

INVASIVE ALIEN SPECIES

A Global Perspective

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Invasive alien species

- Internationally;
- IAS are regarded by scientists internationally as the second greatest threat to global biodiversity, second only to habitat fragmentation (IUCN, 1997)
- KNP;
- IAS are regarded as the single most important threat to the biodiversity of the KNP (1997, Management review on biodiversity conservation in the KNP)

Key notes- IAS

- At least 750 tree species & 8000 other species introduced into SA
- Nearly 200 declared weeds or invaders
- Impact on 10 million ha (approx 8%) of SA
- Use approx 7% of SA's water runoff

Impacts of IAS

1. Impact on water supply
2. Impact on fire regimes and erosion
3. Impacts on biodiversity
 - Impacts of IAS are immense and often irreversible
 - For millennia there were natural barriers such as oceans, mountain ranges, rivers, and deserts.

Impacts of IAS cont..

- In just a few hundred years these have become ineffective through globalization
- Alien species are found in all taxonomic groups
 - >viruses, fungi, algae, mosses, ferns, higher plants, invertebrates, fish, amphibians, reptiles, birds, mammals

They have invaded and affected virtually every ecosystem on earth, resulting in

Hundreds of extinctions (Lake Victoria- to discuss shortly)

Ecological costs of IAS internationally:

- Water reduction –in SA approx 6,7% (van Wilgen *et al*, 2001)
- Directly responsible for species extinctions- loss of approx 200 Cichlid species in Lake Victoria (Bright, 1999)
- Loss of entire plant communities (numerous examples, but Baskin, 2002)
- Loss of ecosystem services- water cleaning (numerous examples)

Ecological costs of IAS internationally cont.

- Loss of biodiversity at all three levels (compositional, functional, structural)
- Loss of keystone species or additional of keystone species driving ecosystem change (Baskin 2002)
- IAS recognized as a “new” driver of ecosystem change and heterogeneity (Sabie river after floods- new component vegetation never had to deal with after the same large floods 75 years ago)

Economic costs of IAS internationally

IUCN, 2001

Indicated costs of some invasive alien species (costs in US \$)		
Species	Economic Variable	Economic Impact
Introduced disease organisms	Annual cost to human, plant, animal health in USA	\$ 41 Billion per year
A sample of alien species of plants and animals	Economic costs of damage in USA	\$ 137 Billion per year
Salt Cedar	Value of ecosystem services lost in western USA	\$ 7-16 Billion over 55 years
Knapweed and leafy spurge	Impact on economy in three US states	\$ 40,5 Million per year direct costs \$ 89 Million indirect
Zebra mussel	Damages to US and European industrial plants	Cumulative costs 1988-2000 \$ 750 Million to 1 Billion
Most serious invasive alien plant species	Costs 1983-92 of herbicide control in Britain	344 Million/year for 12 species
Six weed species	Costs in Australia agroecosystems	\$ 105 Million/year
<i>Pinus, Hakeas, and Acacias</i>	Costs on South African Floral Kingdom to restore to pristine state	\$ 2 Billion
Water Hyacinth	Costs in 7 African countries	\$ 20-50 Million/year
Rabbits	Costs in Australia	\$ 373 Million/year (agricultural losses)
Varroa mite	Economic cost to beekeeping in New Zealand	\$ 267-602 Million



Lake Victoria: site of the first international chronic emergency caused by bioinvasion

- Second largest lake in the world
- fisheries major protein supplier to three nations: Uganda, Kenya, Tanzania
- Since its formation, just 12 000 years ago, has become a “jewel box” of brilliant little fish from a single genus: *Haplochromis*. (Cichlids)
- Although seen by fisheries as “trash fish” as they were too small for effective harvest, there was a solution: the Nile Perch
- During the 1980’s the lake started rearranging itself, and ecologists concluded that 200 species of native fish species disappeared, the greatest single event of extinction ever.
- Secondary problems arose: to smoke the huge quantities of perch, the people harvested the forests, which led to more soil erosion. Plant nutrients in soil combined with increased sewerage, sugar mill effluent and farm run-off promoted large mats of algae to develop.
- Cichlid populations crashed further due to the murky water and rotting algae used up much of the remaining oxygen. By 1990’s, 50-70 % of the lakes water mass was anoxic year round. And then in 1990, the Water Hyacinth arrived. Probably the worlds worst aquatic weed.
- **About \$78 million was pledge to the Lake Victoria Programme**