Invasive Species and Protected Areas

Managing the increasing threat of Invasive Species in Protected Areas in Africa

Are we inadvertently protecting invasive species in protected areas – with resulting impacts on protected biodiversity and re-invasion of other areas in the future?

Introduction

Biological invasions come about when a species is introduced to an area (or ecosystem) to which it is not native and when it establishes there, spreads and causes damage to biodiversity, human health or development. The species causing the problem is then called an invasive species (or invasive alien species). The resulting interaction between the invading species and the affected ecosystem is called biological invasion. In this International Year of Biodiversity we are increasingly aware of the fact that invasive species are one of the biggest drivers of biodiversity loss and are most concerned about the impact of invasive species in protected areas – which have long been thought of a safe refuges for animals and plants but are now under increasing threats from invasive plants and animals. The Global Invasive Species Programme (GISP) has experience of this severe threat to biological diversity and wants to share its experiences.

Protected areas in Africa are one of the main ways in which we can conserve the rich biodiversity of the continent and enhance economic growth through tourism and associated activities. However, we assume that once protected from unsustainable use, fire and other threats, the biodiversity within them will be preserved for future generations. Unfortunately Protected Area boundaries cannot stop the incursion and subsequent establishment of these problematic species which may largely negate the purpose of a protected area. Such invasions are often difficult to detect early in their development and are more often than not only recognised once they become problematic . The following is an attempt to bring this issue to the forefront of protected area management and so biodiversity conservation. There is also a very real worry that protected areas may inadvertently be protecting invasive species which can then re-invade other areas of production or other uses essential to peoples' livelihoods.

Presence of invasive species in protected areas

Most protected areas (be they National Parks, Nature Reserves, Forest Reserves or other areas of key biodiversity) harbour some invasive species with new introductions occurring at an increasing rate. However, few Protected Area managers and their associated staff, especially in developing countries, are aware of this threat or are they able to address it. The Global Invasive Species Programme and partners have worked in many countries in Africa on a range of issues related to protected areas and has information derived from projects, surveys, and interactions with biodiversity conservation practitioners. While some countries in Africa have protected area management systems that take note of, and manage, biological invasions, the vast majority don't have the capacity or resources to identify invasive species; are largely unaware of their impacts; and, more importantly, don't possess the necessary information and equipment to actually manage them.

Biological invasions have been detected in many types of terrestrial and freshwater systems – mainly comprised of alien higher plants but also including lower plants and a few animals. Alien

and invading vertebrates are rare in these systems although a few species of fish, fewer birds and even fewer mammals have been detected over the years. Many invasive plants, however, are both widespread and spreading – ranging from herbs and grasses to climbers, shrubs and trees – in most cases originating from tropical and sub-tropical areas of the world outside of continental Africa.

Impacts of biological invasions in protected areas

Invading plants in protected areas are important because of their impacts on the integrity and conservation of biodiversity such as:-

- Disturbance and disruption of native vegetation and loss of local plant populations
- Competition with locally-important plants – for space, light, nutrients, water
- Possible local extinction of native plant species and the organisms associated with them
- Spread of allelopathic substances (noxious plant chemicals) by invading species which prevent germination and growth of native plants and inhibit restoration of ecosystems
- Disruption of ecosystem services and natural processes such as energy, nutrient and hydrological cycling
- Providing conditions for other possibly invasive species to establish in a changed ecosystem
- Disruption or removal of food, cover, nesting and resting resources for native animals
- Negative impacts on pollination of native vegetation
- Bringing pests and diseases that can affect native vegetation to its detriment
- Increase threats of fire and soil erosion
- Increase security problems – by providing hiding places for illegal hunters or plant collectors in PAs

Some examples

The UNEP-GEF project "Removing barriers to the management of invasive plants in Africa" has enabled several countries to identify and begin to manage several serious invasions in their protected areas, such as:

***Mimosa pigra* in Zambia –** "Giant mimosa" is a spiny shrub that established on the Kafue Floodplain in a national park in Zambia in the early 1980s and has since spread to cover 3,0000 hectares of prime floodplain habitat thereby excluding animals and plants from their natural habitat – including the endemic, aquatic Kafue Lechwe Antelope, many large and important waterbirds, reptiles, amphibians, fish, invertebrates and plants. The Government of Zambia has provided significant financial and technical support through its agencies responsible for

conservation and environment to address this serious problem – which has already spread to another nearby protected area.

