Migratory & Invasive **PESTS AND WEEDS** Management Strategy

2022 – 2027

Government of Kenya

Food and Agriculture Organization of the United Nations

THE WORLD BANK

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Abbreviations and Acronyms

AFA	Agriculture and Food Authority
AfDB	African Development Bank
AIE	Authority to Incur Expenditure
ASTGS	Agricultural Sector Transformation and Growth Strategy
AU	African Union
AU-IAPSC	African Union Inter Africa Phytosanitary Council
BCA	Biological Control Agents
CAADP	Comprehensive African Agriculture Development Programme
CABI	Centre for Agriculture and Bioscience International
CASSCOM	County Agriculture Sector Steering Committee
CIMMYT	International Maize and Wheat Improvement Centre
CoG	Council of Governors
CSG	County Steering Group
DLCO-EA	Desert Locust Control Organisation for Eastern Africa
DOSHS	Directorate of Occupational Safety and Health Services
DREA	Department of Rural Economy and Agriculture
EAC	East Africa Community
ELRP	Emergency Locust Response Program
EMPRES	Emergency Prevention System for Transboundary Animal and Plant Pests and Diseases
ESHS	Environmental Social and Health Safety
FAO	Food and Agriculture Organisation of the United Nations
FGD	Focus Group Discussion
FPC	Fresh Produce Consortium
FPEAK	Fresh Produce Exporters Association of Kenya
FS	Food Safety

GAPs	Good Agricultural Practices
GDP	Gross Domestic Product
GHGs	Greenhouse Gases
GNI	Gross National Income
GoK	Government of Kenya
HCD	Horticultural Crops Directorate
ICIPE	International Centre of Insect Physiology and Ecology
ICT	Information Communication Technology
IFAD	International Fund for Agricultural Development
IGAD	Intergovernmental Authority on Development
ILRI	International Livestock Research Institute
IPPC	International Plant Protection Convention
IRLCO-CSA	International Red Locust Control Organisation for Central and Southern Africa
JASCOM	Joint Agriculture Sector Consultation & Cooperation Mechanism
KALRO	Kenya Agricultural and Livestock Research Organisation
KEBS	Kenya Bureau of Standards
KEFRI	Kenya Forestry Research Institute
KEPHIS	Kenya Plant Health Inspectorate Service
KFC	Kenya Flower Council
KII	Key Informant Interview
KWS	Kenya Wildlife Service
M&E	Monitoring and Evaluation
M&IPWM	Migratory and Invasive Pest Weeds Management
MITT	Multi-Institutional Technical Team
MOA	Ministry of Agriculture
MoALFC	Ministry of Agriculture, Livestock, Fisheries, and Cooperatives

MOH	Ministry of Health
NEMA	National Environment Management Authority
NEPAD	New Partnership for Africa's Development
NMK	National Museums of Kenya
NPPO	National Plant Protection Organisation
NRF	National Research Fund
PCPB	Pest Control Products Board
PESTEL	Political; Economic; Sociological; Technological; Environmental; and Legal
PP	Plant Protection
PP&FSD	Plant Protection & Food Safety Directorate
PPSD	Plant Protection Services Division
REC	Regional Economic Communities
RM & IMP	Regional Migratory & Invasive Pest Management
RPPO	Regional Plant Protection Organisation
SDGs	Sustainable Development Goals
SWOT	Strengths, Weaknesses, Opportunities, and Threats
T&D	Training & Dissemination
TVET	Technical and Vocational Education and Training
UKAID	United Kingdom Agency for International Development
ULV	Ultra-Low Volume
USAID	United States Agency for International Development
WTO-SPS	World Trade Organisation Sanitary and Phytosanitary Measures

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Foreword

While launching the Migratory and Invasive Pest and Weed Management Strategy 2022 -2027, I would wish to celebrate the Directorate of Plant Protection and Food Safety for successfully fighting the desert locust that invaded the country in 2020 and 2021. The Government of Kenya (GoK), through the Ministry of Agriculture, Livestock, Fisheries and Cooperatives (MoALFC), wishes to appreciate FAO, DLCO-EA, IRLCO-CSA, and The World Bank for joining us in not only fighting these pests but also supporting the vision 2030 and the Big Four Agenda. The lessons learnt during the desert locust control operation were used to develop a roadmap now christened "Migratory and Invasive Pests and Weeds Management (M&IPWM) Strategy 2022-2027".

In addition to desert locusts, other migratory and invasive pests also infest and destroy our crops, pasture, and fodder for our livestock. At the same time, some weeds occupy our farm and pasture lands. These pests constrain our ability to achieve food and nutritional security by reducing productivity. This strategy relied on the experience from the desert locust campaign to address the challenges associated with managing migratory and invasive pests and weeds.

The M&IPWM strategy focuses on seven programmatic pillars: Resources Mobilization and Management; ICT to support pest surveillance, Monitoring, and Forecasting; Knowledge Management on Migratory and Invasive Pests and Weeds; Environmentally and Technically Sound Pest Management System; Sustainable Collaborative partnership in pest control, Research and Extension; Responsive Institutional Policy and regulatory framework; and Responsive Livelihood Recovery/Restoration and Resilience Mechanisms. The pillars are crucial interventions geared towards improving food and nutritional security among citizens of Kenya by effectively and efficiently managing migratory and invasive pests and weeds within the confines of our borders. The pillars align with Kenya's national development blueprint, Vision 2030, SDGs and Agenda 2063. The resources to realise the strategic mission are also anchored on the programmatic pillars.

The strategy development process involved critical stakeholders through multi-stakeholder participatory processes. On behalf of the Ministry of Agriculture, Livestock, Fisheries and Cooperatives (MoALFC), I would like to convey profound gratitude to all who developed this strategy. It was a highly consultative and interactive process that left no one behind. Every institution and individual that shared their time, perspectives, and expertise deserve recognition

I am confident that the strategy will serve as a foundation to provide a guiding framework to lay down more effective long term pest management support services in the country. The strategy will be periodically updated to accommodate emerging migratory and invasive pest and weed management issues.

The Ministry wishes to express sincere gratitude to our development partners, FAO, IFAD, and The World Bank, for financial and technical support in developing the strategy. We are also grateful to the ELRP team, PP&FSD, and Strategy Development Experts from FAO-Kenya.

As guided by this document, we now know what to do, when, and how to do it. I am fully committed to the implementation of this strategy.

Hon. Peter Munya, M.G.H., E.G.H.
Cabinet Secretary, Ministry of Agriculture, Livestock, Fisheries and Cooperatives

Message from the Principal Secretary

Migratory pests move across counties, countries, and regions, searching for food and suitable breeding habitats. Such migrations can extend over thousands of kilometres across seas and political borders. Their occurrences and movements are aided by environmental conditions, wind, climate, rainfall and geographical features that influence migratory pathways. Climate change affects the frequency, duration and regions impacted. Unlike migratory pests, invasive species are introduced through trade in agricultural products and people movement. Invasive weeds are accidentally or intentionally introduced as ornamentals, become established and spread in the cultivated pasture, forests and protected areas. These pests have equally devastating effects on agriculture by threatening livelihoods and income. Their impact on the economy, aquatic transportation systems and livelihoods is enormous.

The Government of Kenya (GoK), through the Ministry of Agriculture, Livestock, Fisheries and Cooperatives (MoALFC), in collaboration with other Ministries, county governments, communities and development partners, including the World Bank, AfDB, DLCO-EA, IRLCO-CSA and FAO, have been very instrumental in managing migratory pests, especially recent invasions by desert locusts. On the other hand, different institutions undertake the management of invasive pests and weeds through phytosanitary and quarantine control and other interventions. The effectiveness of control and management programs of these pests has been constrained by challenges related to institutional and coordination structure; human resource capacity; communication, knowledge and information systems; material limitation and logistical issues. The lessons learnt from the first and second waves of desert locust invasions and the emergence and spread of invasive pests and weeds brought out the need for a well-coordinated, multi-sectoral, multi-stakeholder approach for Migratory Invasive Pests and Weeds management.

The MoALFC then took the initiative to develop the migratory and invasive

pests and weeds management strategy through a multi-sectoral and multi-stakeholder approach. The strategy development process involved engagement and consultation of key stakeholders throughout the country. We are confident that the strategy will serve as a guiding framework for more effective long-term pest management support services in Kenya. The strategy is open for periodical reviews to accommodate emerging issues and developments in migratory and invasive pest and weed management. We are grateful to all stakeholders and our development partners who made this strategy a reality.

Prof. Hamadi Iddi Boga, (PhD), C.B.S
Principal Secretary, State Department of Crop Development & Agricultural Research

Message from Food and Agriculture Organisation Country Representative

Migratory and invasive pests pose a severe constraint to food and nutritional security in Kenya. The frequency of invasions and infestations and spread of migratory and invasive pests have increased in the recent past, trends exercebated by climate change. This situation has seen communities in affected areas becoming more vulnerable and unable to recover from such shocks.

Management of these pests is complex and requires a well-thought-out roadmap. As development partners, we are happy to have been part of the team that has contributed to the development of Migratory and Invasive Pests and Weed Management Strategy (M&IPWM). We trust that this strategy will steer management and control of migratory and invasive pests and weeds, and ensure livelihoods recovery, restoration and resilience for affected communities.

It is envisaged that implementation of the strategy will contribute towards achieving Sustainable Development Goals of United Nations and agenda 2065 of increased food and nutritional security through effective management of migratory and invasive pests by strengthening the capacity of MoALFC (PP&FSD) to adequately address any incidences of migratory and invasive pests and weeds in Kenya. The Strategy will also strengthen coordination in pest control, research and extension on Migratory and Invasive Pests and Weeds.

The strategy will be anchored in the Plant Protection and Food Safety Directorate (PPFSD) in the state department of crop development in the Ministry of Agriculture, Livestock, Fisheries and Cooperatives. We look forward to the successful implementation of this strategy.

Carla Mucavi

Carla Mucavi
Food and Agriculture Organisation Country Representative - Kenya

Executive Summary

Migratory and Invasive Pests and Weeds Management (M&IPWM) strategy, which is domiciled in Plant Protection and Food Safety Directorate (PP&FSD) in the Ministry of Agriculture, Livestock, Fisheries and Cooperatives (MoALF&C) is designed to steer the process of managing migratory and invasive pests and weeds to mitigate their effects on agricultural production in Kenya. Kenya, like many other developing countries, relies on agriculture for its economic and rural development. One of the significant challenges that threaten the sector is increased invasion and infestation of pests and diseases due to climate change and other factors. Migratory pests move across counties, countries, and regions, searching for food and suitable breeding habitats aided by environmental conditions such as wind, temperature, precipitation, and geographical features. However, the upsurge of invasive pests and weeds are due to human activities and changes in climatic conditions. This M&IPWM strategy provides a proactive approach in managing these pests and weeds to reduce their devastating effect on agriculture and negative impact on livelihoods.

Historical Development of PP&FSD

The current PP&FSD, initially formed in the 1970s as "Crop Protection Unit", focused on managing migratory pests, which were; *Quelea quelea*, African Armyworm and Locusts (Desert Locusts, Red Locusts, Tree Locusts) and Rodents. The unit was created on the realisation that effective management of migratory pests by farmers would be challenging because of the technical expertise and the number of resources required. Challenges emanating from frequent infestations by emerging pests and diseases such as Maize Lethal Necrosis Disease (MLND), *Tuta absoluta* and Fall armyworm attributed to climate change between 2011 and 2017 resulted in a further upgrade of the sub-division to the Plant Protection Services

Division (PPSD). Plant Protection Services Division was recently upgraded to a full-fledged Plant Protection and Food Safety Directorate (PP&FSD) whose mandate is "*To reduce pre, during and post-harvest crop losses occasioned by migratory pests, invasive weeds, emerging pests and mycotoxins*."

Status of migratory and invasive pests and weeds management

The agriculture sector is guided by the Agricultural Sector Transformation and Growth Strategy (ASTGS) 2019-2029, which is anchored in Global Sustainable Development Goals (SDGs), regional aspirations of Agenda 2063, and the Comprehensive African Agriculture Development Programme (CAADP) of the African Union (AU) among others. The mandate of managing migratory and invasive pests and weeds in Kenya is scattered across different institutions, leading to poor coordination between various actors in plant protection. For instance, Plant Protection Bill 2021 mandates KEPHIS to manage invasive, quarantine and non-quarantine regulated pests of Phytosanitary importance. This bill also designates KEPHIS as the official National Plant Protection Organisation (NPPO). Crops Act (2013) mandates the Cabinet Secretary for agriculture to take control measures against invasive pests while being silent on invasive weeds. KWS is responsible for managing invasive plants in protected areas, while KEFRI has the mandate to spearhead research on the management of invasive plants in forests. Plant Protection Act (2012) and Amendment bill 2021 empowers the Cabinet Secretary to make rules and regulations to prevent and control attacks by or the spread of pests or diseases. The M&IPWM strategy harmonises migratory and invasive pests and weeds by putting in place a national coordination structure, review of policy and legal frameworks, and institutional mandates.

Migratory and invasive pests and weed management

situational analysis conducted through elaborate stakeholder participation through open storming sessions, Focus Group Discussions (FGD), Key Informant Interviews (KIIs), and telephone interview sessions came up with strengths, weaknesses, opportunities and threats (SWOT), Problem Tree, and PESTEL analyses identified the following strategic priority issues to be addressed by the strategy;

a) Upscaling human and physical capacity development.
b) Strengthening ICT to support surveillance, monitoring and forecasting systems.
c) Coordination and campaign for migratory and invasive pests and weeds management.
d) Building sustainable partnerships, collaborations and research programmes.
e) Developing a sustainable resource mobilisation framework.
f) Developing a responsive policy and regulatory framework on migratory and invasive pests and weeds management.
g) Building responsive livelihood recovery/restoration and rehabilitation mechanisms for affected communities.
h) Developing sustainable systems for pesticides management; environmental, social health and safety standards and monitoring.

M&IPWM Strategic Implementation Framework: 2022 – 2027

The strategy implementation will be guided by the following mission, vision and strategic goal.

1

VISION

Establish a system to support effective and efficient management of migratory and invasive pests and weeds for enhanced food and nutritional security in Kenya.

2

MISSION

To effectively and efficiently manage migratory and invasive pests and weeds through an integrated multi-stakeholder approach and environmentally sustainable interventions.

3

STRATEGIC GOAL

To improve food and nutritional security in Kenya through effective management of migratory and invasive pests and weeds.

Strategic Outcomes

The strategy will focus on two main outcomes that give rise to different management strategies;

Outcome 1

Strengthened capacity of the PP&FSD to manage and control migratory and invasive pests and weeds at the National and County levels in Kenya.

Outcome 2

Enhanced coordination among institutions and regional bodies engaged in migratory and invasive pest and weed management, through research, control and livelihood restoration.

The M&IPWM strategy strives to improve human and physical capacities, phytosanitary compliance, surveillance and early warning mechanisms, synergy with national and regional institutions in research, control, and information sharing. This will culminate in enhanced food and nutrition security in line with the Agricultural Sector Transformation and Growth Strategy and Vision 2030.

M&IPWM Implementation Pillars

The pillars capture all aspects of preparedness, pest management and control, and mitigation of risks. The implementation of these pillars is estimated to cost at least USD 203.06 Million. The pillars include:

Pillar 1: Resources Mobilisation and Management.

To effectively manage migratory and invasive pests/weeds in Kenya, there must be adequate financial, physical and human resources to execute various functions and activities at both National and County levels

Pillar 2: ICT to support pest surveillance, monitoring and forecasting.

The strategy proposed establishing a cost-effective information collection and sharing system to detect and monitor migratory and invasive pests/weeds and provide timely information for effective response and management.

Pillar 3: Knowledge Management on Migratory and Invasive Pests and Weeds.

There is need to improve knowledge on migratory and invasive

pests and weeds among various stakeholders managing these pests and weeds. This will enhance surveillance, monitoring, identification and management measures.

Pillar 4: Environmentally and technically sound pest management system.

There is need to effectively and efficiently control migratory and invasive pest and weeds within Kenya while adhering to all the phytosanitary and environmental regulations to protect farmers against losses associated with the pests and weeds. This will improve farm productivity, thus contributing towards food and nutrition security among the people of Kenya.

Pillar 5: Sustainable Collaborative Partnership in Pest Control, Research, and Extension.

There is need to improve collaboration among organisations and institutions at regional, national and county levels involved in migratory and invasive pest management to build synergy in managing the pests and weeds. The collaborative effort will improve efficiency in management of pests and weeds.

Pillar 6: Responsive Institutional Policy and Regulatory Framework.

There is need to harmonise the existing legal policies and regulatory framework and institutional mandates managing plant health and pest control to create an enabling framework for managing migratory and invasive pests and weeds. This will also ensure synergy and overlapping institutional mandates in managing the pests. In addition, the Multi-Institutional Technical Team (MITT) will be anchored in law to enhance the team's ability to perform its functions.

Pillar 7: Responsive Livelihood Recovery/Restoration and Resilience Mechanisms.

There is need to improve the resilience capacity of farmers by supporting them to mitigate risks and uncertainties associated with the invasion of pests and weeds

The Governance and Management of the Strategy

The M&IPWM Unit will be domiciled at PP&FSD and spread out to all the counties in Kenya. The management of various Migratory and invasive pests and weeds will be guided by the Multi-Institutional Technical Team (MITT), which the Director of PP&FSD chairs. MITT comprises Director PP&FSD as the Chairperson, PCPB, KEPHIS, KALRO, AFA, Universities, Farmer's representative, ICIPE, DLCO, MOH, NEMA and co-opts other institutions as when necessary, such as CYMIT and CABI.

This M&IPWM strategy is well-positioned to effectively manage migratory and invasive pests and weeds in Kenya by rallying all national and international partner institutions. The strategy provides a robust coordination structure at national and county levels. The implementation of the strategy will contribute towards increasing the level of food and nutrition security in Kenya and beyond.

01
Introduction

1.0 | Introduction

1.1 Background

Migratory and invasive pests and weeds invasions and infestations, directly and indirectly, affect crop productivity, food and nutritional security, the environment and household incomes. On the one hand, migratory pests are transboundary and move across counties, countries, regions and continents searching for food and suitable breeding habitats. Their migrations can extend over thousands of kilometres across seas and political borders. The pests usually concentrate as swarms (locusts), (armyworms) or flocks (quelea birds). Their occurrences and movements are aided by environmental conditions such as wind, climate, rainfall and geographical features that influence migratory pathways (Elliott, 2000).

On the other hand, invasive pests and weeds have limited ability to move independently but are aided by human activity and changes in climatic conditions. They could be introduced through trade in agricultural produce and human movements over several thousands of kilometres and across borders. Outbreaks of invasive pests or weeds at times evolve due to changes in global conditions. This means invasive plants or organisms that had not attained pest status can become pests due to land use changes, variation in rainfall patterns or changes in temperature regimes (Skendžić et al., 2021).

Sub-Saharan Africa has been experiencing an increased infestation of migratory and invasive pests and weeds due to climate change, as warned by IPCC in 2014 (Niang et al., 2014). In the recent past, Kenya has experienced increased frequencies of both migratory and invasive pests that has greatly hampered the country's

food production. Memorable incidents of migratory pests is the fall armyworm infestation reported for the first time in 2017. This was followed almost immediately by a heavy invasion by migratory desert locust in 2019 through to 2021. Another example of a migratory pest found in Kenya is the African armyworm endemic in Africa. They invade farms in Taita Taveta County from Tanzania during favourable ecological conditions.

Damages associated with invasion and outbreaks of invasive pests cause huge losses and negatively impacts the livelihoods of millions of people. Unfortunately, there are gaps in estimating actual losses and associated monetary values. For example, in Africa, the fall armyworm upon invasion in 2017 caused significant destruction and devastation to crops. Its infestation was estimated to cause 8-20 million tonnes of maize losses (Pratt et al., 2017).

Kenya has experienced frequent invasion and infestation by several migratory and invasive pests in the recent past. Increased frequency of these invasions and infestations have been associated with global change, which is believed to have necessitated transboundary translocation and influenced the breeding and subsequent and establishment in various habitats. Some of the major migratory pests recorded in Kenya in the recent past include the Red-billed birds (*Quelea quelea*), African Armyworm (*Spodoptera exempta*), and the Desert Locust (*Schistocerca gregaria*). While the invasive pests recorded in Kenya include the Fall armyworm (*Spodoptera frugiperda*), the South American tomato pinworm (*Tuta absoluta*), fruit fly (*Bactrocera dorsalis*), the Mediterranean fruit fly (*Ceratitis capitata*), Papaya mealybug (Paracoccus marginatus), the Potato cyst nematode (Globodera rostochiensis), the spotted-

wing drosophila (*Drosophila Suzukii*), the Asian long-horned beetle (*Anoplophora glabripennis*) and the larger grain borer (*Prostephanus truncatus*). Invasive weeds recorded in Kenya include the Purple Witchweed (*Striga harmonthica*), the Japanese Dodder (*Cuscuta japonica*), Water Hyacinth (*Eichhornia crassipes*), Parthenium weed (*Parthenium hysterophorus*), Giant Salvinia (*Salvinia molesta*), Erect Prickly Pear (*Opuntia stricta*), Mathenge (*Prosopis juliflora*), Tall Morning Glory (*Ipomoea purpurea*) among others.

Different categories of pests in the country include;

- **Pest**: Any species, strain, or biotype of plant, animal or pathogenic agent injurious to plants or plant products
- **Quarantine pest**: A pest of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled.
- **Occasional pest:** Pest that infrequently occurs with no close association with a particular crop.
- **Persistent pests**: Occurs on the crop throughout the year and is difficult to control.
- **Invasive pest:** A species that does not occur naturally in a specific area and whose introduction does or is likely to cause economic (including agricultural) or environmental harm or harm to human health.
- **Migratory pest:** These are pests that move in search of food and suitable breeding places. They include locusts, armyworms and the quelea bird. The pests usually concentrate as swarms (locusts), infestations (armyworms) or flocks (quelea birds)
- **Noxious weed**: noxious weeds are non-native plants that have been introduced into an area from other parts of the world or endemic species upsurge to economic significant levels due to climatic change.

Pest and weed invasions and infestations result in reduced household incomes with subsequent effects on livelihoods and human capital and thus require urgent management

interventions. Because they are transboundary in nature, their management requires a regional approach. In this context, Kenya is a member of several regional and international organisations involved in pest management. Such organisations include the Desert Locust Control Organisation for Eastern Africa (DLCO-EA) and International Red Locust Control Organisation for Central and Southern Africa (IRLCO-CSA). These organisations offer technical and material support in management of transboundary pests.

Through the Ministry of Agriculture, Livestock, Fisheries and Cooperatives (MoALFC), the Government collaborates with other ministries, county governments, communities, and development partners, including the World Bank, AfDB DLCO-EA IRLCO-CSA and FAO, among others, in management of migratory and invasive pests. Collaboration with these partners has been in human and physical capacity development, and financial and logistical support. Despite these collaborations, management of migratory pests and invasive pests has been faced with human capacity, material, logistical and coordination related challenges. This has been exacerbated by the absence of a Migratory and Invasive Pest Management Strategy. Such a strategy is expected to put in place a coordinated approach in management migratory and invasive pests and weeds while enhancing linkages and partnerships at National regional and international levels.

The M&IPWM strategy was developed through stakeholder consultation and deliberations. The stakeholders engaged included national institutions comprising policy makers, regulators (MoALFC, KEPHIS, PCPB, HCD, AFA, NEMA, KWS and MoH), national research institutions (KALRO and KEFRI), Universities, international research organisations (ICIPE and CIMMYT), farmer

organisations (FPEAH and FPC), and county governments through the Council of Governors with the support of a development partner – the Food and Agriculture Organisation (FAO). The stakeholders gave their contributions and later participated in the validation of the strategy. This strategy is based on the following strategic issues, identified through stakeholder engagements and consultations:

1. Resource mobilisation and management.
2. ICT communication on early warning, monitoring and surveillance.
3. Knowledge management on migratory and invasive pests and weeds.
4. Migratory and invasive pests and weeds control systems, and emergency response and environmental monitoring.
5. Multi-institutional stakeholder research and extension.
6. Institutional policy and regulatory framework on migratory pests and weeds management.
7. Livelihood restoration and rehabilitation.

Implementation of strategy along the identified mentioned strategic issues will ensure:

1. Adequate preparedness to manage any invasion by migratory and invasive pests and weeds in any part of the country.
2. Strengthened coordination in pest control, research, extension and rehabilitation/restoration on migratory and invasive pests and weeds.

1.2 Justification for the strategy

Globally, migratory and invasive pests and weeds pose a considerable threat to both biodiversity and economic activities such as agriculture, trade and tourism. Migratory and invasive pests can significantly impact agricultural productivity and production, while invasive weeds can take over farming lands and outcompete crops (FAO, 2005). Together, the adversely affect communities that depend on natural resources and

healthy ecosystems to make a living.

The agriculture sector in Kenya is guided by the Agricultural Sector Transformation and Growth Strategy (ASTGS) 2019-2029 (Government of Kenya, 2019). This, in turn, anchors to the global and regional aspirations of the Sustainable Development Goals (SDGs), Agenda 2063, and Comprehensive African Agriculture Development Programme (CAADP) of the African Union (AU), among others (NEPAD Planning and Coordinating Agency, 2015). The Vision 2030 recognises agriculture as the mainstay of the Kenyan economy. The development of the sector's potential is one of the vision's objectives for achieving the 10% annual economic growth rate envisaged under the economic pillar (Government of Kenya, 2007). Food and nutrition security for all is crucial for the government to achieve this growth. In recognition of this mandate, the Kenya government prioritised agriculture in the Big Four Agenda 2017-2022, focusing on achieving 100% Food and Nutrition Security for the country's population.

Migratory and invasive pests and weeds significantly affect the achievement of Food and Nutrition Security goals in Kenya. For example, the fruit fly complex of *Bactrocera dorsalis* and *Ceratitis cosyra* are known to cause yield losses of between 40-80% depending on the host fruit. The fruit fly complex has negatively affected the export market for Kenyan mangoes. This loss of the export market for Kenyan mangoes is estimated to be worth more than US$1 million and this has affected smallholder farmers who are the major producers.

After the first and second waves of locust invasion, it was estimated that 3 million vulnerable households in Kenya experienced food and nutrition insecurity, with a good proportion losing their asset capital. The most significant impacts were felt by households that depend

on livestock and cropping activities and who are already facing acute food insecurity due to their existing high vulnerability and the effects of expected fodder and crop losses. For these households, locust impacts led to deterioration in food security and rise in food prices. It is anticipated that if no control measures were undertaken, the desert locust invasion would cause below-average national harvests and significant pasture losses in arid and semi-arid regions. This would have worsened the food insecurity situation leading to below-average food stocks and pasture conditions, livestock movements, human conflict, reduced incomes, and rising food prices.

