African Forest Forum

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Protocol for surveillance of forest and tree pests in West and Central Africa

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Paul Bosu

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Acronyms and abbreviations

AFF	African Forest Forum
AU	African Union
CABI	Centre for Agriculture and Biosciences International
CSIR	Council for Scientific & Industrial Research
ECCAS	Economic Community of Central African States
ECOWAS	Economic Community of West African States
FAO	Food and Agriculture Organization
FORIG	Forestry Research Institute of Ghana
IAPSC	Inter-African Phytosanitary Council
IPPC	International Plant Protection Convention
ISPM	International Standards for Phytosanitary Measures
NPPO	National Plant Protection Organization
RPPO	Regional Plant Protection Organization
SFM	Sustainable Forest Management
SPS	WTO Agreement on the Application of Sanitary and Phytosanitary measures
W/C	West and Central (Africa)

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Executive Summary

This draft protocol has been prepared to guide regional and national phytosanitary practitioners in West and Central Africa to develop and implement forest and tree pest and disease surveillance programmes. The protocol has been drafted cognizant of the International Plant Protection Convention (IPPC) and the various guidelines of the International Standards for Phytosanitary Measures (ISPMs). After the introduction, the requirements and strategies for pest surveillance, including the roles of regional (RPPOs) and national (NPPOs) plant protection organizations in the sub region are discussed. General requirements for surveillance programmes in the region will include information and data management, stakeholder participation in information collection, database creation and management, and information sharing across jurisdictions. The protocol also provides highlights on strategies and guidelines for undertaking specific surveys at national and regional levels. Lastly, requirements for diagnostic services, capacity development, research and development, funding as well as advocacy and awareness creation have been provided.

CHAPTER 1: INTRODUCTION

1.1 RATIONALE FOR THE PROTOCOL

Surveillance of forest and tree pest and disease in the West and Central (W/C) Africa is very limited. While the required policies and laws for effective implementation of phytosanitary programmes are developed, this has not translated into action, especially with respect to forest and tree pests. Availability of good phytosanitary policies and laws is only a first step towards an effective pest surveillance and management system. Many African countries have a deficit in phytosanitary capacity. For instance, most countries in W/C Africa do not have rigorous programmes in place to facilitate pest reporting by individuals and organizations whose activities predispose the environment to pests and disease infestations. This is because the tools and techniques (protocols, operational plans, guidelines, manuals, etc) necessary for action have either not been developed or formalized. Availability of a protocol for the surveillance of forest and tree pests in the sub region will create an enabling environment for member countries to implement surveillance programmes, and ultimately enhance phytosanitary actions and services. A well thought out surveillance protocol will ensure that the information gathered are based on scientific methods, and thus are of good quality, credible and reliable.

1.2 PURPOSE OF THE SURVEILLANCE PROTOCOL

The purpose of the protocol is to provide a framework necessary to implement efficient forest pest surveillance programmes in W/C Africa. It provides an outline based on which RPPOs and member countries can prepare regional and country specific protocols and guidelines for both general surveillance and specific survey programmes.

1.3 DEFINITIONS AND TERMS

By definition, surveillance is an official process which collects and records data on pest occurrence or absence by survey, monitoring or other procedures (ISPM No. 5, 2010). There are two main types of surveillance systems, viz. general surveillance and specific surveys. General surveillance is “an official process whereby information on particular pests which are of concern for an area is gathered from many sources, wherever it is available and provided for use by the National Plant Protection Organization (NPPO)”. Specific survey is also “an official process by which information on pests of concern on specific sites in an area is collected over a defined period of time”. There are three types of specific surveys:

- *Delimiting survey* is conducted to establish the boundaries of an area considered to be infested by or free from a pest (FAO, 1990).
- *Detection survey* is conducted in an area to determine if pests are present (FAO, 1990; revised FAO, 1995).
- *Monitoring survey* is an ongoing survey to verify the characteristics of a pest population (FAO, 1995).

