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Clearing Kariba weed (*Salvinia molesta*) from Lukanga Swamp, central Zambia (Image courtesy of BirdLife International)

# Action on Invasives

## An invasive species system assessment in Zambia

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KNOWLEDGE FOR LIFE

# An invasive species assessment in Zambia

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# Executive summary

Invasive species are a serious and growing problem in Zambia. The objective of this study was to understand the current status of the invasive species system in Zambia and describe, evaluate and assess the responsiveness of the system to address the threat of invasive species to the country. A methodology was developed that identifies areas to address to strengthen the system, as well as a baseline against which changes in responsiveness of the system can be assessed at a later date if required. The methodology was based on three steps: a desk review; a stakeholder workshop; and key informant interviews. This methodology was used for the first time in Kenya in 2019 with the same approach planned for Zambia in 2020. However, due to the COVID-19 pandemic and global travel and meeting restrictions, a modified approach that concentrated on the literature/ document review and more comprehensive key informant interviews was adopted.

The findings demonstrate that the invasive species system in Zambia has many strengths including a broad range of actors active in the invasive species space, collaboration among actors who demonstrate willingness to work together, and importance given to community involvement in the control and management of invasive species. Significantly there is also clear mandate responsibility and an established framework for invasive species management in the country. However, challenges to the system remain including weak coordination/ communication, a fragmented sector-based approach to managing invasive species, institutional/ legislative gaps, monitoring and evaluation limitations and lack of training and resources.

The feedback from the key informant interviews indicates that there are generally more strengths than weakness in the invasive species system in Zambia. A significant positive is that the process of formally establishing a coordination mechanism is at an advanced stage. It is clear that Zambia has the key elements of what it takes to progress towards a highly effective invasive species system supported by several key committed and competent actors ready to deliver on their respective mandates in a collaborative manner. The next steps are ensuring the apex body and coordination mechanism is formalised with government support to provide an enabling environment.

The invasive species systems approach piloted here has facilitated stakeholder engagement in clearly defining and understanding the system in Zambia as it currently stands. Participants have successfully completed a self-assessment of system strengths and weaknesses, and provided guidance on a clear way forward based on this understanding and insight.

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# Acronyms

| | |
|---|---|
| AoI | Action on Invasives |
| ADC | Area development committees |
| BWZ | BirdWatch Zambia |
| CABI | Centre for Agriculture and Bioscience International |
| CBD | Convention on Biological Diversity |
| CIMMYT | International Maize and Wheat Improvement Centre |
| COMESA | Common Market for Eastern and South Africa |
| COVID | Coronavirus disease |
| DoF | Department of Fisheries |
| DMMU | Disaster Management and Mitigation Unit |
| DNPW | Department of National Parks and Wildlife |
| ECZ | Environmental Council of Zambia |
| EU | European Union |
| EWT | Endangered Wildlife Trust |
| FAO | Food and Agriculture Organisation |
| FAW | Fall armyworm |
| FISNA | Forest Invasive Species Network |
| FNDP | Fifth National Development Plan |
| GEF | Global Environment Facility |
| GISP | Global Invasive Species Programme |
| IAS | Invasive Alien Species |
| ICF | International Crane Foundation |
| IITA | International Institute of Tropical Agriculture |
| IPPC | International Plant Protection Convention |
| IPPM | Integrated Production and Pest Management Programme in Africa |
| IRLCO-CSA | International Red Locust Control Organisation for Central and Southern Africa |
| IUCN | International Union for the Conservation of Nature |
| KII | Key informant interview |
| LGAZ | Local Government Association of Zambia |
| MOA | Ministry of Agriculture |
| MLGH | Ministry of Local Government and Housing |
| MLNR | Ministry of Lands and Natural Resource |

| | |
|---|---|
| MTENR | Ministry of Tourism, Environment and Natural Resources |
| MWDSEP | Ministry of Water Development, Sanitation and Environmental Protection |
| NPE | National Policy on Environment |
| NBSAP | National Biodiversity Strategic Action Plan |
| NGO | Non-Governmental Organisation |
| NHCC | National Heritage Conservation Commission |
| NISSAP | National Invasive Species Strategy and Action Plan |
| NPPO | National Plant Protection Organisation |
| NPE | National Policy on Environment |
| NRM | Natural Resource Management |
| PQPS | Plant Quarantine and Phytosanitary Service |
| RBIPMA | Removing Barriers to Invasive Plant Management in Africa |
| SADC | Southern African Development Community |
| SDG | Sustainable Development Goal |
| SNDP | Seventh National Development Plan |
| UN | United Nations |
| UNEP | United Nations Environment Programme |
| UNZA | University of Zambia |
| WARMA | Water Resources Management Authority |
| WECZ | Wildlife and Environmental Conservation Society of Zambia |
| WTO | World Trade Organisation |
| WWF | World Wildlife Fund for Nature |
| ZARI | Zambia Agriculture Research Institute |
| ZAWA | Zambia Wildlife Authority |
| ZEMA | Zambia Environmental Management Authority |
| ZESCO | State owned power company in Zambia (formerly known as Zambia Electricity Supply Corporation Limited) |

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# Introduction

Invasive species (as opposed to native species) are species that, with human assistance, deliberate or inadvertent, arrive in new areas and cause damage to crops, livestock production and other economic activities, human health, and the environment. They include microbes, weeds, insects, vertebrates and other organisms. A recent example of an invasive species is the fall armyworm (*Spodoptera frugiperda*) in Africa, with potential to cause maize yield loss in the range of 8.3 to 20.6m tonnes per year if management measures are not instituted (Day et al. 2017). Only a small proportion of non-native species become invasive, but those that do cause major direct and indirect losses, including the substantial costs of managing them.

Climate change and increased trade and travel increase the risks (Early et al. 2016), while the impacts are disproportionately borne by the poor and vulnerable. Many international agreements recognise the threat from invasive species, but two are of particular relevance to CABI's mission of solving problems in agriculture and the environment. The International Plant Protection Convention (IPPC) aims to secure "common and effective action to prevent the spread and introduction of pests of plants and plant products, and to promote appropriate measures for their control". Parties to the 1992 Convention on Biological Diversity (CBD) agree in Article 8 (h) to "prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species". CABI recognises the guiding principles on invasive species adopted by the 6th Conference of the Parties to the CBD, which include the three-tiered approach to management: (i) preventing the unintentional or intentional introduction of invasive species; (ii) early detection, rapid response and eradication of new invasions (where possible); and (iii) the control and mitigation of species where eradication or containment is not feasible.

## Action on Invasives Programme

"Action on Invasives" (AoI) is a global programme managed by CABI, focusing on developing countries in Africa and Asia. The goal of AoI is to improve rural livelihoods of women, men and youth, through strengthening system capacity to prevent, eradicate, control and manage priority invasive species at local, national and regional level. There are four areas of intervention:

1. **Stakeholder engagement:** Strengthening linkages and partnerships between different public and private stakeholders to inform policy and plans, and ensure effective and coordinated responses locally, nationally and regionally.

2. **Best practice solutions:** Identifying and validating sustainable technical solutions with partners, for prevention, early detection, control and restoration.

3. **Community action:** Supporting the availability and use of information and technologies at scale, achieving improved rural livelihoods for women, men and youth.

4. **Knowledge and data:** Information resources and tools for practical decision support, meeting a wide range of user needs.

Some activities are focused on selected target species that have already invaded some (but not other) countries, while other activities concern institutional issues such as regulation of pest control products. Currently the main focus is on invasives (especially arthropods, pathogens and weeds) affecting plants in cultivated and natural ecosystems.

## The Study

The overall purpose of the AoI programme is “System capacity strengthened to enable invasive species management practices to prevent, eradicate, control and manage priority invasive species at local, national and regional level”. Three indicators have been defined: (a) Number of men, women and youth utilising and/or benefitting from best practice solutions; (b) Number of countries using invasive species knowledge and data to inform operations for prevention and management; (c) Number of countries/regions that are more responsive to invasive threats and the need to implement control measures.

CABI is leading a study focussing on the third indicator, that is exploring and developing ways to describe, evaluate and assess the responsiveness of countries to the threat of invasives through the three-tier approach described above. As part of this study a methodology has been developed that can be applied to provide an indication of opportunities for strengthening the system, as well as a baseline against which a later application of the methodology would be able to document changes in responsiveness.

This methodology was used for the first time with the aim to understand the current status of the invasive species system in Kenya and consisted of a literature/ document review, a stakeholder workshop and key informant interviews (the latter two elements conducted in-country) in 2019. The same approach was planned for Zambia in 2020 however, due to the COVID-19 pandemic and global travel and meeting restrictions, a modified approach that concentrated on the literature/ document review and more comprehensive key informant interviews was adopted.

## Key objectives

The key objectives of this work are to understand the existing invasive species system in Zambia including:

- Actor roles, responsibilities and mandates in delivering the system functions
- Nature of interactions between actors
- How the system as a whole is operating / delivering its mandate(s)

Although it was not possible to conduct the workshop, the key informant interviews aimed to allow respondents the opportunity to assess their own system strengths and weaknesses. The outcomes detailed in this report aim to help plan a way forward based on the understanding and insight gathered. It can also form either a baseline assessment or a comparative assessment if repeated, to understand what changes have happened over time within the invasive species system.

The assessment process in Zambia consisted of the following elements:

(i) Preliminary interviews of key actors to introduce the study and get inputs to inform an assessment checklist
(ii) Checklist sent to key actors for feedback on the invasive species system assessment (Appendix 1)
(iii) Following on from the checklist responses, further key informant interviews of selected actors

## Theoretical framework

The assessment method is based on a theoretical description of the component parts of an invasive species system, including the actors and organisations involved, the linkages between them, and the required outputs and overall outcomes that the system should deliver. Details of the theoretical framework are given in Additional Information 1. The framework states that actors work within each of the functions, influenced by the country context (governance, staffing etc.) to deliver the outputs of prevention, detection and control of invasive species to increase or maintain productivity, biodiversity and human health (Fig. 1). Development of the assessment method was based on understanding how the actors worked

within each function, worked together, and whether as a whole the system delivered its expected results.

