and future generations, prevent and control pollution of water resources and protect biological diversity especially the aquatic ecosystems.

The act stipulates that any owner or occupier of land whose activities or processes are likely to cause pollution of a water source, shall take all reasonable measures to prevent any such pollution from occurring, continuing or recurring. Failure to comply with such a directive, National Water Resources Authority may take measures as it considers necessary to remedy the situation. In this context, the IPMP will strive to comply with the provisions of the Act.

3.7 Plant Protection Act .

This Act has made provisions for consolidation of plant protection to prevent introduction and spread of harmful organisms, to ensure sustainable plant and environmental protection, to control the importation and use of plant protection substances, to regulate export and imports of plant and plant products and ensure fulfillment of international commitments, and to entrust all plant protection regulatory functions to the government and for matters incidental thereto or connected therewith. Agriculture Research Stations have Gene Bank Divisions which coordinate the regulatory functions on protection of plants in Malawi.

In relation to Integrated Pest Management Plan, Plant Protection Act, highlights that importation of biological control agents is not allowed unless under the prescribed permit by the Ministry responsible for Agriculture .

4.0.0 EXISTING AND ANTICIPATED PEST AND DISEASE PROBLEMS ON IRRIGATION SCHEMES.

There are two key categories of activities that will involve use of pesticides in irrigation schemes to be rehabilitated under the Malawi Floods Emergency Recovery Project, The activities will be i) agricultural for the control of pests, diseases, nematodes and weeds The major crops targeted under IPMP within the irrigated schemes in the flood affected districts are maize, beans, rice, sweet potatoes and cabbages, which involve the application of agrochemicals and inputs such as fertilizers, herbicides, insecticides, nematicides and fungicides.

4.1.0 Food Crops

Main food crops grown in irrigation schemes within the flood affected districts are maize, rice, beans and horticultural crops. The following crop calendar provided an overview of the time when most applications of agrochemicals occur:

			Month											
	Crop	**Activity**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
1	Maize	*Land preparation*												
		Planting												
		Weeding												
		Harvesting												
2	Rice	*Land preparation*												
		Planting												
		Weeding												
		Harvesting												
3	Beans	*Land preparation*												
		Planting												
		Weeding												
		Harvesting												
4	Horticultural crops	*Land preparation*												
		Planting												
		Weeding												
		Harvesting												

Figure 1. Cropping calendar showing different activities for key crops in flood affected districts.

The cropping calendar indicates that rain fed crops such as maize, rice are grown in the period that coincide with the onset of rains in November/December – June/July), round potatoes in March/April, beans in April/May – July/August, tomatoes in June/July – September/October while vegetables are grown between June and October . Fertilizers such as Phosphate, Di-Ammonium Phosphate (DAP), Urea, Calcium Ammonium Nitrate (CAN) and Sulphate of Ammonia (SA) are applied during planting and after weeding, consecutively. Most of the pesticide applications occur between February and April.

4.2.0 Maize

Maize is the major staple food that is grown in all 15 flood affected districts over a wide range of altitudes, ranging from the low lying rift valley floor to 1200 meters middle altitude areas. Maize if grown under rain fed and irrigated conditions in all 15 flood affected districts. Middle altitude areas (plains) are high producers of maize and make an important contribution to the national grain basket. The major insect pests of maize found in this zone and their recommended management practices are listed on Table 2, while pesticides used for pest control are shown in Table 3.

Table 2. Common pests and diseases and their proposed management practises in maize

Pest		Recommended management practices
Insects that occur between planting and harvesting	Stalk borers (*Busseola fusca*)	- Stalks are buried or burned to eliminate diapason larvae - Early sowing reduces infestation - Intercropping with legumes (beans,…) - Neem powder (4-5 gm i.e. pinch of 3 fingers) per funnel - Neem seed cake (4 gm/hole) during planting - Use the extract of *Neuratanenia mitis*, a botanical pesticide
	African armyworm (*Spodoptera exempta*)	- Scout the crop immediately the forecast warns of expected outbreak in the area - Apply recommended insecticide or botanical extract timely
	Seedling weevils *(Tanymecus* spp. & *Mesokeuvus* spp)	- Timely planting to escape damage - Scout the crop - Apply recommended pesticide
Post-harvest insects	Larger grain borer (LGB) Weevils Moths and rodents	- Selection of tolerant varieties - Timely harvest - De-husking and shelling - Proper drying - Sorting and cleaning of the produce - Cleaning and repair of the storage facilities - Use rodent guards in areas with rat problems - Use improved granaries - Use appropriate natural grain protectants where applicable or - Use recommended insecticides - Keep the grain in air tight containers and store these in a shady place, preferably in-doors - Carry out regular inspection of the store and produce. Timely detection of any damage to the grain and/or storage structure is essential to minimise potential loss or damage - Promote biological control of LGB using *Teretriosoma nigrescens* (Tn) to minimise infestation from wild sources.

Pest		Recommended management practices
Weeds (pre and post emergence)	All types See Appendix 1	- Hand pulling and hoe weeding - Intercropping - Use resistant/tolerant varieties - Improvement of soil fertility - Tillage - Proper land preparation - Timely weeding (at 2 and 5-6 weeks after planting) - Apply recommended herbicides

Table 3. Pesticides used to control pre and post-harvest pests occurring in maize

Chemical		Chemical common name	Formulation	Application rate	Target pest	Comments
Insecticides	Pre-harvest				Stalk borers & armyworm	Apply 3-4 weeks after emergence
		Carbofuran Chlorpyrifos	5G			
	Post harvest	Cypermethrin	0.5% D	100gm/100kgs	LGB	
		Fenitrothion + Deltamethrin				Controlling major storage pest of maize
		Pirimiphos methyl	2% D	200-500gm/ 100kgs	All storage insect pests for all grains	Not good enough against LGB
		Pirimiphos methyl + permethrin	1.6% + 0.3%D	100gm/100kgs		
Fungicides	Pre-harvest	Imdaclopid Metalaxyl Thiram	10% 10% 10%		For soil born disease	Maize seed treatment
Herbicides		Atrazine + metalochlor	50% FW	4l/ha	All types	Apply pre-emergence
		Atrazine	80% WP	2.5 to 3.0 l/ha	All types	Pre/post emergence

Notes:
1. All herbicides are applied using knapsack sprayers
2. All the insecticides for storage pests are in dust form and therefore used as supplied without mixing with anything else.
3. The pre-harvest insecticides are used without mixing.
4. The list of pesticides can change as new products are recommended and/or some of the chemicals are withdrawn. Therefore always consult the nearest Agriculture Extension Development Officer if in doubt

4.3.0 Rice

Rice is another important food and cash and crop in the flood affected districts. Improved varieties include Faya 14 –M-69, Nunkile, Mtupatupa (TCG10), Senga (IET 4094) and Kilombero are popular in all flood affected districts. Some rice is grown in upland areas and some rice is grown under irrigation. Irrigated rice farming faces a number of pests and disease

problems. However, most of them do not need pesticide application, especially in rain fed areas. Table 4 shows the key pests and diseases of rice.

Table 4. Major pests and diseases of rice and recommended management practices

Pests		**Recommended management practices**
Insects	Stem borers (*Chilo partellus, C. orichalcociliellus, Maliarpha separatella, Sesamia calamistis*)	- Plant recommended early maturing varieties - Destruction of eggs in the seedbeds - Early planting - Use recommended plant spacing - Minimise simultaneous planting as this provides food continuously for the pest - Destruction of stubble after harvest - Clean weeding - Plough after harvest to expose the eggs to natural enemies
	Stalk-eyed fly (*Diopsis* spp)	
	African rice gall midge (*Orseolia oryzivora*) Small rice grasshoppers (Oxya spp.)	
	African armyworm (*Spodoptera exempta*)	- Resistance varieties - Stalk management in dry season
	Flea beetles (*Chaetocnema varicornis*)	- Suspected to be the key vector of RYMV. No known control measures.
	Rice hispa (*Dicladispa* sp)	- Found mostly in irrigated fields. Avoid stagnant water in the fields
Weeds	Cyperus rotandus, striga All types	- Early clean weeding - Use recommended herbicides if necessary
Diseases	Rice yellow mottle virus	- Field sanitation including burning of crop residues and removal of volunteer plants - Use of resistant varieties
	Rice blast (*Pyricularia oryzae*)	- Destruction of crop residues - Clean seeds - Avoid use of excessive nitrogen fertilizers - Use resistance varieties - Appropriate crop rotation - Timely planting - Burying crop debris
	Brown leaf spot (*Helminthosporium* spp)	
	Sheath rot (*Acrocylindrium oryzae*)	
Vermins	Birds Rats	- Scaring - Bush clearing - Early harvesting - Spraying against Quelea quelea

Source : A Guide to Agricultural Production and Natural Resources Management

4.4.0 Beans (Phaseolus)

Common beans or phaseolus may be regarded as one of the principal sources of protein as well as income to most farmers in flood affected districts. Beans are grown throughout the country with major production under rainfed system and some under irrigated system. Consequently, the pest pressure and type varies due to agro-ecological and management differences. Small-scale farmers grow beans mainly as intercrop with maize, while large-scale farmers grow them as mono crop. In contrast to large-scale farmers, who apply a wide spectrum of chemicals, small scale farmers mainly apply cultural practices to control pests and disease in beans.

The most common diseases in beans are angular leaf spot disease, anthracnose, bean rust, and root rots. These are disease transmitted by fungi. One of the common causes of severe damage is the intensive cultivation of beans without sufficient rotation, the cultivation of resistant

varieties and seed dressing is potential integrated pest management control measures, but farmers have also to be trained in the proper diagnosis of the diseases.

The common pests in beans are stem maggots, brochids and foliage beetles. Maggots of the bean fly and foliate beetles cause damage to the beans while in the field. Brochids are storage insects that may cause severe loss of crop. Storage hygiene, improved storage structures and the application of ash, vegetable oil and botanicals, such as Neem and Tephrosia, are among the potential integrated pest management control measures of bean bruchids. Maggots and foliage beetles may be controlled by seed dressing or spraying with botanicals, or by cultural practices, including rotation, post-harvest tillage and earthling-up mulching.

Through breeding, a number of disease resistant and tolerant varieties are available to farmers. The following Table 5 shows general pest management options for beans,.

Table 5. Major pest problems of beans and recommended management practices

Pest			**Recommended management practices**
Insects	Pre-harvest	Bean stem maggot (*Ophiomyia* spp)	- Seed dressing - Apply recommended insecticide or botanical extracts within five days after emergence - Plant tolerant/resistant varieties if available - Improvement of soil fertility through application of manure and/or fertilisers
		Bean aphids (*Aphis fabae*)	- Practice early planting - Apply recommended insecticides or botanical extracts if necessary
		Bean leaf beetle (*Ootheca benningseni*)	- Observe recommended time of planting - Practice good crop rotation - Post-harvest ploughing where possible - Apply recommended insecticides
		Bean pod borer (*Helicoverpa armigera*)	- Apply recommended insecticides or botanical extracts
	Post harvest	Bean bruchids (*Acanthoscelides obtectus*)	- Ensure the beans are dry and well cleaned before storage - Apply recommended storage insecticide/ botanical extracts
Diseases		Bean anthracnose	- Practice good crop rotation - Sanitation and crop hygiene - Use certified seed - Observe recommended time of planting - Plant tolerant/resistant varieties
		Angular leaf spot	- As above
		Rust (*Uromyces appendiculatus*)	- Avoid planting beans in high altitude areas - Practice good crop rotation - Sanitation and crop hygiene - Plant tolerant/resistant varieties e.g. Ilomba, & Uyole 90 - Observe recommended time of planting - Spray with recommended fungicide when necessary
		Haloblight (*Pseudomonas* sp)	- Plant tolerant/resistant varieties e.g. Uyole 84 - Spray with recommended fungicide when necessary - Use certified seed

Pest			Recommended management practices
		Ascochyta (*Phoma* sp)	- Avoid planting beans in high altitude areas - Spray with recommended fungicide when necessary - Plant tolerant/resistant varieties e.g. Ilomba & Uyole 98 - Sanitation and crop hygiene -
		Bean common mosaic virus (BCMV)	- Plant tolerant/resistant varieties if available - Effect good control of aphids -

4.5.0 Horticultural crops

Shire Valley Region and Lakeshore Districts are well known for growing several horticultural crops such as tomatoes, cabbages, carrots, beans and sweet pepper. Tomatoes and cabbages are the main horticultural crops grown.

Cabbages are mainly grown for income generation and farmers apply available chemicals mainly to control insect pests. The most common disease affecting cabbage is black rot which is caused by bacteria *Xanthomonas campestris* and spreads through infected crop debris and seed. Wet warm weather conditions encourage the development of bacteria populations. Cultural control measures, such as deep ploughing, crop rotation and field sanitation considerably reduce the damage by black rot. Other potential IPM control techniques include seed dressing with *Bacillus* bacteria, seed treatment with hot water or antibiotics, and resistant varieties.

Diamond black moth and cabbage head worm (in lowland areas) are the most devastating insect pests affecting cabbages. Dry and hot weather conditions and the presence of host plants encourage the insect populations to develop. Farmers apply insecticides or cow dung and urine to control the pests. Application of Neem oil has proven to be effective, while the effect of natural enemies and other botanicals, such as *Diadegma,* Tephrosia and Annona seeds should be verified. An alternative control agent is *Bt-Bacillus thuringiensis*. Table 6 shows the major pests affecting cabbage and recommended practices for their control.