The current legal and policy frameworks and strategies at the national, regional and continental levels do not effectively address the rising challenges of migratory and invasive pests and weeds in Africa. At a national level, pest management strategies are designed to provide for the coordinated management of pests. Such a strategy sets out how pests are to be managed and by which agency. A national pest management strategy has statutory force and can include rules requiring people to take specific actions while prohibiting certain actions. For example, the plan can require any person to help monitor the presence or distribution of pests or to control or eradicate the pests. In addition, a levy can be imposed through order in council to fund the strategy's implementation. However, such a national strategy for managing migratory and invasive pests and weeds has been lacking in Kenya.

The need for such a strategy has been informed by the continued threat of invasions by desert locusts and frequent introductions of invasive pests and weeds. Effective and efficient management of pests requires adequate monitoring and early warning anchored on collaborative

research and effective communication. Currently, there is a weak link between these components. Additionally, there is an overlap in mandate between institutions, which leaves gaps in the actions needed to control these pests. Lack or inadequate resources for timely intervention has also been a significant setback in managing these pests.

This strategy has addressed these shortcomings by identifying key pillars that include research and extension, early warning and monitoring, resource mobilisation, response or control unit, monitoring and evaluation, including environmental monitoring and livelihoods restoration and rehabilitation.

02

State of Migratory and Invasive **Pests and Weeds Management**

State of Migratory and Invasive Pests and Weeds Management

Preamble

Management of migratory and invasive pests and weeds is critical in reducing food loss at pre and post-harvest stages of crop production. Plant Protection and Food Safety Directorate (PP&FSD) has been taking the lead role in managing the pests guided by a set of policies, regulations, and international treaties from the time it was created in the 1970s. This effort by PP&FSD has been supported by several local, regional and international organisations. The policies and regulations guiding the management of these pests have also been reviewed over time to create several institutions supporting PP&FSD in managing different aspects related to pests and weeds management. However, the increasing incidents of invasion and infestation of migratory and invasive pests and weeds is attributed to climate change, increased international trade, global movements among other factors. The increased intensity and incidences of invasion and infestations have put pressure on the management capacity of PP&FSD, thus calling for a more proactive approach in dealing with these pests.

2.1 Development of Plant Protection and Food Safety Directorate

2.1.1 Historical Development of Plant Protection and Food Safety Directorate

The current Plant Protection and Food Safety Directorate started as a unit in the 1970s and was referred to as "Crop Protection Unit", focusing mainly on the management of migratory pests. The then migratory pests of interest were; *Quelea quelea*, African Armyworm and Locusts (Desert locusts, Tree locusts). Though not classified as a migratory pest, management of field rodents was also a mandate of the unit. The unit was

created upon realising that farmers' may not effectively manage migratory pests due to the technical expertise and the number of resources required. Furthermore, proper monitoring and early warning system would be necessary, hence the need for government intervention.

In the 1980s, the unit was upgraded to a branch with an expanded mandate to include a section focusing on post-harvest management of grain. This was after the accidental entry into the country of a very destructive storage pest, the Larger Grain Borer (*Prostephanus truncatus*) nicknamed by farmers *Osama* or *Scania*. The post-harvest section also covered capacity building for farmers to manage other storage pests such as grain weevils, rodents, and post-harvest management technologies such as proper drying, shelling, and storage of harvested grains to minimise mycotoxin contamination.

The Crop Protection Branch was later upgraded to a Sub-Division within the Crop Development Division. The mandate of the new subdivision was expanded to include advisory services on judicious use of pesticides. This was necessitated by the country facing several rejections of fresh produce due to high levels of pesticides. Major focus included capacity building of field staff and holding farmers awareness forum on responsible use of pesticides. In addition, there was an increasing challenge on management of obnoxious weeds such as striga, nutgrass and "mathenge". Challenges emanating from frequent infestations by emerging pests and diseases attributed to climate change witnessed since 2011 resulted in a further upgrade of the sub division to the Plant Protection Services Division (PPSD). For effective execution of its mandate, PPSD has been operating under three main sections, namely;

1. The Migratory Pests Control section;
2. The Crop Post-Harvest Management section and
3. The Pesticide Advisory, Pathology and Weeds section.

2.1.2 Current PP&FSD Mandate

The immediate former Plant Protection Services Division (PPSD) was recently upgraded to a fully-fledged Directorate and re-named the "Plant Protection and Food Safety Directorate (PP&FSD)".

Rationale for Upgrading PP&FSD

1. To adequately address issues of food safety, which start right from production and have become pertinent
2. To effectively manage migratory/transboundary pests, including Desert locusts, Quelea birds, and armyworms whose outbreaks are becoming more frequent.
3. To effectively tackle and address invasive pests and weeds.
4. To address incidences of emerging pests and diseases resulting from climate change such as Golden apple snails, Potato cyst nematodes and *Drosophila suzukii.*
5. Capacity building of county extension service providers and stakeholders on migratory and invasive pests management

2.1.2.1 **Vision**
Be the leading agent in the management and control of migratory, strategic and transboundary pests.

2.1.2.2 **Mission**
To promote sustainable plant protection practices that are ecologically safe for increased agricultural production.

2.1.2.3 **Mandate**
To reduce pre and post-harvest crop losses due to migratory pests, emerging pests, transboundary pests, invasive weeds and mycotoxins.

2.1.2.4 Core Functions

1. Undertake control operations for outbreaks of migratory pests and other transboundary pests in collaboration with county governments, relevant government agencies and development partners.
2. Undertake surveillance and monitoring of migratory pests and other transboundary pests in collaboration with other key agencies.
3. Capacity Building of migratory and other transboundary pest's management in the country.
4. Provide centralized coordination and communication for collaboration and partnerships amongst government agencies and other stakeholders in the management of migratory and other transboundary pests.
5. Provide an ICT data and knowledge management centre on migratory and other transboundary pests.
6. Coordinate development of multi-institutional project proposals and strategies for resource mobilization from the government and development partners.
7. Monitoring and evaluation of migratory and transboundary pest management.

2.1.2.5 PP&FSD Structure

1. Plant Protection Division with two units on:
   a) M&IPW Management
   b) Surveillance, Monitoring, ICT & Knowledge Management

2. Transboundary Pests and Post – Harvest Management Division with two units on:
   a) Post – Harvest and Aflatoxin Management
   b) Pathology and Pesticides Management.

2.1.2.6 Roles of Divisions

2.1.2.6.1 Plant Protection Division

1. Monitoring and surveillance of migratory and invasive pests and weeds (M&IPW).
2. Development and implementation of M&IPW control strategies, capacity building, national guidelines and policies for migratory Pest management.
3. Coordination of partnerships with other Government agencies, regional bodies and development partners in the management and communication of M&IPW management.
4. Integration of ICT and knowledge management options into the management of migratory pests, invasive weeds, new, and emerging plant pests.
5. Backstopping on implementation of migratory and invasive pests and weeds management functions.

2.1.2.6.2 Food Safety Division

1. Oversee food and environmental safety in management of migratory and invasive pests and weeds approaches
2. Ensure regulatory compliance with pesticides safety standards during pest management
3. Development and implementation of monitoring and surveillance, capacity development and technology transfer, national guidelines and policies for post-harvest, Aflatoxin, plant disease and pesticides management in the country;
4. Coordination of partnership with other Government agencies, stakeholders, and development partners in the country's management and communication of post-harvest, Aflatoxin, plant disease and pesticides management.
5. Backstopping on implementation of post-harvest, Aflatoxin, plant diseases and pesticides management function.

2.1.2.7 Roles of PP&FSD Units

2.1.2.7.1 M&IPW Management Unit

1. Development and implementation of national M&IPW control strategies, guidelines and policies for M&IPW management.
2. Coordination of partnerships with other government agencies, regional bodies and development partners in the management of M&IPW.
3. Backstopping on implementation of M&IPW management functions.
4. Coordination of partnership with other government agencies, stakeholders, and development partners in managing new and emerging M&IPW.
5. Capacity development and technology transfer to counties on M&IPW management.

2.1.2.7.2 M&IPW Surveillance, Monitoring, ICT & Knowledge Management Unit

1. Development and implementation of monitoring and surveillance strategies for migratory pests.
2. Integration of ICT and knowledge management options into the management of prevalent, new, and emerging M&IPW.
3. Development and implementation of M&IPW communication plan
4. Capacity development and technology transfer to counties on surveillance and monitoring.

2.1.2.7.3 Post-harvest and Aflatoxin Management Unit

1. Development and implementation of national monitoring and surveillance guidelines and policies for post-harvest and Aflatoxin management in the country;
2. Coordination of partnership with other government agencies, stakeholders, and development partners in the

country's management and communication of post-harvest and aflatoxin management.
3. Capacity development and technology transfer to counties on Post-harvest and Aflatoxin management.

2.1.2.7.4 Pathology and Pesticides Management Unit

1. Oversee food and environmental safety in management of migratory and invasive pests and weeds as well as plant disease approaches.
2. Ensure regulatory compliance with pesticides safety standards during pests and weeds management.
3. Development and implementation of national monitoring and surveillance, guidelines and policies for managing new plant diseases and pesticides use.
4. Coordination of partnership with other government agencies, stakeholders, and development partners in managing new plant diseases and responsible pesticide use in the country.
5. Capacity development and technology transfer to counties on Pathology and Pesticides Management.

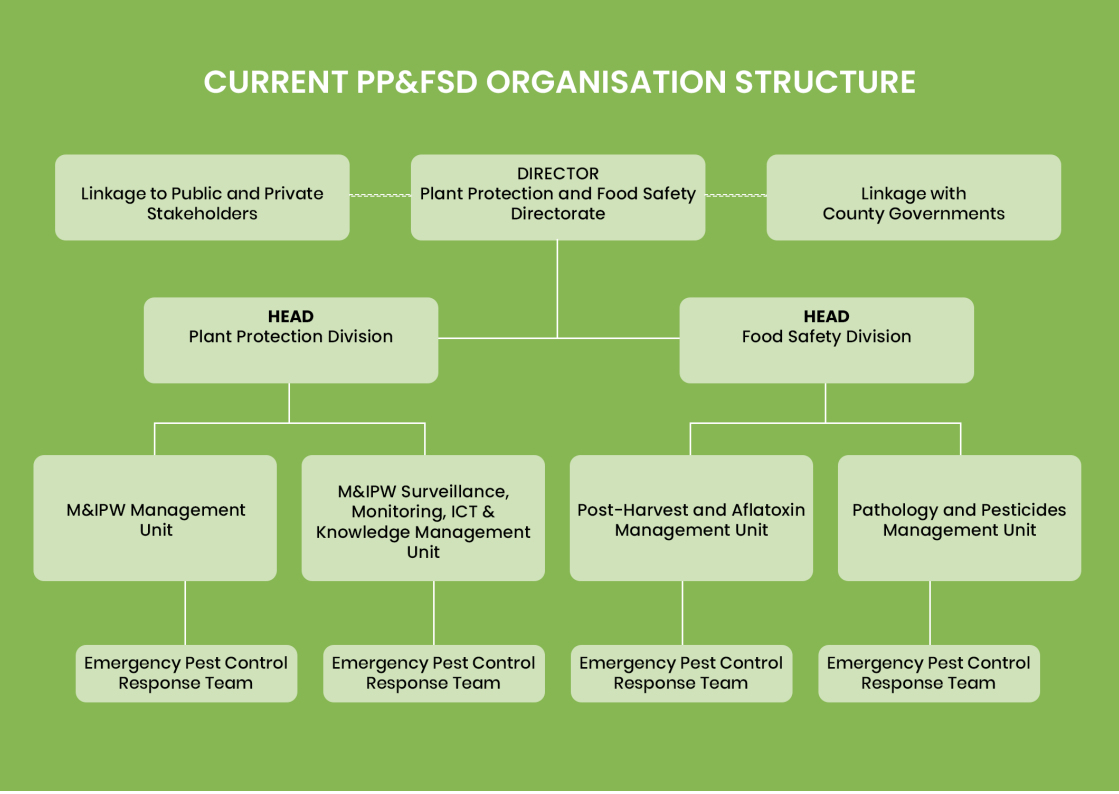


Figure 1: Current PP&FSD Organisational Structure

2.2 The Current State of Migratory and Invasive Pests and Weeds Management

In Kenya, the key migratory pests that have received attention in the past and present include Desert Locust, the African armyworm and Quelea birds. The Plant Protection and Food Safety Directorate in the Ministry of Agriculture, with support from partners like FAO and DLCO-EA is responsible for both ground and aerial management of the pests in collaboration with the DLCO-EA aerial crew.

2.2.1 Invasive Pests and Weeds Management

The mandate of managing invasive pests in Kenya is found across different institutions. Currently, KEPHIS, under the Plant Protection Bill (2021) is mandated to control invasive, quarantine and non-quarantine regulated pests that are

of Phytosanitary importance. Previously management of noxious weeds was undertaken by KEPHIS under Cap 325 (Suppression of Noxious Weeds Act and Agriculture Act (Cap 318) that were repealed) by the Crops Act of 2013. Under the Crops Act, the Cabinet Secretary for agriculture is empowered to take actions to control invasive pests. However, the Act is silent on the management of weeds. KWS is responsible for the management of invasive plants in protected areas, while KEFRI has the mandate to manage invasive plants in forests.

2.2.2 Laboratories to support PP&FSD in management of migratory and invasive pests

A successful pest management strategy requires timely and correct pest diagnosis and identification. Currently, PP&FSD does not have adequate capacity for the identification of pests and weeds. However, there are national and international institutions that have the capacity to identify pests and weeds. Among the national institutions with capacity in both human and physical (infrastructure and equipment) include KEPHIS, KALRO, NMK, CIMMYT, KEFRI and universities. International institutions include ICIPE and ILRI. Therefore, there is need to develop a working memorandum of understanding between PP&FSD and the institutions to support the directorate on pest and diseases management.

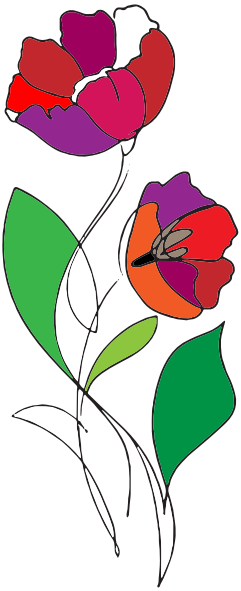
2.3 Legislative Support to PP&FSD

The mandate of the management of invasive pests in Kenya is found across different institutions. Currently, KEPHIS, under the Plant Protection Bill 2021, is mandated to control invasive, quarantine and non-quarantine regulated pests that are of phytosanitary importance. Previously, management of noxious weeds were undertaken by KEPHIS under Cap 325 (Suppression of Noxious Weeds Act) and Agriculture Act (Cap 318) that were repealed by the Crops Act of 2013 (Government of Kenya, 2013a). Under the Crops Act, the Cabinet Secretary at

the MoALFC is empowered to take actions to control invasive pests. However, the Act does not address the management of weeds (GoK, 2013). KWS is responsible for managing invasive plants in protected areas, while KEFRI has the mandate to control invasive plants in forests.

2.3.1 Plant Protection Act (2012) and Amendment Bill 2021

This Act of Parliament provides for the prevention of the introduction and spread of diseases and pests destructive to plants. It gives authority to the Cabinet Secretary at the MoALFC to make rules and regulations to prevent and control attacks by, or the spread of, pests or diseases. In this Act's definition of pests includes arthropod pests, diseases and weeds. The proposed amendment bill seeks to designate KEPHIS as the official National Plant Protection Organisation (NPPO) whose mandate includes, but is not limited to:



- To protect domestic agricultural production and the environment from the introduction and spread of foreign and emerging plant pests.
- To provide for the prevention of introduction and suppression of noxious and invasive weeds.
- To provide for the detection, identification, assessment, emergency response and management of risks to plant health and the environment.
- To support sanitary and phytosanitary compliance of agricultural products to national and international market requirements.
- The provision of pest management, including transboundary and migratory pests.

03
Situation **Analysis**

3.0 | Situation analysis

3.1 State of Plant Protection in Kenya

Plants are the source of the air we breathe and most of the food we eat, yet we often do not pay much attention to keeping them healthy. For example, FAO estimates that up to 40 percent of food crops are lost annually to plant pests and diseases (FAO, 2017). This leaves millions of people without enough food to eat and seriously damages agriculture - the primary source of income for rural poor communities. This implies that countries can improve their food security greatly by reducing pre- and post-harvest losses without expanding areas under production.

Plant health is increasingly under threat. Climate change and human activities have altered ecosystems, reduced biodiversity and created new niches where pests can thrive. At the same time, international travel and trade have tripled in volume in the last decade and can quickly spread pests and diseases worldwide. This causes a significant risk for damage to native plants and the environment. Indeed, plant pests are often impossible to eradicate once they have established themselves and managing them is time-consuming and expensive. Thus, prevention is critical for minimising the devastating impact of pests on agriculture, livelihoods and food security. Thus, emphasis should be on protection and prevention rather than controlling a full-blown infestation.

Strict enforcement of sanitary and phytosanitary measures by persons in the transportation industries should be followed to make sure ships, vessels, airplanes, trucks and trains do not carry plant pests and diseases into new areas. Governments should invest in building infrastructure and increasing support to national and

regional plant health organisations to enhance capacity to execute their mandate of cross border surveillance, monitoring and enforcement of phytosanitary requirements, which is the first line of defence. Because of the strong linkage between plant health and environmental protection, there is a need to encourage environmentally friendly technologies while managing transboundary pests, mainly due to the nature of such control operations. A sound ecosystem approach utilises different pest management strategies and practices resulting in enhanced crop health status with responsible use of pesticides. Avoiding over-reliance on broad-spectrum and persistent pesticides when dealing with pest outbreaks helps conserve the environment, protect fish and aqua-life, preserve pollinators, conserve natural enemies and other beneficial organisms while safeguarding human and animal life.

3.2 Policy, Legal Framework and Institutional Analysis

3.2.1 Policy, Institutional and Legal Framework: Global level

The 2030 agenda for sustainable development is the overarching framework for development in the world. It articulates 17 goals considered holistic for achieving sustainable development for all. The relevant SDGs for managing migratory pests include SDGs 2, 3, 13, 15 and 17 (United Nations, 2021). They specifically provide as follows:

Together, these goals provide a policy framework for the management of migratory pests in the world. However, there are global conventions agreed upon by the community of nations in this regard. These include the following:

3.2.1.1 International Plant Protection Convention

This is a 1951 treaty deposited with FAO that aims to secure coordinated, effective action to prevent and to control the introduction and spread of pests of plants and plant products

The convention extends beyond the protection of cultivated plants to the protection of natural flora and plant products. It also takes into consideration both direct and indirect damage by pests, so it includes weeds.

3.2.1.2 Convention on Biological Diversity

The Convention on Biological Diversity adopts a broad approach to conservation. It requires parties to the Convention

to adopt national strategies, plans, and programmes for the conservation of biological diversity and integrate the conservation and sustainable use of biological diversity into relevant sectoral and cross-sectoral plans, programmes, and policies. Management of migratory pests should consider the conservation of rare and endangered species in the control areas.

3.2.1.3 United Nations Framework Convention on Climate Change

The convention seeks to regulate levels of greenhouse gases (GHGs) concentration in the atmosphere to avoid climate change at levels that would harm economic development or impede food production activities. In essence, migratory pests such as locusts thrive on vegetative and forage parts of plants, depleting carbon sinks. Control of pests is intended to safeguard vegetation cover and also allow for rejuvenation of damaged forage.

3.2.1.4 FAO Guidelines on Good Practice for Aerial Application of Pesticides

These guidelines provide for effective, efficient and safe aerial application of pesticides. It guides correct dosage to defined targets, appropriate spraying equipment, and acceptable spraying distribution. The guide identifies problems faced during aerial spraying and proposes solutions to addressing them.

3.1.1.5 FAO Guidelines on Good Practice for Ground Application of Pesticides

The guidelines are aimed at decision-makers, managers, field supervisors and spray operatives for safe and efficient pesticide use and application.

3.1.1.6 FAO Guidelines on Desert Campaign Organisation and Execution

This guideline is intended for use by individuals responsible for organising a locust control campaign in their country. Field staff, administrators, donors, and other international organisations

may find some of the information useful in understanding what is involved and implementing locust campaigns.

3.2.1.7 FAO Guidelines on Desert Locust Control

This guideline is intended mainly for use by field staff involved in Desert Locust control operations, including field officers supervising control operations and pilots and engineers of spray aircraft. They are useful reference material for training new staff and providing refresher training for experienced locust officers.

3.2.1.8 FAO Desert Locust Guidelines on Safety and Environmental Precautions

This guideline is primarily intended for use by decision-makers, field officers and monitoring staff involved in the organisation and execution of Desert Locust control operations. Two subjects are addressed in this guideline. First, the reduction of environmental and human health risks from insecticide use during locust control is discussed. Practical recommendations are given on how to address risk reduction during the campaign preparation phase, implement it during the control operations, and evaluate it in post-campaign follow-up.

3.2.2 International Institutional Framework

The IPPC establishes the Commission on phytosanitary measures, which oversees the implementation of the IPPC convention. It currently has 183 members and is recognised by the World Trade Organisation Agreement on applying sanitary and phytosanitary measures as the only standard-setting body for plant health. The objectives of the commission are as follows:

- Protect sustainable agriculture and enhance global food security through the prevention of pest spread.
- Protect the environment, forests and biodiversity from plant pests.
- Facilitate economic and trade development through the promotion of

harmonised scientifically based phytosanitary measures.
- Develop phytosanitary capacity for members to accomplish the preceding three objectives.

3.2.2.1 Food and Agriculture Organisation of the United Nations

At the global level, FAO through EMPRES (Emergency Prevention System for Transboundary Animal and Plant Pests and Diseases) helps strengthen National Desert Locust control capacities by improving warning, rapid reaction, preparedness, and introducing environmentally safer control techniques. The organisation's Desert Locust Information Service (DLIS) continuously monitors the situation based on information provided by affected countries and forecasts the timing, location and scale of breeding and migration. DLIS issues monthly bulletins and sends out warnings and alerts when significant developments occur.

3.2.2.2 Desert Locust Commission

The Desert Locust Commission was established under the name Desert Locust Commission in the Near East as Article XIV body within the Food and Agriculture Organisation (FAO) framework of the United Nations. The Commission's role is to strengthen the cooperation and coordination between member states.

3.2.3 Regional Organisations for Migratory Pest Management

3.2.3.1 African Union - Inter Africa Phytosanitary Council

The Inter-African Phytosanitary Council of African Union (AU-IAPSC) is a Specialised Technical Office of the Department of Rural Economy and Agriculture (DREA) of the Commission of Rural Economy and Agriculture (REA) of African Union (AU) and one of nine Regional Plant Protection Organisations (RPPOs) of the International Plant Protection Convention (IPPC) in charge

of Africa.

It collaborates with 54 National Plant Protection Organisations (NPPO) and eight Regional Economic Communities (REC) to support the Member States in the phytosanitary capacity building process, preventing the introduction and spread of exotic and invasive plant pests, and increasing intra- and intercontinental market access.

3.2.3.2 East African Community

The East African Community (EAC) is a regional intergovernmental organisation of 6 Partner States: The Republics of Burundi, Kenya, Rwanda, South Sudan, the United Republic of Tanzania, and the Republic of Uganda, with its headquarters in Arusha, Tanzania.

One of the key sectors under EAC is agriculture and food security, and the community supports this sector through harmonisation of agricultural policies as well as joint programmes for efficient and effective International Conventions, Treaties and Guidelines

3.2.4 Policy, Institutional and Legal Framework: National level

3.2.4.1 Constitution of Kenya

Article 43 of the Constitution of Kenya recognizes the right of every Kenyan to be free from hunger and to have adequate food of acceptable quality. Further, article 42 provides for the right to a clean and healthy environment and to have this environment protected for present and future generations. Migratory pests are a direct threat to the achievement of these rights provided in the constitution, and it behoves stakeholders to develop a strategy for their management.

Article 68 obligates the state to protect the environment and natural resources, including ensuring attainment of a 10%

forest cover of the land area of Kenya, eliminate processes and activities likely to endanger the environment, and protect genetic resources and biological diversity. Migratory pests such as locust forage on plants and particularly trees endangering the livelihoods of many people.

3.2.4.2 Kenya Vision 2030

The Sessional Paper Number 10 of 2012 on the Kenya Vision 2030 under the economic pillar identifies specific interventions which in the agricultural sector include increasing productivity of crops and livestock, introducing land-use policies for better utilisation of high and medium potential lands, developing more irrigable areas in arid and semi-arid lands for both crops and livestock, and improving market access for smallholders through better post-harvest and supply chain management (Government of Kenya (GOK), 2012).

3.2.4.3 Big Four Agenda

This is the current administration's focus for the period 2018 -2022 and encompasses four key areas as follows:

Under the food security priority area, the administration aims at achieving 100% food and nutrition security.

3.2.4.4 Agriculture Sector Transformation and Growth Strategy

This strategy articulates the government's commitment to delivering 100% food and nutrition security (Government of Kenya, 2019). It is anchored in the belief that food security requires a vibrant, commercial and modern agricultural sector that sustainably supports Kenya's economic development, national priorities, and commitments to the Malabo Declaration under the Comprehensive Africa Agriculture Development Programme (CAADP), and the United Nations Sustainable Development Goals (AUC, 2014).

3.2.4.5 National Agricultural Research Systems Policy

The Government recognises the critical role of agricultural technology development and application in transforming and modernizing agricultural research. This policy provides the foundation for research in the agricultural sector. It aims at achieving reforms in the Kenyan agricultural research systems to support the development of an innovative, commercially oriented, and modern agricultural sector.

3.2.4.6 National Agricultural Sector Extension Policy

The policy seeks to rationalise, streamline and enhance coordination of agricultural extension (research) services so that the sector can play its role of delivering the 10 percent annual economic growth envisaged under the economic pillar of Vision 2030. This policy implements the ASDS on matters of agricultural extension services (Government of Kenya, 2012).

3.2.4.7 National Productivity Policy

The Sessional Paper Number 3 of 2013 on the National Productivity Policy responds to low productivity and directs corrective measures. The Policy aims to achieve accelerated economic growth through high investment and productivity

growth, being the incremental growth of 5% per year up from the current less than 1% in private and public sectors. It also aims to increase productivity awareness and consciousness level in the country from the current level of about 1 percent to 60 percent of the population (Government of Kenya (GoK), 2012).