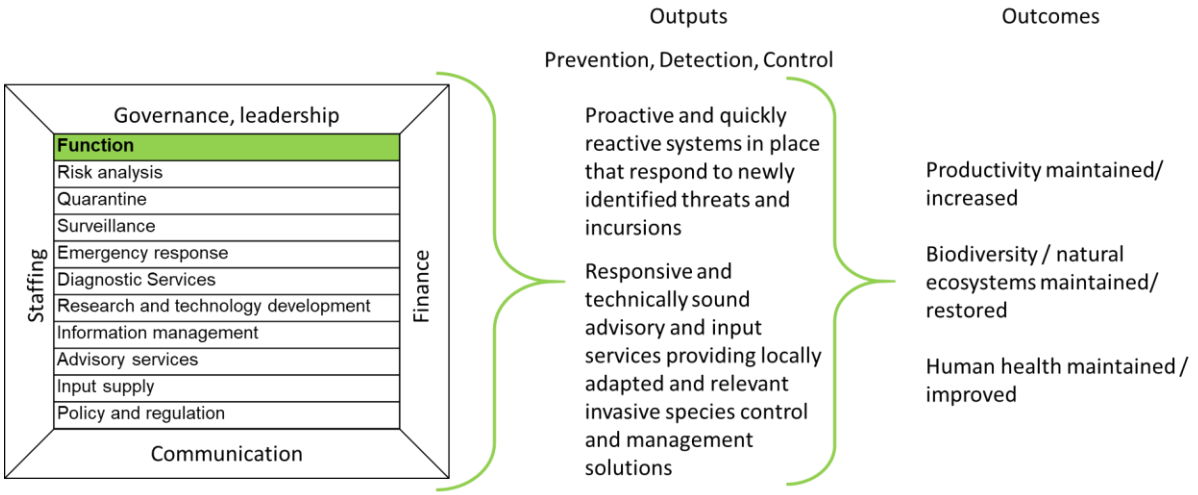


**Figure 1:** Invasive Species System Components

# Methods

## Document / literature review

A desk review of the invasive species system within Zambia was obtained from key documents. The aim of the review was to assist in providing a general understanding of the system and its functioning within Zambia and to highlight what areas need particular follow-up and inquiry. The review also helped to identify key participants for the key informant interviews. The review assisted in identifying the government departments involved in invasive species management and control, and the various key actors who contribute to the system functioning. Contextual factors such as the policy environment were also noted. Policies relevant to agriculture, environment and invasive species specifically, as well as general policies, e.g. on governance structures and institutional mandates, that determine how policies are implemented, were considered.

A lot of information was readily available from government websites, donor and research reports and the document review was a good entry point to start to understand the context. However, official policy and institutional arrangements do not always reflect reality on the ground. Therefore, the key informant interviews helped to understand what is really happening.

A list of the general sources explored includes:

• Overview documents of government structure e.g. centrally-led, devolved government

• Overview documents of structure of Ministry of Agriculture and departments responsible for extension, crop protection, livestock management, quarantine, diagnosis and link with local government structures

• Overview documents of structure of Ministry of Environment and departments responsible for environmental protection, climate change, wildlife management etc.

• Agricultural and environment policy documents / development plans

• Information on regulatory body functions, e.g. National Plant Protection Organisation (NPPO), pesticide control body

• Information on any involvement in Ministry of Trade, Ministry of Health in invasive species management

• Information on any knowledge of private traders, import/ export companies, agro-dealers, transporters on invasive species management

• Information on national research organisations and universities from websites

• Country NPPO information from International Plant Protection Convention (IPPC)

• Donor country papers e.g. Food and Agriculture Organisation (FAO), International Union for the Conservation of Nature (IUCN), World Wildlife Fund (WWF)

• Country statistics from e.g. FAOSTAT and the World Bank

• Removing Barriers to Invasive Plant Management in Africa (RBIPMA) working papers and other publications

• Research papers on invasive systems in the country

## Key informant interviews

Key informant interviews (KIIs) were conducted after the document / literature review had been completed during October and November 2020. Preliminary interviews were conducted with representatives identified from the literature review as key actors in the invasive species system in Zambia. Following these preliminary interviews, a comprehensive checklist of key questions (Appendix 1) were sent to these representatives to complete and return. Once the checklists were returned, KIIs were conducted with stakeholders where it was identified that an actor could provide greater depth of information and insight into the invasive species

system in Zambia. In addition the KIIs helped to capture additional information about contextual influences such as policy environment, institutional structures, donor influence, politics and organisational culture.

The assessment process involved representatives from the following organisations: Ministry of Agriculture (MoA), Zambia Agricultural Research Institute - Plant Quarantine and Plant Services (ZARI - PQPS), Ministry of Lands and Natural Resources (MLNR), the Forestry Department, Zambia Environmental Management Agency (ZEMA), Food and Agriculture Organisation (FAO), BirdWatch, International Crane Foundation (ICF), World Wildlife Fund (WWF), Disaster Management and Mitigation Unit (DMMU) and USAID.

All interviews were arranged with representatives from the identified organisations and conducted by Dr. Joyce M. Mulila-Mitti (in-country consultant contracted by CABI). The majority of the preliminary interviews were conducted face-to-face (adhering to appropriate COVID-secure safety measures) at the CABI offices in Lusaka, Zambia. A small proportion of interviews were conducted at the interviewee's organisation premises; when not in person the interviews were conducted virtually. The majority of the final key informant interviews were held virtually. Standard questions were used concerning the actors' role in invasive species management, what other actors they work with, what challenges they face in managing invasive species, and their opinion of the need for a coordination body to manage invasive species.

# Results

The results in this section represent both the findings from the document / literature review and the key informant interviews (where representatives of the given institutions were available). The literature review highlighted a number of key information sources/ documents. The overview of the local government system in Zambia (Zambia Country Profile 2017-18 http://www.clgf.org.uk/default/assets/File/Country_profiles/Zambia.pdf) details that the democratic republic has two spheres of government, national and local. The national government, known as the National Assembly, is governed by the president and consists of 150 elected, and 8-10 nominated, members. The local government is comprised of councils and must fulfil a range of activities from establishing and maintaining roads, provision and maintenance of water supplies, through to maintaining parks and gardens. The main legislative texts are the Local Government Act 1991 (and amendments) and the Local Government Elections Act 1992 (amended twice).

The government approved a national decentralisation policy in November 2002. The policy covers aspects such as empowering local people through setting up sub-district structures, and clearly defined roles and responsibilities for local authorities, the provinces and national government. While the reforms have resulted in significant changes in the policy framework and institutional structure of provincial, district and local governance, challenges still remain. This situation could be attributed to primarily the centralizing tendencies of the one-party state era. Consequently, the Governments' commitment to transfer functions with equivalent resources to the district and local level to support effective, democratic, participatory and responsive local governance has not yet been realised.

The Ministry of Local Government and Housing (MLGH) is responsible for overseeing local government. Local governments are called councils and there are currently 103 councils in Zambia. Area development committees (ADCs) have been created at the sub-district level to enhance community involvement in local decision-making processes. The Local Government Association of Zambia (LGAZ) is a voluntary national association for all councils with the objective of protecting and promoting the interests of local government in Zambia.

Environmental protection is delivered by both national and local government. Key actors/organisations include ministries, regulatory bodies, national research organisations, universities etc. In 2015, the Government of Zambia and the United Nations (UN) signed a Sustainable Development Partnership Framework that governs the work of all UN agencies on the Sustainable Development Goals (SDGs) in Zambia from 2016 to 2021.

## Policy and Legal framework

The agricultural sector is guided by the National Agricultural Policy 2012-2030 (2011) which undergoes periodic reviews to ensure its relevance to prevailing climatic, social and economic conditions of the country. In addition, the sector has a number of pieces of legislation some of which are outdated. A process has been initiated in the recent past to repeal, review, amend and enact new legislation aimed at providing a legal framework that will maximize sector development and growth.

As a signatory to the CBD Zambia has committed to implementing the resolutions. The results can be seen in its policies for nature, agriculture, environment, fishing, spatial planning, infrastructure, water management, social and economic activities and development cooperation. The National Biodiversity Strategies and Action Plans (NBSAPs) are the principal instruments for implementing the CBD at the national level. Zambia's current NBSAP includes a strategy aimed at controlling or preventing the spread of key IAS in support of Aichi Target

9 which states: “By 2020, IAS and their spreading pathways are identified and prioritized, controlled or eradicated, and measures are in place to manage pathways to prevent their spread and establishment.”

Invasive species are highlighted under the Government of Zambia’s Environmental Management Act, 2011 (No. 12) and associated Environmental Management (Licensing) Regulations, 2013: ‘ “IAS” [Invasive Alien Species] means an animal or plant with potential to cause harm to the environment when introduced into an ecosystem where the animal or plant does not normally exist.’ Incorporation of invasive species issues within this Act has introduced, for the first-time, potential fines and/or prison sentences for non-compliance with agreed norms for prevention, monitoring and control of IAS. Invasive alien species issues have also been included with the Fifth National Development Plan (FNDP), with introduction of targets to reduce *Mimosa pigra* (giant sensitive tree) infestation.

