SFG2140 V5

GOVERNMENT OF THE REPUBLIC OF SIERRA-LEONE

INTEGRATED PEST MANAGEMENT PLAN (IPMP)

FOR THE SIERRA-LEONE

The West Africa Regional Disease Surveillance Systems Enhancement (REDISSE) Project

DRAFT FINAL REPORT

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EXECUTIVE SUMMARY

ES 1 Context

The Regional Disease Surveillance Systems Enhancement (REDISSE) project is planned to strengthen weak human health, animal health, and disaster response systems to improve the preparedness of the West African region to handle future epidemics, and thereby minimize the national, regional, and potential global effects of such disease outbreaks.

The project seeks to address 3 priority areas: (i) Strengthen national capacity to detect and respond to infectious human and animal disease threats; (ii) Establish national and regional platforms for collaboration and collective action; and (iii) ultimately promote a platform to increase engagement across the human health, animal health and environmental sectors to implement a One Health approach.

This IPMP is to ensure that arthropod pests from agricultural and companion animals are identified, prevented, managed or controlled using appropriate, ecologically sound and economic strategies thereby, combating effectively and timely, animal disease emergencies and preventing epidemiology outbreaks.

ES 2 Project Components

The REDISSE project comprises of 5 components as follows:

Component 1: Surveillance and Information Systems. ***Total costs including contingencies US$62.32 million equivalent of which US$50 IDA Credit and US$12.32 million MDTF***

This component will support the enhancement of national surveillance and reporting systems and their interoperability at the different tiers of the health systems. It will support national and regional efforts in the surveillance of priority diseases (including emerging, re-emerging and endemic diseases) and the timely reporting of human public health and animal health emergencies in line with the IHR (2005) and the OIE Terrestrial Animal Health code. Component 1 comprises of three sub-components:

Sub-Component 1.1 Support coordinated community-level surveillance systems and processes across the animal and human health sectors (US$27 million).

This sub-component will involve the strengthening of community-level surveillance structures and processes in countries where gaps exist for detecting events in communities (human and animal). This will entail improving community-level surveillance capacity for active, passive and rumor surveillance including in cross-border areas, and the development and implementation of a plan to ensure adequate territorial coverage for surveillance from the community to the central level.

Sub-Component 1.2 Develop capacity for interoperable surveillance and reporting systems ($20 million)

Sub-component 1.2 will support: (i) assessment of existing human and animal health surveillance systems and networks for prioritization of interventions within and across key sectors; (ii) review and update of national and regional disease priorities, and review and development of harmonized guidelines, protocols and tools to enhance surveillance and reporting processes; (iii) development of common methodologies and protocols for efficient flow and utilization of surveillance data (applicable to both public and private actors involved in disease surveillance); (iv) development of the required information communication and technology (ICT) infrastructure to facilitate cross-sectoral interoperability of surveillance and reporting systems at the national and regional level; and (v) establishing the necessary linkage of surveillance and reporting systems to national incidence management systems.

Sub-Component 1.3 Establish an early warning system for infectious disease trends prediction (US$14 million)

This sub-component will involve the establishment of an early warning system including the use of Geographic Information System (GIS) techniques to study infectious disease patterns and make predictions on evolution of disease outbreaks, including zoonoses and identify potential high risk areas for disease outbreaks in the region. Activities under this will support the monitoring of trends that occur in infectious diseases such as antimicrobial resistance (AMR) and insecticide resistance, and the impact of climate change on infectious disease outbreaks in the region.

Component 2: Strengthening Laboratory Capacity (*US$58 million)*

The objective of this component is to establish networks of efficient, high quality, accessible public health, veterinary and private laboratories for the diagnosis of infectious human and animal diseases, and to establish a regional networking platform to improve collaboration for laboratory investigation. This component is divided into three sub-components.

Sub-Component 2.1 Review, upgrade and network laboratory facilities (US$28 million)

This sub component will include: (i) assessment of existing human and animal health laboratory facilities and networks for prioritization of interventions; (ii) increasing laboratories services, and bio-safety and bio-security; (iii) support for improved supply chain management including the establishment of efficient inventory tracking and management systems; (iv) technical support for integrated laboratory information systems and the interoperability with disease surveillance and reporting systems; and (v) support to the strengthening of quality assurance systems for diagnostic services.

Sub-Component 2.2 Improve data management and specimen management (US$12 million)

This sub-component will support strengthening specimen management including: (i) streamlining the laboratory specimen referral process, including use of strengthened sub-national laboratories for diagnosis rather relying on a central laboratory; where possible and (ii) improving efficiency of specimen transport and disposal systems including through the use of private sector partnerships, and the use of accredited private laboratory networks for case

confirmation. In addition, measures to improve data management will include: (i) strengthening the competencies of laboratory personnel to analyse and use laboratory surveillance data; (ii) strengthening laboratory data management systems to 'report up' and 'report down' more effectively; (iii) achieving interoperability between data management systems, where possible.

Sub-Component 2.3 Enhance regional reference laboratory networking functions (US$18 million)

This sub-component will provide support to improving quality assurance, notably (i) development of common standards, quality assurance systems, procedures and protocols; (ii) introduction of peer review mechanisms; (iii) application of the WHO/AFRO five-step accreditation process and technical assistance to support accreditation of laboratories; and (iv) support inter-laboratory external quality assessments among the participating countries and recruitment of experts to provide mentorship to laboratories. It will (i) strengthen existing and possibly identify new regional reference laboratories for specific diseases or diagnostic techniques, (ii) strengthen regional networking and information sharing between countries; and (iii) harmonize laboratory quality assurance policies across countries in the region, based on international standards

Component 3: Preparedness and Emergency Response (*US$34 million)*

This component will support national and regional efforts to enhance infectious disease outbreak preparedness and response capacity. It will be made up of two sub-components:

Sub-Component 3.1 Enhance cross-sectoral coordination and collaboration for preparedness and response (US$16 million)

This sub-component will support (i) partnership building activities (including the private sector) for outbreak preparedness and disaster risk management; (ii) improvement and harmonization of policies, legislations, and operating procedures that includes representation from other relevant sectors including environment, customs/immigration, education, law enforcement; and (iii) explore the establishment of national and regional financing mechanisms to ensure swift mobilization of resources for animal health and public health emergencies.

Sub-Component 3.2 Strengthen Capacity for emergency response (US$18 million)

This sub-component will support the strengthening of emergency operations centres (EOC) and surge capacity at the national and regional levels. Activities under this sub-component will support (i) the establishment and management of a database of multidisciplinary rapid response teams (MRRTs) that will be available for rapid deployment; (ii) the development and management of stockpiling mechanisms (virtual and physical) to ensure availability of supplies to countries during an emergency response; and (iii) the swift mobilization and deployment of resources in response to major infectious disease outbreaks.

Sub-Component 3.3 US$0 Component for emergency response.

When a major outbreak affects the livelihoods of project beneficiaries, governments may request the World Bank to reallocate project funds to support mitigation, response and recovery. Detailed operational guidelines acceptable to the World Bank for implementing the REDISSE US$0 component for emergency response activity will be prepared at the national level during the first year of the project's implementation. All expenditures under this activity will be in accordance with paragraph 12 of World Bank OP 10.00 (Investment Project Financing) and will be appraised, reviewed, and found to be acceptable to the World Bank before any disbursement is made. Disbursements will be made against an approved list of goods, works, and services required to support crisis mitigation, response and recovery. Triggers and implementation details of the $0 component will be clearly outlined in the Project Implementation Manual (PIM) acceptable to the World Bank.

Component 4: Human resource management for effective disease surveillance and epidemic preparedness (*US$47 million).*

This component will include two sub-components.

Sub-Component 4.1 Health Workforce mapping, planning and recruitment (US$25 million)

This sub-component includes; (i) assessments of current workforce in terms of quantity, geographical distribution and capacity (including private actors); (ii) strengthening capacity for human resource management for disease surveillance and response; (iii) supporting the capacity of governments to recruit health workers and create an incentive environment which encourages skilled individuals to work for the public sector; and (iv) using private actors to deliver public sector activities through delegation of power (e.g. sanitary mandates for veterinarians).

Sub-Component 4.2 Enhance Health Workforce training, motivation and retention (US$22 million)

This sub-component includes training to develop human resource capacity in surveillance, preparedness and response. Cognizant of the importance of community involvement in disease surveillance, a key lesson from the Ebola crisis, the project places emphasis on training at the community level, rather than focusing solely on higher level cadres.

The project will analyse and seek to address the incentive environment within which healthcare workers operate. Armed with an improved understanding of this environment, the project will seek to implement activities which create incentives which not only draw those with relevant skills to the public sector, but also improve staff motivation and retention.

Component 5: Institutional Capacity Building, Project Management, Coordination and Advocacy (*US$41 million)*

This component focuses will include two sub-components:

Sub-component 5.1 Project coordination, fiduciary management, monitoring and evaluation, data generation, and knowledge management (US$30 million)

Under this sub-component, REDISSE will (i) strengthen the capacities of national and regional institutions to efficiently perform core project management functions including operational planning, financial management, procurement arrangements, and environmental and social safeguards policies in accordance with WB guidelines and procedures; (ii) enhance M&E systems including routine health management and information systems (HMIS) and other data sources, including bi-annual Joint External Evaluations (JEE) of IHR (2005) and the PVS pathway; (iii) manage operational research program and economic analysis of disease outbreaks and epidemics in the ECOWAS region implemented by national and regional institutions; (iv) promote the design of impact evaluation studies to measure impact of project interventions; and (v) coordinate the roles of existing national and regional institutions to better support the planned project activities. Both the R-PCU and the individual N-PCUs will work closely with national environmental and social agencies to ensure due consideration of their respective legislations.

REDISSE will also finance the generation of data on animal and human health activities in the ECOWAS countries, which is critical to guide and calibrate investments.