Foreign tree and shrub species in forests in Ghana – Paper mulberry (*Broussonetia papyrifera*), a tree, native to China, was introduced to the Afram Headwaters Reserve in Ghana for pulp and paper production. It has escaped cultivation and together with triffid weed (*Chromolaena odorata*) has invaded hundreds of hectares of the Reserve which lies within the eastern portion of the Upper Guinea forest block, a biodiversity hotspot. This invasion has resulted in the displacement of number of native plant and animal species.

Invasive plants in forests and savanna's of Uganda - Paper mulberry has also invaded the Mabira Forest Reserve while spectacular cassia (*Senna spectabilis*) poses a threat to biodiversity in the Budongo Forest Reserve which is regarded as Uganda's second most important bird area for species of the Guinea-Congo Forests biome. It also has some unique concentrations of trees and other vegetation not found together elsewhere in the region. The Mburo National Park, has been invaded by citronella grass (*Cymbopogon nardus*), which is known to displace native grassland species while biodiversity in the Queen Elizabeth National Park is threatened by invasive lantana (*Lantana camara*) and feverfew (*Parthenium hysterophorus*).

Mesquite in Ethiopia and Kenya – Mesquite (*Prosopis juliflora*) is one of the most widespread invasive species in north and east Africa having already invaded 500 000 and 700 000 ha. in Kenya and Ethiopia, respectively. It has the ability, under ideal conditions, to double its range every 5 years. It displaces native plants such as acacias and important fodder species and wildlife and has a negative impact on underground water resources, especially in semi-arid and arid regions. It is present in many Protected Areas including the Awash National Park in Ethiopia, and in Kenya it has invaded the Tsavo National Park and a number of National Reserves.

Lantana in many protected areas – *Lantana camara* is an invasive shrub from tropical Amercia which has spread in many wild and cultivated areas across Africa. It is now present in proteted areas studied by the project in Ethiopia, Ghana, Uganda and Zambia where it has replaced native vegetation, suppressed the regrowth of local plants, blocked access to food plants of wild animals and generally changed the nature of many wild places. Efforts are being made to manage it locally in protected areas using mechanical means, herbicides and introduced biocontrol agents

Reporting of invasive species in protected areas in Africa

The first step to address biological invasions in protected areas is to appreciate the very real threat they pose to biodiversity conservation and the significant likelihood that some alien species will be introduced (unintentionally or through natural processes from invasions outside the protected area) and then to recognize any non-native animals or plants. This becomes more amenable if the presence of non-native species is among the items recorded in regular monitoring and inspection of a protected area. The process recommended by IUCN World Commission on Protected Areas (WCPA) and other concerned conservation organisations is termed "management effectiveness" whereby the achievements of stated objectives of protected area management plans are regularly assessed through monitoring of key aspects of biodiversity – including the presence of non-native species. Such species can then be assessed as possible threats to the integrity of the biodiversity in the protected area, monitored at regular intervals and action taken if they are seen to spread with negative impacts on local species.

Protected area staff regularly move around their areas for many reasons and so are able to monitor areas of most important biodiversity as well as localities most likely to be impacted by biological

invasions. Alien species are most likely to enter protected areas through "pathways" of invasion such as entry gates, access roads, tourist circuits, accommodation inside or near the protected area, places subject to wild and domestic animal movement from outside the PA, places subject to flooding from water that originates outside the PA, and proximity to areas of development, farming and residence. A growing and active pathway is the construction of new roads which not only spreads species by moving soil but can also bring seeds and other propagules on and in machinery brought in from other areas and countries.

Solutions to the problem

Awareness – as mentioned above, the first requirement is to be aware of the likelihood of biological invasion in any protected areas. This is significant and has been shown to be amongst the greatest threats to the integrity of biodiversity in protected areas, if not **the** greatest threat. Awareness can be spread to all who work in a protected area so that any staff (or even visitors) may contribute to the noting of "new or unusual" species. Awareness can be enhanced by the availability of guides for recognition of alien species, those that can become invasive and their management – but these are yet to be developed for most areas within Africa.