Under Division 8 of the Environmental Management Act, No. 12, 2011 (77-78) the prohibition of importation, introduction, etc. of IAS is outlined as well as the duty of the owner or occupier in relation IAS management. The Act covers permission for an inspector to inspect and examine any premises, vehicle, aircraft, boat, railway carriage or other conveyance where there are reasonable grounds to believe an IAS is being or has been used, stored or transported. The Act also states that the Minister shall, in consultation with the Agency and relevant appropriate authority, prepare guidelines for the management of environmental emergencies including: “(d) natural and climate change related to disaster such as flood, cyclones droughts and major pest infestations or the introduction and spread of IAS.” (Environmental Management Act, 2011).

The National Policy on Environment (NPE) 2009 refers to invasive species: “Species of organisms not indigenous to a given ecosystem that invade it, usually as a result of introduction from abroad for example Water Hyacinth, *Eichhornia crassipes*. Indigenous species also tend to invade ecosystems when they are damaged or under stress.” Section 2.2.9 Heritage Sector (f) refers to encroachment of sites by invasive weeds such as *Lantana camara*.

The National Wetlands Policy considers invasive species such as *M. pigra* on the Kafue flats, *E. crassipes* commonly referred to as Kafue weed, Kariba weed (*Salvinia molesta*) and Azolla (*Azolla pinnata*).

## Specific work related to invasive species

The Zambia component of the “Removing Barriers to Invasive Plant Management in Africa” RBIPMA, in addition to establishing the national strategy and institutional and legislative framework on the prevention and control of IAS, focused its project pilots on removing barriers to the management of three invasive plants species – the shrubs *L. camara* and *M.*, and the aquatic herb *E. crassipes*. The projects aimed at strengthening the enabling policy and institutional environment; increasing information and raising awareness levels and enhancing capacity to deal with the problems. There was also a site-based component to implement strategies for the prevention and management of priority IAS.

RBIPMA contributed to institutional changes in terms of incorporation of invasive species issues in strategic planning and programme development. For example, RBIPMA in Zambia contributed to the formation of the National Invasive Species Strategy and Action Plan (NISSAP) which resulted in the inclusion of invasive species considerations within the revised NBSAP, the new Environmental Management Act No. 12 of 2011, and inclusion within the FNDP. It is important to note that the most substantial efforts made for improving coordination of work on invasive species in Zambia was achieved during the implementation of the RBIPMA project. The current efforts to establish effective coordination has been based on outcomes from this project. The National Executing Agency of the Zambia component of the RBIPMA were the Environmental Council of Zambia (ECZ), recently renamed the Zambian Environmental Management Agency (ZEMA), then under the Ministry of Tourism, Environment and Natural Resources (MTENR). RBIPMA was supported by the UN Environment Programme (UNEP) and the Global Environmental Facility (GEF) who committed to spending ~US$2 million before 2009 to control the invasive species in Zambia.

Under the RBIPMA initiative the Global Invasive Species Programme (GISP) held the regional workshop: “Prevention and management of IAS: forging cooperation throughout southern Africa”, the first on IAS for this region, which was organised by the GISP, the Zambian Ministry of Tourism, Environment and Natural Resources and the US Government and held in Lusaka, Zambia on 10-12 June 2002.

The GISP projects in Zambia include: 1. Pan African invasive plant prevention and management project (with GEF funding), and invasive waterweeds on the Kafue River; and 2. FAO project on invasive alien tree species in South Africa, Zambia, and Zimbabwe.

**Reference to invasive species**

Water hyacinth (*E. crassipes*), in particular, has affected the generation of power resulting in the expenditure of millions of dollars by power utility companies in clearing the weed to prevent it from damaging their turbines. The red clawed crayfish (*Cherax quadricarinatus*) has spread in many wetland ecosystems including the Kafue flats and Zambezi Floodplains. It has resulted in increased fish harvest loss and destruction of fishing gear. The biodiversity of the native fish stock is compromised by these invasive species. The obscure snakehead (*Parachanna obscura*), a freshwater fish native to western central Africa, has been introduced into the Mweru-Luapula system. This predatory species of fish may compete with native species for food and habitat. If left uncontrolled, it is likely to expand its range and could permanently alter the balance of aquatic ecosystems throughout Mweru-Luapula. Damming, draining and channelling impact negatively on the hydrology and health of the wetlands. For example, the Itezhi-tezhi reservoir has negatively impacted the Kafue flats. Reduced water flows have resulted in changes in the flood regimes. These have impacted negatively on the habitat and vegetation leading to encroachment of shrubs and in some cases invasive plant species. Further, this has reduced the carrying capacity of wetlands to support wildlife and livestock.

## Key actors/ organisations

### Ministry of Agriculture

The Ministry of Agriculture (MOA) (https://www.agriculture.gov.zm/) is responsible for a range of functions, the following are of particular relevance: agriculture policy; field services; agricultural research and specialist services; agricultural extension (crops, livestock and fisheries); and fisheries training. MOA report they work directly on the prevention, control and management, and eradication of IAS. They have indirect involvement in coordination of invasive species work both within and outside of the country. In terms of structure MOA has several departments but key departments involved in invasive pests' management are:

1. Department of Agriculture – extension related issues;
    i. Crops Production Branch mandates:
        a. Crops Production techniques
        b. Crops Protection (includes invasive species but not a stand-alone unit)
        c. Post-harvest Handling
    ii. Technical Services Branch
    iii. Advisory Branch
2. Zambia Agricultural Research Institute (ZARI) – research related issues

3. Department of Policy and Planning – policy related issues

MOA is involved in all three stages of invasive species control (prevention, early detection and rapid response, and control and management). Currently they report being primarily involved in early detection, rapid response, control and management for which they provide substantial support to farmers. The ministry is involved in managing fall armyworm (FAW), red locusts (*Nomadacris septemfasciata*) and African migratory locusts (*Locusta migratoria*) (the latter prevalent in Western Zambia). Prevention activities include surveillance for swarms, training farmers to identify pests, and ZEMA's action largely on pesticide regulation. Other key actors reported as important in the invasive species system include: ZEMA (chemical regulation, use and safety); Water Resources Management Authority (WARMA) (water contamination); International Red Locust Control Organisation for Central and Southern Africa (IRLCO-CSA) (focusing on control i.e. of locusts and FAW); DMMU (resource mobilisation, disaster management); FAO (resource mobilisation, financial and technical support); CABI (FAW management); University of Zambia (UNZA) (FAW management); and International Institute of Tropical Agriculture (IITA) (FAW management).

An example of an established internal MOA (not national) monitoring and surveillance system was given for the frequent outbreaks of African Armyworm which has been taking place for over 20 years (primarily supported by IRLCO-CSA) where traps are used and data collected and reported. This internal system is reflected for FAW where actors outside MOA are not involved in monitoring and surveillance. Further concerns include that traps and lures are not provided in good time and in insufficient quantities. In addition, there are a lack of champions within MOA to ensure the monitoring system is functioning adequately (resulting in individual officers taking on monitoring activities out of personal interest, and without allocated funds). This highlights the need for coordinated country support.

The Disaster Management Committee for Permanent Secretaries is established at the national level. When the need arises the Permanent Secretary for Agriculture will contact the relevant departments/organisations (ZARI, PQPS, FAO, etc.) to develop an intervention plan to manage IAS.

**The Plant Quarantine and Phytosanitary Service**

The Plant Quarantine and Phytosanitary Service (PQPS) is the National Plant Protection Organisation (NPPO) of Zambia and contact point for plant health (https://www.ippc.int/en/countries/zambia/reportingobligation/2012/12/organogram/). PQPS is currently a section under the Plant Protection and Quarantine Division of the Zambia Agriculture Research Institute (ZARI). PQPS is mandated to provide services that prevent the introduction of pests and diseases into the country and facilitate international trade through

provisions provided for under the Plant Pests and Diseases Act Cap 233 and the Noxious Weeds Act 231 of the Laws of Zambia. Through PQPS, Zambia is also a signatory to the IPPC which is recognized by the World Trade Organisation (WTO) as the international standard setting body for plant health. The core function of the PQPS is to prevent introduction and spread of plant pests through the enforcement of several phytosanitary procedures to check and direct the movement of all plants and plant products. These procedures include phytosanitary inspections and laboratory analyses. Despite the benefits of movements of plants and plant products for food security, economic development, plant breeding and others, this movement can also serve as a pathway for introduction and spread of pests. The procedures enforced by PQPS therefore aim at protecting the agricultural sector and plant industry by intercepting these plant pests before they can establish and cause economic damage.

There are specific subunits of PQPS tasked with various roles: plant pest diagnostics, pest risk analysis, communication and awareness, documentation, border coordination, and inspection. There are 39 Plant Health Inspectors (PHIs) strategically located at 15 offices around the country as well as the PQPS headquarters on Mount Makulu Research Station. In addition, PQPS works in collaboration with personnel from the Department of Agriculture, bringing the total number of PHIs to 42.

**Department of Fisheries**

The Department of Fisheries (DoF) is sub-divided into Capture Fisheries, Aquaculture, Fisheries Training and Administration. Zambia has relatively rich fisheries based on its many lakes, swamps, and seasonally inundated floodplains. The DoF monitors the introduction and spread of IAS in all aquatic systems through district structures of research and extension units which report to the provincial units and then the central fisheries department at the headquarters. There are no specific officers assigned to work on invasive species; all researchers are responsible for monitoring and management. The DoF is guided by the Fisheries Act No. 22 of 2011, section 19, subsection for the activities on prevention; early detection and control/ management. For instance the management of the Nile tilapia (*Oreochromis niloticus*) has seen measures enforced that restrict the use of the species in jurisdictions that are un-invaded (e.g. northern fisheries circuit- luapula, tanganyika, bangweulu and mweru systems).

The department is also aligned to various other legislation and national, regional and global frameworks that include: ZEMA Act No. 12 of 2011; Wildlife Act No. 14 of 2015; National

Agriculture Policy; Wetlands policy; FAO Code of Conduct for responsible fisheries; and the Southern African Development Community (SADC) regional biodiversity strategy.