Sub-component 5.2 Institutional support, capacity building, advocacy, and communication (US$11 million)

This sub-component will help assess and build capacities at national and regional level. It will provide technical and investment support to enhance provision of services by WAHO and other cross-cutting regional institutions or organizations relevant to animal and human health sector development. To this end, the project will support: (i) the conduct of capacity gap analysis (including staffing, skills, equipment, systems, and other variables); (ii) identify potential synergies and cross-fertilization possibilities among various operations pertaining to disease surveillance and response, using a progressive pathway for OH operationalization at country level, supported by regional institutions; and (iii) establishment or upgrading of national public health institutions. REDISSE will also assist in supporting greater engagement and coordination of the five countries in regional decision- and policy-making processes in ECOWAS, as well as among regional public and non-public organizations.

REDISSE will support advocacy and communication for sustained One Health approach. This will include: (i) generation and dissemination of lessons learned at the national and regional levels through One Health (OH) national and regional platforms respectively; and (ii) raising awareness on strategic issues at the decision and policy levels of countries, and regional economic communities to increase and sustain allocation of resources for disease surveillance, preparedness and response.

ES3: Relationship of the OP 4.09-Pest Management with other triggered Safeguard Policies

Safeguard policies potentially triggered by REDISSE based on the EA screening result are:

S/N	Safeguard Policies Triggered by the REDISSE Project	Yes	No
1	Environmental Assessment (OP/OB/GP 4.01)	*	
2	Natural Habitats (OP/BP 4.04)		*
3	Pest Management (OP 4.09)	*	
4	Indigenous peoples (OP 4.10)		*
5	Physical Cultural Heritage (OP 4.11)		
6	Involuntary Resettlement (OP/BP 4.12)		*
7	Forest (OP 4.36)		*
8	Safety of Dams (OP/BP 4.37)		*
9	Projects on International Waterways (OP/BP/GP 7.50)		*
10	Projects in Disputed Areas (OP/BP/GP 7.60)		*

OP/BP 4.01(environmental assessment) takes into account the biophysical and social environments. The Bank requires Environmental Assessment to help ensure that projects which it is financing are environmentally sound and sustainable. This is important for the REDISSE project because it involves large scale animal disease vector risk control program, and will lead to refurbishment of laboratories and structures. Also, the large scale animal disease vector risk control program could lead to increased use of chemicals, reagents, and pesticides with potential negative impacts and risks on the environment and human health. Accordingly, In Bank-financed agricultural and/or pest/vector control projects, best practices that involve integrated pest management is required. Therefore, this IPMP complements the ESMF/ESMP in ensuring that project related activities are implemented in a safe and environmentally sound manner. It is expected that the IPMP will assist the IHPAU with guidelines, principles and procedures of OP 4.09, which is to be followed in selection of pest control techniques. Where use of pesticide is deemed necessary, this IPMP is to be followed to ensure that obsolete and banned pesticides are not procured or used to avert public health hazard and disease outbreaks.

ES4: Rationale for the IPMP

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

The surveillance, monitoring and containment of diseases including zoonosis anticipated under the REDISSE project could lead to increased use of chemicals, reagents, and pesticides with potential negative impacts and risks on the environment and human health. Given the situation-driven nature of the project, the extent of such an increased use cannot be ascertained in advance, and requires that borrower to prepare an Integrated Pest/Vector Management Plan to identify the potential risks and ways to adequately mitigate them.

ES 5: Scope of the IPMP

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

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

The IPMP will be reviewed and cleared by IDA prior to disclosure country wide in Sierra Leone and InfoShop along with the ESMF report.

ES6: Legislative and Regulatory Framework

Sierra Leone government has a number of a number of legislations and policies relevant to bear on this project. They include:

i. The Environmental Protection Agency Act, 2008

The Act was signed as a legal document in September 2008 and amended in July 2010. Following the enactment of this Act, a National Environment Protection Board was established within the Environment protection Agency. The Board facilitates coordination, cooperation and collaboration among Government Ministries, local authorities and other governmental agencies, in all areas relating to environmental protection. The act empowers a separate environmental protection Agency with the overall mandate of setting and monitoring environmental standards.

Schedule 3 of the Act describes the requirement or areas of study for meeting the standard of an environmental impact assessment in Sierra Leone.

ii. **National Environmental Policy Act (1994)**

The National Environmental Policy (1994) seeks to achieve sustainable development in Sierra Leone through the implementation of sound environmental management systems which will encourage productivity and harmony between man and his environment. It also promotes efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of nationals, and serves to enrich the understanding of ecological systems and natural resources which are important to the country.

iii. ***Public Health Act, 1960***

The Public Health Act (1960) Consistent with the current legislation, Local Councils (and other local level structures) section 121 gives a clear mandate for implementation of premises inspection, and provide strategic direction and back up support to enable council to perform their roles effectively with the adoption of the Expanded Sanitary Inspection Compliance, Monitoring and Enforcement (ESICOME). This Act will enable the monitoring and enforcement of standard with respect to type and use of pesticides in the country.

iv. The Wildlife Conservation Act, 1972

The Wildlife Conservation Act (1972) provides for the protection of wildlife and **c**onservation management, including the establishment and operation of National Parks. The Act takes a conservative approach to wildlife management and does not make any provisions for involving local communities in management responsibilities or for sharing benefits of income generated from wildlife management (e.g. tourism or hunting fees). Issues that bother on wildlife bio-security were also not captured neither did the Act envisage or provide guideline to addressing disease vector from wildlife (to domestic animals and human food). This Act was still under review in June 2013 and a new Act is expected to be presented before the Parliament.

There is however, no clearly identified law or Act that stipulates standards for regulating pesticides for use in Sierra Leone and the transportation, movement, safe use and trading on pesticides/chemicals. Notwithstanding, Sierra Leone is a signatory to many international conventions and treaties that stipulate standard/rules for safe use, storage, transportation and application of chemical for pest controls. Some of the treaties/conventions which Sierra Leone is a signatory include:

#	Convention/Treaties	Date of Ratification by Sierra Leone
1	UN Convention on Biodiversity (Conservation) June1994	December 1994
2	Bamako Convention on the ban of the Import into Africa and the Control of Trans- boundary Movement and Management of Hazardous Wastes within Africa. (BAMAKO Convention), 1991	April 1993
3	Stockholm Convention on Persistent Organic Pollutants (POP); Stockholm 2001	September 2003
4	Montreal Protocol on substances that deplete the ozone layer, Montreal 1987	April, 1993
5	Basel Convention on Transboundary Movements of Hazardous Wastes and their Disposal, Basel 1989	April 1993
6	United Nations convention on climate change, New York 1992	Jan 6, 1995

7	Cartegena Protocol on Biosafety, 2000 – deals with protection from effects of modern technology	Jan 29, 2003
8	Rotterdam Convention, 1998 –convention on the prior informed consent procedure for certain hazardous chemicals and pesticides in international trade	-

World Bank OP 4.09

This policy supports safe, effective, and environmentally sound pest management and promotes the use of biological and environmental control methods. It states that the assessment of the capacity of the country's regulatory framework and institutions to promote and support safe, effective, and environmentally sound pest management should be undertaken for any project that involves pest management. Projects that include the manufacture, use, or disposal of environmentally significant quantities of pest control products are classified as Category A. Depending on the level of environmental risk, other projects involving pest management issues are classified as A, B, C, or FI.

The national extant laws in Sierra Leone are deemed to be consistent with the international laws and the World Bank Operational Policy 4.09 and annex C of OP4.01 on the procurement, use, handling and disposal of pesticides. However, in the event of any discordance between the existing laws in Sierra Leone and the World Bank safeguard policies the more stringent will take precedence.

ES7: Assessment of the Capacity of Sierra Leone on the Implementation of IPMP

Due to the protracted period of civil war in Sierra Leone and associated slow socio-economic and political building process, Sierra Leone has not been able to build or develop capacities required for implementing IPMP. Therefore, this project will assist the government of Sierra Leone with relevant consultants that will implement the IPMP and build capacity in the PCU and key health care implementation institutions within the first 2 years of project implementation.

ES8: Adverse Environmental & Health Impacts of Pests

This IPMP identified a number of environmental, social and health risks from increased and unsafe use of pesticides, chemicals and reagents for control of crop pests and arthropod or zoopodic pests that may be encountered during project implementation.

Environmental

1. **Harm to Non-target Species**

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

2. **Social and Health Concerns of Disease outbreaks** – Recent experience in disaster emergency management of Ebola shows that control or intervention measures in disease outbreaks conditions could have direct effects of morbidity and mortality on health-care personnel thereby causing reduction in the labor force participation. Also, behavioral effects result from the fear of contagion.

ES9: Integrated Pest Management Plan (IPMP)

This IPMP is developed to reduce dependency on pesticides and encourage integrated pest control methods. It considers an IPM for livestock/animal health which entails detection and identification of pests on the animals or within the environment that the livestock occupy and appropriate strategies to manage them and their damage at acceptable levels with the least disruption to the environment. It also designs a program for capacity building in IPM, provides a stakeholder consultative and information dissemination arrangement as well as institutional responsibilities for taking actions and responding to IPM needs.

ES10: Framework for Implementation

REDISSE project implementation will be coordinated by WAHO of ECOWAS which will host the regional secretariat of the project. A project coordination unit will be located in Monrovia for coordination of activities in Sierra Leone.

One Health Steering Committee will be established, this committee will serve as the advisory and oversight body for the project. Other implementing agencies, institutions and their roles in the implementation of REDISSE are spelt out in the document.

ES11: Capacity Building and Awareness

Capacity building and awareness will be very important to the project beneficiaries in the understanding and implementation of this IPMP. Training modules, communication strategy are well spelled out in this report.

ES12 Budget for Implementation

Approximately **US$ 1,247,500** will be required to effectively implement the IPMP for the REDISSE over a five-year period.