Information gathered through pest surveillance may be used to:

- conduct pest risk analyses to justify regulating a particular pest and to require precautionary phytosanitary measures from trade partners;
- establish and maintain pest-free areas to convince trade partners that the commodities from those areas are free of certain pests and should be exempted from quarantine measures;
- aid the early detection of new pests;
- compile host and commodity pest lists and distribution records; and,
- report to other organizations, such as RPPO and FAO.

1.4 GEOGRAPHIC COVERAGE

This protocol has been developed for use by member countries in the W/C Africa region. There are in all 24 countries, belonging to the ECOWAS and ECCAS economic blocks:

ECOWAS (West Africa): Benin, Burkina Faso, Cape Verde, Gambia, Ghana, Guinea Bissau, Ivory Coast, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo.

ECCAS (Central Africa): Angola, Burundi, Cameroon, Congo, Democratic Republic of Congo (DRC), Gabon, Equatorial Guinea, Chad and Sao Tome and Principe.

1.5 CATEGORIES OF PESTS

Major pests of trees and forests in the subregion are insects and fungal pathogens. However, diseases caused by bacteria, viruses, nematodes, molluscs and invasive plants also do occur.

1.6 FOREST TYPES

With the exception of a few plantations of tropical pines in the region, tree species in W/C Africa are essentially hardwoods. Forest types include Evergreen rainforest, Semi-deciduous forest, Savannah Woodlands and the Sahel Savannah. Natural forests are highly diverse, especially in the rainforest zone, and generally resilient to pest and disease attacks. In the humid zone, common species include the Meliaceae (Khaya and Entandrophragma spp.), Milicia spp., Terminalia spp., Triplochiton scleroxylon and Ceiba pentandra. In the savannah zone, Vitellaria paradoxa, Parkia spp., Acacia spp. and Khaya senegalensis occur, while species of Acacia (A. tortilis, A. senegal and A. laeta) are common in the Sahel region. Other species in the Sahel are Commiphora africana, Balanites aegyptiaca, Faidherbia albida and Boscia senegalensis. Plantation forests in the sub region comprise mainly introduced species, such as Eucalyptus, Tectona grandis, Cedrela odorata, Gmelina arborea, Azadirachta indica and Casuarina equisitefolia.

Within cities and towns, Terminalia mentaly, T. catappa, Milletia thonningii, Polyalthia longifolia (weeping willow), Senna siamea (Siamese cassia) and Acacia auriculiformis are widely planted as shade and avenue trees.

1.7 RISK AREAS

The following are target areas for pest and disease infestations in the sub region:

- Tree Plantations, including both native and introduced species.
- Tree nurseries.
- Horticultural yards, especially those in cities and towns.
- Fruit and tree seed orchards.
- Arboreta, parks and gardens.
- Shade and avenue trees within cities, towns and villages.
- Native forest stands, including national parks and other conservation areas.

1.8 PATHWAYS OF INTRODUCTION

Pathways of introduction of pests into the region are largely through major ports of entry and national border posts. Source materials include planting material imported for research or general purpose planting, agricultural and forest products, and wood packaging material (dunnage). In W/C Africa, pests and diseases can cross national borders through natural dispersal, which may be aided by human movements across border towns/communities.

CHAPTER 2: GENERAL REQUIREMENTS OF THE SURVEILLANCE PROTOCOL

2.1 KEY PLAYERS OF THE PROTOCOL

2.1.1 National Plant Protection Organization (NPPO)

NPPOs shall be the main bodies responsible for pest surveillance at country level. Nearly all countries in W/C Africa are signatories to the IPPC and have designated national contact points that have focused most of their phytosanitary actions on agriculture. It will be necessary to re-orientate these NPPOs towards phytosanitary issues in the forest sector.