Table 6. Major pests of cabbages and recommended practices

Pest	Recommended management practices
Pests: Diamondback moth (*Plutella xylostella)*	- Scouting - Use botanical and other control agents - Observe recommended time of planting - Transplant healthy seedlings - Inspect the crop regularly to detect early attacks - Encourage natural enemies (predatory hoverfly larvae, coccinellids, parasitic wasps) by enhancing diversity - Application of fermented cow urine (10-14 days fermentation) - Use botanicals (Neem oil, chillies, etc.)
Aphids *(Brevicoryne brassicae)*	
Diseases: Black rot (*Xanthomonas compestris*)	- Seed dressing with Bacillus bacteria - Seed treatment with hot water - Mulching - Deep ploughing - 3-year crop rotation - Field and crop hygiene - Transplant only healthy seedlings - Plant certified seeds - Plant tolerant/resistant varieties like Glory, Amigo FI - Sterilise the seed bed before sowing - Good drainage, and mulch to avoid infections from rain splash
Cabbage club rot (*Plasmodiaphora brassicae)*	- Crop rotation - Plant in well drained soils - Adjust soil pH to alkaline by adding hydrated lime
Dumping off (*Fusarium Spp, Rhizoctonia spp. Pythium spp and Phytophthora spp)*	- Provide good soil structure and drainage - Avoid overwatering - Apply wood ash in seedbed - Sterilise seedbed - Use treated beds - Pricking excessive seedlings (thinning)
Bacterial soft rot *(Erwinia carotovora var. carotovora, Pseudomonas spp)*	- Avoid harvesting when the weather is wet - Handle produce carefully and store in cool, well-ventilated areas - Plough in crops immediately after harvesting - Practice crop rotation and provide good drainage - Timely planting to coincide with dry season

4.6.0 Migratory and outbreak pests

The key migratory and outbreak pests of economic significance in Malawi including some of the flood affected districts are armyworm (*Spodoptera exempta*), birds, notably the Quelea (*Quelea quelea* spp) and rodents (particularly the field rats). Management of such pests is co-ordinated by Ministry of Agriculture and Food Security as in some cases it involves aerial spraying or control measures to be taken on large areas.

Rodents: Rodents, particularly the multi-mammate shamba rat, (*Mastomys natalensis*), are major pests of food crops. The most affected crops are maize, millets, paddy and cassava. In the maize and paddy fields, rodents retrieve sown seeds from the soil causing spatial germination. In some cases, as much as 100% of the seeds are destroyed, this forcing farmers to replant. If an outbreak occurs farmers are advised to do the following:

i. Regular surveillance so that any management option is taken as soon as possible.
ii. Keep the store clean so that presence of any rodents is noticed early.
iii. Make the store rat-proof in order to discourage rodents from entering.
iv. Place the traps in strategic positions.
v. Use recommended rodenticide such as anticoagulant poisons, preferably as ready-made baits.
vi. Encourage team approach for effectiveness. The larger the area managed or controlled with poison, the more effective the impact

Birds (Quelea quelea). Birds are serious migratory pests of cereal crops, namely wheat, rice, sorghum and millet across the country. The Quelea birds, which in some parts of Malawi occur are swarms ranging from thousands to a few millions, have been responsible for famines of varying proportions in some areas. Bird pest problems in agriculture have proved difficult to resolve due in large to the behavioural versatility associated with flocking. The control of migrant pests such as Quelea is a major concern to most farmers and the Ministry of Agriculture and Food Security.

Several techniques have been tried to reduce bird populations to levels where crop damage is minimal. Traditional methods, slings, bird scares, and scarecrows, are still being used in many parts. Modern techniques of frightening devices, chemical repellents, less preferred crop varieties and alternative cultural practices have been evaluated. All the methods have minimal value in situations where bird pressure is high. The aerial spraying of chemical (parathion and later fenthion) on nesting and roosting sites is the most widely used technique to date. Currently, only fenthion 60%ULV aerial formulation is being used. The pesticide is recommended to be used at the rate of 2.0l/ha.

The concerns over possible human health problems and environmental damage resulting from the large-scale application of chemical pesticide for Quelea control have led to a proposal for alternative non-lethal control strategy. Chemical pesticide applied for Quelea control represent a risk for human, terrestrial, non-target fauna and aquatic ecosystems. The chemical pose risk by directly poisoning or by food contamination/depletion. Among the terrestrial non-target invertebrates, there are beneficial species which carry out organic matter cycling, predators and parasitoids of crop pests, while others like bees assure pollination of crops and wild plants and produce honey.

The risk to human health problems and environmental damage can be mitigated considerably by development of integrated environmentally sound control strategies including Net-Catching. These methods will educate farmers become custodians of the environment. The Food and

Agriculture Organization (FAO) has been encouraging the use of IPM approaches to the problem of bird attacks on cereal crops to minimize the use of pesticides.

Armyworm. The African armyworm (*Spodoptera exempta*) is a major threat to basic food production in a number of East and Southern African countries. Armyworm is a major pest of cereal crops (maize, rice, sorghum and millets) as well as pasture (grass family) and therefore a threat to food security and livestock. Overall losses of 30% for crops have been estimated though in major outbreak years losses in maize of up to 90% are recorded. Armyworm outbreaks vary from year to year and outbreaks are predetermined by weather conditions.

Armyworm control combines monitoring in identified breeding areas, forecasting and early warning of potential outbreaks. The national armyworm control programme based in Lilongwe, runs a network of traps that are distributed throughout the country to assist in forecasting potential outbreaks in the area. The traps are placed at district offices, research stations and in large-scale farms. Farmers are advised to inspect their fields for signs of infestation. If the crop is attacked, farmers should spray with the recommended pesticide. Both ULV and knapsack sprayers can be used depending on available formulation in the outbreak areas.

5.0.0 INTEGRATED PEST CONTROL AND MANAGEMENT OPTIONS

This section provides an introductory discussion of the various types of pest control strategies known and applied in Malawi. This includes a brief review of techniques for biological control, cultural control, chemical control, quarantine and physical or mechanical control, chemical control and botanical control are presented. Table 8 summarizes the benefits and potential risks of various methods.

5.1.0 Biological Control

Biological control involves the use of biological agents and predators to control pests and diseases. This has been practiced and found successful in crops like cassava and water hyacinth. 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 methods under biological control (bio-control).

Malawi has some experience based on the successful control of the cassava mealy bug, the cassava green mite and the water hyacinth. However, at national level, the capacity and capability to implement an effective nationwide programme is limited. The most common type of biological control practices in Malawi is 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 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.

Malawian crop breeders regularly select new varieties for their pest and disease resistance. For example, maize varieties (such as DK 8071, DK 8051, DK 8053, SC 403, SC627, PAN 6195) have been selected for resistance or tolerance to maize streak, the viral disease that causes significant yield loss to late planted maize. Varieties have also been produced with varying degrees of resistance to bacterial blight. Recently approved rice varieties have been selected with resistance to most diseases.

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.

5.2.0 Cultural and Crop Sanitation Practices

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

a) **Crop rotation:** This practice is used to depress weeds and/insect pests and diseases in some crops. For example, Striga in sorghum and millet can be controlled/reduced by planting a trap crop like groundnuts, cotton;
b) **Intercropping:** The field is used to grow two or more crops at the same time;
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) **Trap crops:** These induce the germination of a pest. The trap crop can be intercropped or rotated with a susceptible host (e.g. groundnuts, cotton etc).
g) **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).
h) **Hand pulling and hoes weeding:** These practices are the most common and being used by small-scale farmers.
i) **Burning:** Land clearing and destroying infected plants/crops.
j) **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.
k) **Use of disease free planting material** e.g. cassava cuttings, sweet potato vines etc.
l) **Pruning:** Done in coffee, tea orange tree etc. to reduce insect pests and diseases that might infest the crop.
m) **Thinning:** Done to reduce plant population in the field (e.g. in maize, rice, sorghum and millet, cotton etc.).

In Malawi there exists some indigenous knowledge in (biological) 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.

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.

Table 7: Botanical plants 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 (biological agents) being used in Malawi are 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*)

5.3.0 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.

5.4.0 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. Registered pesticides (annex 1) can be recommended as a component of IPM packages. All of these pesticides are registered under the by Pesticides Act (2000) and Pesticides Control Regulations (2002).

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 – see also Annex III)). 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. The Malawi Floods Emergency Recovery Project will not finance, or support the use of, any of these pesticides.

Annex 1 of this plan provide a list recommended and registered pesticides for crop production in Malawi: Oral LD_{50} and WHO classification

Under Pesticide Act (2000) and Pesticide Regulations (2002)), Pesticide Control Board of Malawi responsible for registration of pesticides, which are hence recommended as part of IPM components in all production/cropping systems as indicated in the previous sections of this report. Those pesticides in WHO class Ib, namely, chlorpyrifos, quinalphos, carbofuran, and isazophos, some of which are WHO class I and II are still featuring on the list of registered pesticides, although most of them are in the phase out list. A list of different categories of pesticides is found in the IPMP.

The current list of pesticides registered in Malawi indicates trade name, registration number, common name, registrant and usage. This is not informative enough given the wide range of its users. It is therefore recommended that, the proposed revised list should include the WHO class, oral LD50, active ingredient, and application rate.

Table 8 : Summary of positive impacts and negative impacts and recommended mitigation measures on various methods of pest control

Control method	Impacts (+ve or –ve)	Mitigation measure
Cultural:		
- Crop sanitation, mulching, pruning, thinning	- Improves the health of the crop and its ability to fight pests and diseases - Improves soil condition and helps to minimize weed infestation	- No mitigation measure required
- Weeding	- Pulling of weeds have minimum impacts to the environment	- No mitigation measure required
	- Use of herbicides will have an impact on environment	- Use measures proposed under chemical control
- Use of resistant varieties and tissue culture	- Use of pesticides is minimized and hence beneficial to environment	- No mitigation measure required
Mechanical:		
- Use of weeders and tillage equipment	- Minimizes use of herbicides - Health and safety may be impacted if operators are not skilled	- Use skilled manpower to operate the equipment - In case of accidents use proper procedures for treatment
- Insect traps (light, pheromones)	- Early detection of pests results in early application of pesticides before the situation becomes critical	- No mitigation measure required
- Manual weeding	- 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
Biological:		
- Application of biological control agents such as Bt (*Bacillus thuringiensis*), wasps - Isolation of bacteria on the KST which inhibits chytrid fungus	- Cost effective - Involves no use of pesticides hence no environmental or health risks - Applied selectively against one or two pests - Takes long to generate results, hence cannot be used in emergency situations - Possibility of acquiring a new host if the old host is completely eliminated	- If the situation of acquiring new host arises, try to establish the minimum population required for survival
- Botanical extracts (neem, tephrosia)	- Friendly to the environment - Application rates are based on estimates. Usually preparation of extracts need a lot of material (such as leaves) for one application	- Try to establish an effective application rate
Chemical: - Lack of knowledge on the toxicity of pesticides to transporters and those involved in application	- Exposure to humans through inhalation, ingestion or dermal contact	- Train store keepers, transporters and all those involved with handling of pesticides. Training should be in the aspects of toxicity, steps to be taken in case of accidents or emergency, combustibility and handling of vehicle contamination

Control method	Impacts (+ve or –ve)	Mitigation measure
		- Female farmers who will be handling pesticides must be warned of the possibility of foetal exposure - Use of drugs recommended for treatment of exposure[1] (
-	- High costs of PPEs which makes farmers reluctant to purchase them	- Provide Personal Protective Equipment (helmet, respirators, overalls, gloves and rubber boots) or protective clothing (long legged trousers, long sleeved shirts, boots and wide brimmed hat) - Train on how to use and the benefits of using such gear
- Indiscriminate disposal of pesticide containers	- Risks of containers being used by other persons and children	- Containers should never be used to carry anything else apart from the intended formulation - Containers not to be used in households - Follow container disposal procedures provided by PHS or TPRI if available
- Water contamination	- Health risks to humans - Impacts on biodiversity (birds, bees, fish) - Impacts on amphibians at the gorge - Reduced densities of beneficial species	- Train farmers on health risks associated with improper use of chemicals - Regular monitoring of water quality. Check the presence of Organochlorines and other pesticides to determine if a lethal dose has been reached

1

5.5.0 **Mitigation Against Chemical Control Measures**

The following measures are proposed to mitigate the potential adverse impacts likely to occur as a result of pesticide use in the project areas. The primary mitigation measures include training in safe and judicious pesticide use and management; delivery of a mix of Information Education and Communication approaches targeting farmers, pesticide operators and teams; provision of Personal Protective Equipment (PPE); training to farmers, and thorough and consistent supervision and monitoring. It is also important to have appropriate pesticide storage facilities and training and equipping health facilities with adequate exposure treatment drugs. Table 8 above also shows the proposed mitigation measures for various impacts that may arise due to application of pesticides in the project areas.