The DoF has dedicated routine activities monitoring IAS in various fisheries across the country. Research activities include engaging and sensitizing the community, especially for edible species (promote control by consumption/ exploitation e.g. crayfish). The department has also been promoting the use of indigenous fish species in aquaculture with current emphasis being on reducing use of exotic *O. niloticus* and promotion of the native species *O. andersonii*.

DoF reported having active collaborative activities on invasive species with the following actors: ZEMA, MLNR, MOA, WWF, IUCN, and BirdWatch Zambia (BWZ). They interact with BWZ in early detection and rapid response in managing *S. molesta* on the Lukanga swamps, other players seem more active in prevention, control and management. Other significant work they are involved in is the management of red claw crayfish with WWF.

**Ministry of Lands and Natural Resources, including the Forestry Department**

The Ministry of Lands and Natural Resources (MLNR) is responsible for policy development for which it engages with key stakeholders and communities. For example, the Zambian government developed the National Policy on Wetlands and its implementation plan, demonstrating the importance of managing wetlands, including managing the threat from IAS. The MLNR coordinates implementation of the Ramsar convention on wetlands and is the focal point for the CBD and Ramsar Convention (through the Climate Change and Natural Resources Management Department). The MLNR is involved in all the three steps of invasive species management as it provides policy direction. In terms of frameworks the department works under the CBD; UN Framework Convention on Climate Change; Ramsar Convention on Wetlands; National Policy on Wetlands and its implementation plan; The National Policy on Climate Change of 2016; The Forest Act No.4 of 2015 (the Act provides for protection and conservation of forests and trees which in turn protects wetlands); The Forestry Policy; Zambia's NBSAP #2 (a national cross-sectoral strategic document of Zambia for the period 2015-2025); and the Seventh National Development Plan (SNDP).

The MLNR identifies other key actors in the invasive species system as other government ministries (Forestry Department; Department of National Parks and Wildlife (DNPW); Ministry of Water Development, Sanitation and Environmental Protection; MOA; and Ministry of Fisheries and Livestock, ZEMA), NGOs (BWZ, WWF-Zambia, Wildlife and Environmental Conservation Society of Zambia (WECZ)), conservation organisations (The Nature Conservancy, International Crane Foundation (ICF)), resource management authorities

(WARMA, Zambezi River Authority, Zambia Electricity Supply Corporation), and statutory government bodies (National Heritage Conservation Commission (NHCC) and DMMU).

The **Forestry Department** under the MLNR was established under the Forests Act No.4 of 2015. The core function of the department is to spearhead sustainable management of the forest resources across the country as captured in the Forestry Policy of 2014. Currently, there are two branches under the Forestry Department; one dealing with extension services and the other dealing with forest research. Each of the ten provinces of Zambia has a Provincial Forestry Office; the department is represented in almost all the districts with district forest offices set up in any newly created districts. In Zambia, some 26,000 square miles (67,300 square km) are classified as forest reserves, although the greater part of the country is wooded but not protected in this way (https://www.britannica.com/place/Zambia/Agriculture-forestry-and-fishing). Indeed, forests rich in biodiversity diminished ten percent between 1992 and 2007 (http://www.new-ag.info/en/country/profile.php?a=2621).

Forestry Research under the Forestry Department through its Ecology and Protection unit is responsible for carrying out periodical ecological surveys and research into forest protection including the detection, management and control of forest pests and invasive species (plants, insects and pathogens) in all forests, woodlands and other tree landscapes. When a new invasive species is found the department identifies the new invader and assesses the risk of the infestation working closely with other line ministries, local communities and other stakeholders such as academia to respond to the threat. For example, Forestry Research reported a first record of red gum lerp psyllid, *Gycaspsis brimblecombei* and published this new record in collaboration with Copperbelt University (https://onlinelibrary.wiley.com/doi/epdf/10.1111/aje.12353). The Forestry Department conducts ecological surveys which are a source of the many publications on the trees and vegetation of Zambia which continues to be updated. There is also a database of plant species and ecological information which is archived and includes invasive plant species and continues to be updated through the National Forest Herbarium. The pathology and entomology section specifically have responsibility for prevention, management and control of forest pests and diseases including invasive species.

The Forestry Department is involved prevention of invasive species introduction by working in collaboration with the PQPS to provide clearance for import and export of forest related plant materials. The department also undertakes early detection and rapid response of invasive species through its network of research and extension services which are spread throughout the country. Recently the department had to stop a forest plantation project in central Zambia that had started to introduce new species of Eucalyptus which were likely to provide a pathway

for new pests due to the fact that no Pest Risk Analysis (PRA) was undertaken. Through the research branch the forest department also undertakes control and management of forest pests e.g. *L. camara* is one of the invasive species that has been managed and controlled in forest plantations.

Examples of the Forestry Department's involvement with invasive species:

a. *Bauhinia petersiana* – discourage the planting of this tree species along water courses especially in degraded riparian zones
b. *Lantana camara* – eradication of the species in plantations and in areas where regeneration of woodland and forests are taking place
c. *Tithornia grandiflora* – eradication of the species in plantations and in areas where regeneration of woodland and forests are taking place
*d.* *Toona ciliata* - eradication of the species in plantations and in areas where regeneration of woodland and forests are taking place
e. Red gum lerp psyllid*, G. brimblecombei* a new invasive forest insect pest has recently been detected in a number of Southern African countries including Zambia for the first time. Initial biocontrol trials were already being developed by the Forest Invasive Species Network (FISNA) in collaboration with the Forest and Agriculture Biotechnology Institute (FABI), with financial support from the FAO.

Regional and International frameworks relevant to the invasive species system related to the Forestry Department include the SADC Protocol on Forestry of 2002 which aims to promote the development, conservation, sustainable management and utilisation of all types of forest and trees; trade in forest products and achieving effective protection of the environment; and safeguarding the interests of both the present and future generations. Other regional initiatives include FISNA which was established in 2004 to coordinate the collation and dissemination of information relating to forest invasive species in sub-Saharan Africa for sustainable forest management and conservation of biodiversity. Some strategies to address invasive species include initiatives which were supported by FAO through a program entitled "Strengthening Controls of Food Safety Threats, Plant and Animal Pests and Diseases for Agricultural Productivity and Trade in Southern Africa". Activities of the Forestry Department are principally informed by the Forest Policy of 2014 and The Forest Act no 4 of 2015 and National strategies including Zambia's NBSAP #2, 2015 – 2025.

**Department of National Parks and Wildlife**

In 1999, Zambia established Zambia Wildlife Authority (ZAWA) under the Zambia Wildlife Act replacing the former Department of National Parks and Wildlife Service. ZAWA was an

autonomous agency of the Zambian Government established to manage Zambia's wildlife estate comprising 20 National Parks, 36 Game Management Areas and one bird sanctuary, which cover 31 percent of the country's land mass. In 2016 ZAWA was dissolved with its responsibilities passed onto the newly formed DNPW. This department is mandated by act of Parliament through the Zambia Wildlife Act No. 14 of 2015 to manage and conserve all wildlife resources in Zambia. One key deliverable of this mandate is habitat monitoring whereby surveys of wild flora are undertaken to establish habitat condition. As a result of this mandate DNPW has a firm understanding of various invasive species and actively focuses on prevention, control and management of these species recognising that a lack of control and management eventually leads to habitat destruction which inherently affects the condition and population status of wildlife populations (e.g. wildlife habitat encroached by invasive *L. camara* would essentially reduce the quality of foliage for wildlife). Habitat monitoring is one of the critical functions for the department which is spearheaded by the research unit. The research unit through its ecologists, research technicians and the conservation unit (law enforcement) are mandated to detect any invasive species.

DNPW implements all three steps of invasive species management but its effectiveness is dependent on the extent of the invasive species problem. For example, prevention is ideal and applicable to areas that have not yet recorded a case, and early detection is applied in that ecologist are able to periodically report on their designated protected area's habitat condition. In protected areas where there is a reported and apparent occurrence of an invasive species, ecologists implement control and management measures.

The DNPW works with the ZEMA, for example, they detected *L. camara* in the Kafue flats and controlled it with technical support from ZEMA, and financial support from stakeholders. DNPW rated their effectiveness at delivering their mandate as moderate.

**Zambia Environmental Management Agency**

The Zambia Environmental Management Agency (ZEMA) (http://www.zema.org.zm/) is an independent environmental regulator and coordinating agency, established through an Act of Parliament, the Environmental Management Act, No. 12 of 2011. Its mandate is to protect the environment and control pollution, supporting the health and welfare of people and the environment. ZEMA is governed by a board which provides strategic direction, develops policies, approves its work plans and budget as well as monitoring of its functions as it relates to administration of the ZEMA.

As a regulator, ZEMA requires organisations to manage IAS on their premises or areas under their control. It is directly involved in the management of invasive species by collaboration with

other institutions particularly in providing guidance and some expertise. ZEMA also regulates the use of chemicals (serving as the pesticide control body) at the ministerial level through to working directly with agro-dealers i.e. they conduct training (in collaboration with the Pesticides Unit) advising on correct use and expiry dates. They report that at times the amount of chemicals that are brought into the country is not clear, nor is the degree to which these remain in the environment (i.e. monitoring of chemicals is not adequate). In this capacity, ZEMA manages and oversees the pesticide registration process; environmental education and awareness programmes to educate and raise awareness of the role of the public in the protection of the environment; and the collection, production and dissemination of environmental information.

