

Invasive Species and their Economic Relevance for and Impact on Forest and Wildlife in Africa

THE FOREST INVASIVE SPECIES NETWORK FOR AFRICA (FISNA) AFRICA FOREST AND WILDLIFE COMMISSION MEETING, BRAZZAVILLE, REPUBLIC OF CONGO, FEBRUARY 2010

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ABSTRACT

The problem associated with invasive species has become a matter of serious concern globally because of the threat to biodiversity and other human interests. Quite a number of species introduced deliberately or accidentally to Africa have become invasive. The cost of invasive species, estimated in terms of loss of forest, wildlife and agricultural products, habitats destroyed and the resultant loss of environmental services they provide, as well as cost associated with monitoring and management runs into billions. As part of efforts to mitigate the impact of invasive species on Africa, the Forest Invasive Species Network for Africa (FISNA) was formed to ensure that resources and information are freely shared across the continent. In order to make the network a truly continental body for combating the menace of invasive species support is required from policy makers, administrators and all stakeholders from across the continent.

INTRODUCTION

Invasive species may be generally described as biotic agents that occupy new environments or habitats and cause harm to the habitats or human interests. They include all categories of life such as land plants (trees, shrubs, herbs, grass), aquatic plants, insects, molluscs, birds, fungi, reptiles, amphibians, crustaceans, and microorganisms. Invasive species are introduced intentionally or unintentionally to new environments. Invasive species are recognized as a major threat to the world's biodiversity. They are also of significant socio-economic impact around the world. The problem of invasive species has been around for as long as man began to discover lands other than their own native abode. However, the number species that are becoming invasive, as well as the extent of habitats being invaded have risen astronomically in recent decades. To large a large extent this increase can be attributed to increased international trade and globalization.

INVASIVE SPECIES ON THE AFRICAN CONTINENT

A significant number of invasive species have been introduced to the African continent, some of which are having serious economic, environmental or ecological impact in the countries or regions where they are found (Bosu, et al., 2009). Major invasives on the African continent include plants such as pumpwood (*Cercropia peltata*) which was deliberately introduced to the Ivory Coast and several west and central African countries during the early part of the 20th century as shade tree in coffee plantations; *Prosopis* species which were introduced for agroforestry and landscape restoration in East Africa; paper mulberry (*Broussonetia papyrifera*) introduced to Ghana and Uganda for pulp paper production, and *Leucaena* (*Leucaena*

leucocephala), introduced to many countries in Africa and around the world as multipurpose species for agroforestry. Siam weed (*Chromolaena odorata*) and Lantana (*Lantana camara*) are examples of serious invasive species which were unintentionally introduced to the continent. Aside from introduced plants, invasive insects and pathogens have also had significant impact on Africa's forests. These include the oriental scale insect (*Aonidiella orientalis*) which devastated neem trees in the Lake Chad Basin during the 1980's, the cypress aphid (*Cinara cupressivora*) which attacks cypress, junipers and other species in Eastern Africa are very serious invasive species on the continent. Other invasive insects include the blue gum chalcid (*Leptocybe invasa*) on Eucalyptus in eastern Africa, and more recently the Sirex wasp (*Sirex noctilio*) and bronze bug (*Thaumastocoris peregrinus*) which have emerged in South Africa (Wingfield et al. 2008) as major threats to plantations.

In South Africa, the pathogen *Phytophthora cinnamomi* infects native fynbos areas, as well as forests in the Tsitsikamma region and kills *Ocotea bullata* trees. This fungus has also spread into commercial forestry plantations throughout the country (Von Broembsen, 1984; Von Broembsen & Kruger, 1985; Linde, et al. 1999). Another example of an introduced fungus causing problems in native ecosystems is that of *Armillaria* spp. in the Fynbos region of South Africa (Coetzee, et al 2003). In Ghana, emerging diseases with potential to cause major destruction to teak (*Tectona grandis*) and cedar (*Cedrela odorata*) plantations are known to belong to *Phytophthora* and *Armillaria* groups (Table 2).

IMPACT OF INVASIVE SPECIES

Invasive plants often become dominant understorey vegetation in disturbed native forests, disrupting natural succession patterns and causing biodiversity loss (Bosu et al. 2009). They often form dense stands that displace native species and reduce food and shelter needed by native wildlife, including endangered species. The increase in invasive species may cause crowding out of other species. There may not be an increase in number of species but an increase in vegetation cover due to the aggressive nature of the species. As a result habitat quality and ecosystem health may decline. Some invasive species have allelopathetic properties and are able to reduce the vigour and productivity of nearby plant species in orchards and plantations.