Budget for the REDISSE IPMP Implementation

Line item	Yr. 1	Yr. 2	Yr. 3	Yr 4	Yr5	**Total**
1. Capacity building & Awareness						
Training & Sensitization programs	300500	150000	150000	60500	0	**661,000**
Radio jingles and handbill on IPM	25000	20000	10000	0	0	**55000**
Sub-total	*325,500*	*170000*	*160000*	*60500*	*0*	***716,000***
2. Environmental management						
Equipment; bed nets; improved species	10000	20000	10000	10000	0	**50000**
Support to IPM research and development	20000	30000	20000	10000	4000	**84000**
Pest/vector surveillance	10000	10000	6000	4000	4000	**34000**
Sub-total	*40000*	*60000*	*36000*	*24000*	*8000*	***168000***
3. Occupational Health & Safety						
Personal Protective Equipment (Hand gloves, gas mask, safety boot and overall wear)	70000	70000	50000	0	0	***190000***
Chemical Neutralizer and first Aid	50000	30000	20000	0	0	***100000***
Sub-total	*120000*	*100000*	*70000*	*0*	*0*	*290000*
4. Project management						
IPMP coordination	4000	4000	4000	4000	4000	**20000**
Monitoring and evaluation	10000	10000	10000	12000	12000	**54000**
Sub-total	*14000*	*14000*	*30000*	*16000*	*16000*	***74000***
Grand total	**499500**	**344,000**	**197000**	**100500**	**24000**	**1,247,500**

1.0: INTRODUCTION

1.1 Project Background

The recent Ebola Virus Disease (EVD) epidemic in West Africa has confirmed the critical importance of strengthening national disease surveillance systems and inter-country collaboration in order to detect disease outbreaks earlier and respond more swiftly and effectively, such that the loss of human lives and economic costs are minimized. The West Africa Ebola outbreak also demonstrated that there can be rapid and large spill-over effects of disease that can transcend local and national boundaries. Ebola emerged in a remote rural area of Guinea, but spread rapidly not only to densely populated urban conglomerations within the country, but also to Sierra Leone amongst other west African Countries.

The concept of the proposed Regional Disease Surveillance Systems Enhancement Project (REDISSE) is thus linked to the commitment that the global community has made to the countries of West Africa in light of the huge human and economic costs of Ebola, to strengthen weak human health, animal health, and disaster response systems to improve the preparedness of the region to handle future epidemics, and thereby minimize the national, regional, and potential global effects of such disease outbreaks.

REDISSE is financed under an IDA Credit in the amount of US$210 million equivalent (see table below per country allocation) and IDA Grant in the amount of US$20 million equivalent to finance activities managed by WAHO. The total IDA Grant and Credit allocation is US$230 million equivalent. In addition, a multi donor trust fund from the Department of Foreign Affairs, Training and Development in Canada was created in the amount of US$12 million and which will be used to finance activities under component 1. The Bank support is planned for six years (2016-2022).

The proposed IDA budget breakdown per country (US$) for the project is the following:

Country / Regional Institution	**Country IDA**	**Regional IDA**	**Total**
ECOWAS/WAHO/		20.0	20.0
Liberia	10.0	20.0	30.0
Nigeria	45.0	45.0	90.0
Senegal	15.0	15.0	30.0
Sierra Leone	10.0	20.0	30.0

1.2 General Description of the Project

1.2.1 Regional Disease Surveillance Systems Enhancement Project (REDISSE)

Over the last four decades, the world has witnessed one to three newly emerging infectious diseases annually. Of infectious diseases in humans, the majority has its origin in animals (**"**zoonotic" diseases), with more than 70% of emerging zoonotic infectious diseases coming

from wildlife. Recent outbreaks such as Ebola Viral Disease (EVD), H7N9 avian influenza, Middle East Respiratory Syndrome (MERS-CoV), Marburg virus, Nipah virus infection, bovine spongiform encephalopathy and HIV/AIDS showcase the catastrophic health and economic effects of emerging zoonotic diseases**.**

In the West Africa region, the recent EVD outbreak clearly eroded hard-won gains in the fight against poverty, including gains in human development and economic growth in Guinea, Liberia and Sierra Leone, as well as in the entire region. In these three countries, the estimated forgone output reached US$1.6 billion, which represents over 12% of the countries' combined outputs. (World Bank). The outbreak also resulted in school closure for at least 6 months in the three countries and over 16,600 children lost one or both parents to the epidemic. Overall, the estimated loss in Gross Domestic Product (GDP) for the 15 countries in the ECOWAS region was approximately US$1.8 billion in 2014, and was expected to rise to US$3.4 billion in 2015 and US$4.7 billion in 2016. These economic losses were over and above the day to day burden that are endemic to human and animal diseases, including zoonoses, on the people of West Africa.

The performance of health systems in many countries in West Africa is weak including chronic insufficient financial and human resources, limited institutional capacity and infrastructure, weak health information systems, prevailing inequity and discrimination in availability of services, absence of community participation, lack of transparency and accountability, and a need for management capacity building.

The REDISSE is therefore, planned to address 3 priority areas: (i) Strengthen national capacity to detect and respond to infectious human and animal disease threats; (ii) Establish national and regional platforms for collaboration and collective action; and (iii) ultimately promote a platform to increase engagement across the human health, animal health and environmental sectors to implement a One Health approach.

1.3 Proposed Project Components

1.3.1 The REDISSE Project Components

The REDISSE project comprises of 5 components as follows:

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This sub-component will support (i) partnership building activities (including the private sector) for outbreak preparedness and disaster risk management; (ii) improvement and harmonization of policies, legislations, and operating procedures that includes representation from other relevant sectors including environment, customs/immigration, education, law enforcement; and (iii) explore the establishment of national and regional financing mechanisms to ensure swift mobilization of resources for animal health and public health emergencies.

Sub-Component 3.2 Strengthen Capacity for emergency response (US$18 million)

This sub-component will support the strengthening of emergency operations centres (EOC) and surge capacity at the national and regional levels. Activities under this sub-component will support (i) the establishment and management of a database of multidisciplinary rapid response teams (MRRTs) that will be available for rapid deployment; (ii) the development and management of stockpiling mechanisms (virtual and physical) to ensure availability of supplies to countries during an emergency response; and (iii) the swift mobilization and deployment of resources in response to major infectious disease outbreaks.

Sub-Component 3.3 US$0 Component for emergency response.

When a major outbreak affects the livelihoods of project beneficiaries, governments may request the World Bank to reallocate project funds to support mitigation, response and recovery. Detailed operational guidelines acceptable to the World Bank for implementing the REDISSE US$0 component for emergency response activity will be prepared at the national level during the first year of the project's implementation. All expenditures under this activity will be in accordance with paragraph 12 of World Bank OP 10.00 (Investment Project Financing) and will be appraised, reviewed, and found to be acceptable to the World Bank before any disbursement is made. Disbursements will be made against an approved list of goods, works, and services required to support crisis mitigation, response and recovery. Triggers and implementation details of the $0 component will be clearly outlined in the Project Implementation Manual (PIM) acceptable to the World Bank.

Component 4: Human resource management for effective disease surveillance and epidemic preparedness (*US$47 million).*

This component will include two sub-components.

Sub-Component 4.1 Health Workforce mapping, planning and recruitment (US$25 million)

This sub-component includes; (i) assessments of current workforce in terms of quantity, geographical distribution and capacity (including private actors); (ii) strengthening capacity for human resource management for disease surveillance and response; (iii) supporting the capacity of governments to recruit health workers and create an incentive environment which encourages skilled individuals to work for the public sector; and (iv) using private actors to deliver public sector activities through delegation of power (e.g. sanitary mandates for veterinarians).

Sub-Component 4.2 Enhance Health Workforce training, motivation and retention (US$22 million)

This sub-component includes training to develop human resource capacity in surveillance, preparedness and response. Cognizant of the importance of community involvement in disease surveillance, a key lesson from the Ebola crisis, the project places emphasis on training at the community level, rather than focusing solely on higher level cadres.

The project will analyse and seek to address the incentive environment within which healthcare workers operate. Armed with an improved understanding of this environment, the project will seek to implement activities which create incentives which not only draw those with relevant skills to the public sector, but also improve staff motivation and retention.

Component 5: Institutional Capacity Building, Project Management, Coordination and Advocacy (*US$41 million)*

This component focuses will include two sub-components:

Sub-component 5.1 Project coordination, fiduciary management, monitoring and evaluation, data generation, and knowledge management (US$30 million)

Under this sub-component, REDISSE will (i) strengthen the capacities of national and regional institutions to efficiently perform core project management functions including operational planning, financial management, procurement arrangements, and environmental and social safeguards policies in accordance with WB guidelines and procedures; (ii) enhance M&E systems including routine health management and information systems (HMIS) and other data sources, including bi-annual Joint External Evaluations (JEE) of IHR (2005) and the PVS pathway; (iii) manage operational research program and economic analysis of disease outbreaks and epidemics in the ECOWAS region implemented by national and regional institutions; (iv) promote the design of impact evaluation studies to measure impact of project interventions; and (v) coordinate the roles of existing national and regional institutions to better support the planned project activities. Both the R-PCU and the individual N-PCUs will work closely with national environmental and social agencies to ensure due consideration of their respective legislations.

REDISSE will also finance the generation of data on animal and human health activities in the ECOWAS countries, which is critical to guide and calibrate investments.

Sub-component 5.2 Institutional support, capacity building, advocacy, and communication (US$11 million)

This sub-component will help assess and build capacities at national and regional level. It will provide technical and investment support to enhance provision of services by WAHO and other cross-cutting regional institutions or organizations relevant to animal and human health sector development. To this end, the project will support: (i) the conduct of capacity gap analysis (including staffing, skills, equipment, systems, and other variables); (ii) identify potential synergies and cross-fertilization possibilities among various operations pertaining to disease surveillance and response, using a progressive pathway for OH operationalization at country level, supported by regional institutions; and (iii) establishment or upgrading of national public health institutions. REDISSE will also assist in supporting greater engagement and coordination of the five countries in regional decision- and policy-making processes in ECOWAS, as well as among regional public and non-public organizations.

REDISSE will support advocacy and communication for sustained One Health approach. This will include: (i) generation and dissemination of lessons learned at the national and regional levels through One Health (OH) national and regional platforms respectively; and (ii) raising awareness on strategic issues at the decision and policy levels of countries, and regional

economic communities to increase and sustain allocation of resources for disease surveillance, preparedness and response.

1.4 Rational for the IPMP

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

IPM is necessary for REDISSE as the surveillance, monitoring and containment of diseases including zoonosis anticipated under the REDISSE project could lead to increased use of chemicals, reagents, and pesticides with potential negative impacts and risks on the environment and human health. Given the situation-driven nature of the project, the extent of such an increased use cannot be ascertained in advance, and requires that borrowers will each prepare Integrated Pest/Vector Management Plans to identify the potential risks and ways to adequately mitigate them.

