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Environment Programme

CAMEROON BIOSECURITY PROJECT

Development and Institution of a National Monitoring and Control System (Framework) for Living Modified Organisms (LMOs) and Invasive Alien Species (IAS)

Quantification of the Occurrence and Abundance of Priority Invasive Species in Cameroon

This report has been produced with the support of UNEP/GEF and the Government of Cameroon via the Ministry of the Environment, Protection of Nature and sustainable Development

Under the Supervision of :

Project Component 4 Taskforce (MINRESI)

&

Biosecurity Project Coordination Unit (MINEPDED)

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November 2017

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ABBREVIATIONS AND ACRONYMS

ANCO	Apiculture and National Conservation Organization
ARTS	African Root and Tuber Scale
AVRDC	Asian Vegetable Research Development Centre
BUCREP	Bureau Central des Recensements et des Études de Population
CAD	Cassava Anthracnose Disease
CAS	Cameroon Academy of Sciences
CBB	Cassava Bacterial Blight
CBP	Cameroon Biosecurity Project
CABI	Center for Agriculture and Biosciences International
CIAT	Centre Internationale de l'Agriculture Tropicale
CIBIC	Commonwealth Institute for Biological Control
CIG	Common Interest Group
CIFOR	International Centre for Forest Research
CMD	Bacterial Mosaic Blight
CRD	Capital Regional District
GSP	Global Positioning Systems
ECOWAS	Economic Community of West African States
FAO	Food and Agriculture Organization of the United Nations
EBI	Encyclopaedia Britannica Incorporation
GEF	Global Environment Facility
GDP	Gross Domestic Product
GISD	Global Invasive Species Database
GISP	Global Invasive Species Programme
GIZ	German International Cooperation Agency
IAS	Invasive Alien Species
IFAD	International Fund for Agricultural Development
IITA	International Institute of Tropical Agriculture
INS	National Institute for Statistics
IUCN	International Union for the Conservation of Nature
IWM	Integrated Weed Management
IRAD	Institute for Agricultural Research in Development
LMOs	Living Modified organisms
MINADER	Ministry of Agriculture and Rural Development
MINCOM	Ministry of Commerce

MINEDUB	Ministry of Basic Education
MINATD	Ministry of Territorial Administration & Decentralization
MINEPDED	Ministry of Environment, Protection of Nature and Sustainable Development
MINEPIA	Ministry of Livestock Fisheries and Animal Industries
MINFOF	Ministry of Forestry and Wildlife
MINRESI	Ministry of Scientific Research and Innovation
MINSANTE	Ministry of Health
NGO	Non-Governmental Organisations
NTFPs	Non Timber Forest Products
PIDMA	Programme d'Investissement et de Développement des Marchés Agricoles
SODEPA	Livestock Development Corporation
UNEP	United Nations Environment Programme
US/EPA	United States Environmental Protection Agency
WRB	Wouri River Basin
WTG	Watershed Task Group
WWF	World Wildlife Fund for Nature

PREFERRED WAY TO CITE THIS PUBLICATION

MINEPDED (2017). Quantification of the Occurrence and Abundance of Priority Invasive Species in Cameroon. Report submitted to MINEPDED under the UNEP/GEF Cameroon Biosecurity Project: Development and Institution of a National Monitoring and Control System (Framework) for Living Modified Organisms (LMOs) and Invasive Alien Species (IAS), Yaoundé, Cameroon.

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ACKNOWLEGEMENTS

The authors are grateful to the following persons who assisted them in accomplishing their assignment:

GENERAL PLANNING FOR INFORMATION COLLECTION

Mr. Hele Pierre the Honorable Minister of Environment, Protection of Nature and Sustainable Development for the introductory letters which enabled the consultants to be received and assisted in the Littoral and Centre Regions. Mr. Rigobert Ntep, CBP Project Coordinator; Mr. Declan Chongwa Ambe, CBP Project Technical & Administrative Assistant; Clouvis Johnbang CBP Financial & Administrative Assistant; Marthe Mendomo, Dr. Mbah David, CBP Technical Adviser; Dr Roger Noel Iroume, Head of Component 4; Mrs. Priscilla Song, Co-Lead of Component 4; Mr. Koulagna Denis, General Manager of SODEPA;

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For Contacts on Cassava Mealybug Invasion