2.1.2 Regional Plant Protection Organization (RPPO)

RPPOs should coordinate pest surveillance activities within the sub-region, and report to higher authorities such as AU-IASPC, IPPC and FAO. At the same time, the information they obtain should be shared with member countries within their jurisdiction. In West Africa, this will be within the ECOWAS structure while in Central Africa it shall be within the ECCAS structure.

2.2 POLICY AND LEGISLATIVE ENVIRONMENT

The policy and legislative frameworks by which the NPPOs and RPPOs operate should be clear and unambiguous. RPPO and NPPOs should operate within the international framework and agreements under the IPPC, AU-IASPC, SPS and others. This is usually not a problem as these instruments have been developed and are in full operation on the international arena. At the regional level, there is a phytosanitary policy for ECOWAS. However, ECCAS is yet to develop its own policy and should take immediate steps to develop a regional phytosanitary policy if forest and tree pest surveillance is to be implemented under this protocol.

2.3 OPERATIONAL PLANS

RPPOs should develop strategic operational plans for pest surveillance for the region. These plans should cover all categories of pests that are of phytosanitary concern and should include regulated, non-regulated and quarantine pests. In addition, RPPOs should ensure that all NPPOs have national pest surveillance plans and guidelines, if these do not already exist. The RPPO should be ready to provide technical backstopping for the preparation of these strategic documents. Each country (NPPO) should have an organizational chart of pest surveillance service.

2.4 LINKAGES AND OPERATIONAL NETWORKS

As the function of the RPPO is more administrative for coordination of the NPPO activities, they should build effective linkages and networks with the NPPOs. In addition, they should build strong linkages with regional and international organizations and experts that will provide support for the implementation of phytosanitary programmes within the sub-region. The networks could include research institutions, universities, museums, centers of excellence, industries, trade organizations, professional bodies and farmers. The operation of the RPPO will focus primarily on general surveillance, involving collection, storage and dissemination of information on pests at regional level. If necessary, RPPOs will commission or organize specific surveys if it is found that a particular pest of concern threatens the sub-region. In such instances, the RPPO should conduct the survey in close collaboration with the NPPOs. The NPPOs shall undertake both general surveillance and specific surveys within their national borders. They will however need to share information with the RPPO as well as with neighbouring countries.

CHAPTER 3: GENERAL SURVEILLANCE PROGRAMMES

In the context of general surveillance, RPPOs and NPPOs main objectives shall be collection, storage and retrieval of information on pests. They should maintain regular communication with all relevant national institutions, which are the main sources of information for phytosanitary actions. In addition to official interactions, valuable information could be obtained from the websites, annual reports, scientific publications (journals, bulletins, newsletters, monographs, etc). RPPOs and NPPOs should have a system in place to verify and authenticate all information received. This could be done through consultation with known experts and credible regional and international bodies such as CABI and FAO.

3.1 INFORMATION AND DATA MANAGEMENT

Each country should develop a well-structured system for the collection, storage and reporting of pest surveillance information. Additionally, there should be a system or procedure in place to allow for regular review of the performance of the pest surveillance programme or service. NPPOs should ensure that all the required information on pests is provided for the records. According to 1SPM 27, the standard set of information on a pest shall include: scientific name of pest, scientific name of host, plant part affected, means of collection, date and name of collector, date and name of identifier, date and name of verifier, geographic location.

3.2 STAKEHOLDER PARTICIPATION IN INFORMATION COLLECTION

Every survey activity is of particular interest to a group of individuals, organizations or region. To ensure that the outcome of a survey is of relevance to the target stakeholder group, it is important to include them in the planning and execution of the survey programme. Their participation could be in the form of funds, logistics, or provision of general information on the pest, including arrival, host range, symptoms, and dispersal mechanisms.

3.3 DATABASE CREATION AND MANAGEMENT

3.3.1 National Database

The NPPO should create a credible national database on pests to enable easy retrieval and usage. The database should be regularly updated and made readily available to relevant stakeholders as well as the general public.