3.2.4.8 National Food and Nutritional Security Policy

The Sessional Paper Number 1 of 2012 on the National Food and Nutritional Security Policy aims at achieving safe food in sufficient quantity and quality to satisfy the nutritional needs for optimal Agricultural Policies & Legislation: The Policy directs the promotion of sustainable food production systems with particular attention to increasing soil fertility, agro-biodiversity, organic methods and proper range and livestock management practices.

3.2.4.9 Plant Protection Act (2012)

This is an act of parliament that provides for the prevention of the introduction and spread of diseases and pests destructive to plants. It gives authority to the Cabinet Secretary to make rules and regulations for the purpose of preventing and controlling attacks by or the spread of pests or diseases.

3.2.4.10 Pest Control Products Act – CAP 346 (1982) revised 2012

This act regulates the importation, exportation, manufacture, distribution and use of products used for the control of pests and of the organic function of plants and animals (National Council for Law Reporting, 2012). It also establishes the Pest Control Products Board, whose functions are as follows:

- To assess and evaluate pest control products in accordance with the provisions of the regulations made under this Act
- To consider applications for registration of pest control products and to make recommendations thereon to the Minister.
- To advise the Minister on all matters relating to the enforcement of the provisions of this Act and regulations made thereunder.

3.2.4.11 Crops Act 2013

This Act consolidates and repeals various statutes relating to crops; to provide for the growth and development of agricultural crops and for connected purposes. The Act has repealed Cap 325 (prevention of noxious weeds Act) and Agriculture Act Cap 318. The act seeks to accelerate the growth and development of agriculture, enhance productivity and incomes of farmers and the rural population, improve the investment climate and agribusiness efficiency, and develop crops as export crops (Government of Kenya, 2013a).

3.2.4.12 Kenya Agricultural Livestock Research Organisation Act of 2013

This Act establishes KALRO as an organisation to promote, streamline, coordinate, and regulate research in crops, livestock, genetic resources, and biotechnology. KALRO works to expedite equitable access to research information, resources and technology and prwomote the application of research findings and technology in the field of agriculture (Republic of Kenya, 2013).

3.1.4.13 National Environment Policy 2013

The main goal of this policy is to provide a better quality of life for present and future generations through sustainable management and the use of the environment and natural resources. It articulates the government's vision to develop a national strategy and action plan for mapping and management of invasive alien species; set up a framework for research, information exchange and environmental awareness on invasive alien species and; Institute measures for prevention, eradication and control of invasive species that have major environmental and economic impacts (Government of Kenya, 2013b).

3.1.4.14 Climate Change Act 2016

Provides for a regulatory framework for enhanced response to climate change, to provide for mechanisms and measures to achieve low carbon climate development.

3.2.5 Institutional Policy and Legal framework matrix:

Preamble

This section highlights the legal framework that will directly guide the implementation of the migratory and invasive pests and weeds management strategy. The existing gaps in the current legal and regulatory framework are also identified and recommendations on what needs to be done. This will enhance and ensure smooth implementation of the strategy.

Table 1: Strategic plan legal and policy framework matrix

S/NO	Policy / Legal framework	Institutions Implementing	Conflict/gap	Recommendations
1	Plant Protection Act (2012) and Amendment Bill 2021	PP&FSD KEPHIS	• PP&FSD mandate is in control of migratory pests • KEPHIS handles quarantine pests some of which are invasive • The ACT does not explicitly state whose mandate it is to control invasive weeds.	• The ACT should be reviewed to clearly state the mandate and role of PP&FSD and KEPHIS • The ACT should also be reviewed to include whose mandate between KEPHIS and PP&FSD should tackle invasive weeds.

S/NO	Policy / Legal framework	Institutions Implementing	Conflict/gap	Recommendations
2	Crops Act 2013	AFA KEPHIS PP&FSD	• The ACT repealed Cap 325 (suppression of Noxious Weeds Act) and CAP 318 (Agriculture Act) but does not provide control of weeds or state whose mandate it is to control weeds. • The Act provides for Cabinet Secretary for Agriculture discretion to declare area as "pest infected" for the purposes of control measures to be undertaken. • The ACT does not clarify between migratory and invasive pests or role of PP&FSD in managing pests.	• The ACT should be amended to provide for provision of management of weeds • The ACT should also be amended to specify a "period within which Cabinet secretary for Agriculture should declare an area "pest infested for the purposes of taking control measure" and prohibit movement of plant materials from "infested areas". • The ACT should be amended to make it mandatory to report new pests in people's territory.
3	Pest Control Products Act 2012	PCPB	No conflict	The ACT should be amended to provide for emergency registration of pesticides in case of invasion of new pests.

S/NO	Policy / Legal framework	Institutions Implementing	Conflict/gap	Recommendations
4	Kenya Agricultural Research Organization Act 2020	KALRO	None	Amend the ACT to be more responsive to emerging research needs on pests and prioritize research funding.
5	Environmental Management and Co-ordination 2015	NEMA	None	Adequate

Table 2: Institutions regulating Environmental Issues

INSTITUTION	ROLES
National Environment Council	Responsible for policy formulation and direction, set national goals, objectives and priorities, convene and coordinate stakeholders
National Environment Management Authority	• Co-ordinate the various environmental management activities being undertaken by the lead agencies and promote the integration of environmental considerations into development policies, plans, programs and projects with a view to ensuring the proper management and rational utilization of environmental resources on a sustainable yield basis for the improvement of the quality of human life in Kenya. • Undertake and co-ordinate research, investigation and surveys in the field of environment and collect, collate and disseminate information about the findings of such research, investigation or survey. • Identify projects and programs or types of projects and programs, plans and policies for which environmental audit or environmental monitoring must be conducted under this Act. • Initiate and evolve procedures and safeguards for the prevention of accidents which may cause environmental degradation and evolve remedial measures where accidents occur. • Monitor and assess activities, including activities being carried out by relevant lead agencies, in order to ensure that the environment is not degraded by such activities, environmental management objectives are adhered to and adequate early warning on impending environmental emergencies is given. • Render advice and technical support, where possible, to entities engaged in natural resources management and environmental protection so as to enable them to carry out their responsibilities satisfactorily.

INSTITUTION	ROLES
National Environment Trust Fund	Facilitates research intended to further the requirements of environmental management, capacity building, environmental awards, environmental publications, scholarships and grants
National Environment Restoration	• Fund which acts as supplementary insurance for the mitigation of environmental degradation where the perpetrator is not identifiable or where exceptional circumstances require the Authority to intervene towards the control or mitigation of environmental degradation. Fund which acts as supplementary insurance for the mitigation of environmental degradation where the perpetrator is not identifiable or where exceptional circumstances require the Authority to intervene towards the control or mitigation of environmental degradation.
County Environment Committees	Responsible for the proper management of the environment within the counties in respect of which they are appointed.
Public Complaints Committees	Consider any allegations or complaints against any person or against the Authority in relation to the condition of the environment in Kenya.
National Environment Action Plan Committee	Every five years, prepares a national environment action plan for consideration and adoption by the National Assembly.
Advisory Committee on Environmental Impact Assessment	• Advises NEMA on environmental impact assessment related reports.

Standards and Enforcement Review Committee	• Advise the Authority on how to establish criteria and procedures for the measurement of water quality. • Recommend to the Authority minimum water quality standards for all the waters of Kenya and for different uses. • Advise the Authority to carry out investigations of actual or suspected water pollution including the collection of data. • Prepare and submit to the Authority draft standards for the concentration of pesticides residues in raw agricultural commodities. • Establish, revisit, modify and submit to the Authority draft standards to regulate the importation, exportation, manufacture, storage, distribution, sale, use, packaging, transportation disposal and advertisement of pesticides and toxic substances with the relevant organizations. • Establish and submit to the Authority draft procedures for the registration of pesticides and toxic substances. • Establish and submit to the Authority draft measures to ensure proper labelling and packaging of pesticides and toxic substances. • Constantly review the use and efficacy of pesticides and toxic substances and submit the findings of such review to the Authority. • Recommend to the Authority measures for monitoring the effects of pesticides and toxic substances on the environment. • Recommend to the Authority measures for the establishment and maintenance of laboratories to operate as standards laboratories for pesticides and toxic substances. • Recommend to the Authority measures for the establishment of enforcement procedures and regulations for the storage, packaging and transportation of pesticides and toxic substances. • Constantly collect data from industries on the production, use and health effects of pesticides and toxic substances and avail such data to the Authority. • Keep up-to-date records and reports necessary for the proper regulation of the administration of pesticides and toxic substances. • Do all other things as appear necessary for the monitoring and control of pesticides and toxic substances.
National Environment Tribunal	Hears appeals on any environmental matter any party or the authority

3.3 Stakeholders' Analysis

The stakeholders involved in the migratory and invasive pest and weed management in Kenya were identified by the strategy development team through an open storming session on 6th August 2021 before they were invited to a stakeholder storming workshop at Kyaka Hotel in Machakos on 16th – 21st August 2021. The identified stakeholders prioritised their influence and interest using a Power Interest Grid (PIG) (Figure 2). The stakeholder identification process benefited from the multi-institutional coordination team constituted by the MoALFC to address the desert locust invasion. The stakeholders were grouped into different categories: research institutions, educational institutions, producer organisations and individuals, logistic institutions, regulatory bodies and agencies, extension providers, development partners and NGOs, marketing agencies, regional bodies, and the MoALF&C. The roles of some of the key agencies include;

3.3.1 Research Institutions

Research institutions are primarily mandated to focus on research in the plant protection sector. In the context of migratory pests, this includes grant writing and bidding and conducting in-depth studies to understand the dynamics around specific pests and the best way they can be. The findings are then published to inform the public domain.

The research institutions include national institutions such as KALRO and regional research bodies such as ICIPE, CABI and CIMMYT. They play a critical role in conducting research and evaluating diverse technologies for use in managing pests. A critical area is the development of environmentally friendly technologies and biological products. The research institutions play a critical role in bioprospecting, field surveys, identification, and multiplication of biocontrol agents. Further, research institutions investigate the environmental impact of crop

protection techniques, emphasising minimising poisoning of and contamination of farmworkers, fresh produce, water, soil, and environment due to misuse of pesticides.

3.3.2 Academia

Academia includes universities, Technical and Vocational Education and Training (TVET) institutions, and Agricultural Training Centres – where academic programmes and short training sessions are conducted covering different target groups. Academia is also involved in building human capacity, conducting research leading to publications, curricula development, and offering technical advice concerning emerging pests and diseases of economic significance.

3.3.3 Producers

Producers include small and large-scale growers targeting local and export market destinations. Producers are key contributors to plant protection. Along the food value chains, producers strive to ensure the safe product is acceptable for local and international consumers. This involves adherence to good agricultural practices (GAPs) such as safe use of pesticides and control equipment for specific pests as recommended by input providers. Producers are critical in providing feedback on the effectiveness of pest control products and the success of migratory pest control operations

3.3.4 Logistics

Logistics includes transporters and persons operating in produce handling facilities. Through adherence to EHS guidelines on logistical and ethical considerations, transporters and handling facilities safeguard human and environmental safety, processing and clearing of pesticides, and control equipment for timely delivery for migratory containment.

3.3.5 Input Suppliers

Input suppliers are privately owned small, medium, and large

firms supplying the requisite pesticides and herbicides to farmers. They are critical players in migratory and invasive pest and weed control systems, linking the farmers to the right chemicals. PCPB should register the substances they supply. The input suppliers were represented by the Agrochemical Association of Kenya (AAK) during stakeholder storming sessions. Their role is to provide high-quality inputs such as pesticides, PPEs, and equipment to manage migratory pests.

3.3.6 Regulatory Agencies

Regulatory agencies play a critical role in safeguarding and enforcing the adherence to sanitary and phytosanitary standards, responsible use of pesticides, Environmental protection, and foodstuff safety. Key among these institutions include KEPHIS, PCPB, NEMA, HCD, AFA, WTO-SPS, EAC-SPS protocol and COMESA-SPS regulations.

Regulatory agencies oversee that supplies for managing migratory pests conform to national, regional, and international policies and laws. Regulatory agencies undertake surveillance and monitoring and play a critical role in the detection of new pests.

3.3.7 Extension Service Providers

The County Government is responsible for providing extension services and management approaches for pest and diseases at the county level. Non-Governmental and other private agencies such as NGOs, CBOS, CABI, PAD and Input dealers supplement government efforts in providing extension services. Marketing agencies such as FPEAK offer tailor-made training to enable producers to access certain fresh produce markets.

3.3.8 Development Partners and NGOs

The donor community and non-governmental agencies support plant protection by resource mobilisation and funding

projects tied to migratory pest management. These include FAO, DLCO-EA, AfDB, CABI, World Bank and IFAD. The agencies also provide technical expertise in the development of legal and institutional frameworks aligning with plant protection.

3.3.9 Marketing Agencies such as FPEAK and FPC

Produce marketing agencies ensure their products meet the requisite standards and conditions set by their customers. Farmers were represented by the Market Alliance and civil societies such as FPEAK and FPC during the stakeholder storming sessions. Marketing agencies work hand in hand with producers and exporters to balance market demands and quality supply besides offering technical market advisory and training. Marketing agencies encourage the formation of farmer groups resulting in ease of communication, dissemination of pest management information, and execution of pest control operations. Marketing agencies also serve as channels of information on pests' status at international market levels

3.3.10 Regional Bodies

They ensure coordinated and concerted effort in successful plant protection against migratory pests, regional bodies support local governments (subscribers) primarily through continued transboundary pest monitoring and control, resource mobilisation, providing technical human and equipment capacities, information forecast as well as capacity building. Some of these regional bodies include DLCO-EA and IRLCO-CSA.

3.3.11 Ministry of Agriculture – Plant Protection and Food Safety Directorate

The division is responsible for organising and executing pests, weeds and diseases control operations when pests occur in outbreak proportions beyond the capabilities of individual counties such as Quelea birds, Fall armyworm, African armyworm, rodents, and invasive weeds, mycotoxins, fruit flies and locusts.

The directorate works in collaboration with other relevant institutions and partners such as KALRO, ICIPE, Department of Defence, universities, DLCO-EA, IRLCO-CSA, CABI, KEPHIS, PCPB, NEMA, KWS, NBA among others in matters related to strategic, transboundary pests and toxins management and the enforcement of Plant Protection Act Cap.324 and Pest Control Products Act Cap 346.

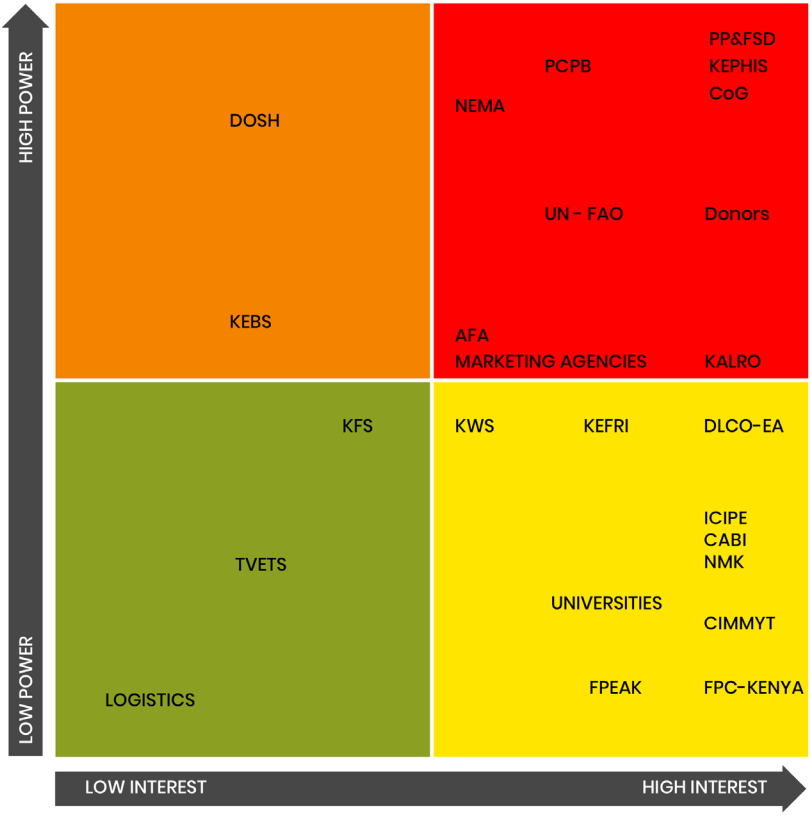


Figure 2: Power Interest Grid for M&IPWM Stakeholders

3.4 SWOT Analysis

Table 3: Summary of SWOT Analysis

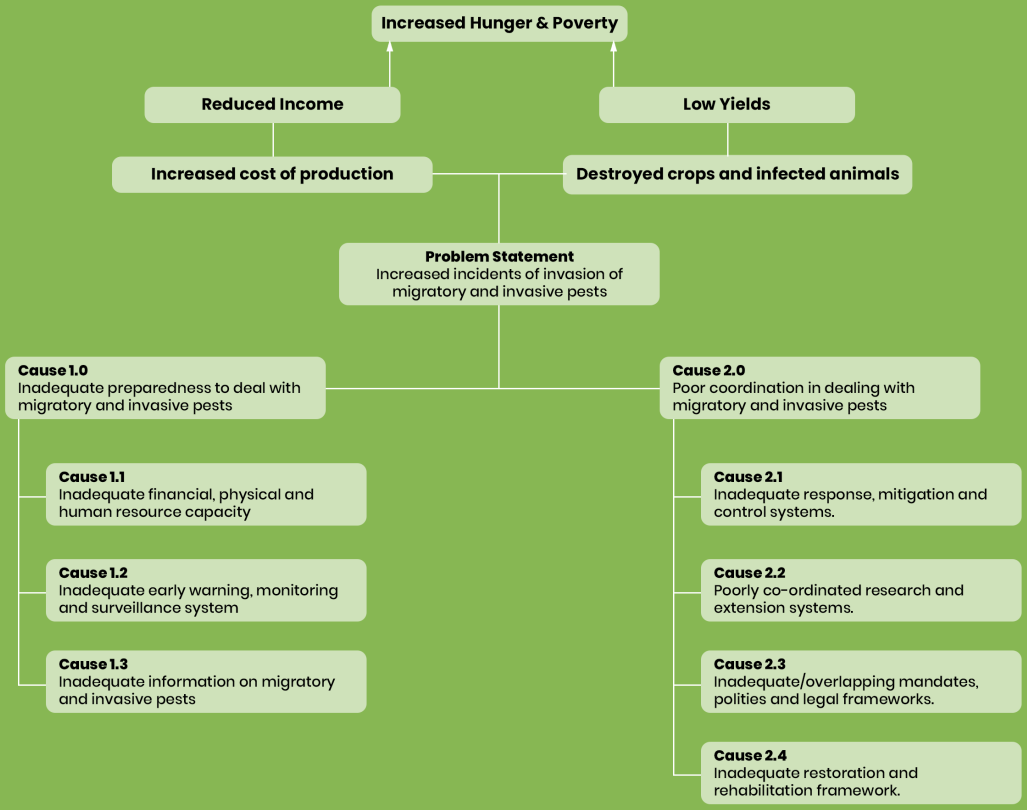
STRENGTHS	WEAKNESSES
• Membership to regional and international organizations dealing with migratory pest management • Physical capacity in terms of vehicles, storage facilities, drum crushers, spray equipment's, laboratories • Capacity for rapid resource mobilization in emergency situations by government and development partners • An operational unit designated for migratory pest management • Well-structured institutional framework (government ministries, departments and agencies, research and academic) that plays critical roles in management of migratory pests, • Sufficient legal framework for management of migratory pests in the ministries, departments and agencies. • Political goodwill.	• Inadequate human and physical capacity • Weak coordination mechanism for multiple institutions involved in migratory pest management • Multiple guidelines and conventions in migratory pest management • Weak anchorage of migratory pest management at policy/strategy level • Inadequate critical ICT infrastructure and information management system • Lack of early warning platforms and models • Lack of critical skills on developing early warning models, deep analytics and deep learning (artificial intelligence and machine learning) • Limited access to real time regional data • Inadequate financial support for migratory pest management • Over reliance on regional bodies for shared resources • Lack of programs on livelihood recovery, restoration and rehabilitation to support communities affected by migratory pests • Inadequate research on long term impact of migratory pest spray operations and biological control options for migratory pests. • Lack of communication strategy amongst stakeholders in the migratory pests' management • Inadequate and substandard pesticides stock storage and disposal management system • Limited monitoring and enforcement of EHS regulations and pesticide label application guidelines • Poor supply chain management especially for emergency situations.

OPPORTUNITIES	THREATS
• High coverage of mobile and internet connectivity in the country • Existence of the harmonized protocols and guidelines on efficacy trials, residue trials and registration requirement on pesticides for domestication and implementation. • National, regional and international partnerships/collaboration on migratory pest management • Existing data system. • Kenya Agricultural Sector has established a cloud based big data platform and High-Performance Computing (HPC) hosted at KALRO • DLIS • Huge climate/weather data exists at state agencies (KMD, NDMA and KALRO) and other partners (FEWSNET, ICPAC and FAO) • Availability of open-source data from satellites • Availability of time series data • Existence of print, broadcast and social media platform as channels for publicity and information sharing • High level policy support to migratory pest management	• Internal and external conflicts, insecurities and disputes • Cybercrime and cyber security • Climate change leading to recurring outbreaks • Communities' perceptions on the effects of the pesticides • Deliberate and accidental introduction of new or exotic pests • Misinformation by advocacy, media and lobby groups. • Global pandemics • Inadequate mobile network and internet connectivity in rural areas • Political interest • Unavailability of pesticides, spray equipment etc.

3.5 Problem Tree Analysis

The Problem Tree Analysis for the problem on migratory and invasive pests and weeds was done during a situation analysis stakeholder storming session held in Machakos to help find possible solutions by mapping out the anatomy of cause and effect around the issues of the migratory and invasive pest. The representatives of various organisations were broken into smaller focal groups depending on their institutions' mandate. The results from each focus group were then merged to form the problem tree represented by Figure 3. This problem tree identifies and isolates the main problems to be addressed in designing the M&IPWM Strategy. The problem tree was used to design the M&IPWM result framework (Figure 3.)

FIGURE 3: PROBLEM TREE ANALYSIS



3.6 Strategic Issues Identified

Strategic Focus

Following the analysis of challenges facing the management of migratory and invasive pests in Kenya, problem tree analysis, and the analysis of Strengths, Weaknesses, Opportunities, and Threats, the following areas were prioritised as the strategic focus for the next five years of the implementation of this Migratory and Invasive Pest and Weeds Management Strategy. The performance of these strategic foci will require a coordinated approach and engagement of all the national, regional, and international stakeholders involved in Migratory and Invasive Pest Management.

3.6.1 Strategic Focus

1. To Enhance financial, technical, and human resources for migratory and invasive pest management.
2. To strengthen institutional capacity for coordination, research and extension in migratory and invasive pest management.
3. To improve data management systems for early warning, preparedness, rapid response, monitoring and evaluation.
4. To Improve regional coordination between Kenya and affected countries: local, regional and international coordination
5. To enhance management systems for pesticides management; environmental, social health and safety standards and monitoring.
6. To enhance communication, information sharing and knowledge management systems.
7. To enhance legal, policy and institutional capacity for management of migratory and invasive pests.
8. To improve supply chain management of control pesticides and equipment
9. Improved monitoring and compliance to environmental,

social and health safety safeguards.

10. Strengthening of pre and post-management impact assessment and recovery plans.

3.7 PESTEL Analysis

A number of factors may affect the effort to execute the strategy to reduce the level of invasion from migratory and invasive pest and to accomplish its mission and vision. These factors have been considered in coming up with this strategic plan.

MACRO-ENVIRONMENTAL FACTORS	IMPACT
POLITICAL FACTORS	• Conflicting interest in enforcement of policies and regulations • Relationships with neighbouring countries • Poor coordination County governments
ECONOMIC FACTORS	• Escalating cost of living • Uncertain monetary and fiscal policies • Inadequate resource allocation • Over reliance on regional bodies for physical and financial resources • Corruption - misappropriation of funds. • Inadequate available pesticides

SOCIO-CULTURAL FACTORS	• Misinformation on migratory and invasive pests • Cultural believes on the migratory and invasive pests and their control measures • Inadequate communication network among stakeholders involved in managing migratory and invasive pests • Inadequate programmes on livelihood recovery. Restoration and rehabilitation among the affected communities
TECHNOLOGICAL FACTORS	• Low diversity in control methods including diversity in chemical and biological control measures • Inadequate IT infrastructure to provide information and monitor the pests • Accidental introduction new and exotic pests • Inadequate research on long-term effect of control measures such as biological and chemical control • Inadequate control equipment • Emerging technologies
ENVIRONMENTAL FACTORS	• Climate change • Changing land use patterns • Lack of strong policies for ecosystem protection • Conflicting roles of institution safeguarding environment control issues
LEGAL FACTORS	• Changing crop protection act • Conflicting legislation by other sectors • Disparities in regional policies and laws • International agreements • New constitution land commission • County governments

04

Strategic Framework 2022 - 2027

4.0 | STRATEGIC FRAMEWORK: 2022 - 2027

This Migratory and Invasive Pest Strategy focuses on enhancing human capacity, institutional coordination, and preparedness of the Directorate of Plant Protection and Food Safety in managing the migratory and invasive pests and weeds. The strategy also recommends technical and administrative solutions in managing the pests.

The strategy focuses on ensuring that the PP&FSD provides better thought-out programmes, which can be implemented successfully in managing invasive and migratory pests and weeds. The strategy is anchored on the Agricultural Sector Transformation Growth Strategy and Vision 2030. This is to ensure that the sector provides a framework for increased productivity and food & nutritional security among smallholder farmers.

The M&IPWM strategy outlines the specific plant protection goals for Kenya within the confines of the existing phytosanitary laws and regulations and adheres to Kenya's environmental laws. The strategy is also within Kenya's Big Four Agenda and CAADP framework and takes cognisance of the political, environmental, social and economic dimensions in setting up its focal areas. The objectives of this strategy include:

1. To upscale financial, human and physical capacity development.
2. To strengthen ICT to support surveillance, monitoring and forecasting
3. To coordinate and campaign for migratory and invasive pest management.
4. To build sustainable partnerships, collaborations and research programmes.
5. To develop a sustainable resource mobilisation framework.
6. To develop a responsive institutional policy and regulatory framework on migratory and invasive pest management.

7. To build responsive livelihood recovery/restoration and resilience mechanisms within five years for communities affected by migratory pests.
8. To develop sustainable systems for pesticides management, environmental, social health and safety standards and monitoring.

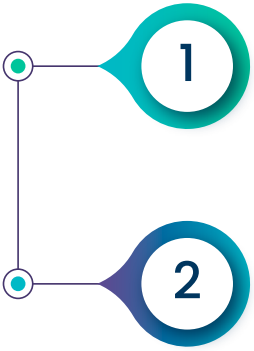
The M&IPWM Strategy will be domiciled at PP&FSD, orchestrated by different partner institutions, and supported by international partners such as UNFAO, World Bank, IFAD and the EU, etc.