ZEMA coordinates the activities of other institutions involved in the management of IAS and are consulted for expert advice when an imported plant species is suspected to be an invasive species, and to verify alerts and reports. For example, when *S. molesta* was first reported to ZEMA they confirmed the identification, researched the biological control agent and provided guidance on management. ZEMA plays a coordination role in all sectors and is also perceived to be active in prevention, early detection and rapid response e.g. for *M. pigra*, *E. crassipes* and FAW. Other key actors in the IAS system include BWZ; DNPW; WARMA; WWF (policy level); Ministry of Water Development, Sanitation and Environmental Protection (MWDSEP); MLNR; and PQPS.

ZEMA hold the responsibility for stakeholder engagement and the formation and hosting of coordination mechanisms for the management of IAS in the country. They raise awareness and sensitise communities to the impacts of IAS. ZEMA are responsible for management of an IAS database as well as documenting the best approaches to managing invasive plant species. However, the last time they collected data was in 2000. Efforts are being made to address this situation with supporting initiatives from the other actors. They are also a member of the Steering Committee for IAS work with BWZ.

**Research Organisations**

The Zambian Agricultural Research Institute (ZARI) (under the MOA) is the largest agricultural research entity in the country with ten research stations and headquarters at Mt. Makulu Central Research Station. The overall objectives of ZARI are to develop and adapt crop, soil and plant protection technologies and to provide high quality, appropriate and cost-effective services to farmers. The National Council for Scientific Research is a statutory body through which the Government of Zambia directs policy on the development and application of science

and technology. Some of the local universities also conduct relevant research that contributes to the IAS agenda.

**Universities**

The University of Zambia and Copperbelt University are involved with research in IAS. For example, both universities are collaborating with BWZ (and other partners) on invasive plants in Lukanga Swamp in central Zambia. Here, Kariba weed (*S. molesta*) originating from South America has invaded the swamp causing access issues for fishermen, birds and mammals, whilst its decaying matter also reduces the oxygen content of the water for fish and other aquatic life. The prolific weed, in the absence of biocontrol, can only be removed mechanically or manually. Academia were reported to also be active in early detection and rapid response e.g. Copperbelt University on forest invasive species and the University of Zambia on agriculture and livestock pests.

**International organisations**

The **International Institute of Tropical Agriculture** (IITA) is the research hub for Southern Africa based in Zambia is currently coordinating the African Development Bank funded programme whose goal is to upscale sustainable environmentally friendly and socio-economically sound proven control measures of FAW particularly targeting smallholder farmers in Africa. Examples of other relevant work includes research into new technology development and dissemination; and farmer training.

The **International Maize and Wheat Improvement Centre** (CIMMYT) is a non-profit international agricultural research and training organisation focusing on maize and wheat, and related cropping systems and livelihoods. CIMMYT has a focus on food security and working in partnership with other organisations, and has projects in 50 countries including Zambia. An example of CIMMYT work in Zambia related to invasive species is the confirmation of the arrival of wheat blast (a devastating fungal disease) to the African continent (https://www.cimmyt.org/location/africa/zambia/).

An example of the **International Union for the Conservation of Nature** (IUCN's) work is the 'Integrated Planning for Biodiversity Conservation and Climate change' for which Zambia is one of four focus countries. Another example is the 'Luangwa Integrated Resource Development Project in Zambia' which developed into an initiative combining management of South Luangwa National Park with a community-based natural resource management programme for 40-50,000 people in the Lupande Game Management Area.

The **Food and Agriculture Organization** (FAO) supports the government with resource mobilisation, equipment and systems for monitoring and surveillance of pests (including invasive species), advocacy, capacity building and training of government personnel, and coordination. Specific staff are assigned to invasive species management and the organisation reports involvement in all three stages of IAS management. Other key actors include MOA, DoF and ZARI. FAO implements projects at national and regional level through partnerships with a variety of actors, including farmer organisations, NGOs and government agencies. The 'Integrated Production and Pest Management Programme in Africa' (IPPM), active in Zambia since 2014, works with small-farming communities to improve productivity and livelihoods through environmentally sustainable practices (http://www.fao.org/agriculture/ippm/projects/zambia/en/). The IPPM programme is an implementation mechanism of the "Support Programme for the Consolidation of the Action Framework under the European Union-Africa Partnership on Cotton".

FAO supported a sub-regional project for Southern Africa to strengthen various institutions in the SADC that address SPS matters including invasive species; the institutions included the NPPO, the Forestry Research unit, Fisheries unit with emphasis on aquatic animal health, Department of Veterinary Services dealing with Animal Health as well as the Food Safety agency.. Substantial progress was made in strengthening the capacity of these institutions for prevention, early detection and rapid response as well as control and management of pests and diseases. Strategies for management of several invasive species, particularly in crops, have been developed under this project and a follow up project that is currently being supported in collaboration with research centres on various IAS e.g. FAW, *Tuta absoluta, Bactocera dorsalis, Fusarium oxysporum* and MLND.

**NGOs**

**Birdwatch- Zambia** (BWZ) is an NGO working in 42 important bird and biodiversity areas in Zambia conducting monitoring, education and awareness raising, and policy and advocacy activities. These areas overlap with game management and protected areas which are under the mandate of the DNPW. BWZ has both direct and indirect involvement in IAS management countrywide. There are six team members who are assigned to specific projects depending on overall urgency. They work as a team to address IAS related activities and interventions.

BWZ conducts routine habitat monitoring placing them in a good position to detect, report (to relevant stakeholders) and sometimes respond. For example, BWZ detected *S. molesta* and *Azolla* sp. in Lukanga, Barotse floodplain, and Simungoma as well as *M. pigra* in some of their

priority areas. They rate themselves as moderately effective in this area. The organisation has a mandate towards control and management of invasive species especially those within their focal point areas. While they have identified several invasive species that need controlling within their primary areas, they have secured funding and are actively working on controlling *S. molesta* in the Lukanga swamp using the biological control agent *Cyrtobagous salviniae* for which they conduct quarterly monitoring of effectiveness. BWZ report themselves as highly effective in control and management. They provide regular updates and lessons learnt to community members, the project steering committee which consists of government, NGOs and international partners, and at the regional level, with consolidated information shared on an open forum. On this project BWZ engage with various stakeholders including traditional leaders, local community members, partner organisations and steering committee members. This takes place via regional and quarterly meetings, and awareness raising materials such as posters, banners, website and social media. BWZ takes pride in ensuring the community is aware of their conservation efforts and ensure community involvement by sharing information with local schools and promoting the formation of 'nature clubs'; they also provide training for community members to become bird guides. In terms of knowledge and data, BWZ's work on Lukanga swamps is contributing to the development of a conservation plan for the swamp (led by MLNR). It is hoped the biological control agent could potentially be released on the Kafue River where *S. molesta* is also a problem.

BWZ report from their perspective that ZEMA and ZARI are responsible for all three stages of IAS management; DNPW, MLNR, ICF and CABI are involved in early detection and rapid response and control and management; and WWF in early detection and rapid response.

The **International Crane Foundation** (ICF) implements the Zambia Cranes and Wetlands Conservation Programme supported by two NGOs one based in South Africa and the other in the US. Zambia has 50% of the crane populations in Africa, hence the significance of the ICF activities. The programme is one of the umbrella activities under the African Crane Conservation Programme meant to safeguard cranes as well as the wetlands (habitat management). The crane is a flagship species in the wetland ecosystem, and is targeted as a way of preserving broader diversity. ICF is currently focused on the Kafue Flats due to the significant threats to the wetlands. Kafue Flats is of strategic importance to Zambia because of economic, social and livelihood factors (it is the main source of water for Lusaka, for fishing and pastoralism, as well as for hydroelectric generation) at the same time, it is highly vulnerable and susceptible to IAS invasions. Kafue Flats had the first proliferation of the water hyacinth and currently is under threat from *M. pigra* threatening livestock and wildlife (especially the Kafue Lechwe).

ICF work in the Kafue Flats is focused on conservation action to restore economic as well as livelihood activities in the area by removing *M. pigra* vegetation to restore the ecosystem. They used mechanical removal with vigorous follow up as well as herbicides, and have also experimented with biological control options. ICF also works very closely with WWF and BWZ in the management of the *S. molesta*. ICF has facilitated the commission of an IAS assessment and review of impacts which is to be implemented by ZEMA.

**World Wide Fund for Nature** WWF-Zambia (WWF) is an NGO that has relevant programme activities for management of IAS as part of the agenda for Environmental Management. Since 2017, WWF in Zambia with support from WWF-Netherlands and in collaboration with Zambia's DNPW and the ICF/Endangered Wildlife Trust (EWT) partnership have been working with local communities to eradicate *M. pigra* from the Kafue Flats. Implementation is normally with partners with whom they share/combine resources and jointly implement activities. They have recently started collaboration with BirdWatch Zambia where WWF is on the steering committee for a project in the Lukanga swamps where *S. molesta* is of increasing concern and biological control is being used. Within the organisation, there is a Wetlands Officer who leads the work on invasive species, fisheries and wetlands initiatives with the support of the organisation when need arises. WWF-Zambia operates in key landscapes in Zambia of which the Kafue Flats is a priority and as such they have been working there for many years. Other freshwater areas where they work include the lower and upper Zambezi and Luangwa. They are currently working on five of the eight Ramsar wetlands in the country. Their main role is in control and management. For example, for *M. pigra* they have completed approximately 90% of the target to control this weed and are on track to achieve 100% control. Another initiative is for the control and management of red claw crayfish in partnership with the DoF and World Fish with whom they recently ran an initial workshop. Research into the impact of the crayfish has been completed along with a survey on the human perceptions of impact and cost implications on fish catches on the Kafue Flats. WWF-Zambia's interventions are preceded by research and they have strong linkages with universities (especially international ones). The activities implemented are flagship of nature i.e. use of mechanical,

**Box 1: WWF-Zambia work on *Mimosa pigra***

*Key considerations in WWF work include that projects benefit livelihoods and improve biodiversity. An example of this is the clearing of M. pigra in the Kafue Flats where there has been involvement of various key stakeholders and community engagement e.g. to date 450 community members have been employed to physically cut and burn M. pigra. Monitoring and evaluation, primarily led by ICF, of the effectiveness of the interventions include research to understand how communities have benefitted (case studies) and subsequent changes in biodiversity are being measured. This is an ongoing process that generates data and increases knowledge which is intended to be shared by publishing the findings.*

chemical and biological control measures combined (Box 1). Regarding expanding their research work, WWF mentioned that they currently do not collaborate with the Forestry Department on *M. pigra* work but would strongly welcome such partnership.