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Woundi Joseph Meyabene Helène Marius, all farmers; Amang Adamou Divisional Delegate MINEPDED Mbam et Inoubou; Effala Gaston Divisional Delegate MINADER Mbam et Inoubou; Yogo Bogiong Chief of Post DDM Bokito; Bodiombo André, farmer Kedia village; Eveng Joseph Desire Divisional Delegate MINADER Nyong et Kelle; Amoiugou Susane Nathalie neé Mpord Divisional Delegate MINEPDED Nyong et Kelle; John Li Agbe Stephane Chef Section des Appuis aux projets et investissements; Nbee Bikim Jacque staff Divisional Delegate MINADER Nyong et Kelle Matip Matip Farmer Muanda Village Ezeka; Bisso Etienne Daniel Nguibazzal Village; Lipenda Leontine Farmer; Ayissi Bernabe Pierre Divisional Delegate MINEPDED Nyong et So'o; Libala Jean Bosco Sub Divisional Delegate Mbalmayo; Adidjatu Musa, Farmer.

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EXECUTIVE SUMMARY

This study was undertaken to establish the framework of biological invasions in Cameroon. Two studies have been conducted on the quantification, occurrence and abundance of the *Cassava mealybug* (*Phenacoccus manihoti*) in the Centre Region and the *Water hyacinth* (*Eichhornia crassipes*) in the Littoral Region of Cameroon. The studies were carried out in October 2017 simultaneously toward the end of the rainy season when the two species are in their high level of performance in their respective localities. Studies on the invasiveness of the *Cassava mealybug* were complemented by IITA's biological control strategy in which the natural enemy (*Epidinocarsis lopezi*) was introduced in all of sub-saharan Africa as a control agent against *P. manihoti* For the *Water hyacinth* in the Littoral, local control methods are being used to contain the weed. The control methods being used do not yield good results because of slow and inadequate means. Satellite images taken in October 2017 show that about 25.52% of its surface area of Douala IV is covered by *Water hyacinth*, while in Douala V, 1.6% of its surface area and in Bonalea 2.0% of its surface area comparative growth studies have also shown that between 2010 and 2017, the mass of *Water hyacinth* has increased quantitatively. In spite of the economic values attached to it by some communities, the weed remains a fast invader.

Until recently, little was known about invasive species in Cameroon and their impact on the country's economy. This poor knowledge about invasives was demonstrated in a workshop on invasives when the Cameroon Delegation reported *Chromonaela odorata* as the only species considered to be invasive in Cameroon (Nyasse *et al*., 2004). This declaration however enabled Cameroon gain the recommendation of setting up a programme to prioritize the monitoring of major and minor invasive species in the national territory, Improvement of knowledge on invasive species continued to gain importance among biodiversity stakeholders. In 2012, in a Training of Trainers Workshop on the Introduction to the Integrated Management of Biological Invasions using the Principles of the Ecosystem Approach, 31 species were identified as invasives (MINEPDED, 2012). More surveys through the CBP activities on biological invasions increased the number to 164 species grouped into 4 taxa - Crop pests and diseases, Plants, Animal and human diseases, and Aquatic life and animals (MINEPDED, 2016). Still within the programme design of Component 4 of the CBP, there is emphases on "Awareness" aimed at sensitizing the Cameroonian public on the proper management of invasive species. More information is being added to the existing knowledge particularly with the participatory efforts of the public and private sectors on biodiversity management programmes.

Depending on the zone of activity, invasive species can affect the livelihood, economy and the environment of a community. The *Water hyacinth* is seen to have badly affected the lives of the riparian communities of the Wouri River Basin in the Littoral Region while the *Cassava Mealybug* has continued to reduce cassava yields in cassava growing regions of Cameroon. Working in Mbalmayo using different clones of 5 cassava genotypes, Ngeve discovered that the *Cassava root mealybug* (*Strictococccus vayssierei*) seriously threatened the production and utilization of cassava in Cameroon, (Ngeve, 2003). Tifu (2012) showed how income-generating activities fishing, sand extraction, river transport and even agriculture were seriously affected by the rapid invasion of *Water hyacinth* in the WRB. He highlighted the distortion of the livelihood of over 900.000 inhabitants within the riparian communities and the extinction of some villages[1]. In the assessment study of the socio-economic impact of *Water hyacinth* invasion within the riparian communities of the Wouri River Basin, Kenfack *et al*., (2004) found that the people's income from fishing had dropped by 75%, while income from sand extraction dropped by 25% and that from water transport by 75%. Although no disease was reported, unconventional breeding programmes involving some species, during the 2012 quantification survey of invasive species.

Work on invasives in Cameroon has progressed from identification, quantification to management, control systems and procedures. Within the structures of the CBP, coordination has been considered such that several government ministries and other stakeholders participate in project activities to get properly informed, involved and be fully participative. Moreover, the CBP activities are divided in 4 components and each component is headed by key stakeholders' ministries. Such a structure enhances collaboration and information sharing, research and capacity building.