1.5 Scope of the IPMP

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

Specifically, it also identifies institutional responsibility with regards to mitigation measures and monitoring indicators to be observed in order to evaluate the performance and effectiveness of the IPMP. The IPMP will be reviewed and cleared by IDA prior to disclosure country wide in Sierra Leone and Info-Shop.

2.0: PEST AND DISEASES PROBLEMS OF AGRICULTURE AND ANIMAL HEALTH IN SIERRA LEONE

2.1 Introduction

Pests and disease vectors constitute serious hazards to public health, food security and safety in Sierra Leone. Vectors transmit several diseases of public health importance in Sierra Leone, and recently Ebola outbreak in 2014 killed approximately 40% of 10,675 laboratory cases confirmed in the country. Also, Malaria which is transmitted by the Anopheles mosquitoes is responsible for considerable morbidity and mortality particularly among children less than 5 years and pregnant women. Onchocerciasis (River Blindness) transmitted by Black flies is responsible for the high incidence of blindness in most rural and remote areas of Sierra Leone. This disease has resulted in depopulation of many fertile farming areas thus contributing significantly to food insecurity and poverty. Lassa fever and Yellow fever transmitted by *M. natalensis* (rats) and *Aedes* mosquitoes respectively have been reported to occur in epidemic proportions in some parts of Sierra Leone.

2.2 Economic Pests and Diseases of Animals in Sierra Leone

Ectoparasitism is a serious threat to both animals and humans West African region including Sierra Leone. The painful bites of parasites could be a great nuisance, leading to loss of large amount of blood (Walker, 1996; Natala, 1997). Ticks alone transmit several important protozoal, rickettsial, bacterial and viral diseases to animals, thereby causing great economic losses. Lice and mites usually cause dermatitis, which is characterized by alopecia and necrotic foci. There is also intense pruritus (especially with mange) which leads to biting and vigorous scratching of affected parts (Lapage, 1968; Yeruham, 1985; Taylor et al., 2007).

2.3 Control methods of pests and animal diseases in Sierra Leone

Mainly pest management controls used in Sierra Leone include:

1. **Cultural control**: which refers to the adjustment of crop husbandry techniques by the farmer? These to a minimum include:

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

2. **Biological Control**: which involves either encouraging or introducing natural enemies of the pest or interfering with the life cycle of the pest

3. **Chemical controls** - the use of pesticides to kill pests.

2.4 Assessment of Capacity of Sierra Leone on Integrated Pest Management

In terms of the strategic action required to sustain animal health, the Sierra Leone context is characterized by lack of preparedness, insufficient human, physical and financial resources, and the lack of cross-sector collaboration to address promptly and efficiently disease outbreak disaster scenarios such as Ebola and the resurgence of highly pathogenic avian influenza.

Similarly, as a result of the protracted period of civil war in Sierra Leone and associated slow socio-economic and political building process, Sierra Leone has not been able to build or develop capacities required for implementing IPMP. Therefore, this project will assist the government of Sierra Leone with relevant safeguard consultants that will implement the IPMP and build capacity in the PCU and key health care implementation institutions within the first 2 years of project implementation.

3.0: LEGISLATIONS AND POLICIES RELEVANT TO USE OF CHEMICAL FOR PEST MANAGEMENT

3.1 Country Legislations

Sierra Leone government has a number of a number of legislations and policies relevant to bear on this project. They include:

ii. The Environmental Protection Agency Act, 2008

The Act was signed as a legal document in September 2008 and amended in July 2010. Following the enactment of this Act, a National Environment Protection Board was established within the Environment protection Agency. The Board facilitates coordination, cooperation and collaboration among Government Ministries, local authorities and other governmental agencies, in all areas relating to environmental protection. The act empowers a separate environmental protection Agency with the overall mandate of setting and monitoring environmental standards.

Schedule 3 of the Act describes the requirement or areas of study for meeting the standard of an environmental impact assessment in Sierra Leone.

ii. **National Environmental Policy Act (1994)**

The National Environmental Policy (1994) seeks to achieve sustainable development in Sierra Leone through the implementation of sound environmental management systems which will encourage productivity and harmony between man and his environment. It also promotes efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of nationals, and serves to enrich the understanding of ecological systems and natural resources which are important to the country.

iii. ***Public Health Act, 1960***

The Public Health Act (1960) Consistent with the current legislation, Local Councils (and other local level structures) section 121 gives a clear mandate for implementation of premises inspection, and provide strategic direction and back up support to enable council to perform their roles effectively with the adoption of the Expanded Sanitary Inspection Compliance, Monitoring and Enforcement (ESICOME). This Act will enable the monitoring and enforcement of standard with respect to type and use of pesticides in the country.

iv. The Wildlife Conservation Act, 1972

The Wildlife Conservation Act (1972) provides for the protection of wildlife and **c**onservation management, including the establishment and operation of National Parks. The Act takes a conservative approach to wildlife management and does not make any

provisions for involving local communities in management responsibilities or for sharing benefits of income generated from wildlife management (e.g. tourism or hunting fees). Issues that bother on wildlife bio-security were also not captured neither did the Act envisage or provide guideline to addressing disease vector from wildlife (to domestic animals and human food). This Act was still under review in June 2013 and a new Act is expected to be presented before the Parliament.

There is however, no clearly identified law or Act that stipulates standards for regulating pesticides for use in Sierra Leone and the transportation, movement, safe use and trading on pesticides/chemicals. Notwithstanding, Sierra Leone is a signatory to many international conventions and treaties that stipulate standard/rules for safe use, storage, transportation and application of chemical for pest controls.

3.2 International conventions and treaties

Some of the treaties/conventions relevant to REDISSE and IPMP in particular which Sierra Leone is a signatory include:

#	Convention/Treaties	Date of Ratification by Sierra Leone
1	UN Convention on Biodiversity (Conservation) June1994	December 1994
2	Bamako Convention on the ban of the Import into Africa and the Control of Trans- boundary Movement and Management of Hazardous Wastes within Africa. (BAMAKO Convention), 1991	April 1993
3	Stockholm Convention on Persistent Organic Pollutants (POP); Stockholm 2001	September 2003
4	Montreal Protocol on substances that deplete the ozone layer, Montreal 1987	April, 1993
5	Basel Convention on Transboundary Movements of Hazardous Wastes and their Disposal, Basel 1989	April 1993
6	United Nations convention on climate change, New York 1992	Jan 6, 1995
7	Cartegena Protocol on Biosafety, 2000 – deals with protection from effects of modern technology	Jan 29, 2003
8	Rotterdam Convention, 1998 –convention on the prior informed consent procedure for certain hazardous chemicals and pesticides in international trade	-

3.3 World Bank OP 4.09

The policy supports safe, effective, and environmentally sound pest management and promotes the use of biological and environmental control methods. It encourages the assessment of the capacity of the country's regulatory framework and institutions to promote and support safe,

effective, and environmentally sound pest management. Projects that include the manufacture, use, or disposal of environmentally significant quantities of pest control products are classified as Category A. Depending on the level of environmental risk, other projects involving pest management issues are classified as A, B, C, or FI.

The World Bank OP 4.09 ensures that EA covers potential issues related to pest management and considers appropriate alternative designs or mitigation measures. It places premium on using biological pest control measures, but where chemical pesticides must be used, it encourages the country's capacity to manage the procurement, handling, application and disposal of pest control products be evaluated and the capacity to monitor the precision of pest control and the impact of pesticide use, and to develop and implement ecologically based pest management program.

OP/BP4.01 annex C exempts procurement of impregnated bed nets and WHO Class III insecticides for intra-domicilliary malaria control from the requirement of preparing a pest management plan. In those cases preparation of a hazard assessment would suffice. A hazard assessment identifies risks associated with the transport, storage, handling and use of the pesticides and provides measures to minimize these risks. The policy further provides that the PMP may be limited to pest control product screening when all of the following conditions are met:

- Expected quantities of pest control products are not significant from a health or environment standpoint,
- No significant environment or health concerns related to pest control need to be addressed,
- The project will not introduce pesticide use or other non-indigenous biological control into an area, or significantly increase the level of pesticide use;
- Products to be financed fall in class 111 or table 5 of the WHO Classification of pesticides by hazards.

The OP 4.09 principles provide general guidance that will be followed during appraisal on how to address pest management issues in different categories of projects to which OP 4.09 applies. These are provided as follows:

1. Do no harm

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

Projects that directly or indirectly finance pesticides: For pesticides directly or indirectly procured under Bank financed projects the policy states that it needs to be established that their use is justified under an IPM approach. It stipulates that optimum use should be made of available non-chemical pest management techniques to reduce reliance on synthetic chemical

pesticides and that adequate measures be incorporated in the project design to reduce risks associated with the handling and use of pesticides to a level that can be managed by the users. The policy encourages monitoring of the effectiveness of these measures in order to achieve project objective.

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

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

2. Do Good Principle

The do good principle calls for enhancing policy reform and strengthening the regulatory framework and institutional capacity for the implementation of IPM and the control of pesticides. The expected level of project involvement depends on the circumstances and the scope of the project. Relevant factors in this respect are the:

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

4.0 OVERVIEW ON PEST MANAGEMENT APPROACHES IN SIERRA LEONE

The problem of pest infestation and damage to crops and animals is a global concern and Sierra Leone has had its own share of the adverse impacts of pests on food security and human and animal health even with the recent outbreaks of Avian Influenza and Ebola virus.

Pest control measures in the country has not followed any scientific and prioritized method, rather the individual and organized farmers have shown their desire for pest control by increasing their purchases of fertilizers and chemicals for growing crops and controlling animal pests. Pesticides are sold and bought indiscriminately in Sierra Leone, and most buyers and sellers are ignorant of the names and chemical ingredients and right application of the pesticides they sale and buy. Many of the pesticides are imported and some were seen to have been labeled in Arabic language (which most English speaking Sierra Leoneans do not understand), even as others are without labels. Information from consultation among users of chemicals in Sierra Leone also revealed that some farmers procure those chemicals for purpose of fish catching, while some apply the chemicals as medicinal cure for skin related health conditions in human. This is particularly, disturbing given that some of the pesticides are poisonous and dangerous to human health.