5.5.1 Training of pesticide applicators .

At least two selected farmers per irrigation scheme will receive detailed training on the emergency steps to take if accidental exposure of the chemical occurs through ingestion, eye or dermal contact with the chemical. This training will be conducted in collaboration with Pesticide Control Board It will include of drills to test knowledge of the operators. The following are basic first aid procedures that will be included in the training program as part of handling pesticide poisoning.

- Follow the first aid instructions on the pesticide label. Take the pesticide can or label to the doctor or medical practitioner if seeking medical assistance.
- For poison on skin: remove contaminated clothing and drench skin with water, cleanse skin and hair thoroughly with detergent and water, and dry victim and wrap in blanket.
- For chemical burns: remove contaminated clothing, wash with large quantities of running water, cover burned area immediately with loose, clean soft cloth (Do NOT apply ointments, greases, powders or other medications to burn).
- Poison in Eye: wash eye quickly but gently, hold eyelid open and wash with gentle stream of clean running water for 15 minutes or more (Do NOT use chemicals or medicines in the water; they may worsen the injury)
- Inhaled Poison: carry victim to fresh air immediately, open all windows and doors, loosen tight clothing and apply artificial respiration if the victim is not breathing or victim's skin is grey or blue. If the victim is in an enclosed area, do not enter without proper protective clothing and equipment
- Poison in mouth or swallowed: rinse mouth with plenty of water, give victim large amounts (up to 1 liter) of milk or water to drink, induce vomiting only if the pesticide label instructs you to do so.

Annex 2 provides detailed guidelines for storage, handling and application of pesticides. Among others, adherence to these guidelines is intended for protection of unwarranted risks to farmers and the general public.

5.5.2 Recommended Guidelines on storage of pesticides

In order to mitigate risks associated with pesticide storage at irrigation schemes, the following key points will serve as key mitigation steps:

- All primary pesticide storage facilities will be double-padlocked and guarded.
- All the storage facilities will be located away from nearby water courses, domestic wells, markets, schools, hospitals etc.
- Soap and clean water will be available at all times in all the facilities.
- A trained storekeeper will be hired to manage each facility.
- Recommended pesticide stacking position and height in the warehouse as provided in the FAO Storage and Stock Control Manual will be followed.
- All the warehouses will have at least two exit access routes in case of fire outbreak.
- A fire extinguisher will be available in the storage facilities and all workers will be trained on how to use this device.
- Warning notices will be placed outside of the store in the local language(s) with a skull and crossbones sign to caution against unauthorized entry.
- All pesticides will be used and any remnants will be stored under lock and key until the next round of application.
- Application of First In/First Out approach in pesticide distribution will be practiced to avoid accumulation of expired pesticide

5.5.3 Guidelines for storage and disposal of obsolete pesticides

A number of preventive steps will be undertaken to avoid the difficult problems and costly solutions of pesticide waste disposal. These include the judicious purchase, collection, transport, storage and use of pesticides. Over the last four years, Ministry of Agriculture and Food Security through the Africa Stockpile Programme (funded by FAO) completed the transportation of obsolete pesticides which had accumulated at various locations throughout the country. This has been an expensive venture as all obsolete pesticides had to be transported out of the country for their disposal. It is important to take key steps to avoid further accumulation of such pesticides.

- When purchasing pesticides calculate the amount needed and try to avoid being left with a surplus.
- Do not buy a large container if only a small portion of its contents is likely to be used by the end of the season.
- Buy the pesticide that is needed for application (eg against stalk borers or armyworm).

6.0 MONITORING INTEGRATED PEST MANAGEMENT PLAN.

The main objective of monitoring plan will be to assess the adoption of various mitigation measures for pests and diseases vectors on the rehabilitated irrigation schemes The plan provides decision-makers, community and farmer groups with clearer guidelines on integrated pest management plan approaches and options to reduce crop and livestock losses with minimal personal and environmental health risks. The specific objectives are:

- Design and delivery of training programme scheme farmers in appropriate use of pesticides and other environmentally friendly methods in flood affected districts in Malawi.

- Promote biological and ecological approaches for farmers to learn, test, select and implement integrated pest management plan options for reducing pest losses while promoting biodiversity, monitoring to serve as early warning systems on pest status, alien invasive species, beneficial species, and migratory pests.

- Monitor and evaluate the benefits of IPM including its impact of food security, the environment and health

6.1.0 Capacity Building programme

Integrated Pest Management methods require considerable training of stakeholders especially farmers. Malawi Floods Emergency Recovery Project will support training activities for farmers in irrigation schemes, training of extension workers and district agriculture and irrigation staff to support the implementation of the various methods..

Capacity building will be achieved through farmer-based collaborative management mechanisms where all key stakeholders shall be regarded as equal partners whose role will be to facilitate the process and provide technical direction and any other support necessary for the implementation of the activities

Project Implementation Unit will prepare a comprehensive training manuals, brochures and leaflets on pesticide use and management, targeting different actors within the program, ranging from extension service providers, actual farmers, loaders, mixers, transporters, government staff among others. The training manual or guides to be developed for use must be simplified and easy to understand and participatory in nature with in-built and demonstration/ practical sessions as much as possible.

Extensive training programs for irrigation scheme farmers, extension workers, and stockiest will be organized in all 15 flood affected districts. Such trainings will be crop based with farmers being organized into groups led by extension workers.

6.2.0 Institutional Arrangements

Effective supervision and monitoring of implementation of the pilot district PMP will be done through the project's management team, Pesticide Control Board and district councils. Pesticide Control Board will be the major coordinating and will be responsible for the preparation/approval of the annual work plans from the districts within the project areas.

Scheme's Water Users Association in irrigation schemes will act as the forum to discuss general pest problems, make decisions about integrated pest management activities and facilitate networks within and between Farmer Groups. Project Implementation Unit will develop Integrated Pest Management packages in collaboration with district agriculture officials and extension workers who will provide technical support to irrigation schemes

including identifying crop protection issues, integrated pest management training and field visits to other irrigation schemes.

6.3.0 Monitoring and Evaluation Arrangements

Successful implementation of recommended measures will require regular monitoring and evaluation of activities undertaken by scheme farmers. The focus of monitoring and evaluation will be to assess the build-up of IPM capacity in the Farmer Groups and the extent to which the recommended techniques are being adopted in crop 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.

6.3.1 Monitoring indicators

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

- Number of scheme farmers who have successfully received integrated pest management training;
- Numbers of Farmer Organizations that nominated members for integrated pest training;
- Numbers of farmers who have adopted integrated pest management practices as crop protection strategy in their crop production efforts.
- Number of crop production systems that have adopted integrated pest management practices;
- Rate of adoption of integrated pest management practices by farmers;
- Economic benefits: increase in crop productivity (and overall income) due to adoption of integrated pest management practices;
- Extent to which pesticides are used for crop production before and after the onset of the project;
- Pesticide application rate per farmer.
- Number of farmers using pesticides (when compared with the baseline value);
- Overall assessment of: activities that are going according to plans; activities that need improvements; and remedial actions required

Monitoring of pesticide use will also be vital in order to detect health and environmental impacts that may arise, and to provide advice on reducing risks associated with the impacts. Monitoring indicators may include the following:

- Appropriate use of protective gear
- Incidence of poisoning
- Pesticide residues in food crops and drinking water
- Contamination of surface water and ground water

6.3.2 Work Plan and Budget

Project Implementation Unit (PIU) and local government officials at district level will be responsible in the implementation of capacity development activities on integrated pest management systems. The estimated costs for the various activities under this program will be built in the budget. The core activities will be as follows:

a) Development of IPM packages for irrigation farmers in rehabilitated schemes
b) Orientation workshops for integrated pest management activities for staff and farmers
c) Training of trainers for irrigation farmers

d) Public awareness and promoting the adoption of integrated pest management practices
e) Field guides/training materials for production, purchase and distribution
f) Farmers field days
g) Crop pest surveillance in irrigation schemes
h) Annual workshops on progress and lesson learnt

Activities for implementation of integrated pest management plan will start with orientation of government officials and extension workers. District government officials and extension workers will be critical in implementation of integrated pest management activities as these work and interact will irrigation farmers in schemes.

A tentative work plan cost estimate of budgetary requirements is given below.

Tentative budget for capacity building activities and implementation of integrated pest

Pest management activities

Line item	Year 1	Year 2	Year 3
1. Capacity building			
IPM orientation	20,000	200 00	20,000
Training of Trainers	20,000	10,000	10,000
Farmer Group training in IPM	20,000	15,000	15,000
Preparation of IPM material s	20,000		
Field preparation for training	20,000	20,000	20,000
Pest surveillance	10,000	15,000	15,000
Training on proper use and storage of pesticides	20,000	20,000	20,000
Workshop	10,000	5,000	5,000
Total	**140,000**	**105,000**	**105,000**

7.0.0 CONSULTATIONS, PUBLIC DISCLOSURE AND GREVANCE REDRESS MECHANISMS.

7.1.0 PUBLIC CONSULTATIONS & PARTICIPATION.

Procedures for project environmental assessment in Malawi and World Bank Safeguard policies require that adequate and informed consultations be carried out during preparation of integrated pest management plan. Consultations are supposed to provide opportunity for stakeholders/project affected persons to air views/concerns on project activities and provide opinions in appropriate plans before implementation. Consultations also help to avoids possible conflicts or misunderstandings on the potential negative risks and also offer measures for addressing concerns. In addition, consultations help to identify enhancement measures for positive impacts.

In order to undertake informed consultations, disclosure of the project is necessary. Information for project disclosure includes: nature and scope of the project, proponent, main components, period of implementation, potential positive and negative impacts among others.

In carrying out consultations for Resettlement Policy Framework for Malawi Floods Emergency Recovery Project, consultants carried out a series of consultations with different stakeholders. These include flood affected people, farmers in selected irrigation schemes, local government officials, extension workers, local leaders, non—governmental organizations and central government officials: A summary of consultations were as follows:

- Consultations with senior officials at various government ministries and departments. Consultations took place in Lilongwe on 18 -27 March 2015.These included Ministry of Finance, Economic Planning and Development, Ministry of Education, Science and Technology, Ministry of Health, Department of Disaster Management Affairs. The discussions centred on aim and objectives of the project, the scope of the project, design and modalities of implementation. Min issues raised were that the project should have included housing construction for people, support for local roads and re-construction of more teachers' houses. The issue of house re-construction, government officials was advised that the resources were not adequate and that the funds could not cover house re-construction and the focus for the project was on essential service infrastructure such as main and secondary roads, water supply schemes and irrigation schemes. List of all consulted is attached in annex 3.

- Interviews and discussions with local government officials in four selected district councils. The four selected district councils are among the 15 flood affected districts. Main issues raised by local government officials included: need of participation in selection of sub-projects for implementation, shortage of funds for environmental and social mitigation measures, inadequate food assistance for flood affected people (as priority activities), in adequate transport to supervise environmental mitigation measures, lack of skills in storage and management of pesticides, proposals to enhance environmental and social mitigation measures among others. List of all local officials consulted is attached in annex 3.

- Consultations with selected non-governmental organizations in selected nongovernmental organizations. The nongovernmental organizations consulted were those in four flood affected districts chosen for field surveys: The non-governmental organizations included: World Vision International, Total Land Care, Eagles Relief Development Programme, Catholic Commission, Malawi Red Cross Society. Main issues raised by non-governmental organizations included: involvement of non-governmental organization in planning and implementation of disaster mitigation related projects, involvement of flood affected people in design and implementation of projects, avoiding duplication in implementation of projects and transparency in resource allocation and utilization on various. Some members of non-governmental organizations raised issues on high costs of pesticides for irrigation farmers. The issues will be incorporated in environmental and social management plans for sub-projects. Most of issues raised by non-governmental organizations would be addressed during planning and implementation cycle of the projects at district level.
- Consultations took place with selected flood affected people and irrigation farmers in four flood affected districts. Views from flood affected people included: that food and clothes assistance was priority at that time and not rehabilitation of irrigation schemes, support to school children disturbed by floods, support with income. Some flood affected people mentioned the need to help in reconstruction of houses damaged by floods. Some flood affected people complained of delay in distribution of food and donated clothes due to poor coordination among local leaders. Consultants could not provide all answers to views/opinions of flood affected people at the time. Most of the issues raised were for local government officials to look into.

7.2.0 PUBLIC DISCLOSURE.

Public disclosure of the project is important in order to allow stakeholders/public appreciate the impacts of the project on their lives and environment. Project disclosure can take place during feasibility stage or planning stage or implementation stage. Disclosure of the project activities helps to gather wider views on the project and enlist support from local communities. Among others public disclosure of the project has to cover rationale of the project, nature of the project, period of implementation, areas of implementation, potential impacts and proposed mitigation measures.

Public Disclosure of Malawi Floods Emergency Recovery Project will follow several stages through various stages and various means. These include:

a) Briefs by government officials to news reporters and district information officers at district consultative meetings and briefs to local leaders and non-governmental agencies. These have already been done.
b) Presentation, briefings and debates in National Assembly. The presentation and debates helped members of Parliament and local people to know more about Malawi Floods Emergency Recovery Project and why government of Malawi planned the project activities. This was already done from March to May 2015.
c) Another important public disclosure has been through radio announcement. Government officials announced publicly through radio and MBC Television regarding the Malawi Floods Emergency Recovery Project.

d) Some members of public will be informed of Malawi Floods Emergency Recovery Project through distribution of the project documents in district commissioner's offices, libraries in towns and districts.
e) The Resettlement Policy Framework will be posted on websites for various government agencies and World Bank Info. The arrangement will allow more people access information on the project and make informed views and opinions.