4.1 Vision, Mission, Goal and Expected Outcome

As a result of the brainstorming process conducted during the M&IPWM strategy development workshop held in Machakos in August 2021, M&IPWM Vision, Mission and Goal were developed, and its strategic outcome and programmatic outputs were defined as follows:

4.1.4 Strategic Outcomes

The strategy will focus on two main outcomes that give rise to different management strategies;



OUTCOME 1

Strengthened capacity of the PP&FSD to manage and control migratory and invasive pests and weeds at the National and County levels.

OUTCOME 2

Enhanced coordination among institutions and regional bodies engaged in migratory and invasive pest and weed management, through research, control and livelihood restoration.

The M&IPWM strategy strives to improve human and physical capacities, phytosanitary compliance, surveillance and early warning mechanisms, synergy with national and regional institutions in research, control, and information sharing. This will culminate in enhanced food and nutrition security in line with the Agricultural Sector Transformation and Growth Strategy and Vision 2030.

4.1.5 Expected Programmatic Outputs of M&IPWM Strategy

The strategic outputs were identified through a brainstorming workshop involving different stakeholders engaged in pest control. The outputs are also in line with the CAADP result framework to increase food and nutrition security among smallholder farmers in Africa. The strategic intervention to achieve the strategic objectives will be based on the identified outputs. The expected strategic output will therefore form the main pillars for the M&IPWM Strategy.

Output 1.1	Enhanced financial, physical and human resource capacities to manage migratory pests and invasive pests and weeds.
Output 1.2	An enhanced ICT system to support an efficient and effective migratory and invasive pest and weeds surveillance, monitoring and forecasting.
Output 1.3	Increased knowledge on the management of migratory and invasive pests and weeds.
Output 2.1	An environmentally and technically sound pest management system to efficiently and effectively respond, control and mitigate against the invasion of migratory and invasive pests and weeds.
Output 2.2	Strengthened partnership and collaboration with relevant stakeholders in managing migratory and invasive pests and weeds.
Output 2.3	Enhanced legal, policy and institutional capacity to manage migratory and invasive pests and weeds.
Output 2.4	Well-structured system for livelihood recovery/restoration and resilience.

4.2 Result Framework

The resulting framework (Figure 4) graphically displays how the M&IPWM strategy expects to achieve its objectives by relating different interventions to be carried out within the strategy. The resulting framework brings together several distinct results outcomes and outputs, which function synergistically to produce the strategy's overall goal. The resulting framework which was drawn from the Problem Tree Analysis also provides the basic implementation structure upon which the activities of the strategy will be based. The basic structures have been christened as the pillars of the strategy.

RESULTS FRAMEWORK

Increased food and nutritional security due to effective management of migratory and invasive pests and weeds.

Contribute towards increased food production due to effective management of migratory and invasive pests and weeds

OUTCOME 1
Strengthened capacity of the PP&FSD to manage and control migratory and invasive pests and weeds at the national and county levels in Kenya

OUTPUT 1.1
Enhanced financial, Physical and human resource capacities manage migratory and invasive pests and weeds

OUTPUT 1.2
An enhanced ICT and communication system to support an efficient and effective migratory and invasive pest and weeds surveillance and monitoring.

OUTPUT 1.3
Increased awareness knowledge on migratory and invasive pests and weeds and their management.

OUTCOME 2
Strengthened coordination in pest control, research and extension on migratory and invasive pests and weeds.

OUTPUT 2.1
An environmentally and technically sound pest management system to efficiently and effectively respond, control and mitigate against invasion of migratory and invasive pests and weeds.

OUTPUT 2.2
Enhanced collaborative and multi-institutional research and extension programs to deal with migratory and invasive pests and weeds.

OUTPUT 2.3
Enhanced legal, policy and institutional capacity on management of migratory and invasive pests and weeds.

OUTPUT 2.4
Well-structured system for livelihood recovery/restoration and resilience

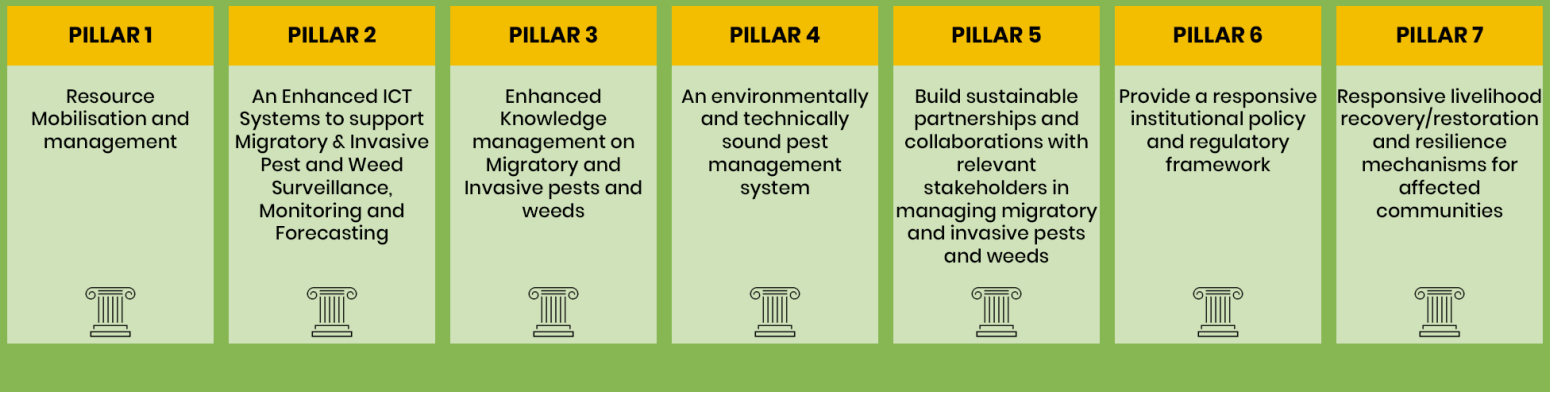


Figure 5: Implementation Pillars for Migratory and Invasive Pests and Weeds Management Strategy

4.3 M&IPWM Implementation Pillars

The seven programmatic pillars were identified to focus on the interventions to achieve the intended strategic outputs. The pillars capture all aspects of preparedness and pest control, surveillance, early warning, awareness creation, policies & human capacity building, phytosanitary compliance, and plant pest risk reduction. They address specific areas geared towards reducing crop production and quality losses. The implementation of the pillars is estimated to cost at least USD 203.06 Million, including a contingency of USD 58.7 Million to cater for emergency response.

4.3.1 Pillar 1: Resources Mobilisation and Management

To establish sustainable migratory and invasive pests and weeds management systems and structures in Kenya, a solid investment plan should exist to achieve several key deliverables. To achieve the deliverables in Pillar 1, the strategy requires at least USD 94.7 Million for a period of five years. The deliverables include:

- Establish cost-efficient information and response systems to detect and monitor migratory and invasive pests and weeds, providing timely information to M&IPWM units (and other relevant stakeholders) to respond to pest situations effectively.
- Improved information and knowledge through migratory and invasive pest/weeds management awareness and information campaigns.
- Smallholder farmers and other value chain actors improved access to pest management services, including contingency pesticide support during emergency outbreaks to effectively manage migratory and invasive pests and weeds.
- Capacity development to monitor and combat migratory and invasive pests/weeds.
- Enhanced multi-institutional research and extension.
- Livelihood recovery/restoration and rehabilitation.
- A well-coordinated approach in managing and combating migratory and invasive pests and weeds.

The Financial resources to manage M&IPWM strategy are likely to come from a variety of sources and this is estimated at USD 203.06 Million for a 5-year programme. Some strategy

elements may be implemented as externally funded independent projects, private sector activities, or institutional partner activities by organisations such as KEPHIS, KWS, PCPB or KALRO. Efforts should be made to embed such projects within the overall M&IPWM strategy framework.

4.3.1.1 Sources of Funding

Government Funding

The government is expected to be the primary financier both at national and county levels. Migratory pest control recurring costs will be required as part of ministry mandates, and these should be funded through regular budget lines at both levels of Government. These include the costs of additional staff to be identified and deployed at migratory pest control units at both levels of governments in addition to office running costs. However, it should be noted that the financial requirements to build capacity and establish effective systems are considerably in excess of what the government is likely to be able to provide alone in the short term. Both levels of Government need to actively seek additional donor support. Additional budgetary allocations will be required to perform the following activities:

- Acquisition and maintenance of appropriate equipment and machinery in addition to making available necessary pesticides for emergency control.
- Installing and maintaining the requisite ICT infrastructure for surveillance and pest load monitoring.
- Enhance requisite human skills in Migratory and Invasive Pest and Weed Management.
- Increase office space at national and county levels to support migratory and invasive pest and weed management operations.
- Conduct mapping and identification of Migratory and invasive weeds in different counties as a baseline data
- Contingency fund for emergency response.

Resource Distribution and Management

The M&IPWM resources will be distributed to all the counties depending on the load of pests and level of invasive weeds. This will be done depending on the economic effects of the pests and weeds. The mobilised funds will be distributed to the counties to manage all aspects of the M&IPWM. PP&FSD will release the funds to the counties through the Authority to Incur Expenditure (AIE) system following strict budget lines from PP&FSD to M&IPWM units. The county M&IPWM units will account to the PP&FSD through the National M&IPWM unit. MITT funds will be managed from the national M&IPWM unit. Just like the county units, national M&IPWM unit will also get the funds through the AIE system following a strict budget line.

Use of emergency funds

The director of PP&FSD with the guidance from MITT to advise the Cabinet Secretary declare an emergency as a result of pests and weeds invasion in any county in Kenya. This will then trigger the mobilisation and release of emergency funds.

Resource Partner Support

Some of the donors that have and are still supporting pest and disease management projects include the World Bank, USAID, IFAD, European Commission, UNFAO, Bill and Melinda Gates Foundation, and the Embassy of the Kingdom of the Netherlands. While this donor list is not exhaustive, it is important that efforts for future investment to manage migratory pests recognise existing initiatives to ensure effective coordination to avoid duplication of efforts, as promoted through the Paris Declaration on Aid Effectiveness (2005) and Accra Agenda for Action (2008). Such coordination from the government side would occur through PP&FSD, which is currently inadequately resourced to fulfil that role. The purpose of this strategy is to align all the initiatives around a Resources Mobilisation Committee.

Cost Recovery/Cost Sharing

Regulatory agencies can recover some of their costs through fees for services to businesses such as import risk analysis, input (pesticide and herbicide) registration procedures, phytosanitary export certification, and inspections at farms or pack-houses.

Private sector support

Private sector actors can also be expected to support the strategy, especially as it relates to commodity value chains that are well organised and effective at generating substantial foreign export earnings. Another specific area in which private sector funding could be expected is in the implementation of emergency responses. Emergency response plans should detail, as far as possible, 'who does what' in the event of an emergency and how the various stakeholders will finance it. Different value chain stakeholders could be involved in the development of the plan and coordinated by PP&FSD.

4.3.1.2 Key Result Area

To effectively manage migratory and invasive pests/weeds in Kenya, there should be adequate financial, physical and human resources to execute various functions and activities.

4.3.1.3 Strategic Objective

To upscale Financial, human and physical capacity to manage migratory and invasive pests

4.3.1.4 Strategic Interventions

- Have adequate contingency funds to manage emergency response on migratory and Invasive pest/weed management
- Allocate an adequate amount of funds within the National budget for migratory and invasive pest/weed management
- Develop and operationalise a Resource Mobilisation and

Management Committee

- Undertake annual resource needs assessment in migratory and invasive pest/weed management
- Enhance requisite human skills in migratory and Invasive Pest/weed management.
- Increase office space at national and county levels to support migratory and invasive pest/weed management operations.
- Conduct mapping and identification of Migratory and invasive weeds in different counties as a baseline data
- Acquire and maintain appropriate equipment and machinery and make available necessary pesticides for emergency control.
- Design mechanism on the management of M&IPWM funds.

4.3.2 Pillar 2: An Enhanced ICT Systems to support Migratory & Invasive Pest and Weed Surveillance, Monitoring and Forecasting

To address the situation analysed in Chapter 3, on preparedness to deal with migratory and invasive pest/weeds/diseases and the root causes contributing towards the introduction and spread of new pests, the M&IPWM strategy proposes that a cost-effective mechanism is established for collecting the information and putting in place procedures to ensure a timely and effective response. Establishing this mechanism is estimated to cost at least USD 5.09 Million.

The M&IPWM Strategy proposes that PP&FSD establish a cost-efficient ICT and response system to detect and monitor migratory and invasive pests/weed, providing timely information to M&IPWM units and relevant stakeholders to respond to pests situations effectively. This could be established through the following interventions.

Effective pest monitoring at border points thereby reducing the risk of new pest incursions

KEPHIS currently plays this role. Preventing entry and establishing new pests is the most effective way to keep the country free of these pests and weeds. However, most of these migratory and invasive pests/weeds spread naturally, aided by wind movement, ocean currents, open border movement and trade. With the aid of ICT, monitors can be placed in strategic positions depending on wind movements to monitor different types of insects and bird movements. Each county will also be provided with surveillance equipment to detect, identify, and

report the presence of pests and weeds. The M&IPWM units will also be equipped to receive and share information on pests' behaviour with regional and international organisations. A harmonised pest reporting protocol will be developed by MITT and shared with all M&IPWM units at national and county levels to facilitate quick data analysis.

Pest surveillance system established to provide early warning advisory services.

The M&IPWM strategy proposes an establishment of adequately equipped M&IPWM units across all counties in Kenya to collect and share information on pests and their behaviour. The pest information collected from the counties will be integrated into a modelling software and database that will provide regular information on pest behaviour, and early warning alerts. This information will strategically manage the pests and provide an early opportunity to design an effective strategic response. Counties are encouraged to strategically train community leaders to enable them quickly signal any potential threats to county monitoring teams.

The surveillance system and database will be domiciled at the M&IPWM unit at the PP&FSD and information will be shared with relevant stakeholders in terms of regular reports. M&IPWM unit, through its management organs such as the MITT will ensure that the integrated data meet the needs of various users. At least 3 County Government Extension members of staff seconded to the M&IPWM units at the county level, and their supervisors will be trained and equipped with tablet computers (or smartphones) installed with the necessary software to correctly identify, recommend appropriate control measures and transmit the information on migratory and invasive pests/weeds to the central database at the M&IPWM unit. Data will also be provided by specific surveillance undertaken by other institutions such as KWS, NMK, KFS, KEPHIS,

or others as necessary, and through trained scouts equipped with sourcing, tools used to track desert cases locust, to verify pest occurrences and extend of spread.

4.3.2.1 *Key Result Areas*

To effectively manage migratory and invasive pests/weeds in Kenya, adequate surveillance to prevent spread, monitoring, and reporting mechanisms should be used. This will inform control measures and subsequent operations.

4.3.2.2 *Strategic objective*

To enhance the ICT system, to support efficient and effective migratory and invasive pest and weeds surveillance, monitoring and forecasting.

4.3.2.2.1 Strategic Interventions

- Install and maintain requisite ICT infrastructure for surveillance and monitoring of migratory pests
- Acquire and install requisite ICT equipment and software across all counties.
- Install requisite migratory pest monitors at strategic points in the country as advised by geospatial information.
- Establish a database on the prevalence of migratory and invasive pests and weeds in the 47 counties in Kenya.
- Develop a robust information sharing and management system for migratory and invasive pests and weeds.
- Develop forecasting platforms and models for early warning for migratory pest management.
- Nurture critical skills on geospatial analytics, modelling on early warning, deep analytics, artificial intelligence and machine learning,
- Adopt artificial intelligence and machine learning in migratory pests forecasting
- Develop mechanisms for accessing real-time data on migratory pests at local, regional and international levels by creating a sustainable data collection (scouting) and reporting mechanism from sub-location to national level.

- Establish collaboration structures for the exchange of relevant meteorological and agro-ecological data/ information from local, regional and international institutions.
- Develop a business continuity plan to safeguard integrity and availability of migratory pest data/information.

4.3.3 Pillar 3: Enhanced knowledge Management on Migratory and Invasive Pests and Weeds.

During a storming workshop with key stakeholders, the problem tree analysis found that the root cause of unpreparedness in managing migratory and invasive pests and weeds is inadequate farm-level information on the management of the pests and weeds. The inadequate farm-level knowledge affects pest management in two distinct forms: Farmers are unaware of management options for these emerging pests and weeds and how to implement them.; Farmers cannot access the quality inputs required to manage the emerging pests and weeds. The intervention to meet this gap is estimated to cost USD 1.2 million.

The following interventions will be undertaken to get the farmers informed and inputs availed:

Improving farmers' knowledge on migratory and invasive pests and weeds and their management options.

M&IPWM unit staff will have to work closely with the county government's extension staff by offering regular training to keep them up-to-date with new approaches, including using ICT to detect and communicate pest and weed presence. The trained extension staff will be expected to advise farmers on various pest and weed management options targeted towards eradicating the emerging pests and weeds. County teams will undertake training of farmers in scouting, identification and reporting of early stages of migratory pests. Counties are encouraged to strategically train community leaders who would enhance dissemination of information to

local communities. Efforts will be made to translate technical information into Kiswahili and local vernacular languages. The informed farmers will now be able to provide accurate information on the presence of the pests and weeds.

However, not all farmers can be reached directly, so several mass media (e.g., local radio FM stations, print media, social media) awareness campaigns are proposed based on pest information received from different regions or common problems occurring at particular times of year/climatic conditions. Campaigns will also focus on the importance of indigenous knowledge in managing some of the pests and weeds. Opportunities for expanding the use of other national and international databases on pest management information to strengthen advisory services will be exploited, and appropriate control or mitigation programmes developed.

Improving access to high-quality inputs to manage migratory and invasive pests and weeds.

Some of the invasive weeds and pests can be managed by individual farmers within their farms using integrated management options and avoiding over-reliance on synthetic pesticides. Farmers managing the invasive pests and weeds at individual or community level is one of the strategies to eradicate or minimise losses due to migratory pests. This can only happen when the farmers are well informed and trained on the proper pest management mechanisms.

Key to appropriate management approaches is the availability of quality inputs. The registration of efficacious pest control products is the sole responsibility of Pest Control Products Board (PCPB). This organisation has been mandated through legislation to oversee testing efficacy and registration of appropriate pest control products for use on plants in Kenya. The pest control products when used appropriately would not

cause adverse effects to farm workers, produce consumers or the environment. The private sector plays a critical role in investing for registration and introduction of new pest control products for use in Kenya. The Government can increase access of pest control products through adoption of lenient taxation regime to keep products affordable to the small-scale farmers

Information generation and dissemination.
While managing the emerging pests and weeds, valuable information will be generated, together with the technical indigenous knowledge (ITKs), will be packaged and disseminated to help manage such pests in the future and in other parts of sub-Saharan Africa. Due to climate change factors, some organisms may become invasive pests and weeds or become invasive in sub-Saharan Africa (Kenya) but not in their regions of origin. Such organisms will be documented and research conducted on innovative approaches to managing them. These innovative management approaches will be documented and shared. Information on change of management regimes for particular pests and weeds will also be documented and shared.

4.3.3.1 Key Result Areas
There is need to improve knowledge on migratory and invasive pests and weeds among various stakeholders managing these pests and weeds. This will enhance surveillance, monitoring, identification and management measures.

4.3.3.2 Strategic objective
To increase knowledge on migratory and invasive pests and weeds and their management measures among stakeholders managing the pests.

4.3.3.3 Strategic Interventions

- Develop and operationalise communication and campaign plan on migratory and invasive pests and weeds.
- Liaise with Pillar 5 to generate information on the most innovative approaches in managing the migratory and invasive pests and weeds
- Document and disseminate new and innovative technical information on the management of various migratory and invasive pests and weeds, with effort to translate technical information to Kiswahili and local languages, and use of local FM radio stations
- Document and share best practices, successes and challenges experienced during the process of managing the pests and weeds for benchmarking and learning.
- Support training of professional and technical staff in the field of plant protection.
- Conduct reviews on technical information materials on the management of various migratory and invasive pests and weeds
- Disseminate technical information on the pests through print an electronic media.
- Train county extension service providers on technical information on migratory and invasive pests and weeds
- Participate in public fora like community barazas to enlighten the public on the need to manage the pests and weeds.
- Hold stakeholder discussions on the management of pests and weeds.

4.3.4 Pillar 4: An environmentally and technically sound pest management system

Developing an appropriate pest management strategy requires proper identification, assessment and prioritisation of risks involved. Depending on the nature or severity of the invasion, a single or combination of different management strategies is required to mitigate the pest's economic, social, and environmental impacts and or the management approach. This approach is termed Integrated Pest Management (IPM).

FAO, (2014) defines IPM as "careful consideration of all available pest control techniques and subsequent integration of appropriate measures that discourage the development of pest populations and keep plant protection products and other interventions to levels that are economically justified and reduce or minimise risks to human health and the environment".

The intervention towards achieving the objectives of this pillar is estimated to cost USD 71.9 million. Most of the funding will be on control operations against identified pests, invasive weeds and diseases in different regions and to handle emergencies while adhering to phytosanitary regulations.

This pillar is in three different sections:

- Migratory insect pests, invasive weeds and diseases control interventions which are primarily the activities of controlling identified pests challenges. The control measures will be as recommended by MITT and Director PP&FSD.

- Emergency control interventions which involve taking immediate action in controlling pests or weeds due to their ability to multiply or cause damage.
- Phytosanitary measures ensure that the control approaches do not harm the environment.

In devising an appropriate strategy for the management of migratory insect pests, invasive weeds and diseases, the M&IPWM Strategy recognises the various ranges in pest situations. It takes notice that some pests are already endemic in certain areas in Kenya and are causing huge losses, other pests may be present at low levels with a potential to cause serious losses, while others are just being introduced of found a habitat in the country and has the potential to cause huge losses.

Improved access to pest management services, improved pest information systems and improved capacity to monitor and combat pests and diseases are all relevant for managing all these scenarios, but details of the approaches may be different. This gives rise to different pest categories. Pests can be classified based on occurrence for example regular, occasional, seasonal, sporadic, persistent. Pests can also be locality of occurrence e.g., migratory, endemic, and quarantine pests. Pest categorisation is also based on economic injury level e.g., key, major, minor, sporadic, potential pests.

Plant Pest Management Technologies

Pest management requires a holistic approach that combines different approaches that complement each other. The most suitable combination results in sustainable management with little disturbance on the environment and biodiversity while assuring safety to humans (AU, 2014). Different management strategies are used depending on the nature of the pest, damage thresholds, available options and desired control or management objectives. Most strategies aim at suppressing

pests below damage thresholds since eradication is almost impossible and where it can be employed the cost is prohibitive (CABI, ICIPE, IITA, and AU, 2020). The commonly used pest management methods include physical, cultural, chemical, biological and integrated pest management.

Objectives of the pest management plan

The strategy recommends that pest management plans be developed and submitted to MITT through the director PP&FSD. The plan must fulfil following the following objectives.

- To document migratory insect pests, invasive weeds and diseases, current and expected status and their management.
- To describe management and control options.
- To identify policy, regulatory framework and institutional capacity needed in pest management.
- To propose activities that ensure the success of pest management plan.
- To develop the work plan and budget for pest management activities.
- To develop monitoring and evaluation schedule for pest management activities.

Purpose of the pest management plan

The purpose of the pest management plan is to ensure that pest management is carried-out in a sound manner that ensures:

- Pest infestation does not result in economic loss to farmers,
- Target pests do not develop resistance fast or the resistance development is delayed,
- There is the protection of;
- The health of users and other humans,
- Environmental health,
- Non-target organisms such as natural enemies and pollinators,

- Other animals in the ecosystem including fish, and
- Products meet food safety and food quality minimum standards.
- The social fabric of the community is protected.

Principles of Pest Management

Successful implementation of a pest management plan requires a holistic approach to management where different options are weighed and the most suitable option(s) selected. The key principles include:

1. **Integration**: Use different control and management options that complement each other.
2. **Public awareness**: Public awareness and knowledge of pests should be raised to increase the capacity and willingness of individuals to participate in control.
3. **Commitment**: Effective pest management requires shared responsibility, capability, capacity and a long-term commitment by farmers/ landowners/ community, industry players and government. Those that create the risks associated with pest introduction or spread and those that benefit from the pest management should help to minimize the impacts of pests and contribute to the costs of management.
4. **Consultation and partnership:** Consultation and partnership arrangements among the local communities, industry groups, government agencies and county governments should be established to achieve a collaborative and coordinated approach to management.
5. **Planning:** Planning for pest management should be based on risk management to ensure that resources target the priorities identified at the county and national levels.
6. **Prevention and early intervention:** Preventive pest management is generally more cost-effective than other strategies and is achieved by: preventing the introduction and spread of pest species by human activity early detection and intervention.
7. **Best practice:** Pest management should be based on ecologically and socially responsible practices that protect the environment and the productive capacity of natural resources while minimizing impacts on the community. It should balance feasibility, cost-effectiveness, sustainability,

humaneness, community perceptions, emergency needs and public safety.

8. **Improvement (research, monitoring and evaluation):** Research about pest and regular monitoring and evaluation of control activities is needed to make evidence-based decisions and improve pest management practices.

Possible management strategies of Migratory and Invasive Pests and Weeds

Appendix V provides a list of possible management options for migratory and invasive pest and weeds.

Accurate and timely detection is an important component of the preventive control strategy for migratory pests such as desert locust, African armyworm and quelea birds. This approach relies on the monitoring and early warning to ensure successful control of the pest populations before they reach outbreak status. Invasive pests continue to negatively impact agricultural productivity and livelihood of millions of people. Some of the pests, such as Fall Armyworm, have the ability to move on their own while others are introduced through trade in agricultural produce and commodities. Successful management relies on collective action that should be based on phytosanitary and quarantine control, legislative and policy framework.

Invasive weeds are plants that can significantly and adversely affect the long-term survival of native species, the integrity and sustainability of natural communities, or genetic variation within indigenous species. Taking a proactive approach to controlling invasive weeds is generally much better than waiting for problems to occur. Deciding on a weed management strategy early allows proper planning of control activities and allocation of resources to deal with the weeds. The choice of the management strategy largely depends on available

resources, nature of the invasive weeds, territories affected, and over objective whether eradication or suppression.

4.3.4.1 Key Result Areas

There is a need to effectively and efficiently control migratory and invasive pests and weeds within Kenya while adhering to all the phytosanitary and environmental regulations to protect farmers against losses associated with the pests and weeds. This will improve farm productivity, thus contributing towards food and nutrition security among the people of Kenya.