4.1 Global Concerns on the Use of Pesticides

Pesticides are toxic substances released most times intentionally into our environment. This includes substances that kill weeds (herbicides), insects (insecticides), fungus (fungicides), rodents (rodenticides), and others. The use of toxic pesticides to manage pest problems has become a common practice around the world. Pesticides are used almost everywhere not only in agricultural fields, but also in homes, parks, schools, buildings, forests, and roads. Though they could be very useful in managing pest problems, they are also a great environmental and health risk.

4.1.1 Persistent Organic Pollutants (POPs)

In May 2001 Sierra Leone became a signatory to the Stockholm Convention on Persistent Organic Pollutants, and ratified in September 2003. Under Annex A (listed for Elimination) of the convention, Parties must take measures to eliminate the production and use of the chemicals listed under Annex A. These obsolete pesticides are characterized by a high persistence in the environment (e.g. half-life for DDT in soil ranges from 22 to 30 years, Toxaphene -14 years, Mirex -12 years, Dieldrin- 7 years, Chlordecone up to 30 years), low water solubility and thus potential to accumulate in fatty tissue of living organisms including humans and toxicity to both human and wildlife. Due to intensive releases to the environment in past several decades, and tendency to long-range trans-boundary atmospheric transport, they are now widely distributed and are found around a globe. Most agricultural pesticides could constitute any of the POPs chemicals, which if are in use pose adverse environmental, animal and human health risks.

Considering that Sierra Leone is a Signatory, the country is obligated to stop the use of POPs pesticides if still in use. For other pesticides, which are not POPs, the issue of toxicity still remains a concern and the consequence of application on agricultural farm land which has wider environmental and social impacts.

4.2 Pesticides and Human Health Impacts

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

Harm to Non-target Species

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

Social and Health Impacts

1. Pesticides can enter the body through inhalation of aerosols, dust and vapour that contain pesticides; through oral exposure by consuming food and water; and through skin exposure by direct contact. The effects of pesticides on human health depend on the toxicity of the chemical and the length and magnitude of exposure. Farmer, farm workers and their families experience the greatest exposure to agricultural pesticides through direct contact.

Children are more susceptible and sensitive to pesticides, because they are still developing and have a weaker immune system than adults. Children may be more exposed due to their closer proximity to the ground and tendency to put unfamiliar objects in their mouth. Hand to mouth contact depends on the child's age. Children under the age of six months are more apt to experience exposure from breast milk and inhalation of small particles. Pesticides can bio-accumulate in the body over time.

2. Effect of Disease outbreaks – Recent experience in disaster emergency management of Ebola in the West African region shows that control or intervention measures in disease outbreaks conditions could have direct effects of morbidity and mortality on health-care

personnel thereby causing reduction in the labor force participation. Also, behavioral effects result from the fear of contagion.

Health hazards and death from consumption of chemically grown crops and disease infected animals

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

4. Possibility of cancers, neurologic, endocrine and reproductive problems from direct and indirect exposure to pesticides.

5. Occupational health and safety risks. Long term inhalation of toxic pesticides sprayed, could eventually result in respiratory illnesses or disease conditions.

4.3 Preventive and Mitigation Measures for Animal Pests/Diseases

To prevent the introduction and dissemination of animal diseases as far as possible, the public, livestock owners and health workers must do the following:

- Ensure adequate hygiene within and around the vicinities of their animals as well as self hygiene for household ;
- Be alert to symptoms of diseases
- Comply with legal requirements when importing animals from other regions or countries;
- Notify a veterinarian early of any suspected animal diseases
- Vaccinate routinely all farm animals against diseases

Table 4.1: Matrix of Some WHO Classified Pesticides and their Effects

Pesticides	**Result of accidental exposure**		
	WHO Class (3)	**Effects of acute intoxication**	**Effects of chronic intoxication**
Clorpyriphos ethyle (1)	II(moderately hazardous)	Nausea. Dizziness. Vomiting. Cough. Loss of consciousness. Convulsions. Constriction of the pupil. Muscle cramps. Salivation. A severe exposure may cause inhibition of cholinesterase Exposure above the Occupational Exposure Limit (OEL) may result in death	The substance may have effects on the nervous system, cholinesterase inhibitor
Fenitrothion(1)	II(moderately hazardous)	Cramps. Diarrhea. Dizziness. Headache. Nausea. Loss of consciousness.A severe exposure may cause inhibition of cholinesterase exposure above the OEL may result in death	The substance may have effects on the nervous system, cholinesterase inhibitor
Malathion (1)	III (Slightly hazardous)	The substance may have effects on the nervous system, causing convulsions, muscle cramps, vomiting, diarrhea, excessive salivation, sweating, difficulty breathing, loss of consciousness. A severe exposure may cause inhibition of cholinesterase Exposure above the OEL may result in death.	A prolonged or repeated contact may cause skin sensitization. Cholinesterase inhibitor; possibility of cumulative effects
Dizinon	II(moderately hazardous)	The main symptom of soft acute diazinon poisoning are headache, nausea, dizziness, pinpoint pupils, blurred vision, tightness in the chest, difficulty in breathing, muscle weakness or twitching, difficulty in walking, vomiting abdominal cramps and diarrhea Effects on the central nervous system may include confusion, anxiety, drowseness, depression, difficulty in concentrating, slurred speech, poor recall, insomnia, nightmares and a form of toxic psychosis resulting in bizarre behavior.	Cholinstrase inhibitor.Accumulation of acetylcholine at junctions between nerves and glands results in gland secretion;and accumulation between nerves in the brain causes sensory and behavioral disturbances.
Cypermethrin	II(moderately hazardous)	Symptoms of acute poisoning include abnormal facial sensations, dizziness, headache, nausea, anorexia and fatigue, vomiting and increased stomach secretion	Chronic symptoms include brain and locomotry disorders, polyneurophasy and immuno-suppression and resembles the multiple chemical sensitivity syndrome
Carbosulfan	II (Moderately hazardous	The acute symptoms of carbosulfan in humans are characterstics of other organoposphate and carbamate insecticides. Signs include dizziness, salivation, excess salivation, nausea, abdominal cramps,	-

Pesticides	**Result of accidental exposure**		
	WHO Class (3)	**Effects of acute intoxication**	**Effects of chronic intoxication**
		vomiting, diarrhea, blurred vision, pi-point pupils, difficulty breathing and muscle twitching	
Carbaryl	II (Moderately hazardous	>> >> >>	-
Profenofos	II (Moderately hazardous	Muscarinic, nicotinic and central nervous system manifestations	There is no available data concerning chronic toxicity of profenofos

5.0: INTEGRATED PEST MANAGEMENT OPTIONS FOR REDISSE

5.1 Introduction

Establishing an IPMP for pests of animals is a function of the following 5 steps:

- ***Detection***

Pest detection requires thorough and regular monitoring of animals for pest invasions and/or other signs and symptoms that indicate a pest is present on the animal or in the environment where animals live (Walker & Stacheki, 1996). This is done by observing an animal's body, feces, living quarters, bedding, surroundings and behaviors. Under REDISSE project, any unusual change noticed in an animal shall be recorded and brought to the attention of a veterinarian.

- ***Identification***

Identification step is required to determine if the pest detected is actually the organism causing the discomfort or disorder in the animal. This is best performed by a trained farm manager or a veterinarian.

- ***Economical or Medical Significance***

A medical judgment of the state of health of an animal is made on the basis of symptoms caused by pests. On the economic side, estimated losses which the pest has caused such as reduction in diary, meat production and egg production are the variable indicators, but high economic loss can be a function of duration of pest invasion or period within which it took for effective mitigation response to take place.

- ***Method Selection***

This involves selecting a method or methods for managing the observed pests such as are contained in this IPMP.

- ***Evaluation***

It is necessary under REDISSE to evaluate the effectiveness of the applied pest management procedures. Keeping records and evaluating pest control techniques will be followed as monitoring task for the REDISSE IPM outcome evaluation.

5.2. Methods or techniques that will be used for Animal Pest Management

IPM for animals includes biological, cultural, mechanical, physical, chemical (use of pesticides), use of resistant breeds and sanitation in the animal's environment.

- ***Biological Control***

  This project will introduce, encourage and artificially increase plants and animals that are parasites or predators of identified pests. This will be effective in managing insects and mites.

- ***Cultural Control***

- It is recommended that under REDISSE, maintaining overall good health of the animals should be a priority in pest management. This is necessary to keep the animal healthy which enhances its tolerant level to pests.
- Animal diets should be well balanced and provided at consistent intervals and in appropriate portions.
- Adequate ventilation should be provided for animals kept indoors to prevent heat, stress or the spread of diseases
- Ensure that animals are not over crowded to avoid pest outbreaks.

- ***Mechanical tools***

Mechanical tools to be employed under REDISSE may include:

- Grooming combs, brushes and flea combs with closely spaced teeth to monitor for insects and ticks;
- Use of electronic devices such as lights that attract flying insects around barns or other animal quarters to reduce some nuisance pests
- Use of traps for rodents that may be carriers of pests

- ***Physical control***

This may involve the following measures:

- Use of sticky flypaper to reduce nuisance flying insects in confined areas.
- Use of cages that separate animals from contact with one another which reduces the spread of insects from infested animals to non-infested ones.
- Use of pest resistant breeds and breeds adapted to the climatic conditions of the surrounding environment where they are raised can avoid or reduce the effect of the pests.

- ***Sanitation***

Implementation of REDISSE IPM shall accord great importance to sanitation as measure to avoiding pest and diseases in animals. Keeping barnyards, stables, kennels, exercise areas and surrounding areas as clean as possible and ensuring that animals drink from safe water points can prevent reasonably pest invasion, and therefore highly recommended. Cleaning animal bedding and the surfaces of cages and other animal confinement with disinfectants also kills pathogens and reduces the tendencies of spread of diseases.