7.3.0 GRIEVANCE REDRESS MECHANISMS ON PROJECT ACTIVITIES.

Implementation of projects activities under Malawi Floods Emergency Recovery Project will take place in various locations of the 15 flood affected districts. Implementation of the activities may generate a number of challenges and complaints especially to those which relate to infringement of rights of sections of the society. Examples of complaints include: discrimination in distribution of relief food to flood affected people, discrimination among farmers on irrigation schemes, objections to use of someone's land during emergency detours, encroachment on private land, harassment of women, and marginalization of women in distribution of material assistance. And examples of grievances: include dissatisfaction with amount of compensation and, dissatisfaction with size and nature of land replacement. Such grievances are likely to crop up in one way or another in implementation sub-projects under Malawi Floods Emergency Recovery Project. It should be pointed out that since the implementation of some labour intensive public works programmes will be community based, negotiation and agreement by consensus will provide the first avenue to iron out and resolve any compliant/grievances expressed by the individuals, the land owners or households whose land and properties might be affected. The communities will ensure that resettlement related grievances should be addressed during the identification and appraisal of sites.

In this context, proper channels of grievance redress mechanisms will be put in place, and the project affected people sensitized to make use of them. The process of grievance redress mechanisms will involve project grievance committee, informal courts handled by traditional leaders (village headmen, traditional authorities) and also formal courts within the judiciary.

a) Project Grievance Committee.

Project Implementation Unit will ensure that implementation mechanism of each sub-project under Malawi Floods Emergency Recovery Project has a project Grievance Committee. The committee will be the first reference point of issues which crops from activities on the site. The committee will be composed of chosen representative of key stakeholders in implementation of sub-project. The committee will operate within framework and timeframe of project cycle. The committee will be set up to address some issues/cases related to activities. The committee will also be responsible for referring some cases/issue to relevant oversight bodies.

b) Traditional courts.

Traditional courts are community based tribunals and operate in form of primary justice. Traditional courts are based in each local village in the country. When such cases crop up, the issues will be referred to a village head. The village head will organize a village tribunal to preside on the matter. Both parties in complaints/cases will be called to be heard. When one party is not satisfied with the decision at village headmen level, the complaint can be taken up to group village headmen. Similarly, that party not satisfied with decisions on

complaints at that level, can take the matter to traditional authorities (T/A) for public hearings. In most cases/ complaints of this nature are sorted out at traditional authority level. However those who are not satisfied with the verdict will be allowed to appeal to the District Commissioner (DC) of the district. Further appeals can be made to the central government. In this regard, the matter can be referred to one of the line ministries (Ministry of Lands and Valuation, Ministry of Labour, Ministry of Local Government) on the matter of dispute which may give direction on the existing policy to be implemented.

c) Formal Courts.

Formal courts include magistrates, High Court of Malawi and Supreme Court of Malawi. These courts handle both civil and criminal cases. In regards to complaints and cases during Malawi Floods Emergency Recovery Project, people with complaints will have opportunity to take cases to these courts for review and determination on course of action. Such cases may include review of amount of compensations, cases theft of valuable properly as well as beating each other. Magistrate courts are located in all 15 flood affected districts and these would help complainants to access the services of these magistrates in case such needs arise.

d) Access to World Bank Grievance Redress system

Malawi Government will also ensure that communities and individuals in project locations are aware of World Bank Grievance Redress System. Government will disclose simple system of submitting issues of concern through letters or newspapers. People who believe that they are adversely affected by project activities carried by contractors or communities may submit complaints (through letters/phones) to Grievance Redress Service (GRS) World Bank Malawi office. The letters would be reviewed by offices. The system ensures that complaints received are promptly reviewed in order to address project-related concerns. Project affected communities and individuals may also submit their complaint to the Bank's independent Inspection Panel, after having brought the complaint to the attention International Development Association through Malawi Country Office. Information on how to submit complaints to the Bank's Grievance Redress Service and the Bank Inspection Panel will be disclosed to the public during public disclosure of Integrated Pest Management Plan.

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ANNEXES

Annex 1 Pesticides for Registration Consideration in Malawi

INSECTICIDES

COMMON NAME	TRADE NAME	FORMULATION	CONCENTRATION
Alphacypermethrin	Fastac (Ripcord Super)	EC	100g/LT
Acephate	Acephate, Orthene	SP	750g/KG
	Ace	SP	750g/KG
	Lancer	DF	970g/KG
	Lancer	SP	750g/KG
	Asafet	SP	750g/KG
	Novatheren TM	SC	750g/KG
Acetamiprid	Novacetam	SL	222g/KG
	Spear	SP	200g/KG
Aldicarb	Sanacarb	GR	150g/KG
	Temik	GR	150g/KG
Amitraz	Mitac	EC	200g/LT
Azinphos-methyl	Gusathion	SC	350g/LT
Azocyclotin	Peropal	SC	500g/LT
	Peropal	WP	250g/KG
Benfuracarb	Oncol	EC	200g/LT
	Oncol	CS	400g/LT
	Oncol	LS	900g/LT
Betacyfluthrin	Bulldoc 050RC	EC	50g/LT
	Bulldock 0.050g	GR	5g/LT
Bifenthrin	Talstar	EC	100g/LT
	Bisect	EC	100g/LT
Buprofezin	Applaud	WP	500g/KG
Carbaryl	Karbaspray	WP	850g/KG
	Sevin	WP	850g/KG
	Carbaryl	WP	850g/KG
Carbofuran	Karbadust	DP	50g/KG
	Curaterr	GR	100g/KG
	Carbosan	GR	100g/KG
	Carbofuran	GR	100g/KG
	Furadan	GR	100g/KG
Carbosulfan	Marshal	EC	250g/LT
	Marshals suscon	GR	100g/LT
	CMF	EC	250g/LT
	Carbosulfan	EC	250g/LT
Chinomethionat	Morestan	WP	250g/KG
Chlordane	Chlordane	EC	600g/LT
	Termidan	EC	600g/LT
Chlorpyrifos	Dursban	EC	480g/LT
	Dursban	WG	750g/KG
	Lirifos	SC	500g/LT/480g/LT
	Apollo	SC	500g/LT

COMMON NAME	TRADE NAME	FORMULATION	CONCENTRATION
Cyfluthrin	Baythroid	EC	50g/LT
	Baysol	AE/NF	50g/LT
	Sneak	WE	50g/LT
Cyhexatin	Cyhexatin	SC	600g/LT
Cypermethrin	Cypennethrin	EC	200g/LT
	Cypersan	EC	200g/LT
	Cyrux	EC	200g/LT
	Kemprin	EC	200g/LT
	Sherpa	EC	200g/LT
	Cymbush	EC	200g/LT
	Ripcord	EC	200g/LT
	Novacord TM	EC	200g/LT
Cypennethrin + Profenofos	Polytrin C	EC	40 + 400g/LT
Deltamethrin	Bitam	SC	50g/LT
	Deltabak	SC	50g/LT
	K-O Gard	SC	50g/LT
	Crackdown	SC	10g/LT
	Cislin	TB	10g/LT
	Decitab	Tablet	25g/LT
	Deltamethrin	EC	0.5g/KG
	Decis	SC	50g/LT
	K-Otab	Tablet	25g/LT
	Decis forte	EC	100g/LT
Deltamethrin+Endosulfan	Kracker	EC	2.5g + 475g/LT
Deltamethrin+Fenitrothion	Shumba Supper	DP	1.3g + 10g/KG
Deltamethrin+Piperonyl Butoxide	K-Biol	EC	25g + 250g/LT
Demeton-Methyl	Metaxystox (I)	EC	250g/LT
	Demeton-S-Methyl	SC	250g/LT
Diazinon	Diazinon	EC	275g/LT
Dichlorvos	DDVP	EC	1000g/LT
	Dedevap	EC	1000g/LT
	Dichlorvos	EC	1000g/LT
	DDVP 100	EC	100g/LT
	Doom	M/V	100g/LT
Dicofol	Kelthane	EC	185g/LT
Dimethoate	Cygon	EC	400g/LT
	Dimethoate	EC	400g/LT
	Rogor, Perfethion	EC	400g/LT
	Dimet	EC	400g/LT
	Dimethoate 20 WP	WP	200g/KG
	Nugor	EC	400g/LT
Disulfoton	Disyston 5g	GR	50g/KG
	Solvirex	GR	50g/KG
	Disulfoton	GR	50g/KG
Disulfoton + Triadimenol	Repulse 5.75g	GR	50g + 7.5g/KG
Endosulfan	Thiodan	EC	350g/LT
	Endosulfan	SC	350g/LT
		MO	350g/LT
		EC	350g/LT
		SC	475g/LT
		WP	475g/LT

COMMON NAME	TRADE NAME	FORMULATION	CONCENTRATION
		SC	350g/LT
	Endflo	MO	350g/LT
	Agrisulfan dust	DP	50g/KG
	Thioflo	SC	475g/LT
	Thionex	WP	500g/KG
		EC	350g/LT
	Thiokill	EC	350g/LT
Fenitrothion	Sumition	EC	500g/LT
Fenitrothion	Sumithion	ULV	1000g/LT
	Fenitrothion	ULV	1000g/LT
		EC	500g/LT
	Folithion	EC	600g/LT
	Tracker Garden Insecticide	EC	600g/LT
Fenitrothion + Fenvalerate	Sumicombi 3D	DP	25g + 5g/KG
Fenpropathrin	Meothrin	EC	200g/LT
Fenthion	Labaycid	EC	500g/LT
		WP	500g/KG
Fenvalernte	Fenkill	EC	200g/LT; 500g/LT
	Felecid	EC	200g/LT
Fenvalernte	Sumicidin	EC	200g/LT; 500g/LT
	Fenvalernte/	EC	200g/LT; 500g/LT
	Sanvalerate	EC	200g/LT
	Novacidin TM	EC	200g/LT
Fipronil	Regent	GR	30g/KG
	Fipronil	GR	30g/KG
Furfural	Crop Guard	EC	900g/LT
Gamma BHC	Bexadust	DP	6.0g/KG
Imidachloprid	Confidor	SL	100g/LT, 200g/LT
	Confidor 70	WG	700g/KG
	Gaucho 70 WS	WS	700g/KG 45 WS
	Imidachlorprid	WS	700g/LT
	Gaucho 600 FS	FS	600g/LT
	Gaucho 390 FS	FS	390g/LT
	Protect 200 SL	SL	200g/LT
	Protect 700 WS	WS	700g/LT
Imidachloprid 233g/LT	Monceren GT	FS	390g/LT
Imidachloprid/Thiram	Gaucho T	WS	45 WS
	Gaucho 275FS	FS	175g/LT + 100g/LT
	Novacot Dress	FS	350g/LT
Isofenphos	Peril turfgrass Insecticide		
		SC	500g/LT
Lambda-Cyhalothrin	Karate	EC	50g/LT
		WG	37.5g/LT
		CS	50g/LT
	Vajra	EC	50g/LT
	Lambda-Cyhalothrin	EC	50g/LT
	Novathrin	EC	50g/LT
Lufenuron	Match	EC	50g/LT
Mercaptothion	Malathion	WP	250g/KG
		EC	250g/LT
	Mercaptothion	WP	250g/KG
Methamidophos	Tamaron, Methaphos	EC	585g/LT
	Sniper, Methamidophos		

COMMON NAME	TRADE NAME	FORMULATION	CONCENTRATION
Methomyl	Methomyl, Lannate Methomyl, Lannate Methosan, Methomex	SL SP SP	200g/LT 900g/KG 900g/KG
Methoprene	Kabat	AE	41.3g/LT
Mevinphos	mevinphos	EC	20g/LT
Mineral oil	Summer oil Bacoil	EC EC	- 835g/LT
Monocrotophos	Nuvacron Monocron Monocrotophos Monostem Azodrin Novacrotophos TM Phoskill	WSC WSC WSC WSC WSC SL SL	400g/LT 400g/LT 400g/LT 400g/LT 400g/LT 400g/LT 400g/LT
Oxydemeton-Methyl	Metasystox ®	EC	250g/LT
Parathion	Folidol	EC	500g/LT
Pamthion	Pamthion Novaper	EC EC	500g/LT 500g/LT
Pamthion-Methyl	Pamthion-Methyl	EC	500g/LT
Permethrin	Coopex TC Tobacco guard Tabakskern Permethrin	TC EC EC EC	250g/LT 50g/LT 5.0g/LT 100g/LT
Phenthoate	Elsan	EC	500g/LT
Phoxin	Baythion Ant killer Turmoil soil insecticide Whack	EC EC EC	500g/LT 500g/LT 500g/LT
Pirimiphos-Methyl	Actellic EC Actellic dust Actellic smoke generator	EC DP EU	500g/LT 20g/KG -
Pirimiphos-Methyl + Permethrin	Actellic Super EC Actellic Super dust	EC DP	500g/LT 16g + 3g/KG
Plus Pencycuron 50 EC	Plus Pencycuron 50EC	EC	50g/LT
Plus Thiram 107EC	Plus Thiram 107EC	EC	107g/LT
Profenophos	Selecron	EC	500g/LT
Propargite	Propargite	EC	570g/LT 720g/LT 790g/LT
Prothiophos	Tokuthion	EC	960g/LT
Terbufox	Terrafos Counter	GR GR	100g/KG 100g/KG
Terbufos	Hunter	GR	150g/LT
Tetradifon	Tedion V8	EC	81g/LT
Thiachloprid	Calypso	SC	480g/LT
Thiodicarb	Larvin	FW	375g/LT
Thiophanate-Methyl	Topsin	WP	500g/KG
Triazophos	Hostathion	EC	420g/LT

