

# An invasive species system assessment in Zambia

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Front cover photo: *Lantana camara* invasive in the Mosi-oa-Tunya National Park, Zambia (photo A. Witt, CABI).

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# Abstract

The study seeks to understand the current status of the invasive species system in Zambia, including its responsiveness. A methodology was developed for identifying areas where the system can be strengthened, as well as establishing a baseline against which changes in system responsiveness can be assessed at a later date, if required.

Through a revised methodology including a document review and key informant interviews the system's current strengths and weaknesses were identified. This facilitated the process of clearly defining and understanding the invasive species system in Zambia as it currently stands and the development of clear guidance on ways forward.

The study findings demonstrate that the current invasive species system in Zambia has some strengths, including a broad range of actors who are aware of the need for invasive species management, some collaboration among actors who demonstrate a willingness to work together, and recognition of the value of community involvement in the control and management of invasive species. However, challenges to the system remain, including weak coordination/communication, a fragmented sector-based approach, institutional/legislative gaps, monitoring and evaluation limitations, and a severe lack of training and resources.

Previous work on invasive alien species (IAS) in Zambia has ensured there is a clear mandate and an established framework for IAS management in the country, with the process of formally establishing a coordination mechanism at an advanced stage. To strengthen the invasive species system in Zambia, a next step should be ensuring the apex body and coordination mechanism is formalized, with government support, in order to provide an enabling environment for action on invasive species in the country.

# Acronyms and abbreviations

BWZ	BirdWatch Zambia
CABI	Centre for Agriculture and Bioscience International
CBD	Convention on Biological Diversity
CIMMYT	International Maize and Wheat Improvement Centre
DOF	Department of Fisheries
DMMU	Disaster Management and Mitigation Unit
DNPW	Department of National Parks and Wildlife
EDRR	Early detection and rapid response
FABI	Forest and Agriculture Biotechnology Institute
FAO	Food and Agriculture Organization of the United Nations
FAW	Fall armyworm
FNDP	Fifth National Development Plan
GEF	Global Environment Facility
IAP	Invasive alien plant
IAS	Invasive alien species
ICF	International Crane Foundation
IITA	International Institute of Tropical Agriculture
IPPC	International Plant Protection Convention
IUCN	International Union for the Conservation of Nature
MOA	Ministry of Agriculture
MLND	Maize lethal necrosis disease
MLNR	Ministry of Lands and Natural Resources
MTENR	Ministry of Tourism, Environment and Natural Resources
MWDSEP	Ministry of Water Development, Sanitation and Environmental Protection
NBSAP	National Biodiversity Strategic Action Plan
NGO	Non-governmental organization
NISSAP	National Invasive Species Strategy and Action Plan
NPPO	National Plant Protection Organization
PQPS	Plant Quarantine and Phytosanitary Service
RBIPMA	Removing Barriers to Invasive Plant Management in Africa
SADC	Southern African Development Community
SNDP	Seventh National Development Plan
UNEP	United Nations Environment Programme
WARMA	Water Resources Management Authority
WWF	World Wildlife Fund for Nature
ZARI	Zambia Agriculture Research Institute
ZEMA	Zambia Environmental Management Agency

# Introduction

An invasive species system is defined as a system that 'consists of all organisations, people and actions whose intent is to combat the threat, spread and effects of invasive species' (Williams *et al.*, 2021). The system therefore includes all invasive species whether native species that have become invasive or non-native invasive species, referred to here as invasive alien species (IAS). However, it is likely that IAS will be causing the most damaging impacts to crops, livestock production and other economic activities; human health and the environment. Therefore in this assessment we focus on IAS to understand the system, as most current and previous engagement in this area has related to IAS.

Invasive alien species are species that, with human assistance, arrive in new areas and cause damage to crops, livestock production and other economic activities, human health, and the environment. They include microbes, plants, insects, vertebrates and other organisms. A recent example of an IAS is *Spodoptera frugiperda* (fall armyworm) in Africa, which has the potential to cause maize yield loss in the range of 8.3 to 20.6 million 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.

Increased trade and travel increase the risk of IAS being introduced, with climate change enhancing species establishment and spread (Early *et al.*, 2016). The impacts from IAS are disproportionately borne by the poor and vulnerable. Many international agreements recognize the threat from IAS, including the International Plant Protection Convention (IPPC), which 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', and the 1992 Convention on Biological Diversity (CBD).