4.3.4.2 Strategic objective

To effectively control migratory and invasive pests and weeds by using the most innovative and environmentally sustainable approaches while adhering to phytosanitary regulations.

4.3.2.4 Strategic Interventions

- Procure and use the most efficient chemical control equipment (transport, spraying and storage) in each region (base)
- Procure, install and use integrated ICT based pesticide and herbicide stock management system
- Build capacity of staff and the public on pest and weed management, including safe use of chemicals
- Adopt an integrated pest management approach to minimise use of pesticides and minimise risks to the environment.
- Design, develop and use the most effective and safe chemical disposal infrastructure in all the counties
- Develop a contingency plan for migratory and invasive pest and weed control
- Liaise with PCPB to register and ensure accessibility of requisite control chemicals
- Identify, monitor and control existing migratory and invasive pests and weeds in each county
- Develop and conduct a continuous Environmental Social and Health Safety (ESHS) monitoring.

4.3.5 Pillar 5: Build Sustainable Partnerships and Collaborations with Relevant Stakeholders in Managing Migratory and Invasive Pests and Weeds

To fulfil its mission, M&IPWM strategy will require strong, innovative and effective partnerships and alliances to come up with the most appropriate control measures, execute these control measures, provide technical pest management information and disseminate the generated migratory and invasive pest and weed management approaches, as well as to boost its performance in terms of harmonisation of legislation and standards and to deliver standard operating procedures of good pest management practices. Enhancing the collaborative and implementation of multi-institutional team prioritised migratory pests research agenda and extension programmes will cost at least USD. 4.74 million.

M&IPWM unit as the centre of migratory and invasive pest management in the country, should work with a range of national, regional and international partners on various aspects of pest management including, resource mobilisation, emergency response, short- and long-term research, collection and sharing pest information and trainings. M&IPWM will partner with other local and international institutions in various programmatic areas. The partnerships will be initiated by the PP&FSD through MITT at the national level. The heads of institutions represented at MITT will form the advisory committee which will offer necessary policy support in management of migratory pests.

Counties will establish and strengthen MITT units by pooling technical expertise at county headquarters from research institutions, regulatory agencies, academia and tertiary institutions that may be available at each county scenario. Local communities or farmers also will play a critical role in supporting the Government's efforts towards migratory pests management. Most of institutions will have to play distinctive roles within the strategic framework and identify their priorities to support the delivery of migratory and invasive pest/weed management strategic objectives.

County Government will explore innovative ways of increasing numbers of farmers receiving information on migratory pests through use of group approach, farmer field schools, contact farmers, spray service providers and increasing the staff: farmer ratio among others. The stakeholder storming workshop bringing together different institutions identified the roles as listed in Table 8 to be played by different institutions. However, the list is not exhaustive and more local and international institution would still support management of the migratory and invasive pests in different capacities but in line with the strategic framework.

Private institutions should also play their role in supporting the management of the pests and weeds in line with the phytosanitary regulations. In addition, faith-based organisations, tertiary training institutions, NGOs and CBO will play a critical role of offering extension services on migratory and invasive pests and weeds to farmers and other stakeholders.

Table 5: Roles and responsibilities of key stakeholders

AGENCY	ROLE	SPECIFIC FUNCTIONS LIST (RELATING TO PEST AND PESTICIDE MANAGEMENT)
Ministry of Agriculture		
State Department of Crops	Policy formulation and fund-raising management	○ Develop policy guidelines on management of migratory and invasive species and weeds.
Plant Protection and Food Safety Directorate	Coordinate migratory and invasive pest management activities	○ Coordinate migratory and invasive pest/weed management through M&IPWM unit
Kenya Plant Health Inspectorate Service (KEPHIS)	Regulatory and quarantine pest control	○ Carry out pest risk analysis. ○ Carry out national pest surveillance ○ Update national pest list. ○ Issue plant import permits for low-risk plant imports/introductions and quarantine import permits for high-risk introductions and monitor plant import to identify new pest introductions and recommend control or eradication measures. ○ Issue biological import permits for biological control organisms and monitor their establishments.
Pest Control Products Board (PCPB)	Regulates the importation, exportation, manufacture, distribution, transportation, sale, disposal and use of products used for the control of pests and mitigate potential harmful effects to the environment.	○ Enhance compliance of pest control products to set standards and facilitate trade. ○ FastTrack registration of products in case of arrival of a new pest ○ Support training of agro-vet shop attendants, extension staff and farmers

County governments	Implementation	Establish and strengthen County Multi-Institutional Technical Team to in conjunction with the Department related to agriculture offer guidance to; o Undertake pest surveillance, monitoring and reporting o Undertake early warning o Coordinate pest control and management activities o Capacity building-training of trainers and extension staff on pest detection, identification and management etc. o Undertake resource mobilization for pest management and control interventions. o Undertake livelihoods restoration, rehabilitation and restoration and environmental monitoring and restoration.
Farmers / farmer organisations/ producers	Support Government's effort in migratory pest management	By attending training forums, timely reporting any new pests noted on their farms, care of monitoring devices sometimes mounted in their farms and support in control operations where applicable, providing feedback on effectiveness of control operations.
Tertiary learning institutions, faith-based organisations, NGO, CBO, AAK	Support Government's effort in migratory pest management	Offering extension services to farmers, agrovet shop attendants and general public.
KALRO	Research in plant health issues related to pesticides	o Research & training on identification, biology, and management of migratory and invasive pests, weeds and diseases. o Conduct efficacy trials of new pest control products to facilitate their registration by PCPB for use in control of migratory and invasive pests either at field or storage phases.

Universities	Research and training	○ Develop curriculum for training on management of migratory and invasive pests and weeds. ○ Undertake training on different aspects of biology, ecology and management of migratory and invasive pests.
National Youth Service	Pest control	○ Execute actual control activities by providing personnel.
National Research Fund (NRF)	Research funding	○ Prioritize research on emerging pest issues. ○ Provide research funds.
Ministry of Health		
Government Chemists Department	Provision of laboratory services in the fields of public and environmental health	○ Test substances and materials for chemical composition, compliance with legal specifications and their suitability for various uses.
Directorate of Occupational Safety and Health Services (DOSHS)	Ensures safety, health and welfare of workers predisposed to pesticides.	○ Identify, evaluate, and control biological and chemical factors in the work environment that may affect employed persons' safety and health and the general environment.
AGENCY	ROLE	SPECIFIC FUNCTIONS LIST (RELATING TO PEST AND PESTICIDE MANAGEMENT)
Ministry of Industry, Investment and Trade		
Kenya Bureau of Standard (KEBS)	Regulate standards relating to pesticides, equipment and their management	Develop pesticide standards. Testing pesticide residues, and toxic elements in foods Certification of products
International Partners		
FAO	Strengthen national capacities for control of migratory pests	Provides guidelines on good practice for aerial and ground spraying, use of pesticides.

World Bank	Provision of financial resources	o Resources for purchase of pesticides o Physical and human capacity building o Infrastructural development and support
IFAD	Technical and financial support	o Development of Migratory and invasive Pests and weeds Management Strategy
ICIPE	Research and extension	o Undertake research on non-chemical control mechanisms o Conduct research in Collaboration and partnership with country national institutions in research and academia such as KALRO, universities, KEPHIS o Train TOTs and Extension staff who in return train farmers with county government on aspects of management of migratory and invasive pests and weeds
CABI	Research and training	o Develop and update the database on migratory and invasive pests and weeds o Undertake research on management of migratory and invasive pests and weeds o Modelling for potential distribution of invasive pests and their natural enemies considering climate change
CIMMYT	Research and training	o Undertake research and disseminate information on management options
DLCO-EA	Coordination and advisory	o Provide guidance on management of Quelea birds, African armyworm and desert locust o Capacity on monitoring, early warning and preparedness and management

ICRISAT, LLRI, WRTI, KEFRI among others	Research and training	○ Undertake research and disseminate information on aspects that many be related to migratory pest management
Regional bodies e.g. IGAD, AU	Information sharing on statues of migratory pests	○ Regional surveillance, monitoring and control of migratory pests
Media Houses – TV Radio, print, social media, etc.	Publicity	○ Undertake national awareness creation and publicity on occurrence and possible management options of migratory and invasive pests and weeds
NMK - museums	Research	○ Research, Identification and classification of migratory and invasive pests and weeds
NBA – biosafety authority	Regulatory	○ Regulate the use of Genetically Modified insects in management of invasive species

4.3.5.1 *Key Result Areas*

There is need to improve collaboration among organisations and institutions at regional, national and county levels involved in migratory and invasive pest management to build synergy in managing the pests and weeds. The collaborative effort will improve efficiency in management of pests and weeds.

4.3.5.2 *Strategic objective*

To build sustainable partnerships, collaborations and synergy with both public and private, local and international institutions in the management of migratory and invasive pests and weeds.

4.3.5.3 *Strategic Interventions*

- Develop and operationalise a collaborative and partnership framework on migratory and invasive pest management
- Formalise the engagement of partners though MoUs or a more legally binding document specifying the roles and quantifying the costs to be incurred by various organisations towards managing the pests
- Strengthen MITT by structuring it to engage in building more partnership and collaboration in managing migratory and invasive pests.
- Strengthen the operations of Resource Mobilisation Committee.
- Conduct regular capacity needs assessments for collaborating institutions.

4.3.6 Pillar 6: A Responsive Policy and Regulatory Framework

Management of pests and plant health is done through several legal policies and regulatory frameworks, including international treaties. These policies and regulatory frameworks have since created several institutions and organisations operating at both national and international levels. The institutions have ensured that the use of chemical control measures is properly regulated so as not to harm humans, livestock and the environment. It will cost an estimated USD. 750,000 to achieve the objectives under this pillar.

In line with Anchor 2 of the Agricultural Sector Transformation and Growth Strategy of increasing agricultural production by maximizing the production of the cultivated lands, this strategy proposes to harmonise existing legal, policy and institutional frameworks and suggest more responsive institutional policies and regulatory frameworks to support the management of migratory and invasive pests and weeds.

Chapter 3 discusses various policies and legal frameworks and international treaties guiding the operation and management of pests. It also discusses the national and international institutions and organisations formed to enforce the regulations. However, there could be overlapping institutional mandates and conflicting policies in Kenya in the management of pests. The strategy proposes an audit on the policies, regulations and institutional mandates to harmonise the operation of migratory and invasive pest management in Kenya and within the region.

4.3.6.1 *Key Result Areas*

There is a need to harmonise the existing legal policies and regulatory framework and institutional mandates managing plant health and pest control to create an enabling framework for managing migratory and invasive pests and weeds. This will also ensure synergy and reduce conflicting legislation and institutional roles in managing the pests. In addition, the Multi-Institutional Technical Team (MITT) will be anchored in law to enhance the team's ability to perform their functions.

4.3.6.2 *Strategic Objective*

To create a supportive policy and legal framework to manage migratory and invasive pests and weeds.

4.3.6.3 *Strategic Interventions*

- Identify various policy and legal gaps on migratory pest management.
- Propose amendments to policy and legal frameworks on migratory pest management.
- To advocate for a review of policy and legal frameworks on migratory pest management.
- Harmonise the roles of key institutions managing plant health and pests within the country.
- Create a responsive institutional policy and regulatory framework to manage migratory and invasive pests and weeds by anchoring in law the Plant Protection and Food safety Directorate and the technical arm of Multi-Institutional Technical Team representation.

4.3.7 Pillar 7: Responsive Livelihood Recovery/ Restoration and Resilience Mechanisms for Affected Communities

Farming communities have continuously faced calamities that reduce their ability to earn their livelihood. Migratory and invasive pests/weeds are among the factors that reduce farm earnings and expose the farmers to risks associated with food security. The recent desert locust invasion in Kenya cleared farms leaving the farmers at risk of hunger. The farmers should therefore be protected against such risks. In collaboration with the county governments, this strategy proposes that mechanisms should be put in place to mitigate against the effects of migratory and invasive pests/weeds and to strengthen the farmers' resilience capacity. Putting up the mechanisms to mitigate against the risks associated with migratory and invasive pests and strengthening the farmers' resilience capacity is estimated to cost at least USD. 24.6 million.

4.3.7.1 Key Result Areas

There is need to improve resilience capacity of farmers by supporting them to mitigate risks and uncertainties associated with invasion of pests and weeds.

4.3.7.1 Strategic objective

To enhance livelihood protection against the effects of migratory pests' infestation.

4.3.7.2 Strategic Interventions

- Establishment of an emergency rehabilitation/restoration fund

- Put up mechanisms to strengthen the farmers' resilience capacity
- Establish a framework to assess risks and damages due to migratory and invasive pests and weeds
- Establish linkages and networks of key stakeholders for resource mobilisation and coordination.
- Promote/undertake livelihood restoration and protection intervention through established structures at the national, county and community level.

4.4 Initiating the Implementation of M&IPWM Strategy

The immediate priority in the 5-year work plan would be to operationalize the M&IPWM Strategy by establishing a Strategy Implementation Steering Committee (SISC) with members drawn from MITT and appropriately gazetting it to drive and oversee the implementation of the strategy through the following:

- Preparation of an implementation plan, including a detailed inception phase for Year 1;
- Preparation of detailed budgets for specific activities, within the overall framework of the strategy;
- Engagement of stakeholders and promoting the strategy;
- Establish MITT and M&IPWM units
- Mobilisation of resources; and
- Identify and map different migratory and invasive pests, and weeds in each county

4.5 M&IPWM Governance and Management

The management of migratory and invasive pests will be coordinated by the Migratory & Invasive Pests Management (M&IPWM) Unit which will be domiciled in the Plant Protection Division of the Plant Protection & Food Safety Directorate (PP&FSD). For the case of migratory and invasive pest management, the PP&FSD will send a representative to JASCOM which is a governance council bringing together both National and County governments. JASCOM will advise the County Steering groups (CSGs) on the management of the migratory and invasive pest management. The director PP&FSD will provide updates and get guidance from the council.

It is the responsibility of the PP&FSD to mobilise funding needed to manage migratory and invasive pests. PP&FSD will therefore form a Resources Mobilisation Committee comprising different stakeholders and international partners to raise funds to manage migratory and or invasive pests. The resources mobilisation committee shall comprise representatives from treasury, IFAD, World Bank, USAID, UKAID, UNFAO, DLCO, and any other regional and international partners.

The M&IPWM Unit will be domiciled at the Plant Protection Division and get guidance from the Food Safety Division on food safety and standards. The Director of PP&FSD will chair a Multi-Institutional Technical Team (MITT) on pest management. This team will advise on the various aspects on pest control including, the appropriate approaches to be used, and pest threshold and injury level.

MITT comprises of Director PP&FSD as the Chairperson and technical experts' representatives from PCPB, KEPHIS, KALRO, AFA, CoG, Universities, ICIPE, DLCO, MOH, NEMA and co-opt other institution as and when necessary, such as CYIMMIT, and CABI, NMK, KEFRI, DLCO, MOH, NEMA among others. The MITT

will conduct joint briefing meetings to the heads or directors of above listed agencies who will form the policy advisory committee on migratory and invasive pests and weeds management.

The MITT will set up a research subcommittee led by KALRO to set out research themes. Research activities will be carried out in collaboration with various research institutions and universities within the country. The activities will have to involve young scientists and students identified through an elaborate framework developed by MITT.

The M&IPWM unit will be divided into five distinct sections:

The research issues to be conducted by KALRO will be derived and prioritised by MITT in which KALRO is also a member. The activities of all these sections are cascaded down to various counties except for the services of pest control and emergency unit which will be managed at the regional blocks (Bases). The roles of each of the sections in the organogram is described in the appendix II: Terms of Reference of the Management Structure.

4.5.1 Monitoring, Early Warning & Surveillance Section.

This section will be responsible for collecting monitoring data both from the country and international sources. The collected information will be relayed directly to M&IMP unit and to County Agricultural Sector Steering Group based at the counties for management purposes. information received from the monitoring, early warning and surveillance will be useful in control, rehabilitation and or restoration activities. Counties information will be collected by the County M&IMP units.

4.5.2 Pest Control & Emergency Section.

This section will be charged with the responsibility to control and or manage both migratory and invasive pest based on the recommendation from the director of PP&FSD in collaboration with M&IPWMMP unit and MITT. Control measures will be conducted by the County department of Agricultural Steering Group through through the county M&IPWM unit.

The County M&IPWM unit in collaboration with County department of agricultureSG will be facilitated to carry out control and management measures from the Regional M&IPWM unit. The Regional M&IPWM will only be responsible for storing and controlling machinery during control and management measures. Regional M&IPWM will be located at the most central county within the regional blocks.

4.5.3 Livelihood Restoration & Rehabilitation

Livelihood restoration and/or rehabilitation will be fully

managed by the CSGs in collaboration with CASSCOM and County M&IPWM unit. They will be responsible for assessment, designing and execution of the rehabilitation and restoration approaches. County M&IPWM will only provide reports as required to the national M&IPWM unit.

4.5.3.1 County Migratory & Invasive Pest Management Unit

The County M&IPWM unit within the department of agriculture ll be responsible for monitoring, early warning and surveillance, management and control of pests, and livelihood and restoration at the county level. The units will carry their activity in close collaboration with the CSG a CASSCOMnd t and they report toto both the CEC agriculture and M&IPWM unit at the national level CEC agriculture through County Director of Agriculture and M&IPWM unit at the national level.

The two officers managing the unit will be county government employees deployed to the office by the CEC Agriculture to this unit. The capacity of the officers will be built by the PP&FSD. PP&FSD will also equip the office provided by the county government to be able to carry out their duties.

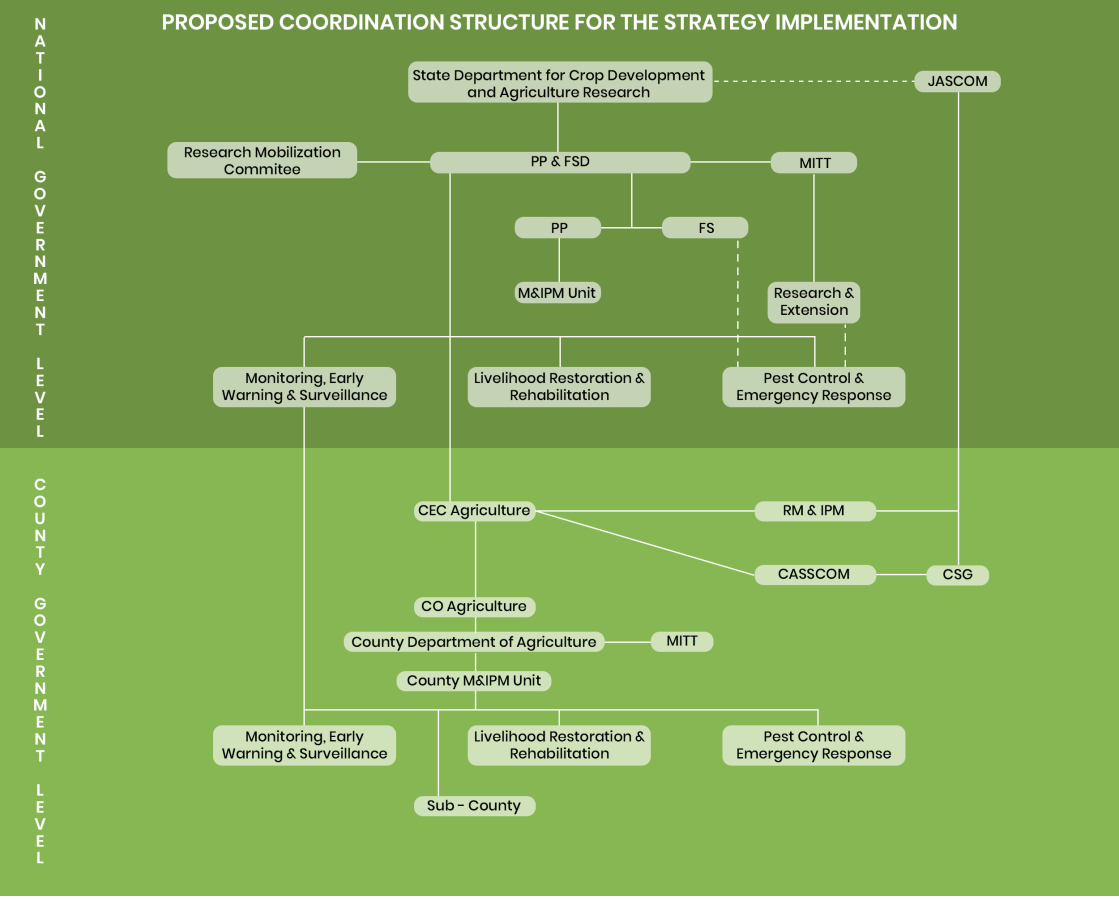


Figure 6: Proposed Coordination Structure for the Strategy Implementation

Acronyms

MITT	Multi Institutional Technical Team
PP&FSD	Plant Protection & Food Safety Division
JASCOM	Joint Agriculture Sector Consultation & Cooperation
RM & IMP	Regional Migratory & Invasive Pest Management
County M&IPWM Unit	Management & Invasive Pest Management Unit
CSG	County Steering Group
FS	Food Security
M&IPWM	Migratory & Invasive Pest Management Unit
CASSCOM	County Agriculture Sector Steering Committee
CECM	County Executive Committee member
CO	Chief Officer

Table 6: Indicative budget

		ACTIVITIES	RESPONSIBLE PERSON	INDICATIVE BUDGET (KES)
GOAL	**To improve food and nutritional security in Kenya through effective management of migratory and invasive pests and weeds**			**20,306,725,000**
Outcome	**1**	**Strengthened capacity of the PP&FSD to manage and control migratory and invasive pests and weeds at the National and County levels in Kenya**		**10,099,900,000**
Output	**1.1**	**Enhanced financial, Physical and human resources capacities to deal with migratory pest and invasive species management.**		**9,472,650,000**
Activity	1.1.1	Build Capacity of existing staff at national and county levels	PP&FSD	59,825,000
Activity	1.1.2	Hire Consultants to train existing staff on geospatial and machine learning	PP&FSD	1,500,000
Activity	1.1.3	Build capacity of county M&IPWM staff /scouts in the counties	PP&FSD	59,825,000
Activity	1.1.4	Hire consultants to support staff on required competencies at national and county levels	PP&FSD	25,000.000
Activity	1.1.5	Conduct Capacity needs assessment and Redeployment of qualified technical staff	PP&FSD	25,000,000
Activity	1.1.6	Procure protective clothing and gadgets for staff	PP&FSD, KEBS	72,000,000
Activity	1.1.7	Procure demonstration and training equipment	PP&FSD	50,000,000
Activity	1.1.8	Procure appropriate central chemical & equipment facilities	PP&FSD, KEBS	200,000,000
activity	1.1.9	Acquire, Secure and furnish adequate office space at national and county level	PP&FSD	588,000,000
Activity	1.1.10	Hire of Arial survey and control equipment and machines	Treasury, PS	1,410,000,000
Activity	1.1.11	Conduct initial survey and mapping of identified endemic pests and weeds	Treasury, PS	With 1.1.10
Activity	1.1.12	Procure and maintain appropriate vehicles	Treasury, PS	960,000,000
Activity	1.1.13	Conduct resource needs assessment in migratory pest management	PP&FSD	1,500,000

		ACTIVITIES	RESPONSIBLE PERSON	INDICATIVE BUDGET (KES)
Activity	1.1.14	Develop and operationalize a resource mobilization and management plan	PP&FSD	120,000,000
Activity	1.1.15	Advocate for resource allocation from the National budget.	PS, Treasury	25,000,000
Activity	1.1.16	Contingency funding for emergency response.	PS, Treasury	5,875,000,000
Outcome	**1**	**Strengthened capacity of the PP&FSD to manage and control migratory and invasive pests and weeds at the National and County levels in Kenya.**		**10,099,900,000**
Output	**1.2**	**An enhanced ICT system, to support an efficient and effective migratory and invasive pest monitoring system and surveillance.**		**509,325,000**
Activity	1.2.1	Procure, Install and maintain ICT infrastructure for surveillance and monitoring	PP&FSD	322,000,000
Activity	1.2.2	Procure and install requisite monitoring equipment at strategic points	PP&FSD	25,000,000
Activity	1.2.3	Develop forecasting platform and models for early warning and pest management	PP&FSD	22,500,000
Activity	1.2.4	Build capacity of critical staff on geospatial analytics, modelling, artificial intelligence, and machine learning	PP&FSD, Experts	30,000,000
Activity	1.2.5	Adopt artificial intelligence and machine learning in migratory pests forecasting	PP&FSD	25,000,000
Activity	1.2.6	Created a sustainable data collection (scouting) and reporting mechanism from sub-location to national level	PP&FSD	59,825,000
Activity	1.2.7	Establish collaboration structures for exchange of relevant meteorological and agro ecological data/ information from local, regional and international institutions	PP&FSD	12,500,000
Activity	1.2.8	Develop a business continuity plan to safeguard integrity and availability of migratory pest data/information	PP&FSD	12,500,000

		ACTIVITIES	RESPONSIBLE PERSON	INDICATIVE BUDGET (KES)
Output	**1.3**	**Enhanced Knowledge management on migratory and Invasive pest and weeds management**		**117,925,000**
Activity	1.3.1	Develop and operationalise communication and campaign plan with stakeholders	PP&FSD	3,000,000
Activity	1.3.2	Train county extension service providers in technical information on the pests and weeds	PP&FSD	59,825,000
Activity	1.3.3	Generate information on innovative technical information on M&IPWM	PP&FS	17,500,000
Activity	1.3.4	Document and disseminate new innovative information on M&IPWM	PS	6,000,000
Activity	1.3.5	Document and share best practices, successes and challenges to support learning	PP&FSD	18,000,000
Activity	1.3.6	Conduct reviews on technical information and disseminate through various channels	PP&FSD	With 1.3.1
Activity	1.3.7	Participate in public for a like baraza to enlighten the public on the pests and weeds	PP&FSD	6,800,000
Activity	1.3.8	Train extension service providers on technical information on M&IPWM	PP&FSD	With 1.1.13
Activity	1.3.9	Hold stakeholder discussions on the pests and weeds managing	PP&FSD	6,800,000
Activity	1.3.10	Develop communication and public awareness plans	PP&FSD	With 1.3.1
GOAL	**To improve food and nutritional security in Kenya through effective management of migratory and invasive pests and weeds.**			**20,306,725,000**
Outcome	**2**	**Enhanced coordination among institutions and regional bodies engaged in migratory and invasive pest and weed management, through research, control and livelihood restoration.**		**10,206,825,000**