COMMON NAME	TRADE NAME	FORMULATION	CONCENTRATION
Trichlorfon	Dipterex Trichlorfon	SP GR SP GR	950g/KG 25g/KG 950g/KG 25g/KG
Triflumuron	Alsystin	SC	480g/LT
Thiamethoxam	Actara	WG	250g/kg

HERBICIDES

COMMON NAME	TRADE NAME	FORMULATION	CONCENTRATION
Acetochlor	Sprint Wenner Curagrass, Crocodile Trophy S Bullet Har-I-cane	EC EC EC EC	900g/LT 700g/LT 750g/Lt 700g/LT
Acetochlor + Atrazine + Propazine	Tuff-E-Nuff	SC	96g + 202g + 202g/LT
Acetochlor + Atrazine + Simazine	Robust	SC	160g + 165g + 165g/LT
Acetochlor + Atrazine + Terbuthylazine	Acetrazine	SC	125g + 187.5g + 187.5g/LT
Alachlor	Alachlor 384, Eland Alachlor 480 Sanachlor 384 Lasso 480 & 384 Lasso MT	EC EC EC EC CS	384g/LT 480g/LT 384g/LT 480g/LT 480g/LT
Ametryn	Gesapax Ametryn Ametryn	SC SC WP	500g/LT 500g/LT 800g/KG
Ametryn + Atrazine	Ametra	SC	250g + 250g/LT
Asulam (Na-Salt)	Asulox	SL	331g/LT
Asulam	Asulam	SL	400g/LT
Atrazine	Atrazine Gesaprim Gesaprim	SC, WP, WG WG SC	500g/LT,800g/KG,900g/k 900g/LT 500g/LT
Atrazine + Terbuthylazine	Suprazine, Eliminator	SC	600g/LT, 500g/LT
Atrazine + Terbuthylazine + Metolachlor	Gadomil	SC	262.5g +262.5g +175g/LT
Bendioxide	Basagran	SL	480g/LT
Bromacil	Bromacil Hyvar-X80	WP WP	800g/KG 800g/KG
Bromoxynil	Bromox Buctril DS	EC EC	225g/LT, 450g/LT 450g/LT
Chlorimuron-Ethyl	Classic	WG	250g/KG
Chlorimuron-Ethyl + Metribuzin	Canopy	WG	107g + 643g/KG
Clomazone EC	Novazone	EC	450g/LT
Cyanazine	Cyanazine Bladex	SC SC	500g/LT 500g/LT
Cyanazine + Atrazine	Blazine Bladex Plus	SC SC	250g +250g/LT 333g +167g/LT
2-4 -D (Amine)	Embamine	EC	480g/LT

COMMON NAME	TRADE NAME	FORMULATION	CONCENTRATION
	2-4 -D Amine	SL	480g/LT
2-4 -D (Ester)	2,4 -D Ester	EC	500g/LT
2-4 -DB	2,4 -DB	AS	480g/LT, 500g/LT
2,4 -D Dicamba	Spotaxe	SL	240g +80g/LT
2,4 -D MCPA	Rampant Turfgrass Herbicide	WSC	360g + 315g/LT
2,4-D + Picloram	Tordon 101	SL	240g + 65g/LT
Dalapon	Dalapon	SP	850g/KG
Dicamba	Banvel	EC SL	480g/LT 480g/LT
Diuron	Diuron Diuron	WP SC	800g/KG 500g/LT, 800g/LT
Diuron + Paraquat	Gramuron	SC	300g + 100g/LT
EPTC	EPTAM	EC	720g/LT
EPTC (+Safener for Maize)	EPTAM super	EC	720g/LT
Ethidimuron	Ustilan Ustilan	GR WP	100g/KG 700g/KG
Fluazifop-P-Butyl	Fusilade super, Forte	EC	150g/LT
Fluazifop-R-Methyl	Gallant Super	EC	108g/LT
Flufenacet	Tiara	SC	500g/LT
Flumetsulam	Broadstrike	WG	800g/LT
Fluometuron	Cottonex	FW	500g/LT
Flazafulfuron	Kantana	WP	100g/KG
Oxyfluorfen	Goal	EC	240g/LT
Glufosinate ammonium	Basta	WSC	200g/LT
Glyphosate	Mamba/Springbok Ridder weed killer Roundup Cobra + Duiker Shaikdown Turbo	SL SL SL SL	360g/LT 360g/LT 360g/LT 180g/LT 480g/LT 500g/LT
Haloxyfob-R-Methyl-Ester	Gallant Super	EC	104g/LT
Halusulfuron	Servian	WG	750g/LT
Hexazinone	Ransom	SL	240g/LT
Hexazionone	Hexazinone, Hexsan Velpar L Velpar SP	SC, SL SC SP	240g/LT 750 DF 240g/LT 900g/LT
Ioxynil +2,4 -D	Actril D.S.	EC	100g +600g/LTD
Isoxatlutole	Merlin	WG	750g/LT
MCPA (K-salt)	MCPA	SL	400g/LT
MCPB	MCPB	AS	400g/LT
Mesotrione	Callisto	SC	480g/LT
Metazachlor	Pree Butisan S	EC SC	400g/LT 400g/LT, 500g/LT
Metolachlor	Dual Magnum + Falcon Gold	EC	960g/LT
Metribuzin	Veto Sencor Contrast Turfgrass herbicide	SC SC SC	480g/LT 480g/LT 480g/LT

COMMON NAME	TRADE NAME	FORMULATION	CONCENTRATION
	Sencor WP Metribuzin	WP SC	480g/KG 480g/LT
Metribuzin + Chlorimuron Ethyl	Extreme plus	WP	107 + 643g/KG
MSMA	MSMA MSMA	SL EC	720g/LT 720g/LT
Nicosulfuron	Sanson	SC	40g/LT
Oxadiazon	Ronstar	EC	250g/LT
Oxyfluorfen	Goal	EC	240g/LT
Paraquat	Paraquat Gramoxone	SL EC	200g/LT 200g/LT
Paraquat Dichloride	Uniquat	SL	200g/LT
Pebulate	Tillam 6E	EC	720g/LT
Pendimethalin + Ametryne + Atrazine	Paragon Plus	WP	350g + 200g + 200g/KG
Pendimethalin + Chlorimuron-Ethyl + Metribuzin	Paragon Extra	WP	437 + 31g + 200g/KG
Prometryn	Gesagard	FW	500g/KG
Sethoxydim	Nabu	EC	186g/LT
Simazine	Simazine	WP	800g/KG
S-Metolachlor	Dual Magnum Falcon Gold	EC EC	960g/LT 960g/LT
S.Metolachlor/Flumetsulan	Bateleur gold	EC	630 + 20g/LT
Tebuthiuron	Tebusan	SC,WP	500g/LT, 500g& 800g/KG
Terbumeton	Terbumeton Terbumeton	SC WP	500g/LT 800g/KG
Terbuthylazine + S-Metolachlor	Sorgomil Gold	SC	600g/LT
Terbuthyn	Terbuthyn	WP	800g/KG
Terbuthyn	Igran	SC	490g/LT
Terbuthyn + S-Metolachlor	Igran +Combi Gold	SC	450g +10g/LT
	Trifluralin Trifluralin	EC SC	480g/LT 500g/LT

FUNGICIDES

COMMON NAME	**TRADE NAME**	**FORMULATION**	**CONCENTRATION**
Acibensolar-S-Metlyl	Bion 50WG	WG	500g/KG
Acibanzolar-S-Metlyl	Bion	WG	50g/KG
Anilazine	Dyrene	WP	750g/KG
Azoxystrobin	Ortiva 250SC	SC	250g/KG
Benomyl	Benlate Fundazol	SC WP FW WP	480g/LT 500g/KG 500g/LT 500g/KG
Bitertanol	Baycor	EC	300g/LT
Captab	Captab	WP, SC	500g/KG, 500g/LT
Carbendazim	Derosol	SC	510g/LT
Chlorothalonil	Chloronil Daconil Bravo	SC WP FW SC	500g/LT 750g/KG 500g/LT, 720g/LT 500g/LT

COMMON NAME	TRADE NAME	FORMULATION	CONCENTRATION
Copper Ammonium Nitrate	Copper Count N	SL	316g/LT
Copper oxychloride	Cupravit Demildex Copper oxychloride	WP WP WP FW	850g/KG 850g/KG 850g/KG 600g/LT
Copper Hydroxide	Cung FU 538SC	SC	Copper Equiv. 350g/LT
Cupric hydroxide	Funguran – OH Cupric hydroxide Kocide 101 Kocide DF	WP WP WP WG	770g/KG 770g/KG 770g/KG 614g/KG
Cymoxanil +Mancozeb	Rimit 50.6 WP	WP	500g +60g/KG
Cyproconazole	ALTO 100 SL ALTO G34	SL GR	100g/LT 34g/KG
Cyproconazole +Disulfoton	Alto mix	GR	2.5g +75g/KG
Difenoconazole	Score	EC	250g/LT
Difolatan	Captafol	WP	800g/KG
Dimethomorph + Mancozeb	Acrobat MZ	WP	90g +600g/KG
Dinocap	Karathane	WP	200g/KG
Fenarimol	Rubigan	EC	120g/LT
Fosetyl - Aluminium	Alliette	WP	800g/KG
Hexaconazole	Anvil	SC	50g/LT
Iprodione	Rovral Rovral flo Iprodione Iprodione	SC FW SL SL	250g/LT 255g/LT 255g/LT 255g/LT
Iprodione + Mancozeb	Rovral M	-	-
Mancozeb	Pennozeb Sancozeb Dithane M45 Mancozeb	WG WP WP WG	800g/KG 800g/KG 800g/KG 800g/KG
Mancozeb + Oxadixyl	Sandofan M8	WP	560g + 80g/KG
Maneb (Dithiocarbamete) + Zinc Oxide	Manager Sc	SC	435g + 4.7g/LT
Maneb + Fentin Acetate	Brestan	WP	180g + 540g/KG
Metalaxyl + Mancozeb	Ridomil MZ 70 WP	WP	100g + 600g/KG
Oruface + Mancozeb	Patafol plus	WP	60g + 640g/ KG
Pencycuron	Monceren	SC	250g/LT
Prochloraz + Carbendazim	Sportac alpha	EC SC	300g + 80g/LT 300g + 80g/LT
Prochloraz + Mangane Chloride	Sporgon	WP	295g/KG
Propamocarb - HCL	Previcurn	SC	722g/LT
Propamocarb Hydrochloride	Propamocarb	SL	722g/LT
Propiconazole	Propiconazole	EC	100g/LT, 200g/LT
Propiconazole	Tilt	EC	250g/LT
Propineb	Antracol	WP	700g/KG
Pyrazophos	Afugan	EC	295g/LT
Sulphur	Wettable Sulphur Kumulus, Triovit	WP WP	800g/KG 800g/KG
Azoxystrobin	Ortiva 250 SC	SC	250g/LT
Acibensolar-S-Methyl	Bion 50 WG	WG	500g/KG
Difenoconazole	Score	EC	250g/LT

COMMON NAME	TRADE NAME	FORMULATION	CONCENTRATION
Cyproconazole/ Thiamethaxam	Verdadero	GR	10 + 10g/KG
Tebuconazole	Raxil 015 ES Folicur	ES EW EC	15g/LT 250g/LT 250g/LT
Thiram	Thiram Thiulin 50 DS	WP DS	750g/KG 500g/KG
Tolcofox Methyl	Rizolex 50	WP	500g/KG
Tolyfluanid	Euparen Multi	WP WP	500g/KG 500g/KG
Tolyfluanid Sulphur E	Euparen multi sulphur dust	DP	75g + 920g/KG
Triadimefon	Bayleton	WP	50g/KG
Triadimefon	Bounce turfgrass fungicide	EC	250g/LT
	Shavit Bayfidan EC Bayfidan G Baytan DS Baytan FS	EC EC GR DS FS	250g/LT 250g/LT 10g/KG 150g/KG 150g/LT
Triadimefon + Propineb	Bayleton A	DS	50g + 700g/KG
Triadimenol + Disulfoton	Repulse 5.75g	GR	7.5 + 50g/KG
Trichoderma	Trichoderma	WP	-
Tridemorph	Calixin	EC	750g/LT
Zineb	Zineb 70 WP	WP	700g/KG

FUMIGANTS

COMMON NAME	TRADE NAME	FORMULATION	CONCENTRATION
Aluminium phosphide	Gastoxin Phostoxin Alphos + Aluminium Phosphide	TB TB, Pellets	560g/KG 560g/KG
Magnesium phosphide	Degesch plates Degesch strips	FU (plates) FU (strips)	607g/KG 607g/KG
Methyl Bromide + Chloropicrin	Methyl Bromide	GA	980 + 20g/KG
	Metabrom Curabrom	GA GA	980 + 20g/KG 980 + 20g/KG