3.3.2 Regional Database

The RPPOs should also create a database with information sourced primarily from the NPPOs as well as IPPC, FAO, SPS and international databases.

3.3.3 Pest information sheets

RPPOs and NPPOs should assemble pest information sheets on key pests of phytosanitary concern in the country or region.

3.4 INFORMATION SHARING ACROSS JURISDICTIONS

NPPOs should make information they gather available to the RPPOs, AU and FAO. This should be done systematically and through formal arrangements between the NPPO and the parties concerned.

CHAPTER 4: SPECIFIC SURVEY PROGRAMMES

4.1 ROUTINE INSPECTIONS AT PORTS AND BORDER-POSTS

NPPOs should regularly report seizures of all suspected pests from ports and border-posts to the RPPO. Additionally, regular surveys and inspections should be in areas where especially air and sea cargo are kept. These should include detailed information on the pests, potential hosts, threat levels, and any other information as required under the ISPMs.

4.2 OPERATION STRATEGIES

Specific surveys should usually be done by NPPOs at the national level. However, it may be necessary for the RPPO to commission a specific survey when a particular pest threatens the entire region or several countries within the region. In such circumstances, the RPPO should provide the funding for such surveys and as such monitor the process.

The process of undertaking a *region-wide survey* can take one of several ways. First, the RPPO can select an expert or team of experts to visit relevant countries to undertake the surveys in collaboration with the NPPOs and their teams. Alternatively, the RPPO can issue directive to the relevant NPPOs with clear instructions/guidelines for undertaking the survey independently in each of concerned countries. The RPPOs will then collate and analyze results obtained from the countries. Such action could be undertaken under the framework of the regional economic block.

In this regard, the NPPOs should have written agreements with private or public organizations to define their mandates, functions and responsibilities to undertake specific surveys. These organizations usually include research institutes, universities and industries. The agreements should cover survey types, surveys related to outbreaks, surveys related to pest-free areas, areas of low pest prevalence, etc.

Operational manual: the procedures describing the operation of specific surveys should be clearly spelt out in the manual. The manual should be reviewed periodically by the NPPOs in collaboration with key partners. In addition, NPPOs should establish strong linkages with the RPPO and other external organizations. NPPOs should engage the services of relevant local stakeholders to support and improve the quality of the surveillance service. The agreements should be such that the organizations can be called upon to undertake emergency pest surveys, when necessary.

4.3 GUIDELINES FOR SPECIFIC SURVEYS

According to ISPM 6, specific surveys may be *delimiting, detection or monitoring* surveys. It also stipulates that each of the surveys should follow a plan approved by the NPPO. ISPM 5 provides definitions for the three types of surveys as follows:

- *Delimiting survey:* Survey conducted to establish the boundaries of an area considered to be infested by or free from a pest (FAO, 1990).
- *Detection survey:* Survey conducted in an area to determine if pests are present (FAO, 1990; revised FAO, 1995).
- *Monitoring survey:* Ongoing survey to verify the characteristics of a pest population (FAO, 1995).

The following are general steps to follow when undertaking a specific survey:

a. **Title of the survey:** Record the title of the survey.
b. **Purpose:** The purpose of the survey must be clearly stated.
   Examples of purposes for a survey may include:
   - ✓ development of pest list;
   - ✓ demonstration of a pest-free area or places of low pest prevalence for trade purposes;
   - ✓ development of a baseline list of pests before ongoing monitoring;
   - ✓ early detection of exotic pests;
   - ✓ early detection of established organisms becoming pests;
   - ✓ delimiting the full extent of a pest following an incursion; and/or,
   - ✓ monitoring the progress in a pest eradication campaign.
c. **Target pests:** Detailed information on the target pest (s) should be provided if known. This should include names (scientific and common names), life cycle, dispersal modes, and diagnostic characteristics. Not all surveys are conducted with a target pest in mind; in such instances this information will not be needed.
d. **Host species:** The host species and any alternative hosts should be stated. In the case of commodity pest lists, indicate the target commodity (ies).
e. **Scope of the survey:** The geographic area of the survey (site/community/district/province, etc.) should be indicated. In addition, the production system and season should be clearly defined.
f. **Timing:** Indicate the dates, frequency and duration of the study.
g. **Statistical basis:** For most surveys, an indication of the statistical basis for the sampling should be provided. Also, sample size, confidence level, selection of and number of sites, sampling frequency and assumptions should all be determined statistically.
h. **Survey methodology**: Details of how the survey will be conducted should be provided. The methodology will generally include:
   - ✓ Sampling procedures, e.g. attractant trapping, whole plant sampling, visual inspection, sample collection and laboratory analysis.
   - ✓ Diagnostic approaches (indicate laboratory, experts, reference materials, taxonomic keys, etc. to be used in diagnosis).