		ACTIVITIES	RESPONSIBLE PERSON	INDICATIVE BUDGET (KES)
Output	**2.1**	**Pesticides Management; Environmental, Social Health and Safety standards and monitoring.**	**PP&FSD NEMA**	**7,189,825,000**
Activity	2.1.1	Build capacity of staff on pesticide management including safe use.	PP&FSD	59,825,000
Activity	2.1.2	Procure appropriate pesticide transport and storage facilities	PP&FSD, PCPB	200,000,000
Activity	2.1.3	Procure, install and use integrated ICT based pesticide stock management system	PP&FSD	22,500,000
Activity	2.1.4	Build capacity of staff on safe handling, application and disposal of pesticides.	PP&FSD NEMA	600,000,000
Activity	2.1.5	Design and develop chemical disposal infrastructure in all the counties	PP&FSD, NEMA	100,000,000
Activity	2.1.6	Develop a contingency plan on pest management	PP&FSD, KALRO	87,500,000
Activity	2.1.7	Promote Continuous ESHS monitoring	PP&FSD, NEMA	120,000,000
Activity	2.1.8	Control identified pests and weeds	PP&FSD NEMA	6,000,000,000
Output	**2.2**	**Building sustainable partnerships, and collaborations pest control, research programs.**		**474,000,000**
Activity	2.2.1	Identify and engage new key partners on migratory pest management	PP&FSD	270,000,000
Activity	2.2.2	Develop and implement joint pest management programs	PP&FSD	68,000,000
Activity	2.2.3	Identify research gaps and strategic partners on migratory pest management in Kenya	PP&FSD, KALRO	68,000,000
Activity	2.2.4	Engage university and TVET students in research activities.	PP&FSD, KALRO	68,000,000
Output	**2.3**	**Developing a responsive institutional policy and regulatory framework on migratory pest management.**		**75,000,000**
Activity	2.3.1	Identify policy and legal gaps on migratory pest management	PP&FSD PS	25,000,000
Activity	2.3.2	Harmonise the roles of key institutions managing M&IPWM in Kenya	PP&FSD, PS	25,000,000

		ACTIVITIES	RESPONSIBLE PERSON	INDICATIVE BUDGET (KES)
Activity	2.3.3	Propose amendments and Advocate for review of policy and legal frameworks on migratory pest management	PS	25,000,000
Activity	2.3.4	Create a responsive Institution policy framework to manage migratory and invasive pests		
Output	**2.4**	**Building responsive livelihood recovery/restoration and rehabilitation mechanisms for affected communities.**		**6,468,000,000**
Activity	2.4.1	Establishment environmental and livelihood restoration and resilience mechanism	PP&FSD, NEMA	34,000,000
Activity	2.4.2	Establishment of linkages and networks of key stakeholders on coordination on environmental and livelihood restoration	PP&FSD	34,000,000
Activity	2.4.3	undertake livelihood restoration and protection intervention through established structures at national, county and community level.	Counties	2,400,000,000

Table 7: Workplan

		ACTIVITIES	YR 1	YR 2	YR 3	YR 4	YR 5
Activity	**1.1.1**	Build Capacity of existing staff at national and county levels					
Activity	**1.1.2**	Hire Consultants to train existing staff on geospatial and machine learning					
Activity	**1.1.3**	Build capacity of county M&IPWM staff /scouts in the counties					
Activity	**1.1.4**	Hire consultants to support staff on required competencies at national and county levels					
Activity	**1.1.5**	Conduct Capacity needs assessment and Redeployment of qualified technical staff					
Activity	**1.1.6**	Procure protective clothing and gadgets for staff					
Activity	**1.1.7**	Procure demonstration and training equipment					
Activity	**1.1.8**	Procure appropriate central chemical & equipment facilities					
Activity	**1.1.9**	Acquire, Secure and furnish adequate office space at national and county level					
Activity	**1.1.10**	Hire of Arial survey and control equipment and machines					
Activity	**1.1.11**	Conduct initial survey and mapping of identified endemic pests and weeds					
Activity	**1.1.12**	Procure and maintain appropriate vehicles					
Activity	**1.1.13**	Conduct resource needs assessment in migratory pest management					
Activity	**1.1.14**	Develop and operationalize a resource mobilization and management plan					
Activity	**1.1.15**	Advocate for resource allocation from the National budget.					
Activity	**1.1.16**	Contingency funding for emergency response.					
Activity	**1.2.1**	Procure, Install and maintain ICT infrastructure for surveillance and monitoring					

		ACTIVITIES	YR 1	YR 2	YR 3	YR 4	YR 5
Activity	**1.2.2**	Procure and install requisite monitoring equipment at strategic points					
Activity	**1.2.3**	Develop forecasting platform and models for early warning and pest management					
Activity	**1.2.4**	Build capacity of critical staff on geospatial analytics, modelling, artificial intelligence, and machine learning					
Activity	**1.2.5**	Adopt artificial intelligence and machine learning in migratory pests forecasting					
Activity	**1.2.6**	Created a sustainable data collection (scouting) and reporting mechanism from sub-location to national level					
Activity	**1.2.7**	Establish collaboration structures for exchange of relevant meteorological and agro ecological data/ information from local, regional and international institutions					
Activity	**1.2.8**	Develop a business continuity plan to safeguard integrity and availability of migratory pest data/information					
Activity	**1.3.1**	Develop and operationalise communication and campaign plan with stakeholders					
Activity	**1.3.2**	Train county extension service providers in technical information on the pests and weeds					
Activity	**1.3.3**	Generate information on innovative technical information on M&IPWM					
Activity	**1.3.4**	Document and disseminate new innovative information on M&IPWM					
Activity	**1.3.5**	Document and share best practices, successes and challenges to support learning					

		ACTIVITIES	YR 1	YR 2	YR 3	YR 4	YR 5
Activity	**1.3.6**	Conduct reviews on technical information and disseminate through various channels					
Activity	**1.3.7**	Participate in public for a like baraza to enlighten the public on the pests and weeds					
Activity	**1.3.8**	Train extension service providers on technical information on M&IPWM					
Activity	**1.3.9**	Hold stakeholder discussions on the pests and weeds managing					
Activity	**1.3.10**	Develop communication and public awareness plans					
Activity	**2.1.1**	Build capacity of staff on pesticide management including safe use.					
Activity	**2.1.2**	Procure appropriate pesticide transport and storage facilities					
Activity	**2.1.3**	Procure, install and use integrated ICT based pesticide stock management system					
Activity	**2.1.4**	Build capacity of staff on safe handling, application and disposal of pesticides.					
Activity	**2.1.5**	Design and develop chemical disposal infrastructure in all the counties					
Activity	**2.1.6**	Develop a contingency plan on pest management					
Activity	**2.1.7**	Promote Continuous ESHS monitoring					
Activity	**2.1.8**	Control identified pests and weeds					
Activity	**2.2.1**	Identify and engage new key partners on migratory pest management					
Activity	**2.2.2**	Develop and implement joint pest management programs					
Activity	**2.2.3**	Identify research gaps and strategic partners on migratory pest management in Kenya					

		ACTIVITIES	YR 1	YR 2	YR 3	YR 4	YR 5
Activity	**2.2.4**	Engage university and TVET students in research activities.					
Activity	**2.3.1**	Identify policy and legal gaps on migratory pest management					
Activity	**2.3.2**	Harmonise the roles of key institutions managing M&IPWM in Kenya					
Activity	**2.3.3**	Propose amendments and Advocate for review of policy and legal frameworks on migratory pest management					
Activity	**2.3.4**	Create a responsive Institution policy framework to manage migratory and invasive pests					
Activity	**2.4.1**	Establishment environmental and livelihood restoration and resilience mechanism					
Activity	**2.4.2**	Establishment of linkages and networks of key stakeholders on coordination on environmental and livelihood restoration					
Activity	**2.4.3**	undertake livelihood restoration and protection intervention through established structures at national, county and community level.					

Table 8: Implementation Period

Implementation period		Year 1				Year 2				Who	Budget
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4		
Consultants (Strategy Experts) Activities											**1,714,565**
Activity 1	Sensitization on the strategy									Strategy Experts	495,000
Activity 2	Strengthening Coordination among key Stakeholders									Strategy Experts	621,325
Activity 3	M&E capacity building and strengthening									Strategy Experts	327,000
Activity 4	Knowledge management and dissemination									Strategy Experts	271,240

Points to Note

1. The budget indicated above is only for implementation of the M&IPWM Strategy, and for limited emergency response in case of an invasion.
2. In the event of an invasion, a contingency plan will be developed using this strategy as a guide, and will contain:
    a. Emergency response protocols.
    b. Plan of action specific to the target pest.
    c. Independent budget specific to dealing with the particular invasion or infestation.

05

Monitoring **& Evaluation**

5 Monitoring & Evaluation

The process of enacting the structures to implement the strategy will be monitored, and learning lessons will be documented to inform decision making on amendments. Even after the M&IPWM strategy has been established at both the national and county level, a strategy monitoring and evaluation process will be put in place to ensure that performance is reviewed and analysed periodically. This strategy will further be subjected to midterm and end-term reviews. The process will consider emergent issues, why targets were not met, and changes in the environment that affect this plan. The logical framework and M&E matrix are presented in Tables 13 and 14 respectively.

5.1 Monitoring and Evaluation of M&IPWM Strategy Implementation

Table 9: Implementation Logical framework for Management of Migratory and Invasive Pests

EFFICIENT AND EFFECTIVE MANAGEMENT OF MIGRATORY PEST AND INVASIVE SPECIES WITHIN KENYA				
GOAL	**OBJECTIVE STATEMENT**	**OBJECTIVELY VERIFIABLE INDICATORS**	**MEANS OF VERIFICATION**	**RISK AND ASSUMPTION**
Outcome 1	**Strengthened coordination in pest control, research and extension on migratory and invasive pests and weeds.**	• **Level of human, Financial, and Physical resources dedicated to the management of migratory and invasive pests and weeds** • **Quantity of monitoring and early warning information shared on migratory and invasive pests and weeds** • **Level of knowledge among the population on migratory and invasive pests and weeds**	• **Directorate reports** • **Communication data from the system.** • **Training and campaign reports**	**There is an enabling political environment.**
Output 1.1	Enhanced financial, Physical and human resource capacities to deal with migratory pest and invasive pests and weeds.	• Number of officers with requisite skills on migratory and invasive pests and weeds • Staff with technical skills in managing equipment used in management of migratory and invasive pests • Availability of requisite equipment to manage migratory and invasive pests and weeds • Availability of enough chemical storage capacity in each region(base) • List of air operation equipment accessible to M&IPWM. • List of ground operation equipment	• Project inventory reports. • Evaluation /monitoring reports	There is an enabling political environment.

		• Amount of resource mobilised to manage Migratory and invasive pests and weeds • Amount of emergency and operational funds available to manage migratory and invasive pests		
Output 1.2	An enhanced ICT system, to support an efficient and effective migratory and invasive pest and weeds surveillance and monitoring.	• Inventory of functional ICT equipment used to report and process information on migratory & invasive pests at national government and all the counties in Kenya • Number of functional information management systems used by M&IPM units • Inventory and geo location of mounted surveillance and monitoring system in all possible entry points • Number of early warning platforms and models used in all M&IPM units in Kenya • Number of well-functioning platform to access real time data on migratory and invasive pests locally, regionally and international information • Number of early warning reports and advisory reports processed by the surveillance and monitoring systems.	• Project inventory reports. • Evaluation /monitoring reports	There is an enabling business environment
Output 1.3	Enhanced knowledge on migratory and invasive pest management	• Number of persons reached on issues related to migratory and invasive pests.	Evaluation and monitoring reports	An enabling political environment.

		• Number of communication material on migratory and invasive pests • Number of campaigns conducted on migratory and invasive past management • Percentage number of members of the public with accurate information and knowledge on management of migratory and invasive pests		
Outcome 2	**Strengthened coordination in pest control, research and extension on migratory and invasive pests and weeds.**	• **Quantity of pesticides/herbicides effectively handled in each of the regional bases** • **Number of M&IPM units active by reporting regularly** • **Available system on safe use and mitigation of effects of pesticides on environment and health** • **Number of institutions actively participating in the multi-institutional research platform** • **Number of policy and legal frameworks developed to support management of migratory and invasive pests and weeds** • **Livelihood protection and restoration framework**	**Gazette notice on the new functional units to deal with Migratory and invasive pests.**	**There is an enabling business environment**

Output 2.1	An environmentally and technically sound pest management system to efficiently and effectively respond, control and mitigate against invasion of migratory and invasive pests and weeds	• Number of registered good quality pesticides and herbicides to be used in control of migratory and invasive pests and weeds • Availability of a functioning pesticide/herbicide management system • Pest/herbicide Storage capacities in each region • Quantity of pesticide/herbicides safely dispersed in all the regions • Number of institutions participating in environmental and social health monitoring • Existence of pesticide/herbicide stock management system • Number of pest/herbicide management regimes developed.	Evaluation and monitoring reports	There is an enabling business environment
Output 2.2	Strengthened Partnership and collaboration with key partners in control, research and extension programs in managing migratory and invasive pests and weeds.	• Number of local, regional and development partners participating in migratory and invasive pest control research; • Number of research program rolled out to addressing priority gaps/problems in the management of migratory and invasive pests and weeds management; • Frequency and consistency of a multi-stakeholder coordinating meetings on research and data sharing	Evaluation and monitoring reports	There is an enabling political environment

		• Number of MoUs on collaboration for sharing research infrastructure and equipment; • operationalized knowledge management systems. • Number of short trainings conducted on migratory pests and invasive pests and weeds.		
Output 2.3	Enhanced legal, policy and institutional capacity on management of migratory and invasive pests and weeds.	• Number of policy and legal gaps Identified • Number of responsive policy and regulatory framework on migratory and invasive pest management developed • Number of amendments on policy and legal frameworks Proposed and advocated for • Number of policies aligned to the existing policies, legal framework, treaties and international regulations • A responsive institution policy and legal framework to manage M&IPWM.	Evaluation and monitoring reports	There is an enabling political environment
Output 2.4	Well-structured system for livelihood recovery/restoration and resilience.	• Number of livelihood restoration frameworks developed in all the counties. • Size of land reclaimed and or livelihoods restored. • Number of farmers who are resilience to pest attack and other risks.	Evaluation and monitoring reports	There is an enabling political environment

5.2 Monitoring & Evaluation Matrix

Table 10: Monitoring & Evaluation Matrix

M&IPWM M&E Matrix							
Strategy Name:	Efficient and Effective Management of Migratory & Invasive Pests in Kenya	**Project Location:**	PP&FS Directorate				
Ministry	Ministry of Agriculture, Livestock, Fisheries & Cooperatives	**Strategy Period:**	2022 - 2027		**Project End Date:**	**June 30, 2027**	
PERFORMANCE INDICATORS		**DATA GATHERING**			**ANALYSIS, USE, REPORTING**		
INDICATOR NUMBER	**INDICATOR AND TARGET**	**MEAN OF VERIFICATION**	**FREQUENCY AND SCHEDULE**	**RESPONSIBLE PERSON/ TEAM**	**DATA ANALYSIS**	**INFORMATION USE/AUDIENCE**	**REPORTING DEADLINE**
GOAL:	To improve food and nutritional security among farmer in Kenya through effective management of migratory and invasive pests and weeds						
OUTCOME 1:	Strengthened capacity of the MoALFC to adequately address any incidences of migratory and invasive pests and weeds in Kenya						
Indicator 1:	Level of human, Financial, and Physical resources dedicated to the management of migratory and invasive pests and weeds Quantity of monitoring and early warning information shared on migratory and invasive pests and weeds size of the population knowledgeable on migratory and invasive pests and weeds	National budget documents International development partners' reports Directorate monitoring reports. Directorate evaluation reports	• Baseline • Mid-term and • End line	• Assistant Director • PP&FSD	Supplementary budget notes	• Beneficiary Households • PP&FS • MoALFC	• Baseline • Mid-term • End line
OUTPUT 1.1:	**Enhanced financial, Physical and human resource capacities to deal with migratory pest and invasive pests and weeds**						
Indicator 1.1.	• Number of officers with requisite skills on migratory and invasive pests and weeds • Staff with technical skills in managing equipment used in management of migratory and invasive pests • Availability of requisite equipment to manage migratory and invasive pests and weeds • Availability of enough chemical storage capacity in each region(base) • List of air operation equipment accessible to M&IPWM • List of ground operation equipment • Amount of resource mobilised to manage Migratory and invasive pests and weeds • Amount of emergency and operational funds available to manage migratory and invasive pests	○ Inventory of equipment and machinery ○ Staff profile ○ Financial records ○ Surveys at Baseline & End line ○ Migratory and invasive pest management records	• Semi-annually • End-term	• PP&FS • M&IPWM division	• Analysis of Migratory and invasive Pest management records supplementary budget notes	• PP&FS Directorate	• After every six months • End line
OUTPUT 1.2:	**An enhanced ICT system, to support an efficient and effective migratory and invasive pest and weeds surveillance and monitoring.**						
Indicator 1.2.	• Inventory of functional ICT equipment used to report and process information on migratory & invasive pests at national government and all the counties in Kenya • Number of functional information management systems used by M&IPWM units • Inventory and geo location of mounted surveillance and monitoring system in all possible entry points • Number of early warning platforms and models used in all M&IPWM units in Kenya • Number of well-functioning platform to access real time data on migratory and invasive pests locally, regionally and international information • Number of early warning reports and advisory reports processed by the surveillance and monitoring systems	○ Surveys at Baseline & End line ○ Migratory and invasive pest management records ○ Surveillance and early warning reports ○ Inventory of surveillance equipment	• Quarterly	• PP&FS • M&IPWM division	• Analysis of Migratory and invasive Pest management records	• PP&FS directorate • Affected household • Affected counties	• After every six months • End line
OUTPUT 1.3:	**Enhanced Knowledge on migratory & invasive pest and weed management**						
Indicator 1.3.	• Number of persons reached on issues related to migratory and invasive pests. • Number of communication material on migratory and invasive pests • Number of campaigns conducted on migratory and invasive past management. • Percentage number of members of the public with accurate information and knowledge on management of migratory and invasive pest	○ •Surveys at Baseline & End line ○ Migratory and invasive pest management records ○ Media campaign reports	• Semi-annually	• PP&FS • M&IPWM division and Treasury	M&E reports from various counties	County M&IPWM unit CASSCOM	• Semi-annually
OUTCOME 2:	**Strengthened coordination in pest control, research and extension on migratory and invasive pests and weeds**						

	• Quantity of pesticides/herbicides effectively handled in each of the regional bases • Number of County M&IPWM units active by reporting regularly • Available system on safe use and mitigation of effects of pesticides on environment and health • Number of institutions actively participating in the multi-institutional research platform • Number of policy and legal frameworks developed to support management of migratory and invasive pests and weeds • Livelihood protection and restoration framework	○ Minutes of MITT meetings ○ Successful programmes implemented by the MITT-Organised research them	• Semi-annually	• PP&FS • M&IPWM division	• Analysis of migratory and invasive Pest management records	• Participating Institutions • PP&FSD • Targeted counties	• Semi-annually or after every six months
OUTPUT 2.1:	**An environmentally and technically sound pest management system to efficiently and effectively respond, control and mitigate against invasion of migratory and invasive pests and weeds**						
Indicator 2.1:	• Number of registered good quality pesticides and herbicides to be used in control of migratory and invasive pests and weeds • Availability of a functioning pesticide/herbicide management system • Pest/herbicide Storage capacities in each region • Quantity of pesticide/herbicides safely dispersed in all the regions • Number of institutions participating in environmental and social health monitoring • Existence of pesticide/herbicide stock management system • Number of pest/herbicide management regimes developed	○ Surveys at Baseline & End line ○ Inventory on chemical storage facilities on Migratory and invasive pest management ○ List of registered chemicals	• Quarterly	• PP&FS • M&IPWM division	• Analysis of migratory and invasive Pest management records	• PP&FS directorate • Affected household • Affected counties	• After every six months • End line
OUTPUT 2.2:	Strengthened Partnership and collaboration in control research and extension programs to deal with migratory and invasive pests and weeds						
Indicator 2.2:	• Number of local, regional and development partners participating in migratory and invasive pest control research; • Number of research program rolled out to addressing priority gaps/problems in the management of migratory and invasive pests and weeds management; • Frequency and consistency of a multi-stakeholder coordinating meetings on research and data sharing • Number of MoUs on collaboration for sharing research infrastructure and equipment; • operationalized knowledge management systems. • Number of short trainings conducted on migratory pests and invasive pests and weeds	○ Number of research and regulatory institution participating in MITT. ○ Minutes of MITT, M&IPWM records. Procurement records	• Quarterly	• PP&FS • M&IPWM division	• Analysis of migratory and invasive Pest management records	• PP&FS directorate • Affected household • Affected counties	• After every six months • End line
OUTPUT 2.3:	**Enhanced legal, policy and institutional capacity on management of migratory and invasive pests and weeds**						
Indicator 2.3:	• Number of policy and legal gaps Identified • Number of responsive policy and regulatory framework on migratory and invasive pest management developed • Number of amendments on policy and legal frameworks Proposed and advocated for • Number of policies aligned to the existing policies, legal framework, treaties and international regulations	○ number of policy issues reviewed. ○ Number of cabinet memos drafted. ○ M&IPWM records and regulations	• Annually	• PP&FS • M&IPWM division • Ministry briefs and records	• Analysis of migratory and invasive Pest management records	• PP&FS directorate • Affected household • Affected counties	• After every six months • End line
OUTPUT 2.4	**Well-structured system for livelihood recovery/restoration and rehabilitation**						
Indicator 2.4	• Number of livelihood restoration frameworks developed in all the counties • Size of land reclaimed and or livelihoods restored	○ Record of restoration activities conducted ○ Record of County M&IPWM records	• Annually	• PP&FS • M&IPWM division	• Analysis of migratory and invasive Pest management records	• PP&FS directorate • Affected counties	• After every six months • End line

5.3 Risks, Assumptions & Mitigation Measures

The M&IPWM strategy acknowledges that the implementation of the strategy could face certain bottle necks or risks. These risks could be encountered at any stage of the strategy implementations. Assumptions are therefore made to mitigate the possibility of encountering the risks so as to steer the strategy implementation within the proposed scope, mandate and time. These assumptions are captured in Table 11.

Table 11: Risks, Assumptions and Mitigation Measures

S/No	Thematic area	Assumptions	Limitations	Mitigation
Human resources equipment and capacity development				
1.	Upscaling human and physical capacity	There are enough staff and willing to be trained	Inadequate staff or staff who are not qualified for training	Capacity building of staff
2.	Redeployment of staff with requisite competencies	Existing staff have requisite competencies	Inadequate staff or staff with no competences	Deployment of adequate staff
3.	Equipment and machinery – for ground and air surveillance and control operations	Govt will acquire or lease adequate equipment	Inadequate or obsolete equipment and machinery	Purchase and or lease of equipment
4.	Appropriate storage	Govt and its partners will expand and modernize storage facilities	Lack of adequate and appropriate storage facilities for pesticides	Expansion and refurbishment of storage facilities
5.	Expansion of Office space	Govt will provide adequate and equipped office space	Lack of adequate and modern operating office space	Expansion and refurbishment of offices
6.	Mobilize necessary resources	Adequate resources will be mobilized by govt and donors to implement the strategic plan	Lack of adequate resources	Government to allocate money for the strategy; fund raising from donors and development partners

S/No	Thematic area	Assumptions	Limitations	Mitigation
Strengthening ICT, Communication and public awareness systems				
1.	Modernization of ICT infrastructure; robust information management system; early warning platforms and models;	The govt and its development partners will provide modern ICT infrastructure for information technology management, development of early warning systems and models	-Lack of adequate and appropriate ICT infrastructure -Obsolete and non-functional ICT infrastructure	Modernization of ICT facilities
2.	Develop & nurture critical skills on early warning, deep analytics, artificial intelligence and machine learning	Appropriate skills exist or will be developed	Lack of or inadequate skills	Develop and roll out early warning strategy
3.	Systems for accessing to real time data at local, regional and international levels;	Data access system are in place or they will be developed	Lack of regional or international cooperation and agreements that allow access to data	Establishment of database management system
4.	Communication strategy/plan; continuous awareness campaigns	Good communication strategy is in place or will be developed	Absence or inappropriate communication strategy	Develop and effective and efficient communication system
Coordination and campaign for migratory pest management				
1.	Coordination structure for the management of migratory pest in Kenya	The govt and other stakeholders will put in place	Lack of or ineffective coordination structure	Develop a coordination strategy

S/No	Thematic area	Assumptions	Limitations	Mitigation
		effective coordination structure		
2.	Migratory pest management campaign strategy	Good and effective migratory pest management campaign strategy will be put in place	Ineffective or poor campaign strategy	Develop and effective and efficient campaign strategy
Building sustainable partnerships, collaborations and research programs				
1.	Develop and operationalize a partnership strategy – with current and new partners	Good partnership strategy will be put in place	Lack of cooperation between partners	Develop a working partnership
2.	Develop and roll out a research program addressing priority gaps/problems in the management of migratory pest	-Funds will be availed for a comprehensive research strategy -Research priorities will be identified	Lack of funds and human capacity	Prioritization of research areas to address gaps in management of migratory and invasive and migratory pests and weeds
3.	Develop/operationalize knowledge management plans	Good knowledge management plan will be put in place	Lack of or inappropriate strategy	Develop a well thought out knowledge management plan
Developing a responsive policy and regulatory framework on migratory pest management				
1.	Identify policy and legal gaps	Legal and policy gaps exist	Failure to enact legal provisions and develop and adopt or implement relevant legal and policy reforms necessary for	Initiate and follow up legal reforms that will ensure successful implementation of the strategy

S/No	Thematic area	Assumptions	Limitations	Mitigation
			implementation of the strategy	
2.	Propose and advocate for amendments of policy and legal frameworks	Strong and coordinated advocacy or legal and policy reforms will be put in place.	Lack of political good will to undertake the necessary reforms	Initiate and contribute to draft legislations/revisions of existing laws like Cap 346 and cap 324 to anchor the strategy in law
Developing a sustainable resource mobilization framework				
1.	Resource needs assessment and mapping migratory and invasive pests and weeds	The need for resources for mapping of migratory pests has been done or will be done	Poor resource needs assessment	Undertake through and in-depth resource needs assessment and provide road map for addressing the needs
2.	Develop and operationalize a resource mobilization and management plan	Resource mobilization and management plan will be put in place	Lack of or poor and uncoordinated resource mobilization and management plan	Put in place resource mobilization unit/team to fund raise for implementation of the strategy
3.	Advocate for resource allocation within the National budget	Lobbying for resource allocation by treasury will be successful	Lack of financial resources	Lobby national treasury to allocate funds
4.	Policy review and lobbying for contingency funding – government funding	Successful lobbying for contingency funding by govt	Lack of funds	Fund raising

5.4 Sustainability

The M&IPWM strategy interventions were anchored on well identified problems, needs and streamlined benefits to the farming communities in all the counties in Kenya. By addressing the immediate need within the counties such as managing the most stubborn weeds and pests, setting up an identification, monitoring and early warning systems, improving farmers knowledge on pest and weed management, and finally putting up resilience and restoration mechanisms, the farming communities within the counties are motivated to take part in what satisfy their interest and need. The strategy proposed to work with already formed government structures within the national and county governments and also within the communities to enhance participatory process on community empowerment and social inclusion.