NEMATICIDES

COMMON NAME	TRADE NAME	FORMULATION	CONCENTRATION
Cadusafos	Rugby	GR	100g/KG
Ethoprop	MOCAP	GR	100g/KG
Ethylene Dibromide (EDB)	Ethylene Dibromide (EDB)	EC, MO	1800g/LT
Fernamiphos	Nemacur Nemacur	EC GR	400g/LT 100g/KG
Metham Sodium	Herbifum Metam Sodium	Liquid Concentration SC	510g/LT 510g/LT
Methyl bromide + Chloropicrin	Methyl brimide	GA	980 + 20g/KG
Oxamyl	Vydate	SL	240g/LT, 310g/LT
1,3 Dichloropropene	Telone II	Liquid concentrate	1110g/LT
Metham-Sodium	Herbifume	Liquid concentrate	510g/LT

MOLLUSCICIDES

COMMON NAME	TRADE NAME	FORMULATION	CONCENTRATION
Carbaryl + Metaldehyde	Snailban	RB	20 + 30g/Kg
Methiocarb	Mesurol	WP RB (Pellets)	800g/Kg 800g/Kg
Methiocarb	Draza Byluscide Metason	RB EC, WP RB	50g/Kg 250g/L; 700g/Kg 50g/Kg

PUBLIC HEALTH (ENVIRONMENTAL) PESTICIDES

COMMON NAME	TRADE NAME	*FORMULATION*	CONCENTRATION
Alphacypermethin	Fendona	SC WP	58g/Kg 50g/Kg
Betacyflutrhin	Tempo	SC	125g/LT
Brodifacoum	Finale (Rodenticide) Klerat	RB BB CB CB BB	0.02g/Kg 0.05g/Kg; 0.75g/Kg 0.05g/Kg; 0.75g/Kg 0.02g/Kg 0.05g/Kg; 0.75g/Kg 0.02g/Kg 0.05g?kg; 0.75g/Kg 0.02g/Kg 0.5g/Kg
Chlorpyrifox	Baygon roach bait	DB	-
Coumatetralyl	Racumin rat bait Racumin rat poison	RB FW	3.75g/Kg 8g/LT
Cyfluthrin	Baythroid H Responsar	WP EW	100g/kg 50g/LT
Cyfluthrin + Propuxur	Blattanex	AE	2.5g/Kg + 10g/Kg
Cyfluthrin + Tetramethrin	Baygon spray	AE	-
D-Allethrin	Baygon mosquito coils	FU (coils)	2g/Kg
D-Allethrin + Piperonyl	Baygon mosquito mats	FU (mats)	50g + 2-g/Kg
Butoxide			
DDVP	Fly bait	RB	5g/Kg
Deltamethrin	Glossinex Crackdonw K-Ogard K-Othrine K-Othrine 15 Deltabak Super crackdown/Cislin K-Othrine K-Othrine	SC SC SC SC E.C SC SC WP DP	200g/LT 10g/LT 10g/LT 10g/LT 15g/LT 50g/LT 25g/LT 25g/Kg; 50g/Kg 2g/Kg
Deltamethrin + Bednet	K-Onet	TB + Bednet	-
Diazion	PCO diazinon	EC	880g/LT
Dichlorvos	Super doom	AE	-
Dichlorvos + Tetremethrin	Baygon fumigator	AE	10g + 2g + 10g/Kg
Fenitrothion	Reskol 64	EC	600g/LT
Fipronil	Fipronil Regent	SC SC	200g/LT 200g/Lt
Flumethrin	Bayricol aerosol	AE	2g/Kg

COMMON NAME	TRADE NAME	*FORMULATION*	CONCENTRATION
Lambda-Cyhalothrin	Icon 10 WP Icon 2.5 CS	WP Cs	100g/Kg 25g/LT
Mercaptothion	Kopthion 50 DP	DP	50g/Kg
Methomyl	Dy-fly	RB	10g/Kg
Naled DBM	Dibron	SL	344.9g/LT
Permethrin	Coopex Dust Coopex WP Cooper WP Peripel 55 Temephosmostop Tobacco Cuard Imperator Coopex smoke generator	DP TC WP SC EC EC SC FU	5g/Kg 250g/LT 250g/Kg 550g/LT 500g/LT 50g/Kg 100g/LT 135g/Kg
Pemethrin + Piperonyl	Pybuthrin 44	FU	0.39% + 0.382% + 0.206%
Pipperonyl butoxide	Baygon knockdown spray	AE	10g + 2g + 1-g/Kg
Butoxide + D-Allethrin Butoxide + D-Allethrin	 Pulvex fly smear	 -	0.206% + 0382% + 0.205%
Phoxim + Honey	Baygon ant bait	RB	0.8G/Kg
Propuxur	Propuxur Baygon dust Baygon fly bait	GA DP RB	0.5 – 2.0% 10g/Kg 10g/Kg
Propuxur + Cyfluthrin	Baygon surface spray	AE	-
Pyrethrins + Piperonyl	Coopermatic fly killer	CB	9g/LT
Butoxide	Flip mosquito larvacide Mosquito larvacide oil Kontakil	- - -	- -

RODENTICIDES

COMMON NAME	TRADE NAME	FORMULATION	CONCENTRATION
Brodifacoum	Finale Klerat	SL BB BB	0.05g/LT; 0.025g/LT 0.05g/Kg; 0.02g/kg 0.05g/Kg
Coumatetralyl	Racumin	FW Liquid BB Tracking powder	8g/LT 3.75g/Kg
Flocoumafen	Storm Supakill	BB -	0.05g/Kg -

PLANT GROWTH REGULATORS

COMMON NAME	TRADE NAME	FORMULATION	CONCENTRATION
Alkylated phenol-ethylene condensate	Agal 90 Agripon Super Agrowett Armoblen Astrozon green turf dye Compement Curabuff G-49 Wetter Kynobuff BB5, Insure	Surfactant Surfactant Nontonic Surfactant Nontonic Surfactant Dye Surfactant Buffer + Spreader Surfactant (Wetter) Ajuvant -	940g/LT 940g/LT - SL Various SL Various - - - - -
Aminofit	Amino Acid Complex	Essential Amino acids for plant growth	

Butralin	Tabamex Tobago	EC EC	360g/LT 360g/LT
Chlorthal-Dimethyl	Razor, Erasor	SC	360g/LT
CU-Max	Copper	Liquid Complex	Copper 50g/LT
Cytokinins + Auxins	Kelpak	SL	0.031mg/LT + 11mg/LT
Ethephon	Ethephon Ethrel Ethrel Latex stimulant	SL SL SL	480g/LT; 217g/LT 480g/LT; 217g/LT 480g/LT; 217g/LT
Heptamethyltrisiloxane	Silwet L77	Adjuvant	1000g/LT
Modified phthalic –Glycerol alkyd resin	Latron B-1956	Speader/sticker	-
Magnesium	Magmax	WP	65g/KG
Multifeed	N,P,K, Micronutrients	Water Soluble Foliar Fertilizer concentrate	19:8:16
N-Decanol	Antak, Decasuckeride Royaltac Suckerkil N-Decanol	EC EC EC	690g/LT; 785g/LT 690g/LT; 785g/LT 690g/LT; 785g/LT
N'Decanol + Octanol	C85 Fair 85	EC EC	400 + 300g/LT 400 + 300g/Lt
Nonylphenol polyglycol ester	Sanawett 90	Wetter/Sticker	945g/LT
NPK + Cronutrient	Green gold plus	-	-
NPK (Plus micronutrients)	Bayfolan, Nitrophoska Turfolan	GR GR	3-2-1 (22) 3-2-1 (22)
Nitrophoska	GR Turfolan	GR 3-2-1(22)	3-2-1(22)
Pendimethalin	Accotab Bacstop Novatop Pendimethalin	EC EC EC EC	330g/LT 330g/LT 330g/Lt 330g/LT
Polyethylene wax	Tax wax Teepol Detergent Teepol disinfectant	Wax (fruit polish) - -	- - -
Polyvinyl Polymer	Mist Control	Adjuvant	20g/LT
Sodium borate	Solubor	WP	20.5%m/m
Sodium molybdate	Sodium molybdate	WP	38.8%m/m
Zinc oxide	Zinc oxide	WP	78.5%m/m
Zinc-Max	Zinc	Liquid Zinc complex	1130g/LT

ANIMAL HEALTH (PARASITICIDES)

COMMON NAME	TRADE NAME	FORMULATION	CONCENTRATION
Alphamethrin	Paracide	EC	70g/Lt
Amitrnz	Milbitrnz	EC	237.5g/kg
Amitrnz	Triatix stock spray Triatix TR	EC	125g/LT
Cargaryl	Pulvex dog shampoo	EC	50g/LT
Chlorfenvinphos	Chlorfenvinphos SUPONA Supona Super	EC EC EC	200g/LT; 300g/LT 200g/LT; 300g/LT 1000g/LT
Chlorfenvinphos + Dioxathion	Tic grease	-	4g + 4g/LT
Chlorpyrifos	Barrier Pulvex dog dip	EC EC	480g/LT 150g/LT

	Pulvex dog powder	DP	10.7g/Kg
Closantel	Prantel	L	25g/LT
Cyfluthrin	Cylence	NF (pour-on)	10g/LT
Cypermethrin	Pouracide	NF	-
Deltamethrin	Decatix Spotton	NF (pour-on)	50g/LT
Febantel + Pyrantel Pamoate	Welpan	TB	1.6% + 1.44%m/v
Febantel + Pyrantel emboate + Praziquantel	Drontal	TB	-
Fenbendazole	Rintal	FW	100g/LT
Fenthion-methyl	Bayopet spotton Ticuvon spotton	L L	100g/LT; 200g/LT 200g/LT
Flumethrin Flumethrin + Piperonyl	Bayopet tick rinse Bayticol Drastic deadline Bacdip plus	EC EC L (pour-on) EC	20g/LT 20g/LT 10g/LT 20 + 100g/LT
Ivomectin	Ivomec	L (injecticable) (Endectoparasiticide)	1% M/V
Levamisole Hydrochloride/ Oxychlozanide	Levisan	Flowable concentrate	25 + 34 g/LT
Praziquantel Propuxur	Cestocur Bayopet tic + Flea powder Bayopet dog colar Bayopet cat collar	FW DP - -	25g/LT 10g/Kg 94g/Kg 94g/Kg
Propuxur + Cyfluthrin	Bayopet surface spray	AE	-
Quainthiophos	Bacdip Bayopet dog and cat shampoo & conditioner	AE EC -	2g/Kg 500g/LT -
Rafoxanide	Ranide	FW	-
Thiabendazole	Thibenzole	FW	-
Toltrazuril	Baycox Systamex	SL FW	25g/LT -
Tetrachlorvinphos			
Piperonyl Butoxide			

Annex 2: General International Standards on use of Pesticides

A. GUIDELINES ON USE OF PERSONAL PROTECTIVE EQUIPMENT (PPE)

1. PPE must be kept separate (i.e. in different lockers) from personal clothing.
2. Protective clothing must be thoroughly washed after each application or spray operation before being worn again.
3. Contaminated protective clothing must under no circumstances be washed at home and should not be removed from the store area.
4. Durable, light-weight and comfortable protective clothing must be provided to workers handling pesticides.
5. Overalls can be two-piece (jacket with hood and trousers) or one-piece hooded garments.
6. Hood must close around gas mask.
7. Sleeves must close at wrists with elasticized cuffs and the trousers must have elasticized closures around waist and ankles.
8. Jackets of two-piece suits should seal on the hips.
9. Overalls should preferably be light in colour so that contamination with pesticides can be visible.
10. A clear transparent face shield, which is impervious to solvent and pesticide vapours; and which provides full face protection should be worn as indicated on the product label, when preparing and applying spray mixtures.
11. Safety goggles are an acceptable alternative to a face shield.
12. Non-slippery gloves made of nitrile rubber, PVC, neoprene or butyl rubber that are long enough to give cover to a minimum of 90 mm above the wrist must be used.
13. Lined gloves are not recommended as pesticides can accumulate in the lining material.
14. Gloves should preferably be light in colour so that contamination with pesticides can be visible.
15. Before contaminated gloves are removed from the hands after use, they must first be washed with soap and water. They should again be washed inside out after removal.
16. Unlined, rubber boots that are at least calf-high must be used.
17. To prevent pesticide from entering boots, trousers must be worn outside/over the boots.
18. At the end of each day's spraying boots should be washed inside and outside.
19. A cotton hat with brim should be used for protection against spray drift.
20. A waterproof hat and cape must be worn by operators during overhead spraying.
21. A hood that covers the head, neck and shoulders of workers should be worn for total skin protection during the application of irritant powders (e.g. sulphur).
22. Respirators should be worn when indicated on the product label.
23. Tractors with closed canopies and air conditioning are recommended for maximum safety and comfort during application. This could improve the productivity of operators and the quality of pesticide application and coverage.