**Resources Partners**

USAID/Zambia has an Environment Portfolio in Zambia with the main purpose to partner with the Zambian government, private sector, civil society and local communities to strengthen natural resource management (NRM). The aim is to create an enabling policy environment to catalyse private sector investment and increase benefits from sustainable energy, wildlife and forest conservation and rural enterprises for sustained national development. The specific focus ranges from national to site specific depending on the nature of the activities being supported. Policies (land, biodiversity, tourism) and energy / technology related activities are largely implemented at the national level while NRM activities are be implemented in targeted biodiversity significant areas, particularly the greater Kafue, Luangwa and Zambezi landscapes, and forests threatened by high rates of deforestation, such as those in the Copperbelt, Central, Eastern, Lusaka and Muchinga Provinces. Given the above and within the framework of a project, if an area with USAID support has its most productive area being impacted negatively by IAS, with significant impact on biodiversity, tourism, flora and fauna, then potentially consideration can be made to address the IAS threat. Although there are not specific personnel assigned to address IAS there are four technical officers managing the broader Environment Portfolio who can take on IAS work (one technical officer has researched the invasive *L. camara* and its allelopathic effects on indigenous plants in Zambia). The key stakeholders in IAS in Zambia include ZEMA, the Forestry Department, ZESCO (state owned power company in Zambia formerly known as Zambia Electricity Supply Corporation Limited) (some IAS have affected the turbines at Kariba), DoF, DNPW (certain national parks have been affected by IAS and hence impact on tourism).

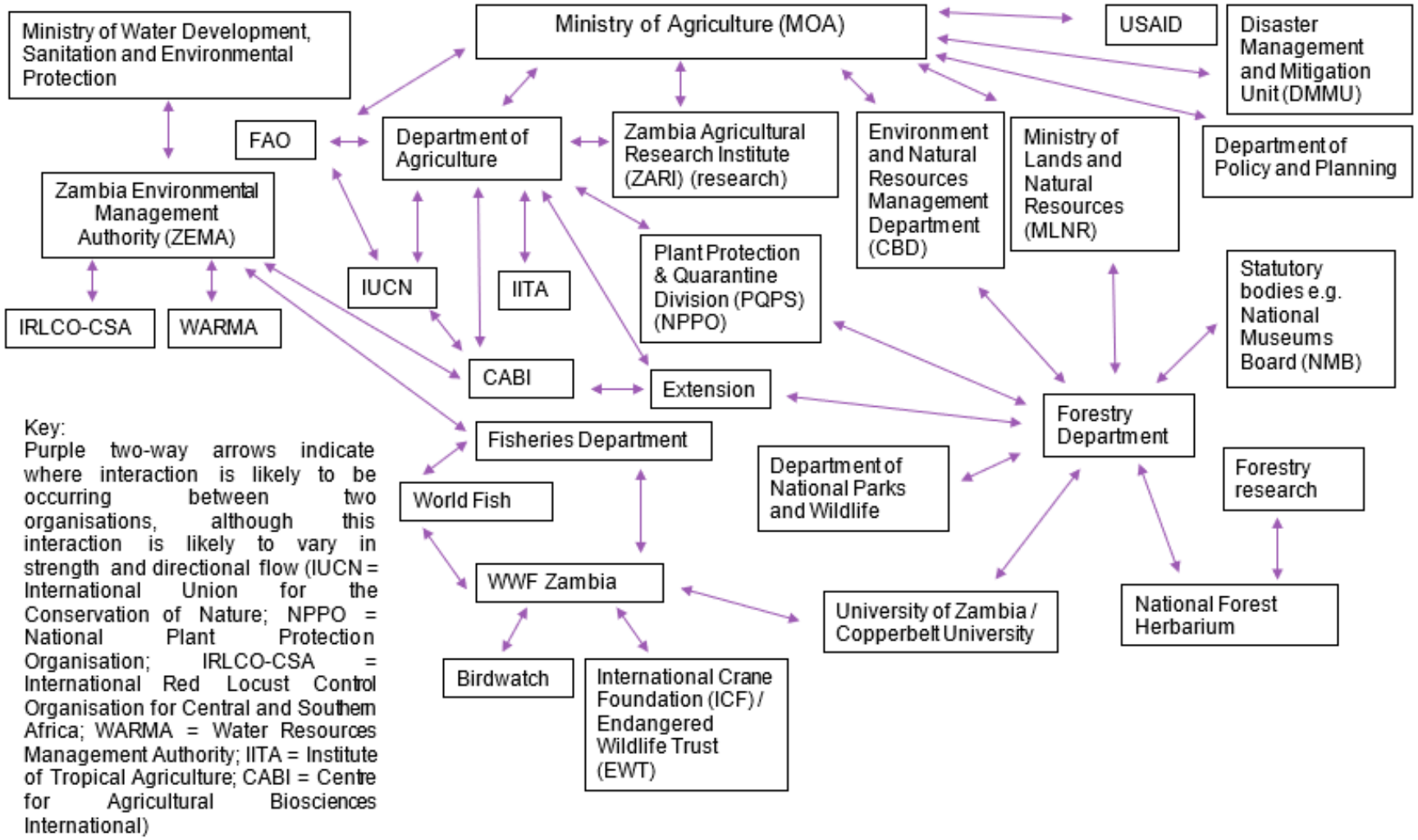


**Figure 2:** Key actors identified in the invasive species system in Zambia. The map shows two-way arrows where interaction is likely to be occurring between two organisations (although this interaction is likely to vary in strength and directional flow).

Checklist respondents were asked to rank their organisation's performance in regards to the three areas of invasive species management: Prevention, Early detection and rapid response, and Control and management (Fig. 3). Although limited by subjectivity and not all actors provided self-assessment scores, this provides an indication of where organisations feel their current expertise lies. For example, Fig. 3 clearly shows that some organisations viewed their performance as high related to prevention (MOA, FAO, MLNR and PQPS), while scores for control and management indicated moderate to high performance, for example, MOA, WWF, MLNR and BWZ self-ranked as highly performing whereas FAO and PQPQ rated themselves as moderate, potentially also reflecting their mandated responsibilities.

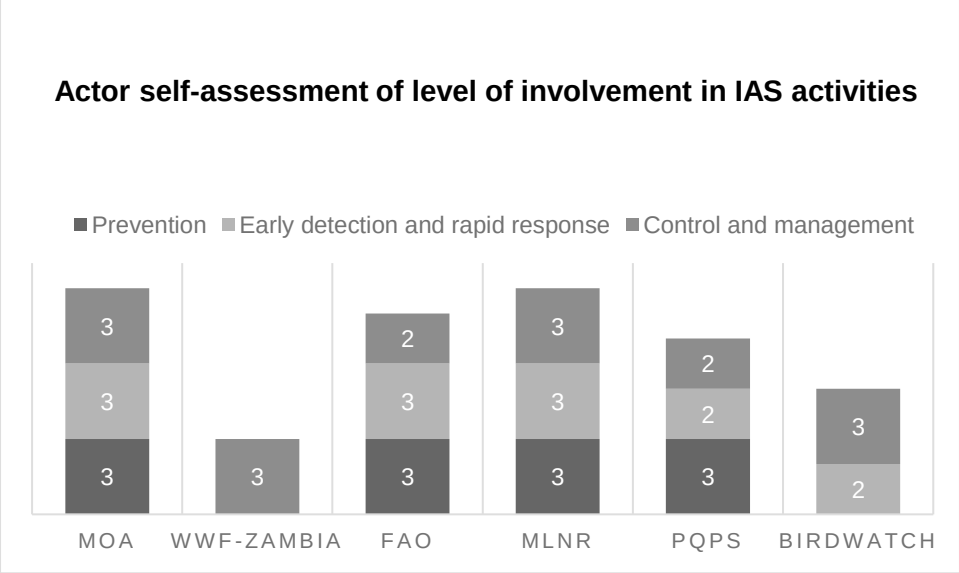


**Figure 3:** Actor self-assessment of performance in the three steps of invasive species management: Prevention; Early detection and rapid response; and Control and management) (scores: 1 = poor; 2 = moderate; 3 = high [level of involvement in IAS management stage])

# Discussion

## Strengths of the Zambia IS system

### Broad range of actors

Zambia has a broad range of actors in the IAS space that represent the major interests of importance for the sustainable preservation of biodiversity and mitigation of the negative impacts IAS threats pose to socio-economics and livelihoods. Most of these key actors have the requisite technical expertise, commitment and modest funding to deliver on their mandates. Refer to Annex 1 for list of actors.

It was evident too that there is good collaboration among these actors with willingness to work together and readiness to share experiences. Through information gathered in the KIIs, some excellent results have been achieved from actors such as BWZ, WWF and the ICF; all these are NGOs that have attracted external funding for IAS related work of considerable significance to biodiversity preservation and environmental conservation in Zambia.

Among the line ministries, those that are active in contributing to the IAS system include the MoA and its various departments that address the three stages of IAS management. The MLNR serves as the focal point for the CBD and provides the policy guidelines for the management of wetlands including threats from IAS. The MoA also coordinates the implementation of the Ramsar Convention. The direct implementation of the provisions of the wetland policy and the Ramsar Convention is the mandate of the DPNW in the Ministry of Water Development and Environmental Protection. The other departments of government with substantial activities of relevance to IAS management and biodiversity conservation are the Forestry and Fisheries Departments.