Parties to the CBD are obligated, in Article 8 (h), to 'prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species'. The guiding principles on IAS adopted by the Sixth Conference of the Parties to the CBD include a 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. Signatories to the CBD therefore have a responsibility to manage IAS. However, for many countries this can be challenging due to competing demands on limited resources, a lack of clarity about the actual cost of the damage caused by IAS (Paini *et al.*, 2016; Pratt *et al.*, 2017; Eschen *et al.*, 2021a, 2021b), and the lack of a well-functioning system through which to undertake management actions (Williams *et al.*, 2021). One step towards enabling countries to improve their IAS management response is therefore to understand the current functioning of the invasive species system within the country, its strengths and weaknesses, and opportunities for building the system.

Williams *et al.* (2021) set out a theoretical framework and approach for describing and assessing the responsiveness of countries to the threat of invasive species. This can be used to identify opportunities for strengthening the system, as well as to establish a baseline against which changes in responsiveness can be measured. This approach was trialled in Kenya in 2019, where those involved in the Kenyan invasive species system engaged in a participatory self-assessment of the functioning of the system. This work highlighted the strengths of the current system in Kenya, but also some weaknesses.

Based on the work in Kenya, the study reported on in this working paper aimed to carry out a similar assessment in Zambia, as a first step towards supporting the further development of the invasive species system in the country. The key objectives of this work were to understand the existing invasive species system in Zambia, including:

- different actors' roles, responsibilities and mandates in delivering the system functions
- the nature of interactions between actors
- how the system as a whole is operating/delivering its mandate(s)

The aim of the study is to assist in planning the next steps for Zambia's invasive species system, based on the understanding and insights gathered. The results can form either a baseline assessment, or can contribute to a comparative assessment if the study is repeated, to understand changes in the system over time.

# Method

The methodology, piloted in Kenya, for the assessment of the invasive species system consisted of a literature/document review, a stakeholder workshop and key informant interviews. 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 was adopted that concentrated on a literature/document review and more comprehensive key informant interviews. The assessment process in Zambia consisted of the following elements:

- a document/literature review
- preliminary interviews with key actors to introduce the study and to get inputs to inform the development of an assessment checklist
- sending the checklist to key actors for feedback on the invasive species system assessment
- following on from the checklist responses, conducting further key informant interviews with selected actors

## **Document/literature review**

The aim of the desk review was to assist in providing a general understanding of the invasive species 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 government departments involved in invasive species prevention, early detection and rapid response (EDRR), and control, and the various actors who contribute towards system functioning. Contextual factors, such as the policy environment, were also noted. Policies relevant to invasive species, and IAS specifically, were considered, as well as general policies (e.g. on governance structures and institutional mandates) that determine how policies are implemented. The general sources explored included:

- documents providing an overview of the government structure
- documents providing an overview of the structure of the Ministry of Agriculture (MOA) and departments responsible for extension, crop protection, livestock management, quarantine and diagnosis, and their links with local government structures
- documents providing an overview of the structure of the Ministry of Tourism, Environment and Natural Resources (MTENR) and departments responsible for environmental protection, climate change, wildlife management etc.
- agricultural and environmental policy documents and development plans
- information on the functions of regulatory bodies (e.g. the National Plant Protection Organization (NPPO); the pesticide control body)
- information on any involvement by the Ministry of Trade and/or the Ministry of Health in invasive species management
- information on private traders, import/export companies, agro-dealers and/or transporters with regard to invasive species management
- information on the involvement of national research organizations and universities in invasive species management
- country NPPO information relating to the IPPC
- donor documents for Zambia (e.g. Food and Agriculture Organization of the United Nations (FAO), International Union for the Conservation of Nature (IUCN), World Wildlife Fund for Nature (WWF))
- country statistics (e.g. from FAOSTAT and the World Bank)
- UNEP-GEF Project, 'Removing Barriers to Invasive Plant Management in Africa (RBIPMA)' working papers and other publications
- research papers on invasive species in Zambia

Information was readily available from government websites and donor and research reports. The document review acted as a good entry point for starting to understand the context. However, official policy and institutional arrangements do not always reflect the reality on the ground, so key informant interviews were conducted to help us to understand what is really happening in Zambia in terms of the invasive species system.

## **Key informant interviews**

Following the document/literature review, key informant interviews were conducted during October and November, 2020. This process involved first conducting preliminary interviews with representatives identified as key actors in the invasive species system in Zambia. Thereafter, those representatives were sent a comprehensive checklist of key questions to complete. Further interviews then took place in cases where it was identified that an actor could provide greater depth of information and insight into the invasive species system.