Ablution facilities

24. Facilities must be provided for operators to wash or shower at the end of each spray operation or shift.
25. Contaminated washing water generated at the ablution facilities shall not be disposed of into any water source, including rivers, ground water sources and sewerage systems. This water can also be channeled into a mesh-covered evaporation pit like the one for the filling area.

B. GUIDELINES FOR SAFE USE AND HANDLING/APPLICATION OF PESTICIDES

Preparation and mixing of spray formulations

1. Application of pesticides should be selective and targeted (in space and time)
2. Pesticides must be prepared and used in the prescribed manner as indicated on the label(s). Any other way is a criminal offence and this must be communicated to workers as such.
3. Only prepare the amount of spray mixture required for one specific application.
4. If containers with concentrated formulation are transported to filling points further away from the agrochemical store, these containers must be locked into a secure metal or galvanized mesh trunk.

Filling points

5. The mixing and filling area for spray equipment must be well away from any water sources.
6. The floor of the filling point must be of non-porous material (e.g. cement with damp coursing) and must be bunded (retaining wall).
7. Rinse liquid from measuring vessels must be added to the spray tank.
8. Soil and water sources may not be contaminated by run-off and/or spillage. Construct a non-permeable evaporation pit that is either filled with stones or covered with a metal grid, into which contaminated run-off water can be channelled. Add a handful of lime to increase the pH. Ultra-violet radiation from the sun, combined with the high pH will break down active ingredients and water will evaporate. Cover the pit when it rains, to prevent rainwater from filling up the pit. Alternatively, install a tank for contaminated water that can be emptied by a professional hazardous waste disposal company.

Worker health

9. Workers handling chemicals must be declared medically fit to work with pesticides. This examination must be done by an Occupational Health practitioner that is a general practitioner with a post-graduate diploma in occupational medicine, and not by a clinic nurse or ordinary general practitioner.
10. All workers exposed to and handling pesticides must undergo routine medical examinations (mostly involving a blood test) to test for signs of pesticide exposure. These should preferably be done annually at the end of the spraying season, but the interval between examinations may not exceed two years.
11. Any incident of exposure to pesticides must be documented according to occupational health and safety regulations and labour regulations.
12. All medical records and records of pesticide exposure must be kept for at least 30 years for every worker exposed to pesticides.

Training

13. All farm workers shall undergo training in the meaning of the signs, warning and labels on containers of pesticides.
14. Formal training (i.e. certificates awarded) in the meaning of signs, warning notices and labels on chemical containers, as well as on the interpretation of written instructions must be provided to all workers handling pesticides.

15. Spray operators must receive formal practical training in the safe handling and application of pesticides and must understand the risks involved and precautions to be taken.

C. GUIDELINES ON FORMULATION AND REPACKAGING OF PESTICIDES

1. Distribution and use of pesticides may require local formulation and/or repackaging. In such cases, The Project Implementation Unit (PIU) should ensure that, packaging or repackaging material conforms to FAO pesticide management guidelines, and is carried out only on permissible premises.

2. The Project Implementation Unit (PIU) should ensure that; (a) the staff working in such premises are adequately protected against toxic hazards; (b) That the resulting pesticide products will be properly packaged and labeled, and that the contents will conform to the relevant quality standards.

3. Pesticide regulations should be strictly enforced in all The Project Implementation Unit (PIU) projects.

D. GUIDELINES ON GOOD LABELLING PRACTICE FOR PESTICIDES

1. Label content:

The purpose of the label is to provide the user with all the essential information about the product and how to use it safely and effectively. The minimum information on the label should therefore tell the user:

What is in the container;

The hazard it represents; and

Associated safety information Instructions for use.

2. What is in the container?

The following information identifying the contents of the container should appear on all labels:

(a) Product or Trade name, associated with the product category (e.g. herbicide, insecticide, fungicide, etc.).

(b) Type of formulation -name and code, as per International Formulation Coding System.

(c) Active ingredient, name (ISO) or other locally used common name or in the absence of either the chemical name as used by IUPAC and content. This should normally be expressed as "contains x g ai per kg" (for solids, viscous liquids, aerosols or volatile liquids) or "contains x g a.i. per liter" (for other liquids), or just "y%".

(d) Net contents of the pack. This should be expressed in metric units (e.g. liter, gram, kilogram, which can be abbreviated to l, g and kg.

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3. Safety information: There should be a clear warning on the label in relation to:

* Reading the safety instructions before opening the pack.
* Handling, transport and storage warning symbols.
* Hazard classification/symbol. There may be a necessity to classify the product with relation to its toxicity.

2.3 Safety precautions should appear on all labels - in black print on a white background:

4. **Safety Precautions**
   The safety text must cover the following product specific advice:
   Good agricultural practice;
   Relevant protective clothing;
   Precautions when handling the concentrate (if applicable);
   Precautions during and after application;
   Environmental safety during and after application;
   Safe storage;
   Safe disposal of product and used container; and
   How to clean equipment (if a potential risk exists)

5. **Safety Pictograms:** Safety pictograms reinforcing the safety text should be included.
6. **Warning:** The following must appear on all labels: Keep locked up and out of reach of children Other warning phrases may be aimed at good agricultural practice and/or steps which need to be taken to avoid adverse environmental effects.
7. **First Aid Advice and Medical Treatment:** Most labels should carry first aid and medical advice, where relevant. Additional information regarding symptoms, special tests and antidotal measures may be added, where appropriate, for particular products.
8. **Leaflets:** Any safety text on the label must also appear on any leaflets associated with it.

E. GUIDELINES ON STORAGE AND TRANSPORTATION OF PESTICIDES

1. The Project Implementation Unit (PIU)is obliged to promulgate, update and enforce rules and regulations for safe, responsible storage and transport. Areas covered by these rules include maintenance of the original product labels, spill prevention, container adequacy, proper marking in storage, facility specifications, product separation, protection from moisture and contamination by other products, restriction of access, and other measures to ensure product integrity and safety.
2. Pesticide stores must be located away from areas where people or animals are housed and away from water sources, wells, and canals.
3. Pesticide stores should be located on high ground and fenced, with access only for authorized persons.
4. There should be easy access for pesticide delivery vehicles and – ideally – access on at least three sides of the building for fire-fighting vehicles and equipment in case of emergency.
5. Pesticides must not be kept where they would be exposed to sunlight, water, or moisture, which could affect their stability.
6. Storehouses should be secure and well ventilated.
7. Pesticide stocks should be arranged such that the oldest are used first (“first in first out” [FIFO] principle), to avoid the accumulation of obsolete stock.
8. Containers should be arranged to minimize handling and thus avoid mechanical damage which could give rise to leaks
9. Containers and cartons should be stacked safely, with the height of stacks limited to ensure stability.
10. Pesticides should not be transported in the same vehicle as items such as agricultural produce, food, clothing, drugs, toys, and cosmetics that could become hazardous if contaminated.
11. Pesticide containers should be loaded in such a way that they will not be damaged during transport, their labels will not be rubbed off, and they will not shift and fall off the transport vehicle onto rough road surfaces.
12. Vehicles transporting pesticides should carry prominently displayed warning notices.
13. Pesticides should not be carried in the passenger compartments of transport vehicles and should be kept tightly secured and covered at all times during transport.
14. The pesticide load should be checked at intervals during transportation, and any leaks, spills, or other contamination should be cleaned up immediately using accepted standard procedures.
15. In the event of leakage while the transport vehicle is moving, the vehicle should be brought to a halt immediately so that the leak can be stopped and the leaked product cleaned up.
16. Containers should be inspected upon arrival at the receiving station.
17. WHO/FAO guidelines (FAO, 1995a) should be followed for handling pesticide-related products during storage, transport, fires, and spills;
18. There should be official reports to The Project Implementation Unit (PIU)and follow-up enquiries in the event of fires, spills, poisonings, and other hazardous events; and
19. Rules and regulations laid down in the Recommendations on the transport of dangerous goods: model regulations (United Nations, 2002) and by international organizations concerned with the specific modes of transport and The Project Implementation Unit (PIU)should be respected.

F. GUIDELINES ON DISTRIBUTION OF PESTICIDES

1. Distribution of pesticides should be carried by trained personnel or under proper Supervision. Misdirection or mishandling can result in the product falling into the hands of uninformed recipients or causing human or environmental risk.
2. Proper packaging is also important to ensure the confinement of the product and its safe handling.
3. The original package is intended to ensure safe distribution; when repacking is necessary, the new packing should meet the specifications of the original packaging as well as complying with the FAO pest management guidelines
4. Packaging (original or repackaging) should conform to FAO pest management guidelines requirements to ensure safety in distribution and prevent unauthorized sale or distribution of vector control pesticides.
5. The distributor should be aware that the shipment is a hazardous product.
6. The distributor must provide a timely service to ensure that products are available on an agreed date that takes into consideration the time of the original order and other related shipment matters.
7. The procurement process should anticipate shipment and distribution schedules.
8. A distribution scheme for pesticide products should be developed that reduces hazards associated with multiple handling and transportation.
9. The distribution of pesticide products to the point(s) of storage by the supplier should therefore be included in tender documents; and
10. All distributors of pesticides should be licensed.

G. GUIDELINES ON DISPOSAL OF PESTICIDES

1. When pesticides have passed their expiry date, specific methods of disposal must follow FAO pest management guidelines for safe disposal of hazardous materials.
2. Similarly, any equipment that is no longer serviceable should be removed from inventory, decontaminated and disassembled to ensure that it will not be subsequently diverted to other uses.
3. Avoid accumulation of obsolete pesticides by provision for phasing-out when pesticides are to be banned or deregistered, refusal of donations in excess of requirement; and spelling out of product specifications, including required packaging and labeling (long-life label).
4. Adherence to WHO/FAO guidelines for handling pesticide-related products during storage, transport, fires, spills and disposal.
5. Consultation with The Project Implementation Unit (PIU) for disposal of obsolete pesticides.
6. Prevention of risk to human and environmental health from emptied packaging and containers, rinsates, and outdated products.
7. Ensure provision of instructions for disposal of pesticide containers as label requirements.
8. Leftover agrochemical formulations must not end up in rivers, streams, ditches, storage dams, etc. and should not be emptied out on the ground.
9. Empty pesticide containers must not be re-used and must be disposed of in a manner that avoids exposure to humans and contamination of the environment.
10. Relevant guidelines appearing on the label(s) should be followed.
11. Empty containers may not be burnt/ incinerated on the farm.
12. Empty containers must be rinsed with integrated pressure rinsing devices on the sprayer, or triple-rinsed (rinsed at least three times) with water, and the rinsate added to the spray/race tank/ Diptank or kept secure until disposal is possible.
13. Triple-rinsed containers can be punctured (in the case of plastics), shattered (in the case of glass) or otherwise rendered unserviceable so as to prevent reuse, whereafter it may be disposed of in a registered hazardous waste landfill site (operated by a registered hazardous waste removal company).
14. Empty triple-rinsed plastic containers can also be collected and removed for recycling by a registered recycler.
15. Obsolete or unwanted chemicals should preferably be sent back to local suppliers or alternatively be removed by certified or approved chemical waste disposal companies.
16. Leftover formulations should never be combined or mixed while being stored for later removal /disposal.

Annex 3 Selected list of people consulted in preparation of the framework

Name	Position	Organization	Date
Mr P. Chiunguzeni	Principal Secretary & Commissioner for Disaster Management	Dept of Disaster Management Affairs	March 2015
Mr S. Maweru	Secretary for Irrigation and Water Development	Ministry of Agric, Irrigation and Water Development	March 2015
Mrs E. Maganga	Secretary for Agric, Irrigation and Water Development	Ministry of Agric, Irrigation and Water Development	March 2015
Mr A. Namaona	Director of Planning	Ministry of Agric, Irrigation and Water Development	March 2015
Mr J. Banda	Deputy Director	Dept of Economic Planning and Development	March 2015
Mr R Fatch	Principal Economist	Dept of Economic Planning and Development	March 2015
Mr J. Kalowekamo	Deputy Director	Department of Energy	March 2015
Mr P. Mamba	Director of Irrigation	Dept of Irrigation	March 2015
Mr A Mbozi	Chief Irrigation Engineer	Department of Irrigation	March 2015
Dr P. Mtende		Ministry of Health	March 2015
Mrs M Kabambe.	Chief Nutrition Officer	Ministry of Education	March 2015
Mr P.Simbani	Director of Aids and Debt Management	Ministry of Finance, Economic Planning	March 2015
Mr S. Ligomeka	Secretary for Housing	Ministry of Lands, Housing and Urban Development	March 2015
Ms E. Bota	Regional Commissioner for Lands and Valuation	Ministry of Lands, Housing and Urban Development	March 2015
W. Chipeta	Project Manager	Shire River Basin Programme	March 2015
O. Durand	Senior Agriculturalist	World Bank	March 2015
P. Waalewign	Senior Water Resources Specialist	World Bank	March 2015
Ms Chikondi-Nsusa	Transport Specialist	World Bank	March 2015
Mr D. Kampani	National Project Coordinator	IRLAD Headquarters	March 2015
Mr C. Mphande	Project Engineer	IRLAD headquarters	March 2015
Mr F. Mphasa	Financial Management Specialist	IRLAD headquarters	March 2015
Mr T.Hiwa	Chief Executive	Roads Authority	March 2015
Mr S Sibande	Transport Economist	Roads Authority	March 2015
Mr C. Mtawali	Senior Engineer	Roads Authority	March 2015
Mr P. Chipeta	Director of Operations	LDF	March 2015
Mr F. Magwede	Controller for Railways	Ministry of Transport	March 2015
Mr K, Munthali	Chief Architect	Directorate of Buildings	March 2015
Mr H. Chiudzu	Director of Buildings	Directorate of Buildings	March 2015
Mr F. Zhuwawo	Director of Planning	Ministry of Local Government and Rural Development	March 2015
Mr F.Sakala	Chief Rural Development Officer	Ministry of Local Government and Rural Development	March 2015
Mr J. B. Phiri	Director of Planning	Ministry of Transport and Public Infrastructure	March 2015