Recognition – this requires some capacity for "seeing" species that are not part of the resident vegetation or fauna and then access to information to take this further to identification. Many protected areas have resident biologists or ecologists or they occur with a PA network. Following identification is the need for an assessment of the risk that any new species may pose to the biodiversity of the area. This is possible with general information that is available in the literature and on the internet (see Available Information, below) but we still need to develop local inventories and guides for particular ecosystems and countries.

Prevention, pathways – It is likely that alien species will enter (or be introduced to) a protected area along the pathways mentioned above – or through others that are special to a particular PA. Prevention related to pathways is carried out by preventing any new species, or species judged to be unwanted (see below), from establishing in the PA. If the species is a plant, it can be removed on first recording by uprooting all individuals and destroying them, preferably before the species flowers or sets seed that may develop into a seed bank that will germinate later and enhance spread. If the new species is an animal, some means of preventing its establishment should be carried out a soon as possible – again, to prevent its possibility of reproducing and becoming too numerous to prevent invasion.

Prevention, unwanted species and known invasive pests and weeds – a list of likely invasive species that are already present nearby or in the country or region can be prepared – including known pests and weeds that are considered a risk to the protected area. Then any species detected that is on that list can be eliminated from the protected area as soon as it is detected without need for further identification or risk assessment.

Rapid responses – if prevention has not been possible and an alien species judged to be a risk to biodiversity has established in the area, the next most effective procedure is to move as quickly as possible to prevent its continued reproduction and later spread. Action at this stage to eradicate or remove a risky species is far less expensive than "waiting to see" if it becomes a problem – by which time expensive management may be needed. Rapid response is the capacity to act quickly based on correct technical information and risk assessment – action that can prevent invasion.

Containment – if the rapid response has not been possible and a foreign species begins to spread, it may be possible to curtail that spread through some form of containment – to reduce the

likelihood of the spread of propagules (seeds, plant parts, bulbs, corms, eggs, larvae, other immature stages of animals or those stages of the new plant or animal most likely to move to other places).

Management in response to desired objectives – if prevention, rapid response or containment have not been possible or were not effective, and a biological invasion has become established, then management is required to remove the threat to biodiversity. Management should be related to agreed objectives of the protected area – such as removal of all alien species, restoration of damaged habitats or ecosystems, or careful observation of alien species for possible invasive traits. Management of invading species is possible through mechanical means, chemical means (if allowable in the PA concerned) or biological control – or a combination of these three main methods, termed "integrated management". Details of methods of management for particular species or types of invasions are readily available once the species has been identified – on the internet.

Capacity building – an essential part of invasive species prevention and management in protected areas is the capacity to understand the issue, to recognize non-native species or unusual growths of native (but unexpected) species, to be able to respond by quick action or eventual management to retain the integrity of the biodiversity of a protected area. Capacity building in this area is possible through projects devoted to that end and through training courses offered by such organizations as the Global Invasive Species Programme. Self training is also possible through many internet websites and familiarity with species likely to cause biological invasions can be developed through the many databases of invasive species information on the web.

Available information

The IUCN World Commission on Protected Areas (WCPA) has been promoting the concept of management effectiveness as a way of ensuring good practice in protected areas to achieve the results intended by a PA management plan. One of the resolutions of the World Parks Congress in 2003 was to include invasive species issues in management effectiveness as a matter of course and to assess and manage this threat to biodiversity. To date WCPA has been preparing details of how this will work and to support this with guidelines and information – which should be available soon.

The Nature Conservancy (TNC) has prepared a set of guidelines for addressing biological invasions in protected areas: "**Assessing and Managing Invasive Species within Protected Areas. A Quick Guide for Protected Area Practitioners**" available at http://www.cbd.int/invasive/doc/ias-tnc-guide-2009-en.pdf as well as on http://www.gisp.org/

A publication is available as a manual for managers of protected areas in African French speaking countries. This is can be referenced as **Triplet P. (2009)** ***Manuel de gestion des aires protégées d'Afrique francophone.*** **Awely, Ministère de l'écologie, 1234 pp**. it can be downloaded at: http://www.awely.org/index.php?option=com_content&task=view&id=158&Itemid=108 This has two chapters on the detection and management of invasive species in protected areas.

Much useful information is available on the website of the Global Invasive Species Programme http://www.gisp.org/ and detailed information on many potentially invasive species on the Global Invasive Species Database to be found on http://ww.issg.org/ There are hundreds of databases relating to invasive species issues on the internet which can be accessed through your favourite search engine.