The representatives who were contacted included individuals from the organizations set out in the table below:

**Table 1.** Key organizations/actors interviewed.

<ul> <li>Ministry of Agriculture (MOA):</li> <li>Crops Production Department</li> <li>Forestry Department</li> <li>Department of Fisheries (DOF)</li> </ul>	<ul> <li>Research and regulation:</li> <li>NPPO: Zambia Agricultural Research Institute (ZARI) – Plant Quarantine and Phytosanitary Service (PQPS)</li> </ul>
<ul> <li>Ministry of Lands and Natural Resources (MLNR)</li> <li>Zambia Environmental Management Agency (ZEMA)</li> </ul>	<ul> <li>NGOs/international organizations:</li> <li>BirdWatch Zambia (BWZ)</li> <li>International Crane Foundation (ICF)</li> <li>WWF</li> <li>FAO (agronomist)</li> <li>United States Agency for International Development (natural resource specialist)</li> </ul>
<ul> <li>Disaster Management and Mitigation Unit (DMMU)</li> <li>Landscape manager from the Upper Zambezi programme</li> </ul>	
<ul> <li>Team Leader for the development of the National Biodiversity Strategic Action Plan (NBSAP) #2 (FAO expert)</li> </ul>	

Standard questions were used, concerning the actors' role in invasive species management, the other actors they work with and the challenges they face in managing invasive species. The interviews also provided information on contextual influences, such as the policy environment, institutional structures, donor influence and the organizational culture. The interviews gave respondents the opportunity to assess their own strengths and weaknesses within the system.

# Results

# Policy and legal framework

As a signatory to the CBD, Zambia has committed to implementing resolutions relating to the Convention, and this is evident in the country's policies relating to the natural world, agriculture, the environment, fishing, spatial planning, infrastructure, water management, social and economic activities, and development cooperation. National Biodiversity Strategic Action Plans (NBSAPs) are the principal instruments for implementing the CBD at the national level. Zambia's current NBSAP includes a strategy that aims to control or prevent the spread of key IAS, in support of Aichi Target 9, which states: 'By 2020, IAS [invasive alien species] 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 alien species are highlighted under the Government of Zambia's Environmental Management Act 2011 (No. 12) and associated Environmental Management (Licensing) Regulations 2013, which state: "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.' The incorporation of IAS issues within the 2011 Act has introduced, for the first time, potential fines and/or prison sentences for non-compliance with the agreed norms for the prevention, monitoring and control of IAS. Division 8 of the Act (77–78) prohibits the importation and introduction of invasive

species, and lays down the duty of owners or occupiers in relation to IAS management. The Act covers permission for an inspector to 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 guidelines will be prepared 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.'

IAS issues are also included in the Fifth National Development Plan (FNDP), which introduces a target to reduce *Mimosa pigra* (giant sensitive tree) infestation. The National Policy on the Environment 2009 also refers to IAS, as follows: 'Species of organisms not indigenous to a given ecosystem that invade it, usually as a result of introduction from abroad for example, *Eichhornia* [now *Pontederia*] *crassipes* (water hyacinth).' Section 2.2.9 Heritage Sector (f) further refers to the encroachment of sites by invasive weeds, such as *Lantana camara*. The National Wetlands Policy mentions invasive species such as *M. pigra* on the Kafue Flats, *P. crassipes* (commonly referred to as Kafue weed) and *Salvinia molesta* (Kariba weed), as well as *Azolla pinnata* (azolla), a native invasive species (*A. filiculoides* is introduced and invasive in Zambia).

A key development in Zambia's engagement with the issue of IAS was its involvement in the RBIPMA project, implemented between 2005 and 2011 under the United Nations Environment Programme/Global Environment Facility (UNEP-GEF)<sup>1</sup>. The project contributed to the formation of a National Invasive Species Strategy and Action Plan (NISSAP) for Zambia and led to consideration of invasive species in the revised NBSAP, the Environmental Management Act 2011, and the FNDP (as discussed above). The current efforts to establish effective coordination are based on outcomes from the RBIPMA project. Kiff and Oti-Boateng (2012) provide a detailed review of the RBIPMA and Boy and Witt (2013) provide a comprehensive review of outcomes as well as lessons learned and recommendations for future work.

As part of the RBIPMA project a review of the enabling policy and institutional environment for invasive plant management in Zambia was produced providing a detailed overview of the invasive species system at the start of the project. This review highlighted gaps, overlaps and inconsistencies in the regulations, policies, strategies and institutional arrangements relating to IAS in Zambia (MTENR, 2007).

## Key invasive species system actors/organizations

There are a number of actors within the invasive species system in Zambia, with various roles and responsibilities. Their main involvement is summarized in the paragraphs below.

#### Ministry of Agriculture (MOA)

The MOA (<u>https://www.agriculture.gov.zm/</u>) is responsible for a range of functions, including agricultural policy, field services, agricultural research and agricultural extension (crops, livestock and fisheries). As part of these responsibilities, the MOA works directly on the prevention, EDRR and control of IAS, and is indirectly involved in the coordination of IAS work related to agriculture.