Actors not consulted during the study, whose activities are affected by IAS, include utility companies such as for electricity (ZESCO) and the water authority (WARMA).

### Existence of collaborative partnerships

From the assessment process, the best example of collaborative partnership in Zambia for IAS work is through the current project by BWZ on the control of *S. molesta* in the Lukanga Swamps. Through this project, BWZ has established a Steering Committee which constitutes most of the key actors working on IAS management, including ZEMA, who is charged with the responsibility to coordinate the IAS agenda in the country. This is an example of the potential model that can be employed for a national level coordination mechanism. Other examples of satisfactory collaborative partnerships include the FAW national task force created following

the invasion of FAW in Zambia. However, a key gap in the case of FAW is that other actors outside the MOA are not involved in monitoring and surveillance activities.

There are other examples of good collaboration among the various actors though not as formally established as the one for the BWZ. Such examples include the work of the DNPW with the ICF which includes the facilitation of provision of a waiver for conducting the Environmental Impact Assessment from ZEMA, substantially reducing the cost and time of ICF operations in the control of *M. pigra* in the Kafue Flats. In addition, WWF has a good collaborative relationship with the DoF for their work on red claw crayfish; they are also on the steering committee for the BWZ project on *S. molesta*, as well as having a good collaborative partnership with ICF, and strong linkages with universities (mostly for their work in the Zambezi and Kafue). For more examples, BWZ and ZEMA referred to the wide range of actors with whom they collaborate.

**Track record of past and present results for learning**

A number of results from current and past efforts in the management of IAS by various actors are available and serve as lessons towards the development of best practices in the IAS system. E.g. BWZ's active control of *S. molesta* using a biological control agent demonstrates the successful utilisation of a biological control agent. The Forestry Department, through their research branch, reported a first record of red gum lerp psyllid, *G. brimblecombei*, publishing this in collaboration with Copperbelt University. Other examples of notable results include the identification of *L. camara* on the Kafue Flats by the DNPW with technical support from ZEMA. The MOA also has a wealth of knowledge gained from the management of several IAS, particularly the sustainable management of FAW from which lessons on best practice can be drawn and contribute to the functioning of the IAS system in the country. It is also worth mentioning that substantial work focussed on three species *L. camara, M. pigra and E. crassipes* as part of studies by GEF, UNEP and CABI supported project RBIPMA.

**Community action**

The ultimate success of the control and management of IAS, is determined by the extent to which the threats to socio-economic activities, the livelihoods of the communities and the biodiversity of the target area are reduced and preserved without disrupting the environment. To achieve this goal, community action is a vital element of success. Most of the key actors consulted in the assessment referred to active community participation in IAS management,

particularly in the control and management stage. BWZ for example, highlighted the following in reference to the engagement with local communities:

"*We are strong on local community Site Support Groups in our Important Bird Areas. We pride ourselves in ensuring the community is aware of our conservation efforts through various means of engagement. Through these groups, we provide livelihood programs that are conservation friendly, we train community bird guides and conduct awareness raising. We involve local community schools and promote the formation of nature clubs among learners whom we teach and conduct environmentally friendly projects within their communities. We promote sustainability of these groups even in our absence on the ground through sharing of newsletters (termly schools' newsletters and monthly member's newsletters).*"

Active engagement of the community includes provision of technical support for capacity development for effective local based monitoring and control and management of the various IAS. All the NGOs and most of the line ministries reported being actively involved in facilitating community participation in the sustainable management of IAS.

**Mandate for coordination of the IAS system and policy support**

The mandate of ZEMA is well known by all actors in the IAS system. ZEMA has responsibility for overseeing the coordination mechanism that was developed ten years ago. A few actors referred to the existence of a National Invasive Species Committee. Efforts to formally establish the coordinating mechanism were started under the RBIPMA project with significant progress being made towards getting the coordination mechanism in place. Therefore, there is clear mandate responsibility and an established framework, the remaining question is how to engage to make this fully operational.

## Weakness of the Invasive system in Zambia

**Table 1: Challenges to the invasive species system in Zambia**

| Assessment of the current system |
|---|
| Weak coordination, collaboration and information sharing among key stakeholders |
| Lack of a coordinating body among key stakeholders i.e. no well-defined institutional co-ordination mechanism for ensuring that IAS issues are addressed with the necessary broad, multisectoral ecosystem approach |
| Strengthening the legal framework on IAS control and management; lack of a stand-alone policy specific to management of invasive species in Zambia |

| |
|---|
| Limited/ inadequate capacity to address prevention, early detection and rapid response with no strict surveillance measures on species entering the country |
| Lack of knowledge about IAS in communities by the general public and at the professional level |
| Inadequate ability to identify IAS |
| Inadequate financial resources; upon detection of an invasive there are no readily available funds to control it and the invasive will quickly spread becoming out of control and too expensive to manage |
| Lack of a national strategy / reporting system (reporting and prioritisation of areas for immediate action is needed) |
| Institutional capacity for an effective invasive species system exists but needs further development through training, provision of equipment and tools, improved national and local level coordination, development of databases and reporting mechanisms to improve information gathering, storage, retrieval, sharing and dissemination among implementing agencies and communities in the country. |
| Lack of prioritizing of invasive species and their impact on biodiversity |
| General absence of well- developed best practices and limited coordinated action |
| A weak invasive species system with data gaps (lack of documentation/research into locations, socio-economic and environmental impacts) and poor understanding of the extent of IAS in Zambia |
| IAS management is expensive; if investment could be prioritised on prevention then efforts could focus on managing native biota and conserving natural resources |
| IAS are a threat to indigenous flora and fauna, and to key economic activities (hydrogeneration as the turbines affected by aquatic IAS) |
| Fire-fighting approach to the management of IAS (lack of a proactive approach) |

**Weak coordination**

Despite all the efforts to establish an effective coordination mechanism through an apex body and the fact that ZEMA is recognised as the responsible unit to oversee national coordination of the IAS agenda, the mechanism is not formalised. This has resulted in a tendency for a fragmented approach to implementation of IAS management activities which is found to be particularly sector based. Some actors operate quite independently of any apparent accountability to ZEMA for planning or reporting. Most of the actors' programme planning is influenced by the funding levels, sources of funding and institutional priorities/interests. Given the inadequate allocation of resources from the government, and absence of a well-established coordination mechanism and lobby and advocacy actions, not all IAS activities in the country are monitored and reported on. This situation undermines not only the role of ZEMA, but also the policy guidance and coordination role of the MLNR, as the focal point for the CBD with which work on IAS should be closely aligned in order to contribute to the relevant global frameworks. The fragmented approach by sector reflects the inadequate appreciation and failure to embrace broader biodiversity and recognise its importance in the ecosystem, as

well as the implications of IAS in relation to other threats such as habitat transformation and the encroachment of ecosystems.

There is a disconnection between Ministries where collaboration is weak and fragmented i.e. MOA, ZEMA, DNPW belong to different ministries who have different focal areas. There may also be other actors working in an area (e.g. WARMA and other actors) that are no longer active and whose responsibilities have been allocated to different ministries. Clarification on mandates, roles and responsibilities is required. The national level Disaster Management Committee for Permanent Secretaries structure is not replicated at provincial and district levels. As such, the Permanent Secretaries of a given ministry are able to mobilise with other implementing / cooperating partners and stakeholders in the line ministry but it is unclear whether this cascades to the provincial level.

**Institutional/ legislative framework gaps**

Recognising the complexity of the IAS space, the RBIPMA project made great strides to contribute to institutional changes in terms of incorporating IAS issues in strategic planning and programme development. The project aimed at strengthening the enabling policy and institutional environment; increasing information and raising awareness levels and enhancing capacity to deal with the problems. The project made a major contribution to the formation of the NISSAP, which resulted in the inclusion of the IAS considerations in the revised NBSAP #1 and the FNDP. This resulted in inclusion of an indicator in the FNDP directly related to control of *M. pigra* which attracted substantial funding from the central government. Unfortunately, with the closure of RBIPMA and the absence of a coordination mechanism, there was no follow up to NISSAP and subsequently the alignment of the programmes of the various actors in IAS management to the NBSAP #2 is rather weak.

Another important consideration for effectiveness of operations is the composition of actors and their presence in the targeted areas. It is important that institutions have a presence on the ground where activities are being implemented and that all levels are involved when mechanisms are being formulated. It is also imperative that all relevant institutions adequately budget for IAS management for operations on the ground.

WWF mentioned that there are no guidelines available to institutions for deciding where to work. For example, WWF mostly works in the Zambezi area with the decision on where to work depending on the programme and opportunities provided from the available funds from resource partners; they are also influenced by the capacity of partner organisations.

**Monitoring and evaluation framework limitations**

Largely due to the gaps in the institutional and legislative framework, and the absence of strategic planning and programming, monitoring and evaluation (M&E) is significantly undermined as is subsequent effective reporting of results. There were not many examples given of systematic M&E and reporting that ensures alignment to the NBSAP and the SNDP. The oversight by the MTENR for the implementation of the NBSAP as the focal point has been absent and as such the opportunity for reporting on the set targets missed. The Ministry has not set up the National Steering Committee or the Clearing House Mechanism that were envisioned to support the implementation of the NBSAP.

For the IAS system to have functional M&E, the coordination body (once established) would hold responsibility for monitoring performance, guided by relevant global and national policy and strategic frameworks. A related gap is the absence of adequate data for setting baselines for the different IAS as inventories of the existing IAS for monitoring purposes. A comprehensive monitoring framework for IAS is required for sustainable and effective management.