- ***Use of Pesticides***

Pesticides may be used in REDISSE for animal pest control in combination with other methods of prevention and control, or used when other methods have failed or considered in applicable. For example, cultural or other management strategies discussed earlier may not be applicable to control or prevent deer flies and horse flies. In that or similar cases, the use of repellants or chemicals at appropriate application, quantities and methods for the environment are conceivable options. Nonetheless, banned and obsolete pesticides shall not be procured nor be used in any case under REDISSE.

5.3 Classes of insecticides/Acaricides that may be used in Animal Pest Management

- ***Chlorinated Hydrocarbons***

This class includes lindane and methoxychlor. Lindan has become a restricted use pesticide for *mange mites and lice.*

- ***Organophosphates (OP)***

Organophosphate compounds inhibit cholinesterase. Cholinesterase is a chemical catalyst found in mammals that helps regulate the activity of nerve impulses. It is a synthetic organic pesticide containing carbon, hydrogen and phosphorus. Cholinesterase includes a broad range of insecticides such as chlorpyrifos, malathion, DDVP, runnel, stiriphos, etc

Organophosphates have been found to be effective against a wide range of insects including but not limited to fleas and ticks.

Other classs of insecticides/acaricides that may be used in this project are:

- *Carbamates*
- *Synthetic pyrethroids*
- *Botanicals*
- *Lime sulfur (Calcium polysulfide)*
- *Mineral oil*
- *Amitraz*
- *Ivermectins and*
- *Insect growth regulators and hormone mimics*

5.4 Formulations that are allowed for Managing Animal Pests for use in REDISSE

Insecticides and acaricides formulations vary widely and must be selected to fit the particular situation. Noted below are various formulations that may be used but their applications must be based on effectiveness, cost, practicality and relative safety to human, the animal being treated and the environment.

- ***Ready to use (RTU)***

RTU formulations require no mixing or combining with other ingredients or diluents. They come in containers that serve as the application device, such as an aerosol can, pour-on bottle, roll-on, spot-on or spray bottle.

- ***Wet-able powders (WP)***

This type must be mixed with water before application. They are concentrates in solid, powdered form and can be sprayed after mixing.

- ***Emulsifiable concentrates (EC)***

Emulsifiable concentrates are liquids that must be mixed with water before application. They can be sprayed after mixing or sponged on the animal being treated.

- ***Shampoo***

A Shampoo is a formulation of insecticide and other ingredients that is applied to an animal's wet haircoat and worked into a lather. Label direction should be looked out for to determine the length of time that the shampoo must remain on the animal to achieve effective pest control before being thoroughly rinsed.

- ***Dust***

A dust is a ready-to-use dry formulation. The following safety caution must apply:

  - Protect the animal and applicator's eyes from the dust.
  - Applicators must wear appropriate personal protective equipment to protect exposed skin, the respiratory tract and eyes

- ***Baits***

Baits are either commercially prepared as dry granules or made as mixes of insecticides.

- ***Pastes, liquids, powders, tablets/pellets and injectables***

These formulations should be given orally or injected into animals to control internal parasites. Only licensed or qualified veterinarians shall administer this on the animal.

5.5 General Guidelines to be followed for insecticides/chemical use for animal pest control

- Read labels before using any pesticide, and follow strictly label instructions;
- Use only products labeled for use on animals or in animal environments'
- Do not exceed label dosages; measure carefully and know the animal's exact weight;
- Provide adequate ventilation while using pesticides;
- Remove animals from buildings if it is an area or premise spray;
- As much as possible, use dust formulation instead of spray on outdoor animals on cold days
- Use all appropriate personal protective equipment during applications of any pesticide;
- Do not add new insecticides to old, previously used dipping water, but start with fresh water.
- Avoid using pesticide when an animal has been, will be or is anesthetized;
- Keep records of pesticides applications;
- Always store and dispose of pesticide containers according to label directions (or see attached animal waste management protocol).

5.5.1 Pest Management Planning Matrix for the REDISSE

Table 5 outlines the matrix of activities, expected results, milestones and performance indicators of the IPMP for the REDISSE Project.

Table 5: Planning matrix for the REDISSE IPM Project

Narrative summary	Expected results	Performance indicators	Assumptions/risks
Goal: Enhance the capacity of health workers and veterinarians to contribute to human and animal health disaster reduction through environmentally friendly pest management practices.	• Improved public & animal health • Increased national and community surveillance & preparedness on human and animal health risk disaster management • Increase capacity of institutions to manage health emergencies/outbreaks in environmental and socially safe manner • Increase number of private laboratories for diagnosis of infectious human and animal health	• Evidence of no of persons and institutions trained on • Increase in number of accredited private laboratories for diagnosis of infectious human and animal diseases • Evidence of reduction in use of pesticides • Evidence of increase in use of non-chemical or safe chemical applications on crop production and even mosquito control around human settlement	• National security remains stable • Government commitment to implement national regulations and conventions on pesticides/chemical storage, transportation and application
Purpose (i) improvement in efficiency of specimen transport and disposal system ii) Increase awareness on use and safety of application of chemicals for pest/vector control (iii) document and disseminate key lessons to users and stakeholders iv) reduction in the use of harmful or banned chemicals/pesticides in growing foods for human and animal consumptions	**Medium-term results/outcomes** • Health institutions and and those that control/use pesticides are able to prioritize pest problems, specifically with the REDISSE and identify IPM opportunities to mitigate negative environmental and social impacts associated with pesticides. • Health institutions and those that control/use pesticides are able to adopt ecologically sound options to reduce cassava crop losses with minimal personal and environmental health risks. • Policy makers in Health institutions and agric. Organizations and associations are strengthened and provided with guidelines enabling them to promote IPM approaches and options in animal health management • Collaborate linkages established to develop a national IPM policy to promote compliance with international conventions and guidelines on safe pesticide use	• Commitment of government to implement IPM across the national health and agricultural sector spread. • Level of compliance with World Bank safeguards, and compliance parameters of other donors etc. • Level of chemical control practices • Types and level of use of alternatives to synthetic pesticides	

6.0: IMPLENTATION STRATEGY

6.1 Context

To ensure that this IPMP is optimally implemented a number of steps are required to be taken. These include:

i. Measures that will ensure capacity building among stakeholders that will implement the IPMP
ii. Measures to ensure that POPs pesticides and WHO class 1 and 2 pesticides considered highly hazardous are not procured and/or used;
iii. Measures that will ensure that farmers and health workers get the relevant technical aids and education on the implementation of safe and alternative pest control measures rather than the use of chemicals
iv. There will be need to ensure that funding and approval process for IPMP implementation are well coordinated and effective
v. Monitoring and evaluation resources should be provided as and when due to ensure no set back in monitoring activities.

6.2 Capacity Building

Training is a fundamental component of this IPMP. There is need to train and enlighten stakeholders on different aspects of the IPMP requirements necessary for their project support. The training components contained in this report are first steps in filling the capacity gaps in the country for the implementation of the IPMP.

Table 6: Capacity Building and cost estimate for the REDISSE Project

Modules	**Targets**	**Responsibility Arrangement**	**Budget in USD**
World Bank Environmental and Social Safeguards (emphasis on OP 4.09)	Agro dealers, HCF Health workers, veterinarians, livestock farmers, , Members of Disease surveillance committee	Safeguards Consultant	**50,000**
Occupational Health and Safety (OHS) Basics in chemical pest applications	Agro dealers, HCF Health workers, veterinarian, livestock farmers, Members of Disease surveillance committee	Independent Consultant	**65,000**
Safe Management of Chemical Pesticides (transportation, storage, handling, storage of empty pesticide containers and final disposal)	Agro dealers, HCF Health workers, veterinarians, livestock farmers, Members of Disease surveillance committee zonal office	Independent Consultant,	**45,000**

Modules	**Targets**	**Responsibility Arrangement**	**Budget in USD**
Decision making on the selection of IPM approaches or options	Agro dealers, HCF Health workers, veterinarians, livestock farmers, Members of Disease surveillance committee	Independent Consultant,	**55, 500**
Breeding of natural enemies of pests	Agro dealers, HCF Health workers, veterinarians, livestock farmers, Members of Disease surveillance committee	Independent Consultant	**85,000**
Total			**300,500**

6.3 Framework for Implementation

REDISSE project implementation in Sierra Leone will be coordinated by an Integrated Health Project Administration Unit (IHPAU) that will be housed in the office of the Permanent Secretary of the Ministry of Health. It will coordinate the operations of REDISSE in collaboration with the inter-ministerial committee, One health committee and other agencies. The responsibilities of the IHPAU shall include:

i) Procurement and financial management of all REDISSE operations; Ensure adherence to all World Bank group implementation and reporting guidelines; iii) Prepare project progress report which will be sent to the regional secretariat (WAHO) and World Bank; iv) Ensure consultations with stakeholders during each stage of project implementation; v) Coordination and collaborations with stakeholders including relevant agencies and departments of Ministries of Health and Agriculture; vi) Take the lead in partnership with other stakeholders in advocacy and enlightenment programs as necessary for result oriented implementation of REDISSE IPMP/VMP and vii) day to day planning and operations of REDISSE including IPMP/VMP implementation and monitoring.

(will be located in Sierra Leone and the project will be implemented using the following structure:

a. Inter-ministerial Committee

Mandate: Policy orientation, overall oversight & decision making on funding allocations of the project. Membership: Not yet defined but presumably Minister of Finance, Minister of Health and Minister of Agriculture.

b. One Health Committee

Mandate: Approve project work plans (overall and yearly), monitor technical progress, provide guidance for project implementation, and ensure regular reporting and dissemination of outputs.

Chair**:** co-chaired by Chief Medical Officer and Chief Agricultural Officer.

Membership: Senior technical officers from MoHS; MAFFS; OFFICE OF NATIONAL SECURITY, EPA (Police); RSLAF (Army); training institutions, partners (senior representatives).

c. **Technical Working Groups (IDSR, Lab and P&R)**
Mandate: Develop operational plans, produce technical reports, review and validate guidelines and standard operating procedures.

Membership: Competent technical officers from relevant ministries & departments, technical experts from partners.

d. Directorates Units
Directorates and departments from the two ministries will be responsible for implementation of the project country wide in liaison with district implementation officers.

e. District level
The existing MoHS and MAFFS structures will be utilised to facilitate implementation of the project at district level. Working groups will be established at this level.