<sup>&</sup>lt;sup>1</sup> UNEP-GEF Project No. GFL / 2328 – 2711 – 4890 – Removing Barriers to Invasive Plant Management in Africa. CABI -Project Lead International Executing Agency; The World Conservation Union (IUCN) – Assisting International Executing Agency; Environmental Council of Zambia (ECZ) – Project National Executing Agency in Zambia.

Prevention activities include surveillance for locust swarms, training farmers to identify pests, and provision of substantial support to farmers in managing species such as *Spodoptera frugiperda* (fall armyworm) (FAW), *Nomadacris septemfasciata* (red locust) and *Locusta migratoria* (African migratory locust) (the latter being prevalent in western Zambia). The Plant Quarantine and Phytosanitary Service is housed under the MOA (see below).

The MOA has an established internal monitoring and surveillance system for the frequent outbreaks of *Spodoptera exempta* (African armyworm), which has been replicated for FAW. Some of the challenges to effective functioning of this system are a lack of champions to ensure the monitoring system is functioning adequately (resulting in individual officers taking on monitoring activities out of personal interest, and without allocated funds), and traps and lures not being provided in good time and in insufficient quantities.

## Plant Quarantine and Phytosanitary Service (PQPS)

The PQPS is Zambia's NPPO, point of contact for plant health and signatory to the IPPC on behalf of the Government of Zambia. The PQPS is currently a section under the Plant Protection and Quarantine Division of ZARI, under the MOA. The PQPS is mandated to provide services that prevent the introduction of pests and diseases into the country and facilitate international trade through the provisions provided for under the Plant Pests and Diseases Act, CAP 233 and the Noxious Weeds Act, CAP 231.

The core function of the PQPS is to prevent the introduction and spread of plant pests through the enforcement of phytosanitary procedures. This involves checking and directing the movement of all plants and plant products with the aim of intercepting plant pests before they can become established and cause economic damage. The PQPS issue Plant Import Permits for the import and export of plant products with the aim to ensure no IAS (on the list of prescribed plants and organisms) are spread. The department also instruct inspectors at ports of entry to check consignments and seize those not complying with standards.

Specific subunits of the PQPS are tasked with different roles relating to IAS, for example, plant pest diagnostics, pest risk analysis, communication and awareness, documentation, border coordination and inspection.

## **Department of Fisheries (DOF)**

The DOF's activities related to IAS are guided by the Fisheries Act No. 22 of 2011, section 19, which includes a subsection on activities relating to prevention, early detection and control/management. The DOF monitors the introduction and spread of IAS in all aquatic systems, through district research and extension units which report to provincial units. The DOF also conducts routine monitoring of IAS in various fisheries across the country. However, there are no specific officers assigned to work on IAS, with all DOF researchers responsible for the monitoring and management of IAS.

The DOF engages in collaborative activities on IAS with ZEMA, MLNR, MOA, WWF, IUCN, and BWZ. For example, the DOF worked with BWZ on the early detection of, and rapid response to, *S. molesta* in Lukanga Swamp, and is also involved, alongside WWF, in investigating management options for the control of *Cherax quadricarinatus* (red claw crayfish). Indeed, the highly invasive *C. quadricarinatus* has been deliberately introduced to a number of sites in both the Zambezi and Kafue River catchments since 2001 and is now widespread (Douthwaite *et al.*, 2018).

#### Ministry of Land and Natural Resources (MLNR) including the Forestry Department

The MLNR is responsible for land administration, forest management and climate change programmes co-ordination as well as providing policy direction. For example, the Zambian government developed the National Policy on Wetlands and its implementation plan, which includes managing the threat from IAS. The MLNR is the focal point for the CBD and coordinates implementation of the Ramsar Convention on Wetlands (through the Climate Change and Natural Resources Management Department).

The **Forestry Department's** Pathology and Entomology section has responsibility for the prevention, management and control of forest plantation pests and diseases, including IAS. Its Forestry Research branch, through its Ecology and Protection Unit, is responsible for undertaking control and management of forest pests (an example is *L. camara*, which has been managed and controlled in forest plantations). The branch carries out periodical ecological surveys and research into forest protection, including the detection, management and control of forest pests and IAS (plants, insects and pathogens) in all forests, woodlands and other tree landscapes. When a new IAS is found, the department identifies 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 the first record of *Glycaspsis brimblecombei* (red gum lerp psyllid) and published this new record in collaboration with Copperbelt University (https://onlinelibrary.wiley.com/doi/epdf/10.1111/aje.12353). Thereafter, the Forest Invasive Species Network developed initial biocontrol trials for this pest, in collaboration with the Forest and Agriculture Biotechnology Institute (FABI), with financial support from FAO.

