Flora Fauna and Fungi

Conservation of Ecosystems to Conserve Fungi to Conserve Ecosystems

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Conservation of terrestrial ecosystems in Australia has traditionally focused on Flora & Fauna but is awakening to the continent's est. 250,000 species of Fungi

- Fungi are ubiquitous and diverse in most bushlands
- Fungi interact with and influence many biotic and physical components vital to the health of ecosystems
- Flora, Fauna and Fungi (at least) need to be considered together in whole-of-ecosystem biodiversity conservation
- Integration of Fungi would be encouraged by the availability of an improved knowledge base defining species and communities of fungi

Interlocked circumstances

Conservation of fungal biodiversity hinges upon conservation of their habitats
Conservation of the habitats may hinge upon conservation of fungal biodiversity

Macrofungi

Macrofungi highlight many circumstances coupling the conservation of ecosystems and fungi.
Macrofungi attract the greatest public participation and awareness of all fungi in conservation issues.

- Visible fungi - mushrooms, truffles, corals, brackets…
- Est. 10,000+ species in Australia

Help sustain healthy bushlands by:

- Recycling carbon & nutrients - decomposing and redistributing them throughout fungal networks
- Interlinking directly with flora & fauna

Conservation status

Knowledge about the features, geographical distribution & ecology of fungi is required for assessing the conservation status, and formal listing of rare & endangered fungi. Poor knowledge about most fungi currently limits assessment.

Caption:

Most Australian fungi have been inadequately surveyed, and hence fall into lower levels of formal conservation listing, if at all. The pink-gilled *Amanita carneiphylla* is only known from a few locations, but insufficient survey effort precludes declaring it as a rare and endangered species. It is formally listed on Western Australia's Flora Conservation Codes at Priority 2 - a level noting the need for further survey.

Biological Surveys

Fungi can be assessed in biological surveys by people using methods requiring only minimal knowledge about fungi.

Caption:

Fungi surveys can encourage public interest in conservation of ecosystems.

Food for Animals

Fungi provide food and/or habitat for many animals. Australia's est. 2,000 species of truffles rely on animals such as bandicoots, potoroos & woylies to dig up & disperse their spores. Insects that feed & live in fungi may have increased significance for truffles in areas where such mammals have become extinct.

Captions:

The rare and endangered Gilbert's potoroo eats native fungi, particularly truffles, and disperses the fungi spores. (see text about recovery of animals)

Portuguese millipedes introduced into Australia voraciously graze on native macrofungi and potentially could affect reproduction of the fungi, and perhaps diminish fungal biodiversity.

Like many truffles, this species of underground*Scleroderma* has a strong odour that may attract small mammals. (Shown excavated for photo)

Geotrupid beetles dig deep burrows in sand, eat native truffles, and may disperse truffle spores when they emerge. A microscopic view of a geotrupid beetle's dung (right) shows it is full of truffle spores.

A myriad of small insects, feed on and lay eggs in macrofungi.

Restoration of Vegetation

Are native fungi self-returning where native vegetation is being restored? If not, to help ensure self-sustaining biodiverse vegetation for the long-term, we ought to know which fungi may need to be assisted back and how to help.

Recovery of Endangered Animals

Fungi are crucial for the recovery of some threatened animals. Mycorrhizal fungi are the main food of the recently re-discovered Gilbert's Potoroo (photo above). Survival of the potoroos, the fungi they eat, & the plants of their habitat are tightly interdependent. The fungi are a prerequisite for successful translocation of potoroos.

Captions:

The once diverse bank of native fungi in natural woodlands is becoming extremely depleted in the wheatbelt of W. Australia There, many fungi may not self-return to revegetation for a long time, if ever.

If required, spores of beneficial decomposer & mycorrhizal fungi, preferably obtained from local native vegetation, may be used as inoculum.

Fungi Weeds

Weed fungi rapidly colonise disturbed areas, and may compete with or displace native fungi, in turn disrupting Flora-Fauna-Fungi interactions.

Captions:

This *Coprinopsis* is a decomposer fungus recently introduced into Western Australian
urban bushlands.

Amanita muscaria is an exotic mycorrhizal fungus now invading native forests in Australia.

Food for Plants – Food for Fungi

Many hundreds of species of mycorrhizal fungi supply nutrients from the soil to plants such as eucalypts, wattles & orchids. In return, the plants exchange sugars to the fungi. Mycorrhiza are vital to the well-being of both partners.

Caption:

The mushrooms of a mycorrhizal fungus are usually fleeting. However, an individual fungus may sustain long-lived mycorrhizal linkages with individual plants spanning many years.

Microhabitats

Some fungi favour or are restricted to particular habitats e.g. moss beds, fallen logs, or burnt wood. Diverse microhabitats in ecosystems nurture fungal and other biodiversity and need to be retained.

Captions:

Campanella gregaria favours the inside of banksia bark on fallen logs

Lichenomphalia chromacea favours moss beds and is symbiotic with a tiny alga.