- ✓ Data storage procedures (indicate how this will be done, software, etc.).
- ✓ Personnel involved (list the key personnel involved - their roles, expertise, etc.).

i. **Permits and permissions:** These should be obtained in good time to allow for smooth implementation of the field survey once it starts.
j. **Pilot surveys or reconnaissance visits:** This will be helpful in fine-tuning the methodology and establishing rapport with the stakeholders.
k. **Undertake survey:** This should involve collection of data and samples.
l. **Data analyses.**
m. **Report results:** Format for reporting should follow standard procedures. Also, results should be sent to all relevant stakeholders – other NPPOs, RPPO, FAO and IPPC. Further details on survey procedures can be found in ISPM 6.

CHAPTER 5: ADDITIONAL REQUIREMENTS

5.1 DIAGNOSTIC SERVICES

Requirements for pest diagnostics can be found in ISPM 27. NPPOs should make formal arrangements with local, regional or international laboratories to provide diagnostic services. In addition, the NPPOs should ensure that they have agreements with professionals in disciplines for which diagnosis are required. These will largely include entomologists, plant pathologists, virologists, nematologists, bacteriologists and weed scientists. Once they are identified, it will be easier to obtain prompt services when needed.

5.2 CAPACITY DEVELOPMENT

The RPPO should work in close collaboration with NPPOs to develop capacity for the implementation of phytosanitary measures. RPPOs should be involved in curriculum development for the training of phytosanitary and surveillance personnel at the regional and national levels. Training must be provided to key staff involved in phytosanitary activities. This will usually be in the form of short courses, workshops and seminars on specific aspects of phytosanitary measures. NPPOs should work with their respective government ministries and departments to develop the institutional capacity for phytosanitary work.

5.3 RESEARCH AND DEVELOPMENT

Research and development should be an integral part of national and regional pest surveillance programmes. There are several reasons why this must be so. Firstly, the effect of climate change on pest biology, ecology and general dynamics demands that scientists and phytosanitary practitioners regularly update their knowledge and understanding of the local and national pest situations. Secondly, the increase in world trade has resulted in increase in the introduction of pests into new environments globally, which requires that research to understand the complexities that result when organisms are moved to new environments. Finally, there is currently increased interested in tree planting under various programmes/initiatives such that these investments should be protected against pests and diseases. Research is therefore needed to regularly update phytosanitary practitioners on emerging trends and challenges.

5.4 FUNDING

Funding is a major challenge to the implementation of surveillance programmes in the sub- region, because of the limited interest of national authorities in phytosanitary programmes. Where governmental support is limited, and the NPPO is unable to generate funds from its operations, it should actively source support from industries and trade organizations with operations that could be at considerable risk to pest infestations. Such organizations could be moved to contribute if the NPPO carries out an effective advocacy and awareness programme. Additionally, NPPOs should impress upon governments to ensure that funds are allocated to surveillance activities for all relevant forest management projects supported with donor funds.