Some invasive plants generate higher fuel loads than native plants. When these plants invade, wildfires can be more frequent and sometimes catastrophic. Invasive species such as Lantana and siam weed harbour dangerous pests and diseases of crops and livestock. Invasive insects and fungi generally attack and kill trees in orchards, plantations, or natural forests and cause substantial ecological and economic losses. Some invasive plants are known to consume enormous quantities of water and their presence in an ecosystem lead to loss of water to wildlife, forestry, agriculture, and even drinking water supply to communities and cities. A typical example is *Prosopis* species which was deliberately introduced to several countries in East Africa during the 1970s, which has now invaded and colonized large tracts of land in countries like Sudan, Ethiopia and Kenya. The long, powerful and poisonous thorns of the plant negatively affect wildlife as well as domestic animals. Additional problems of *Prosopis* include drying of soils, blockage of water flow in rivers, losses to the fishing industry as the plant takes a lot of water, blockage of irrigation canals, obstruction of roads, trails and other communication channels.

Globally, losses due to invasive species run into billions of United States dollars annually. This is cost due to direct losses to agriculture, forest and wildlife resources. It also includes cost of

management, monitoring and control. Indirect cost due to environmental destruction, species extinction, loss of ecosystem services, ecotourism, is equally huge. It has been estimated that the United States losses about 138 billion dollars to invasive species annually. Though the cost to Africa has not been estimated this is expected to also run to billions.

MANAGEMENT OF INVASIVE SPECIES

Prevention, early detection, and rapid response against invasive species are required to prevent their introduction and spread. Regional or worldwide approaches to management of invasive species are often ideal because invasive species do not recognize national barriers. Such an approach would involve sharing experiences and collaborating on ideas for the development of programmes and methodologies of control, prevention, monitoring and the management of invasive species. Fortunately, regional and global cooperative efforts to fight invasive species are quite encouraging. Though delayed a continental effort to deal with the problem of invasive species in Africa was instituted about five years ago. The Forest Invasive Species Network for Africa (FISNA) is a network of scientists, administrators and stakeholders in Africa that aim to protect the forest resources of Africa against noxious biotic agents.

Table 1. Some major forest invasive plant species recorded in Africa.

SPECIES	COMMON NAME (S)	FAMILY	LIFE FORM	Country/ Region
<i>Acacia hockii</i> De Willd.	Shitim wood	Leguminosae	Small tree	Uganda
<i>Acacia mearnsii</i> De Wild.	Black wattle	Mimosaceae	Tree	Tanzania, South Africa
<i>Broussonetia papyrifera</i> (L.) Vent.	Paper mulberry	Moraceae	Tree	Ghana, Uganda
<i>Castilla elastica</i> Cerv.	Mexican rubber tree	Moraceae	Small tree	Tanzania
<i>Chromolaena odorata</i> (L.) King & Robinson	Siam weed	Asteraceae	Shrub	West and Central Africa, South Africa
<i>Cecropia peltata</i> L.	Pumpwood	Cecropiaceae	Tree	Cote d'Ivoire, Cameroun, Zaire
<i>Cordia alliodora</i> (Ruiz & Pav.) Oken	Spanish elm	Boraginaceae	Tree	Tanzania
<i>Eucalyptus tereticornis</i> Sm.	Forest redgum	Myrtaceae	Tree	Malawi, East Africa
<i>Lantana camara</i> L.	Lantana	Verbenaceae	Shrub	West, Central and East and Southern Africa
<i>Leucaena leucocephala</i> (Lam.) De Wit	Leuceaena	Mimosaceae	Small tree	Ghana, Kenya, South Africa
<i>Maesopsis eminii</i> Engl.	Umbrella tree	Rhamnaceae	Tree	Tanzania, East Africa
<i>Mimosa pigra</i> L.	Mimosa	Mimosaceae	Small tree	Uganda
<i>Pinus patula</i>	Patula pine	Pinaceae	Tree	Malawi, East Africa, South Africa
<i>Prosopis juliflora</i> (Sw.) DC.	Prosopis	Mimosaceae	Small tree	East Africa South Africa
<i>Rubus ellipticus</i> Smith	Yellow Himalayan raspberry	Rosaceae	Shrub	Tanzania
<i>Senna spectabilis</i> DC.	Cassia	Caesalpinaceae	Small tree	Uganda, Tanzania, East Africa