Some of the community structures had already gone through various trainings during desert locust control operations hence stable. These community structures and government structures had been streamlined, such that they are bound to continue with other pests and weed control activities even with minimal support from PP&FSD. The strategy interventions were also aligned to their respective county needs.

The strategy supports the development of sustainable pest and weed control mechanisms aligned to existing local and international policy frameworks, specific geographical regions, and type of pests and weed depending on resources available in each county situation. The strategy proposes to harmonize the policies and institutional framework to ensure that there is a harmonious policy framework aligned to existing development goals and strategies including ASTGS, vision 2030, SDGs and agenda 2063. This also ensured that the strategy interventions are aligned to national and county government policies and

regulation. This strategy proposes to ensure there is collaboration among key players in the pest and weed control including government departments at national and county level, international institutions and bodies, private institutions and individual farmers and their organizations.

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Appendix 1:
List of Stakeholders Involved in the Strategy Development

ORGANIZATION	NAME
AFA	Ms. Elizabeth Langat
AFA	Mr. Jackson Kurgat
CEC	Hon. Albert Mwaniki
COG	Mr. Robert Kiteme
CYMMYT	Dr. Anani Bruce
CYMMYT	Mr. Gerphas Ogola
ELRP	Mr. Boniface Mutua
ELRP	Ms. Catherine Kinyanjui
ELRP	Dr. Douglas Indetie
ELRP	Mr. Dunro Kombo
ELRP	Mr. Emmanuel Otieno
ELRP	Mr. Geofferey Wahome
ELRP	Mr. Henry Dzombo
ELRP	Mr. James Mosobo
ELRP	Mr. Johnson Ndolo
ELRP	Mr. Julius Tutha
ELRP	Mr. Ken Orumo
ELRP	Mr. Steven Onguko
FAO	Ms. Clare Muthui
FAO	Dr. Allan Mweke
FAO	Dr. Ochola W. Adede
FAO	Dr. George Ong'amo
FPC KENYA	Mr. Okisegae Ojepat
FPEAK	Mr. Anthony Mutiso
ICIPE	Dr. Daniel Mutyambai
KALRO	Dr. Johnson Nyasani
KEFRI	Mr. Linus Mwangi
KENYATTA UNIVERSITY	Dr. Emily Wabuyele
KEPHIS	Dr. Alex Muvea

ORGANIZATION	NAME
KEPHIS	Mr. George Momanyi
KWS	Mr. Solomon Kyalo
MOA	Mr. Raphael Njoroge
MOH	Mr. Leonard Kimtai
MURANGA COUNTY	Mr. Samuel Muriithi
NEMA	Dr. Charles Lange
PCPB	Mr. Fredrick N. Muchiri
PP&FSD	Mr. Collin Marangu
PP&FSD	Ms. Flora Kainyu
PP&FSD	Mr. Francis Musavi
PP&FSD	Mr. Eliud Baraka
PP&FSD	Mrs Teresia Karanja
PP&FSD	Mr. Esbon Agira
PP&FSD	Mr Ishmael Mganda
SDL	Ms. Joan Otiang
UON	Dr. Dora Kilalo
UON	Prof. Paul Ndegwa

Appendix 2:
Management Structure – Terms of Reference

S/N	OFFICE	RESPONSIBILITIES
1.	**State Department of Crop Development and Agricultural Research**	○ Undertake policy and legal review and amendment ○ Initiate new /relevant legislations ○ Provide policy direction ○ Lobby enhanced resource allocation to PP&FSD to handle manage migratory and invasive pests and weeds ○ Chair JASCOM meetings ○ Resource mobilization form GoK and development partners
2.	**JASCOM**	○ Deliberate and allocate roles between national and county government in management of migratory and invasive pests and weeds ○ Links CSG with the national government
3.	**PP&FSD**	○ Chairs MIIT ○ Chairs resource mobilization committee ○ Resource mobilization and management ○ Provide technical leadership on migratory and invasive pests and weeds management ○ Initiate and maintain collaborations with intergovernmental agencies, private sector and development partners and donors ○ PP&FSD report Principal Secretary (State department of crop development and agricultural research)
4	**PP&FSD**	**PLANT PROTECTION DIVISION** ○ Hosts migratory and invasive pests and weeds management unit ○ Provides human and physical resources for management of migratory and invasive pests and weeds ○ Capacity building on migratory and invasive pests and weeds and emerging diseases management ○ Backstops migratory and invasive pests and weeds management unit functions ○ Reports to director PP&FSD
5	**PP&FSD**	**FOOD SAFETY DIVISION** ○ Ensure regulatory compliance in pest management ○ Oversee food and environmental safety in management of migratory and invasive pests and weeds approaches ○ Reports to director PP&FSD
6	**MITT**	○ Members: PP&FSD, KALRO, KEPHIS, PCPB, Universities, ICIPE, DLCO-EA, MoH, NEMA, Co-opted members- CABI & CIMMIT and other technical persons and international organizations.

S/N	OFFICE	RESPONSIBILITIES
		○ Heads of institutions represented in MITT form the advisory committee on migratory pests' management ○ Identify and prioritize research on migratory and invasive pests and weeds management-in Kenyan context ○ Resource mobilization through development of proposals
7	**Resource Mobilization Committee**	○ Members: -representative from national treasury, IFAD, World Bank, USAID, UK AID, UN-FAO, DLCO-EA, other regional funding institutions and international development partners ○ Source and avail funds for management of migratory, invasive pests and weeds ○ Share information with director-PP&FSD
8.	**Research And Extension**	○ Function outsourced to KALRO in collaboration with other members of MITT ○ Dissemination of appropriate information on migratory and invasive pests and weed management strategies ○ Reports to MITT and share information with PC&ER
9.	**Migratory And Invasive Pest Management Unit (M&IPWM)**	○ Coordinates and executes all functions related to management of migratory and invasive pests and weeds within the country including monitoring, early warning and surveillance, pest control and emergency response. ○ Participate in livelihoods recovery, restoration and rehabilitation ○ M&E, learning and knowledge management ○ Reports to PPD
10.	**Monitoring, early warning and surveillance**	○ Undertake pest surveillance, monitoring and develop early warning on migratory and invasive pests and weeds ○ Share information with national and regional institutions on migratory and invasive pests and weed management ○ Report to M&IPWM
11.	**Pest Control and Emergency Response Sub-unit (PC&ER)**	○ Execute migratory and invasive pests and weeds control in collaboration with county pest control unit ○ Capacity building on migratory and invasive pests and weeds management. ○ Report to M&IPWM and share with RM&IPWM
12.	**Regional Monitoring and Invasive Pest Management Unit (RM&IPWM)**	○ Coordinate pest control and emergency response with a region (group of counties) ○ Source and temporarily store pesticides and herbicides for control of migratory and invasive pests and weeds. ○ Coordinate movement and deployment of machinery and

S/N	OFFICE	RESPONSIBILITIES
		equipment to be used control of migratory and invasive pests and weeds o Reports to M&IPWM o Share information with CASSCOM and CECM agriculture
13.	**County Executive Committee Member for Agriculture (CECM)**	o Link with PP&FSD on pest and weed management o Chair County Agricultural Sector Steering Committee (CASSCOM) o Provide leadership on matters concerning migratory and invasive pests and weeds. o Represent agricultural sector in County Food Security Steering Group (CSG) o Reports to CSG
14.	**County Agricultural Sector Steering Committee (CASSCOM)**	o Approve operations related to control and emergency response, livelihood restoration and rehabilitation o Report to CSG
15.	**County Food Security Steering Group (CSG)**	o Links counties to JASCOM
16.	**County Chief Officer (CCO)**	o Provide technical leadership in management of migratory and invasive pests and weeds o Oversee capacity building on management of migratory and invasive pests and weeds o M&E, learning and knowledge management
17.	**County Migratory and Invasive Pest Management Unit (CM&IPWM)**	o Comprises 3 sub-units: o Monitoring early warning and surveillance whose function is to undertake pest surveillance, monitoring and developing early warning on migratory and invasive pests and weeds at county level. o NB: Monitoring and early warning data given directly to CO and national early warning, monitoring and surveillance sub-unit. o Livelihood recovery, restoration and rehabilitation whose role is to assess and document status of food security status as affected by migratory and invasive pests and weeds o County Pest Control Unit (CPCU)-In collaboration with national pest control and emergency response sub-unit in management of migratory and invasive pests and weeds. o PCCU reports to CM&IPWM.

Appendix 3: Strategy Development: Chronology of Events

DATE	ACTIVITY	TIME TAKEN
3 – 7 May 2021	• Initial storming meeting	5 days
01 – 04 August 2021	• Inception meeting and drafting inception report (road map for the strategy)	4 days
05 August 2021	• Presentation of the inception report	1 day
06 – 13 August 2021	Desktop review of migratory and invasive pest & weed management • National laws, policies and regulatory framework • Treaties, regional and international institution involved in migratory and invasive pests & weeds • Status of migratory and invasive pests and weeds management	6 days
16 – 21 August 2021	Stakeholders' storming session (The Kyaka Hotel, Machakos) • Stakeholder analysis • SWOT analysis • Problem tree analysis • PESTEL • Appropriate strategic options • Sketch of Result framework • Pragmatic pillars • Activities to the pillars • Capacity needs assessments	6 days
23 – 27 August 2021	• Open discussion with ELRP team and PP&FSD staff at Naivasha – focus group discussion • Developing contents to the strategy	5 days
30 August – 03 September 2021	• Finalizing the draft report and activity and plan of work formulation discussion • Budget discussions	5 days
06 – 10 September 2021	• Developing coordination and implementation framework • Developing M&E framework • Zero draft presented to PP&FSD through online meeting	5 days

DATE	ACTIVITY	TIME TAKEN
13 – 17 September 2021	• Validation of the draft with county government officials (CECMs and COs) at Naivasha workshop	5 days
20 – 24 September 2021	• Amending the document to include county government inputs • Amendment to include PP&FSD and ELRP comments	5 days
28 September 2021	• Online Stakeholders' validation workshop	1 day
29 September 2021	• Document presented to heads of departments and FAO for further comments • Awaiting further comments.	
14 December 2021	• Presentation to and clearance by SWAG_PLS for public participation exercise	2 days
14 December 2021	• Presentation to and clearance by SWAG_PLS for Public Participation	1 day
10-14 December 2022	• Country-wide Public Participation	5 days
18 – 20 December 2022	• Review of comments from SWAG 1 and Public Participation to consider, adopt and include them into the strategy document	3 days
27 January 2022	• Presentation to and clearance by SWAG_PLS for National stakeholders' validation.	1 day
31 January 2022	• Briefing the Principal Secretary and Heads of Departments on the M&IPWM Strategy finalisation process	1 day
1 February 2022	• National Stakeholders' Validation	1 day
2 February 2022	• Review of comments from the PS, HoDs and National Stakeholders to consider, adopt and include them into the strategy document	1 day
7 February 2022	• Launch of the M&IPWM Strategy	1 day

Appendix 4: Some Management Options for Migratory Pests

PEST	MANAGEMENT
Desert locust (*Schistocerca gregaria*)	• Early warning and monitoring, • Use of Ultra Low Volume (ULV) formulation of the insecticides applied via aerial, vehicle mounted or back mounted sprayers. • Use of approved EC, WP, SC, EW and WDG formulations. • Use of biopesticides against hoppers.
African armyworm (*Spodopetera exempta*)	• Cultural practices-crop rotation, use of resistant varieties, field sanitation, habitat manipulation. • Biological control using BCAs, use of bio-pesticides (fungal and bacterial (Bt) and baculoviruses). • Mating disruption (use of pheromones). • Use of approved synthetic pesticides
Quelea birds (*Quelea quelea*)	• Monitoring and early warning • Traditional capture method • Habitat manipulation like bush clearance in roosting sites • Use of approved chemicals for aerial spraying. • Blasting technique (use of explosives)
Lepidopteran pests-Fall armyworm (*Spodoptera frugiperda*), *Tuta absoluta*, Stem borers (*Chilo partellus*)	• Early warning and surveillance • Bury/burn stalks to eliminate diapausing larvae, • Early sowing to reduce infestation, • Intercropping with pulses, • Push-pull technology • Mating disruption using pheromone traps • Biological control using biocontrol agents • Use of biopesticides (fungal, bacterial, baculoviruses) • Use of appropriate chemicals • Indigenous Technical Knowledge options such as • Use of botanical plants (Chilies, Aloe vera, Mexican marigold etc.) Application of mixture of ash, soil and sand
Fruit fly (*Droposphila suzuki*, *Bactrocera*	• Early harvesting • Use recommended chemicals, • Use bait sprays e.g., yeast products mixed with • malathion or fenthion around the tree base,

PEST	MANAGEMENT
dorsalis*, *Ceratitis capitata)	• Removal of infested fruits and proper disposal (collect and bury at least 10 feet deep) • Fruit bagging before maturity to prevent egg laying • Male annihilation technique: mass trapping of males using methyl eugenol pheromone + malathion as pesticide • Augmentorium: a structure that would allow escape of natural enemy but trap the emerging fruit flies from infested fruits • Field sanitation • Area-wide management, • Removal of wild hosts, • Monitoring • Post-harvest treatment like hot water treatment. • Phytosanitary and quarantine control
Storage pests (Larger grain borer (*Prostephanus truncatus*)	• Proper drying • Sorting and cleaning of the produce • Cleaning & repair of the storage facilities • Use appropriate natural grain protectants where applicable, or chemicals • 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 minimize potential loss or damage. • Promote biological control of LGB using *Teretriosoma nigrescens* to minimise infestation from wild sources
Papaya mealybug (*Paracoccus marginatus*)	• Phytosanitary and quarantine control • Introduction and use of classical biological control using hymenopteran parasitoids originating from its area of origin e.g., *Acerophagus papayae*, *Anagyrus loecki*, and *Pseudleptomastix mexicana* especially when infestations cover smaller areas • Spacing or pruning trees to ensure their canopies do not touch. • Use of appropriate chemical

PEST	MANAGEMENT
Golden apple snail (*Pomacea canaliculata*),	• Quarantine restrictions to prevent movement of plant materials from infested to un infested areas • Rapid Response-eradication in small infested areas • Public awareness to notify the public and participate in management and eradication activities • Cultural methods like ploughing and harrowing during the off-season increase the mortality of dormant snails in the soil. • Higher seeding rates provide greater tolerance to damage because missing patches can be filled in. • Chemical control - Several of the molluscicides that have been used against *P. canaliculata*, such as organotin compounds
Potato cyst nematodes (*Globodera rostochiensis* and *Globodera pallida*)	• Phytosanitary and quarantine control • Crop rotation • Use of clean planting seeds • Clean soil from potato tubers and have the soil tested to be sure of non-transference of potato cyst nematode. • Trap cropping like using resistant potato clones as trap crop • Solarization is a good method of killing nematodes in very hot climates but in small areas. • Use of fungal parasites like *Pochonia chlamydosporia*, *Fusarium oxysporum* and *Cylindrocarpon destructans*.

Appendix 5
COMMUNICATION PLAN

1.0 | BACKGROUND

The skill and ability to communicate is critical to the success of the implementation of this plan. The strategy cannot be accomplished if there isn't effective communication. The communication strategy presented in this section picks out those elements of communication that contribute most effectively to the realisation of the M&IPWM Strategy goals.

The communication strategy's development is a result of consultative meetings, qualitative research and interactive sessions with key stakeholders. Many views and ideas were expressed and taken into consideration, all of them contributing in one way or another to the strategy and implementation plan presented here.

This is a countrywide strategy, where many of the activities are conducted in a coordinated manner between the national government and county governments. Each county is guided by its own internal policies, but with overall oversight by the Ministry of Agriculture, Livestock, Fisheries & Cooperatives as well as the Migratory & Invasive Pests management (M&IMP) Unit. The national coordination units therefore need to tailor the strategy to county/local contexts. This process is included in the implementation plan. Some elements of the strategy are best implemented at national level, and fall within the scope of roles already assigned to various branches of the MoALFC.

This communications plan covers a five-year period. However, the possibility of a second phase is envisaged from the outset, so the strategy has been written under the assumption of the need to implement a second phase. The strategy covers a five-year period beginning in 2021, upon the launch of the M&IPWM Strategy. A first revision is scheduled to take place twelve (12) months after the launch, with data gathered during the Monitoring & Evaluation (M&E) phase of the project used to

make necessary adjustments. Nevertheless, at the same time as addressing immediate needs, it is written with an eye to the longer term, with the overall aim of ensuring a full-capacity Country M&IPWM Communication Centre.

The strategy is divided into four strategic areas of communication:

- National M&IPWM Communication Centre
- Innovative, Affordable & Practical Communication
- Communication Management and Coordination
- Websites & Support Collateral

1.1 Rationale

The M&IMP Strategy is based on the principle that early warning, long term planning and a well-structured invasive and migratory pest management plan cascading from national level down to community level can create seamless pest and weed control structures that benefit farmers, as well as ensure national and county food and nutrition security in the short and long term.

The role of an effective communications strategy is to break down the strategy's key element into messages that are simple, easy to transmit and effective at passing important pest control messaging. The purpose of doing this is:

1. To enhance capacities of national and county governments in dissemination of effective invasive pest and weed control measures.

2. To enhance trans-county collaboration, and collaboration between national and county governments, in agricultural training and information dissemination.

3. To facilitate increased transfer of agricultural technology,

information and knowledge across county boundaries and bureaucratic systems.

1.2 Strategic Pillars in Relation to Communication

PILLAR	COMMUNICATION COMPONENTS
Pillar 1 Resource Mobilisation and management	• IT hardware and software acquisition • HR Training
Pillar 2 ICT communication on Early warning, monitoring and surveillance.	• Enhanced communication channels • Development of communications focal point.
Pillar 3 Enhanced awareness and Knowledge management on Migratory and Invasive pests and weeds.	• Capacity building of communication human resource. • M&E of messaging to farmers and other stakeholders.
Pillar 4 Migratory and invasive Pests and weeds control systems and emergency response and environmental monitoring	• Storing and providing access to progeny performance data
Pillar 5 Multi institutional Stakeholder Research and extension.	• Coordination of communication activities • Articulation of research needs by farmers and other users of research outputs

PILLAR	COMMUNICATION COMPONENTS
Pillar 6 A responsive policy and regulatory framework on migratory pests and weeds management.	• Articulation of research needs by farmers and other users of research outputs. • Communication for policy advocacy.
Pillar 7 Livelihood Restoration and Rehabilitation	• Sharing and publicising data and results

1.3 Scope

The development and capacity building of a National M&IPWM Communication Centre is a major part of the M&IPWM Strategy. However, not all elements of the strategy are directly linked to the Communications Centre. This communications strategy therefore covers communication needs within the time and capacity parameters of the strategy and their coordination through the Communication Centre.

Over time, the communication needs of the M&IPWM Strategy will become more prominent. As a pre-requisite, the use of Information Technology is a must, and is significantly relied upon for communication of this strategy. The overall budget of the strategy covers the acquisition and upgrading of IT infrastructure for communication, and is therefore not covered in the communication strategy.

Human resources are also needed for the implementation of the strategy. This includes a strong element of "dissemination", which in the context of agricultural research and development is taken to mean the promotion and uptake of new technologies. While communication is a part of the process, not

everything required for the uptake of these new technologies is communication.

Promoting dissemination through improved linkages between researchers, extensionists and farmers is a major thrust in many programmes in Kenya, and its neighbouring countries. There are similar interventions that exist and are larger than the M&IPWM Strategy, and seek to make the organisational and institutional changes that will improve the communication and dissemination of new technologies. This strategy therefore encourages the linking to such initiatives.

1.4 Goal & Objectives

Communication clearly cuts across the seven pillars of the M&IPWM Strategy. For this reason, the communications plan cannot be nested within one of the pillars. The overall purpose of this communication plan is to enhance national and county communication and information sharing with farmers – and all relevant stakeholders – at all levels in a manner that is simple, efficient, understandable and impactful in the management of migratory and invasive pests and weeds.

To achieve this, six key intermediate objectives must be realized.

1. Development of a national communications research plan on currently available communication methodologies.
2. The use of innovative technologies to reach all demographics of farming communities across the country.
3. Tailored communiques that are of immediate and impactful benefit to farmers, and farmers' support stakeholders – extension officers, government policy makers and implementors, etc.
4. A simplified, integrated and embedded communication framework that cuts through bureaucratic systems to ensure simplified and affordable communication

dissemination at all levels of government.

5. A unified brand identity guideline that sets standards for the use of brand names, logos, fonts, imagery, messaging and other visual elements.
6. The effective use of websites as a key repository for information updates, provision of collateral, coordination of events and stakeholders and dissemination of information, all controlled by the National M&IPWM Communication Centre.

2 Strategic Areas

2.1 National M&IPWM Communication Centre

The National M&IPWM Communication Centre is envisaged to have the research, content creation, coordination, dissemination and training capacity to make it the nerve centre of all communication activities related to the M&IPWM Strategy. This means it has to be well funded, and with the capacity to generate quality, well-researched content. This centre has to be respected and well-known by all stakeholders. To achieve this, three results must be arrived at:

Result 1: Strong Communications Centre Brand

A strong brand recognition campaign, with emphasis on branding, brand awareness and a focus on a reputation based on competence and accuracy. This brand reflects the overall vision of the strategy, and is consistently applied to ensure maximum impact.

Result 2: Publicity & Networking

The maintenance of a good reputation is essential to the centre's success. As work is done by all stakeholders to ensure successful migratory and invasive pest and weed management, the centre has to be adept at publicising this work. In addition, a collaborative approach must be undertaken to ensure proper coordination and movement of information between stakeholders, from national level down to community level.

Result 3: Strong Digital, Print and Traditional Media Relations

The mass media has a wide reach across the country. The use of radio, TV, newspapers and online-based communication channels means Kenya remains one of Africa's most informed nations. Ensuring consistent coverage at national, regional and international media means the need to maintain strong media relations. These relations have to rely not on just individuals

within stakeholder organisations, but a strong relationship with the communication centre's entire hierarchy. This ensures that the media remains accurately informed, and therefore pass on accurate information to farmers.

2.1.1 Result Areas

To ensure the establishment of a successful National M&IPWM Communication Centre, the following activities have to be undertaken across the respective result areas.

Brand Development

- **Activity 1**: Brand Visioning – a collaborative, national exercise carried out to develop an agreed brand identity for the communications centre.
- **Activity 2:** Visual Identity – This includes a logo, colour scheme, brand identity guideline and a uniform look and feel of the centre's publicity and communication materials.
- **Activity 3:** Core Messaging Summaries – Development of a set of key brand messages that act as a basis for various items of publicity and media coverage.
- **Activity 4:** Application – Engagement of a branding expert consultant to develop brand identification guidelines and templates for all M&IPWM Strategy communication.
- **Activity 5:** Training – Training and monitoring of staff through short trainings to become brand supporters and ambassadors.

Publicity & Networking

- **Activity 1**: Success Stories – Telling compelling stories in an effective way that captivates audiences.
- **Activity 2:** Promotional Materials – development of a 'kit' that contains posters, banners, brochures, leaflets, digital artwork and others as needed.
- **Activity 3:** Public Events – Staging of publicity events to attract media coverage and encourage participation of stakeholders. These include road shows, stakeholder workshops, open house events, competitions and publicity events.
- **Activity 4:** Use of social media – use of networks such as Facebook,

Twitter, YouTube, Instagram, TikTok, LinkedIn, WhatsApp and others to promote interest in the activities of the M&IPWM Strategy. All networks should link back to the strategy website.

- **Activity 5:** Blogging – Staffers, stakeholders and other interested partners are encouraged to blog, in order to create a cache of content that can be continually used by interested parties.
- **Activity 6:** Annual Reports – Generation of annual reports summarizing the year's activities, and highlighting successes.

Strong Media Relations

- **Activity 1:** Media Policies - Policy guidelines are needed that enable the communication centre's staff to talk to the media in a coordinated and consistent way.
- **Activity 2:** Journalist and Media House Links - develop a list or database of key media contacts; these can be shared amongst the communications focal points. The list should include individual journalists, media houses and other organisations that distribute news items nationally and regionally.
- **Activity 3:** Press Releases and Coverage – Using the established links, the media will be provided with regular opportunities for news or feature items.
- **Activity 4:** Staff Training – Stakeholder and implementation teams' staff who will interact with the media need to be prepared through short trainings.
- **Activity 5:** Website Media Area – Have the web development consultants create section of the M&IPWM Strategy website that will provide news, press releases, and other information for journalists and the media, including standard text for editors notes.

2.1.2 Logical Framework

	Logic of Intervention	Indicators of Achievement	Verification Means and Sources	Assumptions
Purpose	Communications centre that's well known and respected by stakeholders	Index of stakeholder awareness and trust	Survey	Awareness and trust results in confidence in the centre's activities
Expected Results	Brand Development	Coordinated visual identities in use according to guidelines	Internal brand audit	Brand conveys appropriate messages.
	Publicity & Networking	No. of publicity events/ promotions per year	M&E reports.	Quality of events and materials
	Strong Media Relations	Level of media coverage.	Media monitoring report	Turnover of media contacts not too high.

	Logic of Intervention	Indicators of Achievement	Verification Means and Sources	Assumptions
Activities	See workplan below			• Stakeholders can agree on brand values and visual identity. • Website in operation for newsletters and annual reports. • Media contacts interested • in M&IPWM stories

2.1.3 Workplan

YEAR	YEAR 1: 2021				YEAR 2: 2022				YEAR 3: 2023				YEAR 4: 2024				YEAR 5: 2025				OUTPUTS
Quarter	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
Result 1: Strong Communications Centre Brand																					
Brand Visioning																					
Visual Identity																					Logos, look and feel
Application																					Brand guidelines
Core Messaging Summaries																					Key brand messages
Training																					
Result 2: Publicity & Networking																					
Success Stories																					
Promotional Materials																					
Public Events																					
Use of social media																					
Blogging																					
Annual Reports																					
Result 3: Strong Media Relations																					
Media Policies																					
Journalist and Media House Links																					
Press Releases and Coverage																					
Staff Training																					
Website Media Area																					

2.1.4 Budget

ITEM	COST
Web developer and identity design consultants	$ 8,500
Ad hoc consultants for event staging	$ 1,000 per event
Cost of print material	Various
Annual report design	Soft Copy: $ 500 Hard Copy: $2,500
Media Monitoring consultancy	Various, depending on needs

2.2 Communication Management & Coordination

The purpose of this strategy area is to showcase the methodology through which the communication strategy is implemented and evaluated according to plan.