The Forestry Department holds a database of plant species and ecological information, including for invasive plant species, which is continuously updated through the National Forest Herbarium.

In terms of prevention, the Forestry Department works in collaboration with PQPS to provide clearance for the import and export of forest-related plant materials. For instance, the department recently stopped a forest plantation project in central Zambia that was introducing a new species of eucalyptus (a likely pathway for new pests), for which no pest risk analysis had been conducted.

#### Department of National Parks and Wildlife (DNPW)

The DNPW is mandated to manage and conserve all wildlife resources in Zambia and actively focuses on the prevention, control and management of IAS to prevent habitat destruction which impacts wildlife populations. An example of DNPW's role in the IAS system in Zambia is the part it played in detecting *M. pigra* in the Kafue Flats, which was subsequently controlled with technical support from ZEMA and financial support from stakeholders.

#### Zambia Environmental Management Agency (ZEMA)

ZEMA is mandated to protect the environment in order to support the health and welfare of people and the environment. As a regulator, ZEMA requires organizations to manage IAS on their premises or in areas under their control. The agency plays a coordination role and is active in the prevention and EDRR of IAS (e.g. the invasive alien plants (IAPs) *M. pigra* and *P. crassipes*). It is directly involved in managing IAS, coordinating activities of other institutions involved in their management, and is consulted for expert advice when an imported plant species is suspected to be invasive, verifying alerts and reports. However, there is limited staff capacity with only a single environmental officer responsible for IAS. The agency is also responsible for stakeholder engagement and the formation and hosting of coordination mechanisms for the management of IAS in the country. It raises awareness among communities and sensitizes them on the impacts of IAS, and holds responsibility for managing an IAS database and documenting the best approaches to managing IAPs. However, when the RBIPMA project ended in 2011 most IAS activities ceased in Zambia. Efforts have recently (within the last few years) been made to address this delay in action, with support from the other actors. The agency is also a member of the Steering Committee for IAS with BWZ.

#### **Disaster Management and Mitigation Unit (DMMU)**

The DMMU is a permanently established statutory government agency with the responsibility of ensuring the achievement of Zambia's Disaster Management Objectives under the Disaster Management Act No. 13 of 2010. At the national level, the Disaster Management Technical Committee of Permanent Secretaries is established. When required the Permanent Secretary for Agriculture will initiate contact with the relevant departments and organizations (ZARI, PQPS, FAO, etc.) to develop an intervention plan to manage IAS.

#### **Research organizations and universities**

Research organizations involved in IAS management include ZARI (under the MOA) whose objectives 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 the statutory body through which the Government of Zambia directs policy on the development and application of science and technology. The University of Zambia and Copperbelt University are also involved in research on IAS. Both universities are collaborating with BWZ (and other partners) on invasive plants in Lukanga Swamp, while Copperbelt University has conducted research on forest IAS, and the University of Zambia has conducted research on agriculture and livestock pests.

#### International organizations

The International Institute of Tropical Agriculture (IITA) is currently coordinating a programme to upscale sustainable, environmentally friendly and socio-economically sound proven control measures for *S. frugiperda*. The International Maize and Wheat Improvement Centre (CIMMYT) has a focus on food security and was involved in confirming the arrival of wheat blast to the African continent. FAO, which works with the MOA, DOF and ZARI (among others), has specific staff assigned to IAS management. FAO supported a sub-regional project for southern Africa to strengthen various institutions in the Southern African Development Community (SADC) that address sanitary and phytosanitary measures, including IAS. The project strengthened the capacity of these institutions for prevention, EDRR, as well as control and management of pests and diseases. The FAO is currently providing support for projects on *S. frugiperda*, *Phthorimaea (Tuta) absoluta, Bactrocera dorsalis, Fusarium oxysporum* and maize lethal necrosis disease (MLND).

## Non-governmental organizations (NGOs)

**Birdwatch Zambia**'s (BWZ) mandate includes the management of IAS, especially those within their focal point areas. The NGO conducts routine habitat monitoring, which puts it in a good position to detect, report (to relevant stakeholders) and sometimes respond to IAS. For example, BWZ detected *S. molesta* and *Azolla* sp. in Lukanga, Barotse floodplain, and Simungoma, as well as *M. pigra* in some of its priority areas, and has secured funding for, and is actively working on, controlling *S. molesta* in Lukanga Swamp using the biological control agent *Cyrtobagous salviniae*.