Problems associated with invasive species in Cameroon include poor knowledge of invasives, consensus in the meaning of Biosecurity,[2] lack of baseline data, cost and availability of inputs and climate change. Invasive species need to be identified, managed and controlled. Overcoming these problems will require understanding the ecosystems and their services. This implies the use of information for policy makers and economic planning. Today, *Water hyacinth* is being used as a raw material for the manufacture of house-hold material, paper, manure and animal feed. The Water Task Group is using the initiative and is now planning to construct a processing unit for the River Wouri Riparian Communities (WTG, 2011).

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[1]The village of Mousoko with an initial population of 400 people was left with no inhabitants while Bongo village is close to extinction with only 3 inhabitants at the time of survey 2012.

[2]There is need to have an appropriate term in the French language which distinguishes Biosafety and Biosecurity. In the French language, both terms mean the same

The *Cassava mealybug* has continuously affected cassava yields in many cassava producing areas in Cameroon. Cassava today serves as an export product to several countries in the Central African sub-region and even abroad. The need to improve on its production therefore requires precautionary measures to reduce disease agents like the *mealybug* and associated factors which affect it production.

There is need to apply current management techniques and appropriate control measures to enable the problems of invasives to be adequately addressed in Cameroon.
The approach used in this study is to situate the information so far gathered towards the management of invasive species in Cameroon. Within the scope of the CBP and research so far conducted, much has been done already although efforts are still ongoing. This activity is designed:

- ✓ To quantify, list, analyse baseline data of a common water invasive plant to illustrate the nature of aquatic invasives and the *Cassava mealybug* to show the degree of damage by crop pests on Cassava production.
- ✓ The visit of 2 pilot sites chosen for the study, Littoral Region for the *Water hyacinth* and Centre Region for the *Cassava root mealybug* will enable the authors make an up-to–date appraisal of the damage caused by invaders. Victims of the invasion (farmers and fishermen) river transporters will be interviewed to assess the extent and progress and effectiveness control measures.

In both cases, sampling was done using the methodology described in the report and .make a comparative analysis using existing information will enable the study team draw conclusions and make useful recommendations.

The conclusions and next steps are meant to sensitize the public especially the rural masses on the need to master the various impacts caused by biological invasions and adopt sound management and control techniques. The need has been expressed for biodiversity stakeholders to cooperate with policy-makers and resource managers on the control of biological invasions and protection of our environment and its components. This should continue to be the concern of everybody.

THE MINISTER OF ENVIRONMENT,
PROTECTION OF NATURE AND
SUSTAINABLE DEVELOPMENT

DEFINITIONS OF TERMS USED IN THE TEXT

Abundance: Extremely plentiful, over sufficient quantity of supply

Crop Pests: Any animal, plant or insect that causes harm to crops

Frequency: The rate at which something occurs over a particular period of time or in a given sample

Control Area: Defined or demarcated space meant for a special purpose

Control Method for invasive species: Method used to reduce minimise or eradicate the occurrence or impact caused by an invasive species

Estuary: The tidal mouth of a large river, where the tides meet the stream

Evapotranspiration: The transfer of water from land to the atmosphere by evaporation from the soil and other surfaces and by transpiration from plants

Impact by an invasive species: The effect of an invasive species to the environment, human life, economy biodiversity in general.

Microecosystem: Exists in locations precisely defined by critical environmental factors within small or tiny spaces. Such factors may include temperature, pH, chemical milieu, nutrient supply, presence of symbionts or solid substrate, gaseous atmosphere (aerobic or anaerobic) etc.

Natural Enemy: An organism that kills decreases the reproductive potential of or otherwise reduces the numbers of another organism. Natural enemies that limit pests are key components of integrated pest management programmes.

Occurrence: Something that happens or takes place

Phyto-remediation: Direct use of living plants for in-situor in place, removal, degradation or containment of contaminant in soil, sludges, sediments, surface water and ground water.

Proliferation: A rapid increase in the amount of something, the action of becoming larger or more extensive

River Basin: The portion of land drained by a river and its tributaries. It encompasses all the land surface dissected and drained by many streams and creeks that flow downhill into one another.

Riparian Communities: Human settlements whose activities, and livelihood depend on the water mass around them.

Siltation: A process by which water becomes dirty as a result of fine mineral particles in the water

Study Area: An area limited or recommended for a specific study

Symbiosis: Any type of close and long term biological interaction between two different biological organisms be it mutualisation, communalistic or parasitic.