5.5 ADVOCACY AND CREATION OF AWARENESS

A well-planned advocacy and awareness creation programme is necessary for a variety of reasons. It will draw the attention of national authorities to the relevance of pest surveillance programmes to improve access to international and regional markets. Furthermore, the potential of surveillance activities to prevent or minimize massive destruction of natural resources as a result of alerts or established early warning systems must be made clear. With this understanding national authorities will be more apt to provide political and logistical support to NPPOs and surveillance programmes.

Advocacy and awareness creation should also be targeted at private sector organizations with operations that can suffer from pest outbreaks. Such organizations and individuals will usually accept surveillance programmes and be willing to provide logistical support, as well as promote the need for surveillance programmes within government circles and among key stakeholders. Lastly, awareness among academia, media and the general public will be needed to garner support for surveillance activities. Whatever the circumstances, advocacy and awareness activities should be stepped up in the event of unexpected pest outbreaks or an issue of significant phytosanitary concern in the country or region.

APPENDICES

APPENDIX 1: TOOLS AND MATERIAL

Tools for Pest Surveillance
- Sample collection kits
- Pest traps (plant diseases, insects and mites)
- Camera
- Nets
- Specimen bottles
- Inspection kits (scalpel, forceps, probes, magnifying glass)
- Chemical reagents

General Identification Guides
- Forestry Compendium/ Forest and Tree Database
- Global Invasive Species Database
- Diagnostic insect pest books
- Pest illustrated handbooks
- Identification fact sheets
- Pest lists
- Taxonomic identification keys

Materials for Training
- Training curricula and manuals
- Teaching aids
- LCD Projectors
- Pictures, photographs, specimens, leaflets, fact sheets, herbarium specimens
- Guidelines for plant pest surveillance
- Surveillance team work plans
- Pest record books
- Case studies reports
- Standard operating procedures

Materials/Resources for Advocacy Creation and Awareness
- Posters, brochures, fact sheets and leaflets on quarantine pests
- Notice to airports, seaports and border posts
- Videos on pests, surveillance operations, etc

APPENDIX 2: INTERNATIONAL STANDARDS FOR PHYTOSANITARY MEASURES (ISPM, FAO, ROME)

ISPM No. 2: Framework for pest risk analysis, 2007.
ISPM No. 3: Guidelines for the export, shipment, import and release of biological control agents and other beneficial organisms, 2005.
ISPM No. 4: Requirements for the establishment of pest free areas, 1996.
ISPM No. 5: Glossary of phytosanitary terms, 1995.
ISPM No. 6: Guidelines for surveillance, 1997.
ISPM No. 7: Export certification system, 1997.
ISPM No. 8: Determination of pest status in an area, 1998.
ISPM No. 9: Guidelines for pest eradication programmes, 1998.
ISPM No. 10: Requirements for the establishment of pest free places of production and pest free production sites, 1999.
ISPM No. 11: Pest risk analysis for quarantine pests, including analysis of environmental risks and living modified organisms, 2004.
ISPM No. 12: Guidelines for phytosanitary certificates, 2001.
ISPM No. 13: Guidelines for the notification of non-compliance and emergency action, 2001.
ISPM No. 14: The use of integrated measures in a systems approach for pest risk management, 2002.
ISPM No. 15: Guidelines for regulating wood packaging material in international trade, 2002.
ISPM No. 16: Regulated non-quarantine pests: concept and application, 2002.
ISPM No. 18: Guidelines on the use of irradiation as a phytosanitary measure, 2003.
ISPM No. 20: Guidelines for a phytosanitary import regulatory system, 2004.
ISPM No. 22: Requirements for the establishment of areas of low pest prevalence, 2005.
ISPM No. 23: Guidelines for inspection, 2005.
ISPM No. 24: Guidelines for the determination and recognition of equivalence of phytosanitary measures, 2005.
ISPM No. 25: Consignments in transit, 2006.
ISPM No. 27: Diagnostic protocols for regulated pests, 2006.
ISPM No. 28: Phytosanitary treatments for regulated pests, 2007.

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