**Inadequate communication**

A related weakness, resulting from weak coordination, is the poor communication among the actors in the IAS system where information sharing on IAS management is not effective. There is no national reporting mechanism and no provision for a national system for storage of information and data from the work on IAS in the country. For more effective communication and information sharing an open access platform/website should be established. As a result of inadequate communication some actors reported the existence of a National Invasive Species Committee while many others were not aware of such a committee**.**

**Inadequate training and resources**

Regular monitoring is essential for an effective early warning system and to help prevent the spread of IAS but currently there is isolated monitoring by actors in their areas of operation. Effective monitoring and surveillance requires adequate training of community members. This training should be the most appropriate and effective for the specific pest e.g. for the African Migratory Locust, the community should be trained to monitor for swarms laying eggs and advised to control the nymphs as this is most effective practice. While it is accepted that regular monitoring is essential to prevent IAS spread, currently there is isolated monitoring by

actors in their areas of operation, largely due to inadequate training and resources to sustain this important activity. In addition to training in identification, support is required for reporting at appropriate levels as well as advice on the correct and safe use of chemical pesticides i.e. to ensure spraying occurs at the most appropriate time.

Specific training on IAS within organisations is required. Concern was also raised that in some instances high levels of staff turn-over results in a vast amount of knowledge being lost. In addition, there is a reported lack of resources such as diagnostic laboratories where organisations such as ZEMA can confirm identifications.

### Emergency/reactionary mode of operation

There was a general observation that the operations of most of the actors in the invasive species space tends to be reactionary/emergency in nature as opposed to being proactive. While this was attributed to low levels of funding for particularly the government programmes, it was also observed that this was a factor of inadequate planning as well as the inadequate coordination and reporting of activities at the national level. As a result of this scenario, for most activities, there are no contingency plans for the IAS even in cases where outbreaks are frequent. In most cases what the actors had were response plans.

According to the DMMU, other emergency situations such as floods and droughts have contingency plans in place resulting in proactive action. This needs to be promoted in the case of IAS with a conscious move away from reactionary, often emergency, responses to threats, with the concept of preparedness adequately institutionalised. It is also observed that generally there is less satisfactory action on prevention, early detection and rapid response as well as a lack of surveillance related activities in comparison to control and management activities which undermines prevention efforts.

## Opportunities

The feedback on the information gathered from the KIIs indicates that there are generally more strengths than weakness in the IAS system in Zambia. There is potential to improve the situation and attain an effective system with optimal stakeholder engagement, effective data and knowledge management, and community participation that achieves results for all three stages of IAS management. There are some opportunities discussed below that indicate the high potential for achieving a very effective IAS system in Zambia.

**Table 2: Recommended actions to improve the invasive species system in Zambia**

| Recommended actions |
|---|
| Increased availability of skilled personnel |
| Surveillance to determine the extent of spread/distribution |
| Documentation with empirical evidence on the economic impacts of IAS |
| Training of PHIs and others responsible to prevent, control or manage IAS |
| Equipment such as inspection kits and reference materials |
| Amending or revising policy on invasive species |
| Enhanced resource mobilisation for the management of IAS |
| Employing an integrated approach to dealing with IAS i.e. utilising a range of control methods (mechanical, chemical and biological) |
| Advocate for increased funding for the prevention, early detection and rapid response, control and management of IAS |
| The system needs to be strengthened and to become more responsive |
| Institutional roles clearly defined and properly coordinated, especially as relates to implementation and coordination to avoid overlaps and duplication of efforts |
| To operationalise the CBD (at the moment there is no clarity on the status of the CBD) |
| Upscaled awareness raising about IAS in general from key public personnel |
| Prioritizing prevention as a strategy especially at entry points |
| Investment in safeguards to avoid further spread |
| Build the capacity of responsible/mandated authorities and stakeholders |
| Investment in research |
| All management strategies need to have a component of IAS management (at whatever level needed i.e. surveillance through to control and management) |
| A coordinated approach to IAS management |

**Policy guidance/ implementation framework**

The threat of IAS cuts across many sectors. Currently, there is no single policy to guide the IAS system; the closest is the policy on Environmental Management and Wetlands. The most relevant strategic framework is the second NBSAP. The NBSAP is a mandatory requirement under the CBD for implementation, monitoring and evaluation of work and tracking of the globally set Aichi targets which countries report against. Zambia has identified 18 out of 20 targets as national ones. In the absence of a specific IAS national strategy, as follow up to the NISSAP, the NBSAP serves as the best framework for the actors in IAS system to adopt for the monitoring of the work and contribution to the CBD and to the SNDP. The NBSAP was recognised as a guiding framework by the DNPW, WWF, BWZ and ICF. As a starting point, the NBSAP can be used while a process to develop the NISSAP #2 is considered.

**Establishment of Coordination Mechanism at a very advanced stage**

The process of formally establishing a coordination mechanism for IAS management in Zambia is at an advanced stage. ZEMA has a meeting to review the draft terms of reference (TORs) (Nov. 2020) in readiness for presentation to ZEMA management. The MTENR has strongly indicated the urgency of the need to have the apex body functional as soon as possible. The membership of the coordinating committee will comprise relevant government ministries, conservationists and all those actors whose activities are affected by or affect the infestation of invasive species. The timelines are such that once the presentation of revised TORs is made, this will be followed by formal appointment of the proposed members and formalisation of the committee. The National Invasive Species Committee should also be re-established ensuring that concerns such as inadequate resources, too specific a focus on a specific IAS in a target area, and that the meetings become too 'political' resulting in activities slowing down, are addressed.

**Resources mobilisation opportunities**

It is evident that there are opportunities that exist for resource mobilisation in Zambia. For IAS management, there is an opportunity to mobilise resources from the DMMU through the Disaster Management Technical Committee. Though usually perceived as a unit that provides largely for emergencies, the DMMU will support prevention and mitigation interventions, provided strong linkage is seen on how such interventions will work towards mitigating substantial disasters. To be able to have access to such funds, it is necessary that the apex body coordinating committee is in place and is the approved channel for developing proposals on behalf of the actors for resources mobilisation. Another potential source of resources is through the lobbying and advocacy for IAS management work through the Zambia Parliamentary Conservation Caucus (a high-level policy body). Such lobbying and advocacy would have more weight if conducted by the apex body coordinating IAS management activities.

# Conclusions

It is clear that Zambia has the key elements of what it takes to have an effective IAS system in place as there are several key committed and competent actors ready to deliver on their respective mandates in a collaborative manner. The requirement now is to ensure the apex body and coordination mechanism, led by ZEMA, is formalised as soon as possible. The only

threat to this process is slow progress in fulfilling the remaining steps and government support in providing an enabling environment to support ZEMA's efforts.

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# Appendix 1: Checklist questions

Checklist for the IAS System assessment for Zambia

1. Full Name of your organisation
2. Title of main respondent(s)
3. Define your understanding of IS system in simple terms
4. How is your organisation structured to address IS related activities, is there a team assigned to the IS related activities?
5. Zambia is a focus country for the CABI Action Against Invasive; The system has a cross sectoral approach for sustainable management of IS. There are 3 steps in the process of IS management in line with the Global Strategy and Action Plan for IS; namely Prevention, Early Detection and Rapid Response and Control and Management: Can you please indicate which of the three steps your organisation is involved in and explain giving specific examples of the key actions, including the IS of reference that characterise the mandate of your organisation.
6. To which national/regional and global frameworks relevant to the IS system/management does the mandate of your organisation relate? Give examples of policies, acts, strategies that govern the activities that you have highlighted in 5 above.
7. Who are the other key actors in the IS system in Zambia that you know of or interact with. If possible indicate which of the three steps you think they are responsible for.
8. Kindly describe the nature of the interactions with the other key actors that you have named in 7 above.
9. The Key Result Areas of the IS system as alluded to in the Global Strategy Action Plan are as follows: (1) Stakeholder Engagement (2) Community Action (3) Knowledge and Data and (4) Best Practices and Solutions. Would you kindly indicate the contributions of your organisation to these 4 KRAs based on the description of the steps that your organisation is responsible for (the three steps)? How would you rank your organisation's performance given these aspects?
10. What would be your assessment of the overall current IS system in Zambia and what do you see as gaps?
11. What would you recommend as actions required to achieve optimum performance of the IS system in the country?

# Annex 1: List of persons consulted

1. Mr. Ronald Msoni; Agronomist, FAO
2. Mr. Shadreck Mwale; Principal Agricultural Officer, Crops Production, MoA
3. Mr. Demian Mabote Ndalamei; Agricultural Research Officer,
4. Dr. Kenn Msiska; Head/Team Leader, PQPS
5. Mr. Rodwell Chandipo; Desk Officer, Natural Resources; ZEMA
6. Ms. Mwangala Simate; Principal, Natural Resources Officer
7. Ms. Sandra Ponde; Senior Ecologist, Department of National Parks and Wildlife
8. Mr. Masuzyo Nyirenda; Principal Fisheries Officer, Kabwe
9. Mr. Keddy Mbindo; Senior Research Officer (Ecology and Protection) MLNR, Kitwe
10. Ms. Clara Nanja; Project Coordinator, Birdwatch
11. Mr. Griffin Kaize Shanungu; Programme Coordinator for the Zambia Cranes and Wetlands Conservation Programme
12. Mr. Daniel Phiri; Wetlands Officer, Team Leader (IS and Fisheries and Wetlands), WWF
13. Mr. Bruce Ellender; Kabompo Landscape Manager, Upper Zambezi programme
14. Mr. Misael Kokwe; Team Leader for the development of the NBSAP #2, FAO expert
15. Mr. Sikaona; Assistant Director Research, Prevention and Mitigation (DMMU)
16. Mr. Evans kapengele; Principal Officer, Prevention and Mitigation Unit (DMMU)
17. Ms. Catherine Lwando; Natural Resources Specialist, USAID

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