Table 2. Some invasive insects and diseases in Africa

Scientific name	Common name	Order: Family	Host plant	Distribution
<i>Aonidiella orientalis</i>	Oriental scale insect	Hemiptera: Diaspididae	<i>Azadirachta indica</i>	Cameroon, Chad, Nigeria, Niger
<i>Leptocybe invasa</i>	Blue gum chalcid	Eulophidae (Hymenoptera)	<i>Eucalyptus</i> spp.	Kenya, Ethiopia, Tanzania, Zimbabwe, South Africa
<i>Cinara cupressivora</i>	Cypress aphid	Hemiptera: Aphididae	<i>Cinara cupressivora</i> (Cypress)	East/ Southern Africa
<i>Sirex noctilio</i>	Sirex wasp	Hymenoptera: Siricidae	<i>Pinus radiata</i>	South Africa
<i>Thaumastocoris peregrinus</i>	Bronze bug	Hemiptera: Thaumastocoridae	<i>Eucalyptus</i> spp.	South Africa, Zimbabwe, Malawi
<i>Phytophthora cinnamomi</i>			<i>Ocotea bullata</i>	South Africa

<i>Amillaria spp.</i>			<i>Tectona grandis Cedrela odorata</i>	South Africa, Ghana, etc
<i>Phytophthora spp</i>			<i>Tectona grandis Cedrela odorata</i>	South Africa, Ghana, etc

THE FOREST INVASIVE SPECIES NETWORK FOR AFRICA

The Forest Invasive Species Network for Africa (FISNA) was formed at an FAO sponsored task force meeting in Zomba, Malawi to review and revitalize the defunct Tree Pest Management Network for Africa, in December 2004. The need for an African network on forest invasive species was to ensure that resources and information are freely shared across the continent (Bosu and Chilima 2009). During the meeting the Forestry Research Institute of Malawi (FRIM) was nominated as the Secretariat and an Executive Committee was established of founder members. The overall objective of FISNA is to coordinate the generation, collation and sharing of information relating to forest invasive species in Sub-Saharan Africa for sustainable forest management and conservation of biodiversity. Current FISNA membership includes Benin, Ghana, Kenya, Malawi, South Africa, Tanzania, Togo, Uganda, Zambia and Zimbabwe. FAO, the African Forest Research Network (AFORNET), USDA-Forest Service and Commonwealth Agricultural Bureaux (CAB) International (Africa) have variously provided technical and financial support in the functional role of partners and/or sponsors.

In order to pursue its key objective of networking and information sharing FISNA maintains an active website which is currently hosted by FAO www.fao.org/forestry/site/26951/en. In addition, FISNA maintains a dynamic listserver hosted by the University of Pretoria which serves as the forum for discussion and information exchange on issues relating to invasive species on the continent. All FISNA members work on a purely voluntary basis with the support and permission of their institutes. Membership is open to individuals in the forestry sector in sub Saharan Africa. Experts in forest invasive species and other stakeholders who wish to join or support the network can obtain further information from the FISNA website: www.fao.org/forestry/site/26951/en.

FUTURE OUTLOOK

In order for FISNA to achieve its objectives the support of policy-makers and administrators of the forest sector in all countries of Africa is needed to succeed in the fight against invasive species.

1. A representation of all or most countries of Africa is important to make the network a truly continental body. This would lead to a better understanding of the current status of forest invasive species in Africa, and the national or regional programmes in place to mitigate their impact.
2. Relevant policies and logistical support are required in various countries of Africa to regulate entry or exit of biotic agents which are recognized invasive species or have the potential to become invasive . This would include strengthening of monitoring staff and institutions at entry points within countries.
3. Provision of logistics to undertake rapid response to managing invasive species before spreading.
4. Fostering cooperation with different stakeholders in agriculture, forestry, wildlife and other relevant institutions on programmes for the prevention and management of invasive species.

5. Provision of support for research for the generation of information and networking for FISNA and other relevant institutions and bodies on the continent.

CONCLUSION

There is no question that the problem associated with invasive species will continue to be with us, even as intra-continental and world-wide trade increase. The cost involved in preventing, monitoring or managing invasive species can be huge and the outcome of the efforts sometimes may appear little or insignificant. However, the social, economic and environmental consequences of our inaction could be catastrophic. Prevention, early detection and rapid response, information sharing and networking are key to managing the problem of invasive species.

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