The **International Crane Foundation** (ICF) works in the Kafue Flats to restore economic and livelihood activities by removing *M. pigra* vegetation, for which it uses physical removal with vigorous follow-up and herbicides; this is alongside the established biological control agent previously released here. The ICF also works very closely with WWF and BWZ in the management of *S. molesta*, and has facilitated the commission of an IAS assessment and review, to be implemented by ZEMA.

The **World Wildlife Fund** (WWF) has been working with local communities to control *M. pigra* from the Kafue Flats since 2017, and is also involved in the control and management of *C. quadricarinatus*. The WWF's interventions are preceded by research and it has strong linkages with universities. The WWF historically has mainly been a donor for research, they now have a wetlands officer who leads work on IAS, fisheries and wetlands initiatives.

## Other key actors

Other actors identified as key in the invasive species system include the Ministry of Water Development, Sanitation and Environmental Protection (MWDSEP); the Wildlife and Environmental Conservation Society of Zambia; other conservation organizations not mentioned above (e.g. the Nature Conservancy); resource management authorities (e.g. the Water Resources Management Authority (WARMA), the Zambezi River Authority, and the Zambia Electricity Supply Corporation); and statutory government bodies (e.g. the National Heritage Conservation Commission).

# Discussion

## Strengths of the invasive species system in Zambia

#### **Broad range of actors**

A broad range of actors in Zambia are involved in managing and mitigating the negative impacts of IAS. Actors such as BWZ, WWF and ICF, have had some success in attracting external funding for IAS-related work that is of considerable significance to biodiversity preservation and environmental conservation in Zambia.

Among the line ministries of the Government of Zambia that are active in contributing to the invasive species system, the MLNR serves as the focal point for the CBD, providing policy guidelines for the management of wetlands (including threats from IAS), with the MOA also coordinating implementation of the Ramsar Convention on Wetlands. The direct implementation of the provisions of the wetland policy and the Ramsar Convention is the mandate of the DNPW within the MWDSEP. Other departments that engage in activities relevant to IAS management and biodiversity conservation are the Department of Forestry and the DOF.

## Existence of collaborative partnerships

The study found evidence of good collaboration among the actors working on IAS, with willingness to work together and readiness to share experiences. The best example of a collaborative partnership in Zambia for IAS work is the current BWZ project on the control of *S. molesta* in Lukanga Swamp. Through this project, BWZ has established a Steering Committee which constitutes most of the key actors working on IAS management, including ZEMA, which is responsible for coordinating the IAS agenda in the country. This provides a model that could be employed for a national-level coordination mechanism. Other examples of effective partnerships include the recent invasion of FAW where a

national taskforce was created. However, a key gap in the response to FAW is that other actors outside the MOA are not involved in any monitoring and surveillance activities.

A further example of good collaboration among various actors (although not as formally established as the one for the BWZ) is that between ICF and DNPW, with the latter helping to facilitate provision of a waiver from ZEMA for conducting an environmental impact assessment, which substantially reduced 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 in its work on *C. quadricarinatus*, and is 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 in its work in the Zambezi and Kafue Flats).

#### Past and present experiences that can be used for learning

Various actors have engaged in, or are engaging in, managing IAS: their experiences can provide lessons for further developing best practices in the IAS system in Zambia. The MOA, in particular, has a wealth of knowledge gained from the management of several IAS, particularly the sustainable management of *S. frugiperda*. BWZ's control of *S. molesta* demonstrates the successful utilization of a biological control agent. The research branch of the Forestry Department, in collaboration with Copperbelt University, reported and published a first recording of *G. brimblecombei* in the country.

#### **Community action**

Community action is a vital element in efforts to manage IAS. Active engagement of the community includes ensuring, and building capacity for, effective locally-based monitoring and control of species. Most of the key actors consulted in this study pointed to examples of active community participation in IAS management, particularly at the control stage. For example, BWZ highlighted the following in reference to engagement with local communities:

'We are strong on local community Site Support Groups in our Important Bird Areas. ... Through these groups, we provide livelihood programmes 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.'

All the NGOs and most of the line ministries who contributed to this study reported being actively involved in facilitating community participation in the sustainable management of IAS.

## A mandate for the coordination of the invasive species system and policy support

Zambia Environmental Management Authority has responsibility for overseeing the coordination mechanism for the invasive species system, the National Invasive Species Committee, which was developed ten years ago under the RBIPMA project. Unfortunately, when the project ended momentum was lost, but there have been recent attempts to re-establish the Committee. The existence of ZEMA's clear mandate for responsibility (which all actors in the system are aware of) and this established framework bode well for future coordination in the sector. However, the Committee is not yet fully operational and some actors were not aware of its existence.

## Successful utilization of biological control

The potential of biological control of IAS has been demonstrated. For example, although communities were employed to manage *S. molesta* this had little impact as after clearing, the IAS would re-establish.