2.2.1 Result Areas

Strategy implementation initiated

- Activity 1: Adoption of communications strategy – A strategy and implementation plan will be presented to a steering committee as a generic document for domestication and implementation. The committee will be invited to comment on and adopt the document, giving the go ahead for implementation. The committee will also consider options for resourcing implementation of the strategy, including the roles assigned.
- Activity 2: Regional Planning Meetings – Following approval of the Communication Strategy, a meeting will be convened that brings together all stakeholders' representatives, including key communications and IT personnel.
- Activity 3: County review of strategy and plan – One-day

County meetings will be held in each county to review the strategy and implementation plan, and to adjust them according to local contexts.

Programme participants aware of activities and progress

- Activity 1: Establish contacts database of participants – A simple contacts database will be developed by the communication focal person in each county. The structure of the database (i.e., column headings and allowable content in each column) will be defined, including at least the following fields: Name, Organisation, Position, Role, Telephone, E-mail, Address.
- Activity 2: Define e-newsletter format and content – Using inputs from the national workshop (the steering committee will agree the format and content for an e-newsletter, for circulation to all participants and stakeholders.
- Activity 3: Set up workflows for information gathering – In each participating organisation the focal point will be responsible for sending information to the communications focal point for inclusion in the e-newsletter, the website, or other communication materials.

2.2.2. Logical Framework

	Logic of Intervention	Indicators of Achievement	Verification Means and Sources	Assumptions
Purpose	Communication strategy implemented and evaluated according to plan	Index of stakeholder awareness and trust	Survey	Awareness and trust results in confidence in the centre's activities
Expected Results	Strategy implementation initiated	First annual communication workplans approved by committee.	Committee minutes	Current budget can be reallocated.
	Programme participants aware of activities & progress	Feedback from programme participants	Survey.	Awareness of programme activities will improve overall communication and project implementation
Activities	See workplan below			

2.2.3 Workplan

YEAR	YEAR 1: 2021				YEAR 2: 2022				YEAR 3: 2023				YEAR 4: 2024				YEAR 5: 2025				OUTPUTS
Quarter	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
Result 1: Strategy implementation initiated																					
Adoption of communications strategy																					Approval for domestication
Regional Planning Meetings																					Initial action plans, agreements on roles
County review of strategy and plan																					Finalised strategy, plan
Result 2: Programme participants aware of activities and progress																					
Establish contacts database of participants																					Database
Define e-newsletter format and content																					One page guideline
Set up workflows for info gathering																					

2.2.4 Budget

ITEM	COST
County workshops	$ 1,500 per event
National workshops	$ 2,500 per event
Communication unit posts and costs	Various

2.3 Innovative, Affordable & Practical Communication

At times, there is a disconnect between information created through scientific research, and end product content. Information is only useful if it can be applied for economic and social good. To bridge the gap, various stakeholders are involved. Information has to flow from policy makers, through the stakeholder chain (national leaders, county leaders, actors in the commodity value chain etc) and eventually get to the farmer on the ground, and in communities.

To assess the effectiveness of linkages from the top to the bottom of the information chain, there is need for a social network analysis in order to investigate how well information moves through the system. An analysis produces three results:

Result Area 1: Effective Communication with Farmers

Farmers are the chief recipients of research output. However, the content has to be understandable to farmers at all levels. Already, the government uses extension officers to communicate to farmers. A range of tools are already in use to reach farmers, with radio the most commonly used platform for mass messaging.

However, face-to-face communication is always preferred, but is inefficient. New approaches like the use of video and mobile phones can be tried. This, coupled with participatory approaches, are effective. In addition, there is need to include gender and age perspective, to ensure correct messaging. The establishment of mechanisms to translate material to Kiswahili and other native tongues also improves effectiveness of messaging.

Result Area 2: Advocacy of Policy Change

In certain cases, sharing of information is hampered by policy

differences and bureaucratic processes between counties, and departments within government. Part of effective communication involves harmonization of policies, using well planned campaigns.

Result Area 3: Facilitation of Stakeholder Linkages

Innovative and practical flow of information is required in order for effective migratory and invasive pests and weeds to occur. For effective communication, stakeholder linkage activities are undertaken in order to stimulate interaction and information sharing. This enables them to express their information more effectively, hear common complaints and have collaborative communication messaging.

2.3.1 Result Areas

Effective Communication with Farmers

- Activity 1: Participatory creation of materials – Communication materials for farmers are often created by scientists or others who may think, view things and express themselves in different ways from farmers. This risks communication materials being ineffective, so participatory approaches have become more common to avoid this pitfall.
- Activity 2: Engendering communication approaches – The I&IPWM Strategy and the Communications Centre will take steps to ensure that gender is taken into consideration in communication activities, requiring a gender focal point to work closely with the communication focal point.
- Activity 3: Translating communication materials – In Kenya, most research material is written in English. Not all farmers at community level speak fluent English, so there is need to create messaging translated to vernacular languages, as well as Kiswahili.
- Activity 4: Reaching farmers through partners – There is need for partnership with organisations in contact with

farmers for different reasons, including those seeking to provide agricultural products and information.

- Activity 5: Radio Programs – Radio is the most common source of agricultural information for farmers in the country. Interactive radio shows are elaborate, and have the advantage that farmers can SMS or call in with questions that can be addressed on the spot. Multiple local FM radios provide opportunities for local language content.
- Activity 6: Video – Farmers obtain a lot of their agricultural information from other farmers. So, videos of farmers showing new technologies and practices, and explaining the benefits, are a useful communication tool. A challenge with videos is how to get them seen by large numbers of viewers.
- Activity 7: Face to Face Tools – Direct contact between farmers and those with information is the most effective way of communicating, though the cost per farmer is higher than many other methods.
- Activity 8: Mobile Telephony – Many public and private sector organisations are experimenting with the use of mobile phones to deliver extension messages (as well as other information) to small scale farmers. Challenges include how to distil sometimes complicated information into 140-160 characters, and how to ensure messages are relevant and timely.

Advocacy of Policy Change

- Activity 1: Advocacy planning – The first step in advocacy planning is to specify what policy change is being advocated. Once steps have been taken to identify necessary changes required, each stakeholder then implements the agreed policy influence plan.
- Activity 2: Identify and work with champions – People who are extremely influential in facilitating changes and

promotion of the commodities will be invited to serve as advocacy champions. These will include law makers, policy makers and decision makers, or implementers.

- Activity 3: Policy dialogues and briefings – Short events such as a breakfast meeting or seminars can be used to bring together decision makers with various stakeholders to allow interaction on the policy changes being promoted.

Facilitation of Stakeholder Linkages

- Activity 1: Multistakeholder innovation platforms (MSIPs) – An MSIP should involve all the actors with a stake in the commodity value chain, such as input suppliers (agro-dealers, finance), farmers and their organisations, intermediaries of various kinds, output markets (traders, processors), policy makers from agriculture and related ministries.
- Activity 2: Business and other fora – Businesses have a strong incentive to make value chains and innovation systems function more effectively, and do not necessarily wait for public sector interventions. Thus, fora or platforms around particular commodities sometimes already exist in the private sector, and these provide an excellent opportunity to link up and interact with different stakeholders.
- Activity 3: Contribute to online multi-stakeholder platforms – The internet is still not easily accessible to most farmers, but for many other stakeholders in the innovation system it provides a new opportunity for communicating with many other actors.

2.3.2 Logical Framework

	Logic of Intervention	Indicators of Achievement	Verification Means and Sources	Assumptions
Purpose	Increased linkages between actors in the commodity innovation system	Network density	Survey	Awareness and trust results in confidence in the centre's activities

	Logic of Intervention	Indicators of Achievement	Verification Means and Sources	Assumptions
Expected Results	Effective communication with farmers	- Number of farmers receiving information through communications centre. - Number of farmer communications materials developed	- Training & Development reports - M&E reports	Farmers understand and trust information
	Policy change advocated	No specific policies advocated in more than 1 county or agency.	M&E reports.	Political factors don't hinder policy change
	Stakeholder linkages facilitated	- No. of multi-stakeholder events held. - Measures of centrality and/or information sending/receiving	• M&E reports • Social Network Analysis	Actors make use of linkages facilitated
Activities	See workplan below			

2.3.3 Workplan

YEAR	YEAR 1: 2021				YEAR 2: 2022				YEAR 3: 2023				YEAR 4: 2024				YEAR 5: 2025				OUTPUTS
Quarter	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
Result 1: Effective Communication with Farmers																					
Participatory creation of materials																					
Engendering communication approaches																					Logos, look and feel
Translating communication materials																					Brand guidelines
Reaching farmers through partners																					Key brand messages
Radio Programs																					
Video																					
Face to Face Tools																					
Mobile Telephony																					
Result 2: Advocacy of Policy Change																					
Advocacy planning																					
Identify and work with champions																					
Policy dialogues and briefings																					
Result 3: Facilitation of Stakeholder Linkages																					
Multistakeholder Innovation Platforms																					
Business and other fora																					
Contribute to online-multistakeholder platforms																					

2.3.4 Budget

ITEM	COST
Short videos for farmers	$450
Series of radio programs on vernacular carries and national carrier (Radio Citizen or Radio Jambo)	$3,500 to 4,000 (production and airing)
Online multi-stakeholder fora	Staff time only
Social network analysis	$500
Shamba shape-up TV episode	$9,500 (production and airing)
Short story on Citizen TV, KTN or NTV	~15,000

2.4 Websites & Support Collateral

2.4.1 Introduction

A professional web development consultant should be engaged to create a website that meets content and design needs of all stakeholders. The communication centre's management team plays the coordinating role. It is most prudent to host the site on Amazon's AWS (Amazon Web Services) platform. This hosting platform is secure, fast and reliable. Once the website is fully designed, the web consultant then trains communication centre staff, and provides support for a period of at least six months.

The website is built using one of three Content Management Systems (CMS); Drupal, Joomla! Or WordPress. These management systems have undergone rigorous testing, and been proven to be stable, reliable and secure. Best practice website security and access protocols must also be established on the website.

2.4.1.1 Governance Of Site Content

For a website to remain useful and functional, it must be driven by quality content. The communications office is responsible for creating and managing a system of processes, roles, human resource and responsibilities that ensure the creation and management of quality website content. The website, including workflows, imagery, resource repositories, databases, links, social media support structures and all multimedia has to be fresh, up to date, visually appealing and well maintained. Initial support shall be provided by the web development consultant.

The consultant will train key staff within the organisation to create, upload, maintain and remove content. The website's content must reflect the excellent standards of the research being undertaken.

2.4.1.2 Resource and Document Repository Setup

One of the website's key functions is to contain a document and resource repository. The M&IPWM Strategy implementation produces a cache of documents, resources, multimedia material and databases. Contained within the website is a repository – named 'Resource Centre' – where all necessary content can be stored and shared with relevant stakeholders. Access levels may have to be introduced, depending on needs of level of access to content. All staff and other are trained on how to use, access and disseminate content, through established content sharing protocols.

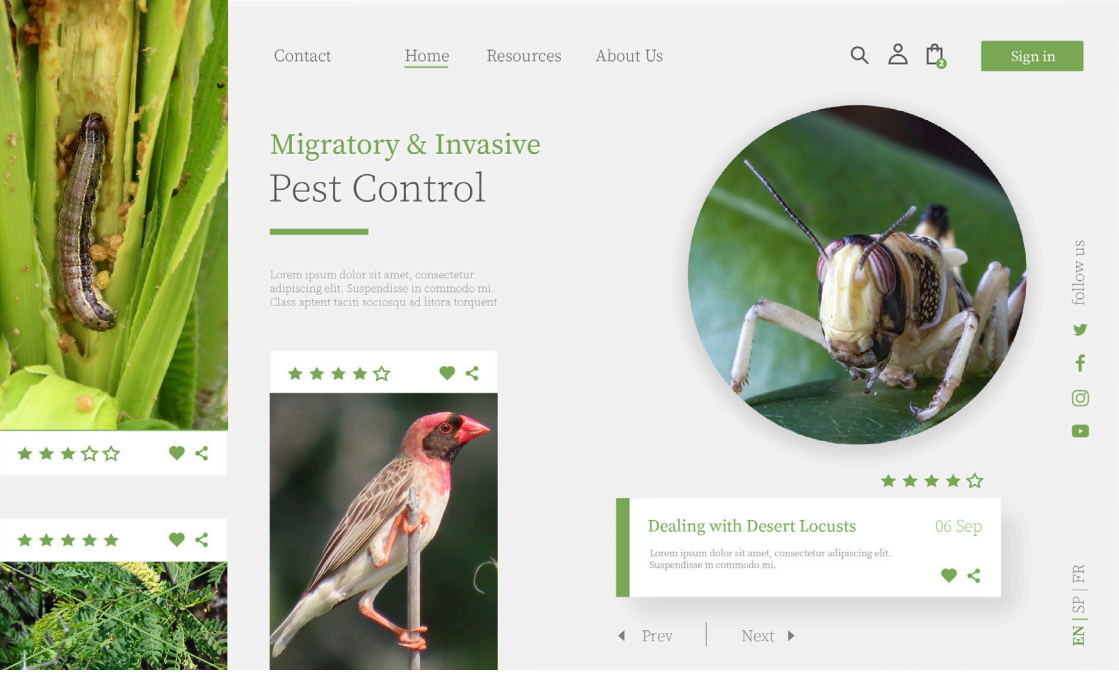

Figure 7: Website Home Page Design Mock-up

2.4.1.3 *Review and Update of Content*

A well-functioning website must have up to date content that is easy to find, read and share. As important as it is to generate content, is the role of maintaining it. The communications office, working in coordination with the M&IPWM Strategy implementation team, produces content that meets the expectations of all end-users (stakeholders). The creation and implementation of a good governance system ensures that there is proper generation, uploading, updating and review of content, done in a timely manner to ensure relevance.

2.4.1.4 *Site Stats Analysis*

One of the many advantages of creating the website using an established Content Management System is the ability to use analytic tools to monitor site traffic, use and misuse. Once the website is created and goes live, its use is to be monitored,

establishing frequently-used resources, improving on poorly or rarely used functions and continuously refining website navigation.

The website's Uniform Resource Locator (URL) – web address – must be included as a key component of the branding and communication material. In addition, partner and stakeholder websites, social media accounts and other digital and physical material is used to drive traffic back to the website. Search Engine Optimization (SEO), the use of social media platforms and the use of blogs, vlogs and podcasts has to be put to use in-step to drive traffic to the website, and ensure high traffic of relevant audiences.

2.4.1.5 Creation Of Digital and Print Collateral

Part of having a unified brand identity is the creation of uniform marketing and publicity collateral, available for use both digitally and print. Collateral cuts down on the need for, and the cost of design, both in terms of money and time consumed. The editable collateral is availed in a 'resources' repository within the website, with clear guidelines given on the use of imagery, colours, fonts, logos, text and intellectual property.

The image below is a sample poster for locust control. Within it is a guideline on the use of header fonts, header images, logo use, the use of blurbs, body text and contact area. Each collateral carries a unique brand identity, with matching colours and layout. Various layouts are to be provided in order to have a variety to choose from. This collateral also includes digital posters, flyers and banners. There needs to be controlled access of this collateral, available only to relevant stakeholders who have the capacity to put it to responsible use.

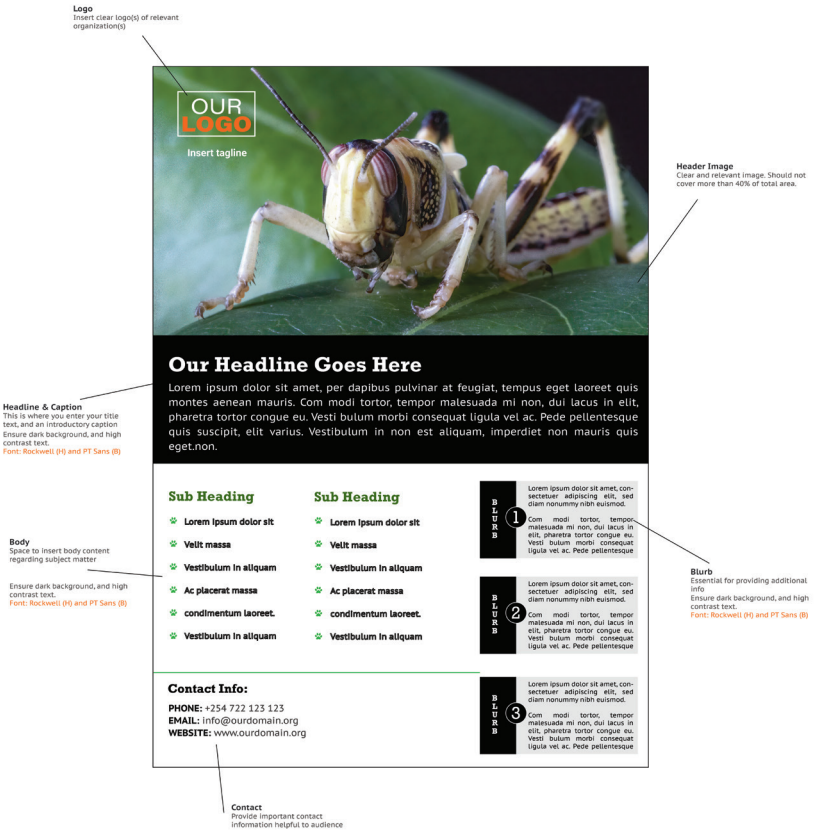

Figure 8: Sample Print Poster, with guidelines for use.

The purpose of this strategy area is to provide websites that meet the needs of all stakeholders internationally, nationally, regionally and at county and community level. This will be evaluated by conducting surveys of stakeholders.

2.4.2 Result Areas

M&IPWM Website Designed

- **Activity 1:** Identify users and needs – Each stakeholder will contact representatives of their key expected website users

to assess their needs. The information will be reviewed during an interactive workshop, and a common statement of users and needs agreed.

- **Activity 2:** Acquire Domain Names – A domain name is synonymous with a website address on the World Wide Web. The domain name comes in the form of a uniform resource locator (URL) that enables users of the website to access it from anywhere in the world. Domain names are purchased through domain registries and authorized registrars. Suggested domain names for the M&IPWM Strategy are:
    1. www.mipm.org
    2. www.mipm.or.ke
- **Activity 3:** Identify website host – The websites will need to be hosted on a dedicated or semi-dedicated server either using a co-located server, a virtual private server or a physical server in the institution. Websites hosted on shared webhosts usually share the server with hundreds of other websites, with disadvantages including slow speeds and difficulties in securing and backing up the site.
- **Activity 4:** Define content - It is necessary to decide on all the information that will be displayed on the website, and it should support and sustain the objective of the website. Content will include text, images, video and audio.
- **Activity 5:** Develop site map - A sitemap will be used as the website planning tool. The sitemap represents the hierarchical structure of the website's pages in a diagram.
- **Activity 6:** Design website layout and look – All the pages in the website should have a consistent visual design and layout, which can be achieved by configuring the CMS software to use page templates.
- **Activity 7:** Develop website wireframe – Wireframes are basic line drawings that provide a visual guide on the structure, components and arrangement of the content

of pages that make up the website. The wireframes ensure that all structural elements of the design are taken into account and can be reviewed by relevant staff for acceptability before actual development starts.

- **Activity 8:** Define user access controls – The website will have different kind of users, who will have different levels of access. Normal users, i.e., the public, will have free access to the public area of the website. Some internal users will be able to update content on the websites, and access parts of the website that are not for public use – such as internal project documents.
- **Activity 9:** Software and security management – Security management is very important, so the server hosting the website will need to adhere to security protocols defined in the website policy.
- **Activity 10:** Set up website monitoring statistics – Website monitoring will allow the organisations to keep track of many different statistics such
    - The number of total visitors
    - The number of unique visitors.
    - Pages visited, and time per page
    - The geographical location the traffic originated from
    - The keywords used to find the site
    - Sites that link to the website
- **Activity 11:** Set up content sharing mechanisms – The website will include mechanisms for sharing web content, such as news or articles, to social media and other web platforms.
- **Activity 12:** Define backup mechanisms - A clear backup policy of the website server will be put in place, spelling out clearly how the website files and databases will be backed up. These backups should be automated to occur at regular intervals to ensure no data loss.

Establishment of Content Governance Protocols

- **Activity 1:** Develop a website policy - The management of the website will be guided by a website policy. The policy will give guidance on the type of content, rules to ensure content does not infringe copyright and will define how the website will link to third party websites.
- **Activity 2:** Define roles and responsibilities – The roles and responsibilities of all the staff that will be part of the content governance model need to be defined. Each person needs to know how their role fits into the larger content process. These roles and responsibilities are not synonymous with the organisational staff structure but rather define the roles in the workflow by which content appears on the site.
- **Activity 3:** Develop workflows – Website workflows describe the process of publishing content from beginning to end. This will include who requests, creates, edits, approves, maintains and publishes content. The workflow will allow all content to be in particular states e.g. "Draft" and "Editorial Review" through which all content must pass through some predefined states before being published. Only users in different roles will be able to move content from one state to the next

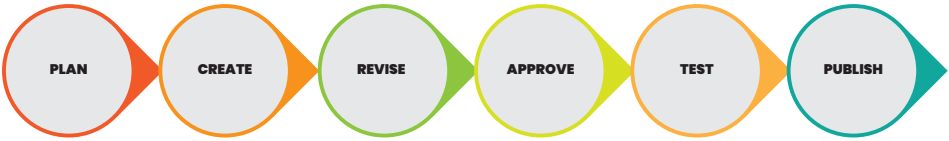

Figure 9: Sample content creation workflow

- **Activity 4:** Develop content guides – Documentation on various topics in the content workflow including all policies and procedures made available to the staff involved,

especially as it is unlikely that they will all be sitting in the same location. For the guides to be useful they need to be easily accessible to the staff.

- **Activity 5:** Train staff – Training of website staff is fundamentally important to the success of the website. All staff involved in the content generation and maintenance workflows should be trained on among other things;
    - Using the CMS and other publishing tools.
    - Web writing
    - Copy editing
    - Page design and layout
    - Photography and video editing
    - Search engine optimization (SEO)

Setup Document and Collateral Repository

- Activity 1: Set up metadata standards and submission guidelines – The host institutions will set up metadata standards to guide how documents will be described so that they can be catalogued and indexed properly by the document repository.
- Activity 2: Document access control – As part of the document cataloguing process, the level of access of the document will be defined. Access for each document could be set simply to Public or Restricted (to registered users), but the Restricted category could be further classified if different levels of access are needed.
- Activity 3: Train staff members – The institutions will organise training of staff on how to use the document repository. This will include the process of ensuring good metadata is included with the documents and should give practical examples of document uploading.
- Activity 4: Upload documents and collateral – After training of users, the communication focal person will lead a team participating organisation who will be responsible for

uploading existing documents to the document repository.

Relevant and up-to-date content

- Activity 1: Generate content – M&IPWM projects and programmes generate a large number of communication materials. Some can be uploaded as they are (such as soft copies of research papers, manuals), while other material may need to be repackaged to create suitable articles.
- Activity 2: Uploading and updating content – Content will be regularly reviewed to ensure that the information on the website is up to date. This will be regulated with a content maintenance workflow which will stipulate how often the website should be checked for content maintenance.
- Activity 3: Regular review - There will be regular review of the website by a communications focal person covering:
    - Website statistics
    - Content
    - Availability
    - Accessibility
    - Infrastructure
    - Security
    - Satisfaction

Website Regular Use

- Activity 1: Website Launch – After creating the website, an official launch will provide media coverage and publicity opportunities. This is done via:
    - A launch event
    - Press releases
    - Launch emails
    - Social media announcements
- Activity 2: Advertise URL – The new website URL should be included in all M&IPWM communication. This should be reflected in the branding, email signatures, business cards,

letterheads, newsletters etc.

- Activity 3: Back Links - The website should have link exchanges with similar organisations and partners. Having links to and from the website enables the website to be found more easily when using a search engine.
- Activity 4: News and guest articles on other sites and blogs - Quality content created by the websites should be offered as guest posts in other influential websites and blogs such as partners, news websites and private organisations. The articles should always include a link back to the website as part of the authorship, to drive traffic

2.4.3 Logical Framework

	Logic of Intervention	Indicators of Achievement	Verification Means and Sources	Assumptions
Purpose	Websites that meet information needs of all stakeholders	User satisfaction index	User surveys	Target stakeholders have good internet access

	Logic of Intervention	Indicators of Achievement	Verification Means and Sources	Assumptions
Expected Results	Website designed	New website online	URL	Required URLs are available.
	Content governance established.	Policies, guidelines and workflows in place and used	Documentation and staff survey	Generate research output of interest to website users
	Setup document repository.	• No. of Documents Uploaded • No. of Downloads	• Query of document repository. • Download count module report	Website content including documents are of interest to stakeholders
	Website content up to date and relevant.	• Frequency of content updates. • No. of uploaded items	Content analysis report	
	Website well used	• No. of visitors. • Percentage of new visitors. • No. of countries visitors are from	Site metrics reports.	
Activities	See workplan below			

2.4.4 Workplan

YEAR	YEAR 1: 2021				YEAR 2: 2022				YEAR 3: 2023				YEAR 4: 2024				YEAR 5: 2025				OUTPUTS
Quarter	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
Result 1: M&IPM Website Designed																					
Identify users and needs																					Active domain names
Acquire Domain Names																					
Identify website host																					
Define content																					
Develop site map																					Site map
Design website layout and look																					Wireframe prototype
Develop website wireframe																					Website designed
Define user access controls																					Access criteria
Software and security management																					Website secured
Set up website monitoring statistics																					
Set up content sharing mechanisms																					
Define backup mechanisms																					Backup plan document
Result 2: Establishment of Content Governance Protocols																					
Develop a website policy																					Policy documents
Define roles and responsibilities																					
Develop workflows																					Content Workflows
Develop content guides																					Guidelines
Train staff																					Capacity increased
Result 3: Setup Document and Collateral Repository																					
Set up metadata standards and guidelines																					Guidelines
Document access control																					Access criteria
Train staff members																					Capacity increased
Upload documents and collateral																					Documents uploaded
Result 4: Relevant and up-to-date content																					
Generate content																					Content generated
Uploading and updating content																					Content uploaded
Regular review																					Review report
Result 5: Website Regular Use																					
Website Launch																					Website launched
Advertise URL																					Corporate branding
Back Links																					Back links increased
News and guest articles on other sites																					Appearance increased

M&IPWM Strategy

2022 - 2027