6.3.1 World Bank/Partners

The role of partners in REDISSE IPMP implementation amongst others shall be to:

- Provide technical and financial support.
- Support the establishment of REDISSE resource center at the Federal and State Ministries of Health.
- Support research on new trends in REDISSE.
- Serve on the REDISSE Technical Advisory Committee and Disease Surveillance and Response Committee.
- Collaborate with all tiers of government for improving disease surveillance activities.
- Mobilize resources from other interested parties to support REDISSE implementation

6.4 Monitoring and Evaluation (M&E)

The objective of monitoring and evaluation is to measure and assess the implementation of the IPMP against the set objectives. The overall impact of the M&E is to dictate early, gaps in the implementation as well as areas where planned measures were not sufficient to address pest

management for categories of animal and/or crop pests. Information feedback from M&E will be helpful to REDISSE implementation agencies in redesigning their methods of IPMP mix to ensure effectiveness of intervention.

Therefore, the specific targets of the M&E of the REDISSE are as follows:

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

The key issues to be considered in the monitoring process are whether a the pesticides procurement checklist is available and used during procurement and screening to 1) ensure that POPs pesticides and WHO class 1A and 1B pesticides are not procured or used. 2) Monitor the progress of the IPM implementation vi-a-viz the results.

In specifics, the following are **monitoring indicators** required to achieving IPM project development objectives:

- Reduction in the use and application of pesticides in the area
- Performance ratings in pest management using proffered IPM controls
- Number of farmers and stakeholders aware of the pollution, contamination and toxicity associated with pesticides
- Decline or increase in pests infestation
- The number of farmers or farmers association using biological methods of pest control
- Number of persons trained in the method of spraying and handling of chemical pesticides
- The reported incidences of pest and disease outbreak early
- Improvement in production/harvest of crops/livestock from use of IPM vi-a-viz the pre-IPM baseline
- Level of understanding of IPM processes
- Level of understanding of World Bank operational policy on pest management among PCUs and farmers associations

Towards the course of the above monitoring indicators the following action indicators will be incorporated into a participatory monitoring and evaluation plan.

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

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

7.0: WORKPLAN AND BUDGET

Table 7.1 below provides an indicative budget for implementation of the REDISSE IPMP over a 5-year period. Approximately **US$ 1,052** is estimated for the implementation of the IPMP for the REDISSE program. The cost components cover IPM orientation workshop, capacity building and awareness program, and project management including the cost of monitoring. Detail of the work plan and cost are presented in table 7.1below.

Table 7.1: Budget summary for IPMP of the REDISSE

Line item	Yr. 1	Yr. 2	Yr. 3	Yr 4	Yr5	**Total**
1. Capacity building & Awareness						
Training & Sensitization programs	300500	150000	150000	60500	0	**661,000**
Radio jingles and handbill on IPM	25000	20000	10000	0	0	**55000**
Sub-total	*325,500*	*170000*	*160000*	*60500*	*0*	***716,000***
2. Environmental management						
Equipment; bed nets; improved species	10000	20000	10000	10000	0	**50000**
Support to IPM research and development	20000	30000	20000	10000	4000	**84000**
Pest/vector surveillance	10000	10000	6000	4000	4000	**34000**
Sub-total	*40000*	*60000*	*36000*	*24000*	*8000*	***168000***
3. Occupational Health & Safety						
Personal Protective Equipment (Hand gloves, gas mask, safety boot and overall wear)	70000	70000	50000	0	0	***190000***
Chemical Neutralizer and first Aid	50000	30000	20000	0	0	***100000***
Sub-total	*120000*	*100000*	*70000*	*0*	*0*	*290000*
4. Project management						
IPMP coordination	4000	4000	4000	4000	4000	**20000**
Monitoring and evaluation	10000	10000	10000	12000	12000	**54000**
Sub-total	*14000*	*14000*	*30000*	*16000*	*16000*	***74000***
Grand total	**499500**	**344,000**	**197000**	**100500**	**24000**	**1,247,500**

8.0 ENVIRONMENTAL AND SOCIAL MONITORING

8.1 Institutional arrangements

In order to ensure quality delivery of the project activities, project monitoring will be conducted by different institutions and at different levels.

National Level: The infrastructure working group mentioned above will serve as the technical review arm for this project and will comprise of the Ministry of Health (Infrastructure Division and the Environmental Health Division) who will lead the process of ensuring environmental monitoring for sub project activities. The Environmental Protection Agency (EPA) will ensure that sub project activities requiring permits complies with existing laws.
A sub national level, the County Health Teams will lead the implementation of environmental mitigation activities and ensure that all sub project activities comply with existing legislation.

8.2 Monitoring and Reporting Procedures

The project will ensure continuous monitoring and supervision, focusing primarily on monthly county level visits and a mid-term and end of project evaluation. The budgetary allocations in the budget will support local monitoring by the Environmental and Social Management consultant and monitors from the DEOH and the EPA to effect the wide scale monitoring of the ESMF.

9.0 CONSULTATIONS, GRIEVANCE REDRESSAL MECHANISM AND PUBLIC DISCLOSURE

9.1 Public Consultation

Under this project, public consultation is critical and without which optimal results will not be achieved. The ESIA and IPM team have embarked on far-reaching consultations in Sierra Leone.

Consultations were carried out between March 2nd and March 24th among agro chemical dealers, farmers associations and healthcare institutions in Freetown, Kenema, Makari and Kailahun.

The outcomes of the consultations are insightful as it reveals the expressed happiness of the people for the REDISSE project. The gain also includes findings on general approach to pest control and use of pesticides. The agro dealers and farmers were willing to embrace IPM for pest control.
Public consultation is a continuum throughout the life cycle of this project, and therefore, at various stages of project implementation the public will be consulted and continued to be consulted for their awareness, participation and collaboration. This will be done through radio jinggle, community town hall meeting, and fliers and also via the public disclosure of prepared safeguard documents at designated centers as required by the law.

This IPMP and the ESMF amongst other safeguard will be disclosed in Country and at Infoshop once they are cleared by the Bank. All comments provided during these consultations will be recorded, and included in the final IPMP/ESMF and any subsequent safeguard instruments which will be developed as required.

9.2 Grievance Redress Mechanism (GRM)

Communities and individuals who believe that they are adversely affected by a World Bank (WB) supported project may submit complaints to existing project-level grievance redress mechanisms or the WB's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed in order to address project-related concerns. Project affected communities and individuals may submit their complaint to the WB's independent Inspection Panel which determines whether harm occurred, or could occur, as a result of WB non-compliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the World Bank's attention, and Bank Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank's corporate Grievance Redress Service (GRS), please visit http://www.worldbank.org/GRS. For information on how to submit complaints to the World Bank Inspection Panel, please visit www.inspectionpanel.org.

In country, grievance procedures will be put in place to address any mistreatments/ mishandling between both health workers, and health workers and patients. In the case of patients, for example, the Community health leader – who sits on the Hospital Health Board and primary health facility and Community committees -will be the grievance focal point. Patients will be able to discuss grievances directly with the community health leader, or by writing these down, and placing in a suggestion box. Health facilities will be required to ensure that grievance procedures are understood by, and understandable to illiterate populations.

All grievances related to the IPMP and the REDISSE project implementation in general will be collected and addressed by the PCU and/or reported to the WAHO for issues that cannot be handled at the PCU level. In addition to this, mechanisms to address grievances among health workers will also be developed (including redress mechanisms) and enforced by health facilities. Adherence to these grievance mechanisms will be monitored closely in the quality checklist for hospitals and primary health facilities. Therefore, members of the public are urged to take advantage of the GRM under this project to resolve all dissatisfactions.

REFERENCES

Environmental and Social Management Framework and Healthcare Waste Management Plan: Development System Strengthening Project, (January 2016)

Environmental and Social Management Framework: Smallholder Commercialization and Agribusiness Development Project (2015)

IPMP of the West African Agricultural Productivity Programme (2010)

Pest Control in Cassava Farms; IPM Guide for Field Extension Agent, IITA (2000)

Rotterdam Convention on the Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides in the International Trade. Text and annexes. UNEP and FAO (1998)

Stockholm Convention on Persistent Organic Pollutants (POPs). Text and annexes. UNEP and FAO, (2001).

ANNEXES

Annex 1: List of banned pesticides

1. Aldrin 2. Chlordane 3. DDT (Dichlochphenyl trichloroethane) 4. Dieldrin 5. Endrin

6. Heptachlor 7. Toxaphene 8. Chlordimeform 9. Mercury Compounds 10. Lindane

11. Parathion 12. Methyl Parathion 13. Methyl bromide 14. Hexachlorobenzene

Annex 2: List of crop and livestock protection products approved for use by NAFDAC

a) Insecticides

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

	15. Parathion – Methyl 16. Phosphamidon 17. Methidathion

b) Herbicides and fungicides

Organophosphorus	**Carbamates**	Other herbicides	Fungicides
Organophosphorus 1. Anilofos 2. Piperophos 3. Glyphosate 4. Glyphosate Trimesium (Touchdown or Sulfosate) 5. Amideherbicides (Acetochlor; Alachlor; Propanil; Butachlor; Metalochlor) Triazines and Triazoles (Atrazine; Ametryn; Desmetryn; Terbuthalazine; Terbutrex Terbutryne) Chlorophenoxy herbicides (Prometryn; Simazine; 2.4-D (2.4 Dichlorphenoxy acetiacid) 7. Urea and guadinidines ; (Diuron ; Linurex (=Linuron); Fluometurone; Chloroxuron; Neburon) Quaternary nitrogen compounds (paraquat; diquat)	1. Asulam	1. Dimethachlor 2. Metazachlor 3. Monosodium Methyl Arsonate (MSMA) 4. Fluxixpyr 5. Imazaquine 6. Triassulfuran (Amber) 7. Osethoxydim 8. Oxadiazon (Ronster) 9. Clomaone 10. Trifluralin 11. Stamp 500 (pendimethalin) 12. Fluazifop – P.butyl	1. Benomyl (Nitroheterocyclic Compound) 2. Dazomet (Thiadiazine Fungicide) 3. Folpet (Phthalimide Fungicide) 4. Metalaxyl (Acylalamine Fungcide) 5. Cyproconazole (Alto – 100SL) 6. Bavistin (Carbon) – Benzimide 7. Triadmenol (Bayfidon GR Conzole Fungicide)

Annex 3: Good Management Practices Guide and Pesticides Management Measures

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

Safe use of pesticides

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

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

Insecticides registration

Reinforce the registration process of insecticides by ensuring:

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

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

- Develop national guidelines applicable to the purchase of products intended for vector control and ensure that all the agencies buying them strictly comply with those guidelines;
- Use synthetic Pyrethroids: Deltamethrin SC, Permethrin EC, Vectron, Icon, Cyfluthrin, as recommended by the national policy;
- Refer to the guiding principles issued by WHO or FAO on calls for tenders, to FAO recommendations regarding labeling and to WHO recommendations regarding products (for indoor spraying);

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

Precautions

Labeling

Pesticides should be packaged and labeled according to WHO standards. The label should be

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

Storage and transportation

Pesticides should be stored in a place that can be locked up and is not accessible to unauthorized individuals or children. The pesticides, should, in no event, be stored in a place where they could be mistaken for food or beverage. They should be kept dry and out of the sun. They should not be transported in a vehicle that also carries food products.