This resulted in looking for alternative methods and the introduction of the classical biological control agent *C. salviniae* which subsequently established in Zambia.

## Weaknesses of the invasive species system in Zambia

#### Weak coordination

Following on from the previous point, the coordination mechanism for the system is not yet formalized and this has resulted in a fragmented approach to the implementation of invasive species management activities, which are sector-based. Some actors operate independently of ZEMA in regard to planning or reporting. Most of the actors' programme planning is influenced by funding levels, sources of funding and institutional priorities/interests. Given the inadequate allocation of resources from the government, and the absence of a well-established coordination mechanism, as well as lobbying 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, sector-based approach reflects a failure to embrace broader biodiversity and to recognize its importance in the ecosystem, as well as a failure to appreciate the implications of IAS in relation to other threats, such as habitat transformation and encroachment on ecosystems.

There is a disconnect between ministries, and collaboration between them is weak and fragmented. Thus, the MOA, ZEMA and DNPW belong to different ministries with different focal areas. Some actors (e.g. WARMA) are no longer active, and their responsibilities have been allocated to different ministries. Thus, there is a need for clarification on mandates, roles and responsibilities. Furthermore, the national-level Disaster Management Committee for Permanent Secretaries structure is not replicated at provincial and district levels. Thus, while the permanent secretaries of a given ministry are able to mobilize with other implementing/cooperating partners and stakeholders in the line ministry, it is unclear whether this cascades to the provincial level.

## Gaps in the institutional/legislative framework

While positive institutional changes were made by the RBIPMA project, including developing the NISSAP and including IAS considerations in the revised NBSAP #1 and the FNDP (which led to substantial government funding from the central government for control of *M. pigra*), its closure, together with the absence of a coordination mechanism, means there has been no follow-up to the NISSAP, and thus the alignment of the programmes of the various actors in IAS management with the NBSAP #2 is rather weak. The NISSAP needs to be updated, endorsed by government and implemented.

One effect of the lack of a fully functioning institutional framework is the fact that there are no guidelines available to institutions for deciding where to work, with this decision depending on programmes and opportunities provided by the available funds from resource partners, as well as influenced by the capacity of partner organizations.

## Limitations in the monitoring and evaluation framework

The gaps in the institutional and legislative framework, and the absence of strategic planning and programming, significantly undermine monitoring and evaluation within the invasive species system. The study uncovered very few examples of systematic monitoring and reporting that ensures

alignment to the NBSAP and the Seventh National Development Plan (SNDP). Oversight by the MTENR for the implementation of the NBSAP has been absent, and as such the opportunity for reporting on the set targets has been missed. The ministry has not set up the National Steering Committee or Clearing House Mechanism, which was envisaged would support the implementation of the NBSAP. In order to ensure functional monitoring and evaluation within the invasive species system, this coordination body should be established and should have responsibility for monitoring performance, guided by relevant global and national policy and strategic frameworks. Another related gap is the absence of adequate data for setting baselines for the different IAS. Overall, a comprehensive monitoring framework is required to ensure the sustainable and effective management of IAS.

#### Inadequate communication and information sharing/storage

The weak coordination in the system results in poor communication among actors, including a lack of effective information sharing on IAS management. There is no national reporting mechanism and no provision for a national system for storing information and data obtained from work on IAS in the country.

#### Inadequate training and resources, and the problem of staff turnover

Regular monitoring is essential for an effective early warning system, to help prevent the spread of IAS, but this requires adequate training of community members. Currently, due to the inadequate training and resources to sustain this important activity, there is only isolated monitoring, which is conducted by actors in their areas of operation. There is also a need for training and support on reporting at appropriate levels, as well as advice on the correct and safe use of chemical pesticides, to ensure spraying occurs at the most appropriate time. Furthermore, there is a need for specific training on IAS within different organizations. Finally, there is a reported lack of resources, such as diagnostic laboratories for confirming identification. Indeed, lack of resources in general is reflected in the very donor-dependent nature of any IAS activities. A different challenge is the loss of information gained from training when staff leave organizations, which is reported to be a problem in Zambia, where there are high rates of staff turnover.

## An emergency/reactive mode of operation

Respondents reported that the operations of most of the actors in the IAS space tend to be reactive/emergency in nature, rather than proactive. This was attributed to low levels of funding, particularly for government programmes, and to inadequate planning, coordination and reporting of activities at the national level. There are no contingency plans in place for IAS, even in cases where outbreaks are frequent. This is in contrast to other emergency situations, such as floods and droughts, which have contingency plans that result in proactive action. It was also observed that there is less satisfactory action on prevention, early detection and rapid response, in comparison to control activities, and that there is a lack of surveillance-related activities. This undermines prevention efforts.