List of people who attended consultative meeting held at Salima District Council on 31 st March 2015

Name	Designation	Organization	Phone
Mr M. Chimphepo	District Commissioner	Salima District Council	
Mr B. Kantema	Assistant Disaster Risks Management Officer	Salima District Council	0994200509
Mr B. Kamanga	Trade Officer	Salima District Council	0888377323
Mr C. Nyasa	District Fisheries	Salima District Council	0999941740
Mr A. Nkhata		Salima District Council	0888160863
Mr G. German	COOPI	Salima District Council	0999391013
Mr L. Chinoko	Environmental Health Officer	Salima District Council	0999365075
Mr B. Nangwale	District Social Welfare Officer	Salima District Council	0999042326
Mr L. Katunga	Assi DADO	Salima District Council	0882542320
Mr H. Makombola	Ass. DCDO	Salima District Council	0999247812
Mr M. Kaufulu	Assist Registrar	National Registration Bureau	0999304455
M M Mailosi		Salima District Council	0993453785
Mr N. Charambo	Environmental Inspectors	Salima District Council	0993608700
Mr S. Phiri	District Forestry Officer		099568 2222
Mr S. Chiphake	Director of Public Works	Salima District Council	0999350819
Ms C. Banda	Field Officer	Red cross Society	0881673098
Mr C. Kumikundi	District Education Manager	Salima District Manager	0999266431
Mr B. Mahara	District Lands Officer	Salima District Council	0995644267
Mr J. Varela	Director of Agric	Malawi Mangoes Ltd	
Mr I. Majamanda	Director of irrigation	Malawi Mangoes Ltd	0999962 274

List of people who attended consultative meeting held at Mangochi District Council on 1 April 2015

Mr BJ Mtayamanja	Director of Administration	Mangochi District Council	
Mr E. Kadzokoyo	Director of Planning	Mangochi District Council	0999313318
Mr C. Millimu	Coordinator	Disaster Relief and Reparation	0999459479
Mr Y. Chiwndo	District Tourism Officer	Mangochi District Council	0999223298
Mr M. Mphande	District Community Dev. Officer	Mangochi District Council	0999342930
Mr J. Chamveka	District Fisheries Officer	Mangochi District Council	0999231873
Ms C. Chabwera	Assist District Disaster Relief Management Officer	Mangochi District Council	0999797617
Ms J. Lipinga	Monitoring and Evaluation Officer	Mangochi District Council	0884128280
Ms M. Kanyama	OPC	Mangochi District Council	099917862
E. Makwinja	Acting Diocesan Coordinator	CADECOM	0999644125
Mr D. Mfunya	Assistant District Forestry Officer	Mangochi District Council	0881638546
Mr W. Kamwendo	Ass. Business Officer	Mangochi District Council	0888375968
Mr B. Chunga	Ass.Commun Dev Officer	Mangochi District Council	0888301940
Mrs T. Mankwadzi	Enviro .District Officer	Mangochi District Council	0999613417
Ms A. Hauya	Environmental Health Officer	Mangochi District Council	0999232304

List of people who attended consultative meeting held at Liwonde Township,Machinga 2 April 2015

Name	Position	Sector	Phone
Mrs R.K Chavula	District Commissioner	Machinga District Council	0884002578
Mr M. Chimbalanga	Director of Planning and Dev	Machinga District Council	0888765454
Mr Dominic Mwandira	Director of Administration	Machinga District Council	0888353788
Mr Yohane Maseko	Land Resources Officer	District Agric Office	0881302956
Joseph Chipekiwe	District Comm Dev Officer	Min of Comm Dev	0999030244
Micheal Kachika	District Labour Officer	Ministry of Labour	0999652888
Matthews Kalaya	District Environmental H .Officer	District Health Office	0888346122
Ezekiel Luhanga	Monitoring and Evaluation Offi	Machinga District Council	0888352129
Shepherd Jere	Assist District Disaster Officer	Machinga District Council	0881142387
Eliza Kasinga	Wash facilitator	District Water office	0888187647
Marvia Mkondiwa	Assistant Cooperative Officer	District Trade Office	0882989552
Paul Mahosha	District Forestry officer	District Forestry office	0999381294
John Gangata	Officer Incharge ESCOM	ESCOM	0888844392
Evansi Chisiano	District Information Officer	Dept of Information	0881799978
Macleaod Piringu	HIV/Aids Coordinator	District Health Office	0888717650
Sandilonda Nkhunga	Assistant Planning Officer	Liwonde Town Council	0881799137
Bob K. Joshua	District Fisheries Officer	Dept of Fisheries	0888876892
Bertha Mijoya	District Social Welfare officer	District Social Welfare Off	0888142912
Mr M.Makanjira	Ward Councilor	Liwonde Town Council	0888908355
Steve Meja	DWDO	Machinga District Council	099304222

List of people who attended consultative meeting held at Chikwawa District Council on 7 April 2015

Mr A. Mdooko	District Commissioner	Chikwawa District Council	0999917342
K. Harawa	Director of Planning	Chikwawa District Council	0888697451
D. Magwira	District Agric Dev Officer	Chikwawa District Council	0999927480
K. Kamphambale	Chief Accountant	Chikwawa District Council	0888891040
E.E. Hane	Building Supervisor	Chikwawa District Council	0888550843
P.G.Dulani	Director of Public Works	Chikwawa District Council	0994091558
Mrs Mwenje	AEDC	Chikwawa District Council	0999640206

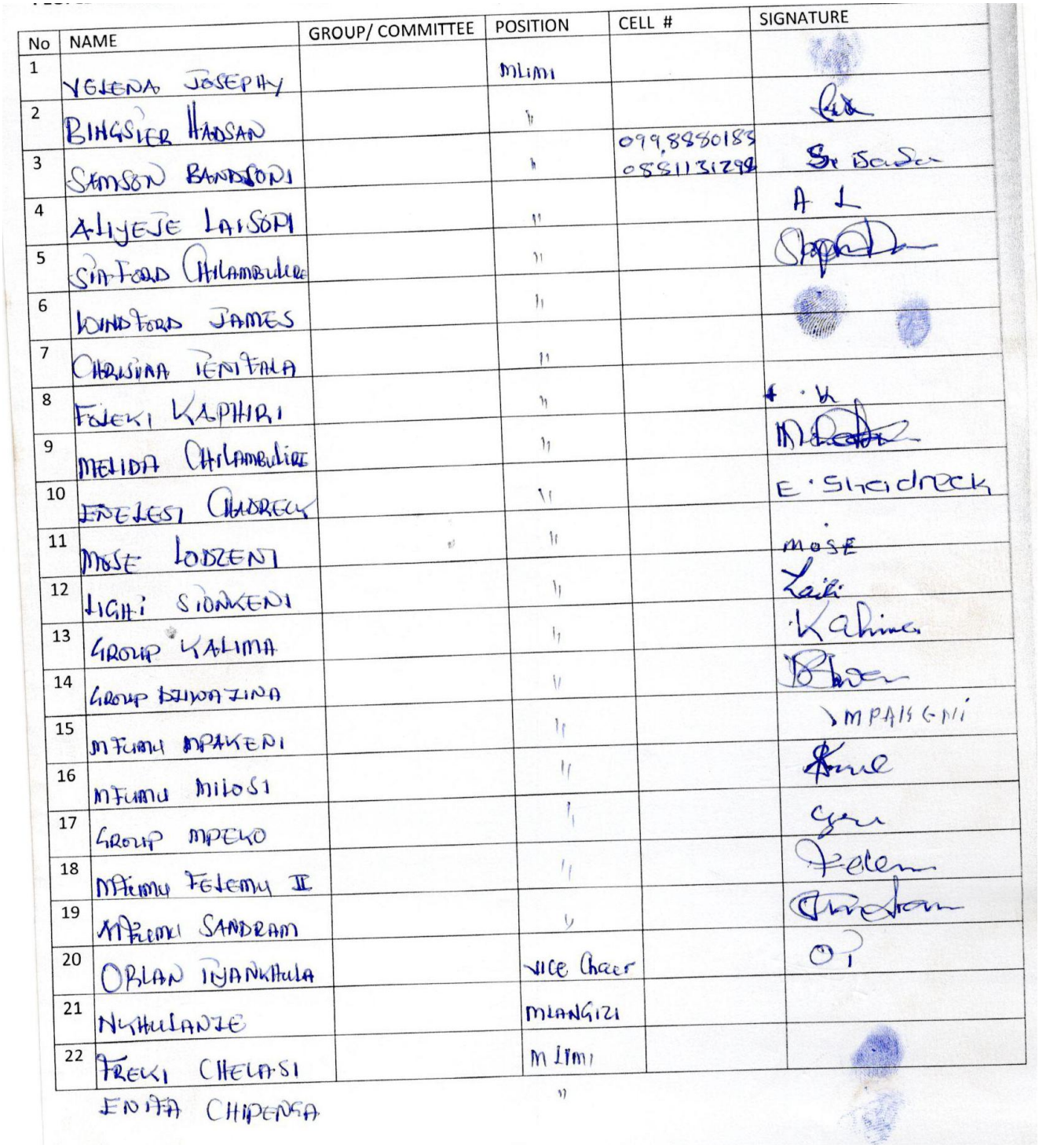
List of people who attended consultative meeting held at Phalombe District Council on 8 April 2015

Name	Designation	Organization	Phone
Mr. P. Kalilombe	District Commissioner	Phalombe District Council	0888312157
Mr I. Mkandawire	Director of Planning and Development	Phalombe District Council	0888342155
Mr F. Mphalo	Acting Enevironmental District Officer	Phalombe District Council	0888899628
Mr D. Mataka	District Education Manager	Phalombe District Council	0881663592
Mr Z. J. Phiri	Environmental Health Officer	Phalombe District Council	0888736851
Mr D.Chbani	Assistant Disaster Risk Management Officer	Phalombe District Council	0999104056
Mr H. Mwavani	Chief Public Works Officer	Phalombe District Council	0888313840
Mr S. Mkata	Assistant District Community Development Officer	Phalombe District Council	0884227228
H. M Kafanikhale	District Env Health Officer	Phalombe District Council	
H.D Phiri	District Community Development Officer	Phalombe District Council	

Annex 4: List of Non –governmental organizations consulted

Name	Position	Name of NGO	Phone
Kelton Tembo	Field officer	Goal Malawi	0881919721
Benson Chidaomba	Coordinator	CADECOM	0999375166
Lewis Msiyadungu	Coordinator	CCJP	01420577
Richard Dikamdima	Engineer	Presscane	0881701454
Laston Zungu	Project Officer	Total Land Care	0995468023
Joseph Chimabalu	DCEO		
Prestone Yohane	Project Leader	DAPP	0991554660
Tawachi Kaseghe	Project Officer	Eagles Relief	0888358263
Clara Banda	Project Officer	Malawi Red Cross	0881673098
Gift German	Project Officer	Coopi	0999391013
Bucker Bijl	Director	Agricane	0999960 481

Annex 5 : List of flood affected local people consulted in in Chikwawa District



No	NAME	GROUP/ COMMITTEE	POSITION	CELL #	SIGNATURE
1	YOLENDA JOSEPH/		MLIMI		
2	BINGSTER HASSAN		"		
3	SAMSON BANDSONI		"	0998850185 0881131298	
4	ALIYEJE LAISONI		"		
5	SINFORD CHILAMBULIRE		"		
6	WINDFORD JAMES		"		
7	CHRISINA IENIFALA		"		
8	FOLEKI KAPHIRI		"		
9	MELIDA CHILAMBULIRE		"		
10	FREDEST ANDREW		"		
11	MOSE LODZENI		"		
12	LIGHT SIONKENI		"		
13	GROUP KALIMA		"		
14	GROUP BENDAZINA		"		
15	MFUMU MPAKENI		"		
16	MFUMU MILOSI		"		
17	GROUP MPEKO		"		
18	MFUMU FELEMU II		"		
19	MFUMU SANDRAM		"		
20	ORLAN NYANKHULA		VICE CHAIR		
21	NKHULANJE		MLANGIZI		
22	FREKI CHELASI		MLIMI		
	ENIFA CHIPENGA		"		

Annex 6: List of farmers consulted at Mitawa Irrigation Scheme

1. Harold Mtalika
2. Mavuto Kamala
3. Gofrey Rodgers
4. Charles Soliyai
5. Jenet Gablon
6. Tamani Malunga
7. Jack Chpojola
8. Abitiress Mkonda
9. Ester Makonde
10. James Kamwanza
11. Christina Khosi
12. Dinesi Kosimasi
13. George Matwere
14. Weston Chewayini