In order to ensure safety during storage and transportation, the public or private agency in

charge of managing purchased insecticides and insecticide-impregnated supports, should

comply with the current regulations as well as the conservation conditions recommended by

the manufacturer regarding:

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

Distribution

Distribution should be based on the following guidelines:

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

Disposal of pesticide stocks

After the operations, the remaining stocks of pesticides can be disposed of without risk by

dumping them in a hole dug specifically or in a pit latrine. A pesticide should not be disposed

of by throwing it in a place where there is a risk of contaminating drinking water or for bathing or where it can reach a pond or a river. Some insecticides, such as pyrethroids, are very toxic for fish.

Dig a hole to at least 100 meters from any stream, well or habitat. If in hilly areas, the whole must be dug below. Pour all waters used for hand washing after the treatment. Bury all containers, boxes, bottles, etc. that have contained pesticides. Reseal the hole as quickly as possible. Packaging or cardboard, paper or plastic containers— the latter cleaned — can be burnt, if allowed, far away from homes and drinking water sources, regarding the re-use of containers after cleaning. Pyrethroid suspensions can be discharged on a dry soil where they are quickly absorb and then will go through a decomposition process making them harmless for the environment.

If there is an amount of insecticide solution left, it can be used to destroy ants and cockroaches. Simply pour a little bit of solution on infested areas (under the kitchen sink, in corners) or to rub a sponge soaked with water on it. To temporarily prevent insect proliferation, a certain amount of solution can be poured inside and around latrines or on other breeding places. Pyrethroid suspensions for mosquito nets treatment and other fabrics can be used days after their preparation. It can also be used to treat mats and rope mattresses to prevent mosquito to bite from the bottom. Mattresses can also be treated against bugs.

Cleaning of empty pesticide packaging and containers

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

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

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

completely with water and allowed to stand for 24 hours. Then it should be emptied and this process should be done over again.

General Hygiene

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

Individual protection

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

Protection of the population

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

Protective clothing

Treatments inside homes:

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

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

Preparation of suspensions

People responsible for bagging insecticides and preparing suspensions, particularly for the treatment of mosquito bed net units must take special precautions. In addition to the abovementioned protective clothing, they must wear gloves, an apron and eye protection, for example a facial shield or glasses. Facial shields protect the entire face and keep less warm. Nose

and mouth should be covered as indicated for treatment in homes. They should ensure that they do not touch any part of their body with gloves during pesticide handling.

Treatment of nets

To treat mosquito nets, clothes, grills or with tsetse traps with insecticides, it is necessary to wear long rubber gloves. In some cases, additional protection is required, for example against vapours, dusts or insecticide dusting that could be dangerous. These additional protective accessories should be mentioned on the product label and may consist of aprons, boots, facial masks, coveralls and hats.

Maintenance

Protective clothing should always be impeccably maintained and should be checked periodically to verify tearing, wearing that could lead to skin contamination. Protective clothing and equipment should be washed daily with water and soap. Particular attention should be paid to gloves and they must be replaced once they are torn or show signs of wear. After usage, they should be rinsed in water before removing them. At the end of each working day, they will need to be washed inside and outside.

Safety measures

During spraying

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

Clothing and equipment should be washed everyday. Avoid spraying organophosphate or

carbamate for more than 5 to 6 hours daily and wash hands after each filling. If Fenitrothion is

used or old stocks of Malathion are used, operators should control the level of cholinesterase in their blood every week.

Monitoring exposure to organophosphate

There are country kits available on the market to control cholinesterase activity in the blood.

If this activity is low, it can be concluded that there excessive exposure to organophosphate insecticide. These dosages should be done every week with people handling such products. Any person whose cholinesterase activity is very low should be stopped from working until it returns to normal.

Fabric spraying

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

b. Measures to minimize transportation, storage, handling and usage risks

Annex 4: WHO Pesticides Classification

Pesticides product	Active ingredient	Chemical class	Toxicological class	Main use
BASUDIN	Diazinon	Organophosphate	11	Insecticide
HERBOXONE	2,4-D	Chlorophenoxy-acid	11	Herbicide
TOPIK	Clodinafop-Propargyl	Arylozyphenoxy propionics	111	Herbicide
AATREX	Atrazineq	Triazines	U	Herbicide
MACHETE	Butaclor	Chloroacetanilides	U	Herbicide
CERTAINTY	Sulfosulfurone	Sulfonylureas	U	Herbicide
ERADICANE	EPTC	Carbamides	11	Herbicide
LASSO	Alachlone	Chloroacetanilides	111	Herbicide
DECIS	Deltamethrin	Pyrethroides	11	Insecticide
ALTO	Cyproconazol	Triazoles	111	Fungicide
SENCOR	Metribuzin	Triazines	11	Herbicide
CONFIDOR	Imidacloprid	Neonicotinides	11	Insecticide
GRANDSTAR	Tribenulon-methyl	Sulfonylureas	U	Herbicide

Annex 5: WHO Pesticides Classification

Code of Conduct - 2001 revised version	Code of Conduct - 1989 amended version
10.1 All pesticide containers should be clearly labelled in accordance with applicable guidelines, at least in line with the FAO guidelines on good labelling practice (3).	**10.1** All pesticide containers should be clearly labelled in accordance with applicable international guidelines, such as the FAO guidelines on good labelling practice.
10.2 Industry should use labels that:	**10.2** Industry should use labels that:
10.2.1 comply with registration requirements and include recommendations consistent with those of the recognized research and advisory agencies in the country of sale;	**10.2.1** include recommendations consistent with those of the recognized research and advisory agencies in the country of sale;
10.2.2 include appropriate symbols and pictograms whenever possible, in addition to written instructions, warnings and precautions in the appropriate language or languages (3);	**10.2.2** include appropriate symbols and pictograms whenever possible, in addition to written instructions, warnings and precautions;
10.2.3 comply with national or international labelling requirements for dangerous goods in international trade and, if appropriate, clearly show the appropriate WHO hazard classification of the contents (3,35,36);	**10.2.3** in international trade, clearly show appropriate WHO hazard classification of the contents (11) or, if this is inappropriate or inconsistent with national regulations, use the relevant classification;
10.2.4 include, in the appropriate language or languages, a warning against the reuse of containers and instructions for the safe disposal or decontamination of used containers;	**10.2.4** include, in the appropriate language or languages, a warning against the reuse of containers, and instructions for the safe disposal or decontamination of empty containers;
10.2.5 identify each lot or batch of the product in numbers or letters that can be understood without the need for additional code references;	**10.2.5** identify each lot or batch of the product in numbers or letters that can be read, transcribed and communicated by anyone without the need for codes or other means of deciphering;
10.2.6 clearly show the release date (month	**10.2.6** are marked with the date (month and

and year) of the lot or batch and contain relevant information on the storage stability of the product (21).	year) of formulation of the lot or batch and with relevant information on the storage stability of the product.
10.3 Pesticide industry, in cooperation with government, should ensure that:	**10.3** Industry should ensure that:
10.3.1 packaging, storage and disposal of pesticides conform in principle to the relevant FAO, UNEP[10], WHO guidelines or regulations (27,28, 37, 39, 40) or to other international guidelines where applicable;	**10.3.1** packaging, storage and disposal of pesticides conform in principle to the FAO guidelines for packaging and storage, the FAO guidelines for the disposal of waste pesticides and containers, and WHO specifications for pesticides used in public health;
10.3.2 packaging or repackaging is carried out only on licensed premises where the responsible authority is satisfied that staff are adequately protected against toxic hazards, that the resulting product will be properly packaged and labelled, and that the content will conform to the relevant quality standards.	**10.3.2** in cooperation with governments, packaging or repackaging is carried out only on licensed premises where the responsible authority is convinced that staff are adequately protected against toxic hazards, that the resulting product will be properly packaged and labelled, and that the content will conform to the relevant quality standards.
10.4 Governments should take the necessary regulatory measures to prohibit the repackaging or decanting of any pesticide into food or beverage containers and rigidly enforce punitive measures that effectively deter such practices.	**10.4** Governments should take the necessary regulatory measures to prohibit the repacking, decanting or dispensing of any pesticide into food or beverage containers in trade channels and rigidly enforce punitive measures that effectively deter such practices.
10.5 Governments, with the help of pesticide industry and with multilateral cooperation, should inventory obsolete or unusable stocks of pesticides and used containers, establish and implement an action plan for their disposal, or remediation in the case of contaminated sites (41), and record these activities	*- new paragraph in revised Code -*
10.6 Pesticide industry should be encouraged, with multilateral cooperation, to assist in	*- new paragraph in revised Code -*

disposing of any banned or obsolete pesticides and of used containers, in an environmentally sound manner, including reuse with minimal risk where approved and appropriate.		
10.7 Governments, pesticide industry, international organizations and the agricultural community should implement policies and practices to prevent the accumulation of obsolete pesticides and used containers (37).		*- new paragraph in revised Code -*