## Barriers to use of biological control

Although demonstrated to be highly successful in IAS management the introduction of *C. salviniae*, along with an associated Environmental Impact Assessment was extremely expensive. Further, the process for introductions are not clear and the length of time it takes for a potential agent to be approved is prohibitively long. For example, it took over ten years to obtain permission to release *Carmenta mimosa* for control of *M. pigra* (Arne Witt, *pers. comm. Dec 2021*).

# Recommendations

The information gathered from the key informant interviews indicates that there are strengths and weaknesses within the invasive species system in Zambia. There is potential to improve the situation and to put in place an effective system with optimal stakeholder engagement, effective data and knowledge management, and community participation, to achieve results for all three stages of IAS management.

The main recommendations are centred around the following key areas:

Policy level:

- Amend and/or revise policy on invasive species with a focus on IAS
- Ensure all management strategies by key actors have an IAS management component, at whatever level is needed (i.e. from surveillance through to control and management)

Coordination:

- Ensure a central body is established to coordinate IAS activities
- Promote an integrated approach to dealing with IAS i.e. utilizing a range of control methods e.g. physical, chemical and biological
- Improve communication and information sharing i.e. via an open access platform/website
- Ensure institutional roles are clearly defined and properly coordinated, especially in regard to implementation, to avoid overlaps and duplication of efforts

Awareness:

• Raise awareness about invasive species especially IAS among key public personnel to cascade through to all levels i.e. local, regional and national

Capacity building:

- Training and skills development for responsible/mandated authorities and stakeholders
- Prioritize prevention of new IAS as a strategy, especially at entry points, and institutionalize the concept of preparedness, moving away from reactive, often emergency, responses to threats
- Ensure surveillance takes place to determine the extent of spread/distribution

Resources:

- Advocate for increased funding for prevention, early detection, rapid response and control of IAS
- Enhance the mobilization of resources for the management of IAS
- Procure and distribute equipment, such as inspection kits and reference materials
- Invest in safeguards to avoid further spread
- Invest in research including updating data repositories on IAS present in the country
- Invest in documenting, with empirical evidence, the economic impacts of IAS

#### Policy guidance/implementation framework

While the threat of IAS cuts across many sectors there is currently no single policy to guide the invasive species system (the closest is the policy on Environmental Management and Wetlands). There is an urgent need for the development of overarching legislation followed by support in implementation. The most relevant strategic framework/ overarching strategy is the NISSAP developed under the RBIPMA project, which, in the absence of a national strategy for specific IAS, serves as the best framework for actors in the invasive species system with regards to monitoring, and contributing to the CBD and the SNDP. Thus, as a starting point, the NISSAP should be used. At the same time, a process for developing the NISSAP #2 should be considered.

#### Establishment of a coordination mechanism

The process of formally establishing a coordination mechanism, a National Invasive Species Committee, for invasive species / IAS management in Zambia is at an advanced stage and the MTENR has indicated the urgency of making this apex body functional as soon as possible. The membership of the coordinating committee will comprise relevant government ministries, conservationists and all actors whose activities are affected by, or that affect, infestation by invasive species / IAS. In November 2020, ZEMA had a meeting to review the draft terms of reference for the committee, in readiness for presentation to ZEMA management. This was expected to be followed by formal appointment of the proposed members and formalization of the committee, though it is unclear whether this has happened. There is a need to address concerns about the functioning of the National Invasive Species Committee, including inadequate resources, too specific a focus on certain IAS in target areas, and the meetings becoming too 'political', which slows down activities.

#### **Opportunities for mobilizing resources**

There are opportunities for mobilizing resources for IAS in Zambia, for example, from the DMMU, through the Disaster Management Technical Committee. Though usually perceived as a unit that provides support largely for emergencies, the DMMU supports prevention and mitigation interventions, provided it is made clear how such interventions will work towards mitigating substantial disasters. To be able to have access to these funds it is necessary that the apex body coordinating committee is in place, and is the approved channel for developing proposals for resource mobilization on behalf of all actors in the system. Another potential source of resources is lobbying and advocacy through the Zambia Parliamentary Conservation Caucus (a high-level policy body). Again, this would have more weight if it was conducted by the apex body.

# Conclusions

Zambia has in place some of the key elements of an effective invasive species system, with a number of committed and competent actors who are 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 formalized as soon as possible. If the threats to this process (slow progress in fulfilling the remaining steps and lack of government support in regard to providing an enabling environment to support ZEMA's efforts) can be overcome, there is high potential to achieve a very effective invasive species system in Zambia.

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