*"Prosopis was introduced in the 1980s to combat soil erosion and as a fodder supplement. The opinion of the community in Baringo is that it has destroyed their grazing lands."* Mr Simon Choge, Kenya Forestry Research Institute, Baringo, Kenya.

# Risks associated with promoting alien tree species for social benefits

## Unintended consequences of projects that promote invasive alien woody plants

Planting of alien tree species has been and continues to be promoted, with the aim of addressing social and environmental problems in Eastern Africa. These species are promoted for agroforestry purposes, to re-green degraded landscapes or to alleviate fuelwood shortages. Some of the promoted trees have spread widely and now cause serious environmental problems that impact human wellbeing, including losses of grazing land, reduced water availability and increased land management costs. We give recommendations to support decision making about funding for projects that aim to introduce new, or promote established alien woody plant species.

The actors that promote alien tree species include national and international organizations and NGOs. Although their intentions are good, it appears that actors are ill informed about long-term socio-environmental impacts of promoting these species. Furthermore, once their adverse effects become apparent,

### Key Messages

- Despite good intentions, some projects that have promoted alien tree species in the past have resulted in serious negative impacts.
- The risk of adverse effects can be reduced through review of funding or project proposals by multidisciplinary expert panels.
- Promotion of alien tree species should be subjected to rigorous risk assessment according to established international standards, particularly regarding their possible consequences for nature and nature's contributions to people.

the problems become those of the recipient countries to fix at their own expense. The negative effects of alien tree species that became invasive in Eastern Africa are well described and understood (Box 1). Hence, ignorance among those who fund and approve projects about the consequences of introducing and promoting alien tree species can no longer be an excuse for repeating and perpetuating the same mistake.

## Recommendations for the review of future projects

We recommend establishing procedures for reviewing project proposals and funding calls to avoid promoting any alien tree species that could have serious impacts. As a general principle, decisions should be guided by internationally accepted environmental and socio-economic impact assessment protocols. Input and feedback should be sought from expert groups such as the European Weed Research Society or Regional Plant Protection Organizations. Decisions on introducing a species should be based on sound (scientific) advice (Box 2). If native or already established alien species with similar properties and expected benefits exist, these should receive preference over new introductions of alien plant species, which should be avoided because the potential unintended consequences of introducing a new species may be less known.

### *Projects that propose introduction of species*

New introductions require rigorous risk assessment following international standards. Such assessment should consider social, economic and environmental aspects. The assessment should include a thorough review of literature on spread or spread potential, negative impacts and realized benefits in parts of the world where the species has been introduced previously. Moreover, potential short term and long-term impacts during and after the project life-

### Prosopis: more harm than good Box 1

Trees in the genus *Prosopis* are native to central and South America. Their pods (beans or fruits) are highly nutritious and some trees can produce over 1000 kg of pods per ha per year. The trees grow well in arid areas, and the additional fodder can be used to supplement grass to carry livestock through drought periods, when natural sources of fodder are depleted. There are also other potential benefits in the form of shade, control of soil erosion, firewood and charcoal production. Therefore, they have been widely promoted and planted by governments and aid agencies outside of their native range, including Africa, India and Australia.

In the introduced range, however, *Prosopis* is invasive. Once the trees establish, their seeds are dispersed by livestock and along watercourses to new sites. They can rapidly form impenetrable stands that displace valuable grazing areas. They are so dense that livestock cannot even access the pods, thus annihilating the fodder benefit. *Prosopis* is also deep-rooted, and it depletes vital groundwater resources in arid and semi-arid regions. It displaces native plants, mammals, birds and invertebrates, with severe impacts on biodiversity and ecosystem functioning.

Economic studies from many sites in Africa indicate that the costs associated with these negative impacts rapidly come to exceed any benefits, and this gap grows as the plants continue to spread.

The example of *Prosopis* illustrates the risks associated with the active promotion of "wonder plants" in areas outside of their natural distribution range. There are numerous examples that involve other alien plant species. Governments and aid agencies should consider these risks before promoting the use of alien plants to improve livelihoods in rural areas. Native tree species can also provide numerous benefits, and their promotion does not include the risk of creating new biological invasions.

"*Using Prosopis to make charcoal does not help controlling Prosopis. We have done it for so long, but the weed is still around and progressing fast.*" Mr Mfuru, charcoal maker in Kahe, Tanzania.

## How to judge conflicting evidence Box 2

It has been established that invasive alien species can and do cause serious environmental and social impacts. However, many people and organizations challenge this view. Decision-makers are thus frequently confronted with conflicting assessments of the benefits and risks posed by projects that involve the introduction of plant species to environments outside of their natural distribution ranges.

The best decisions would be those that are taken by weighing up all of the available evidence, but the level of confidence that should be placed on conflicting points of view needs to be assessed to support these comparisons. How can decision-makers make such assessments? Here are some criteria for assessing opinions:

- **Evidence**: Is the opinion based on verifiable evidence? Proponents must present complete and verifiable evidence information and intelligence from trusted sources.
- **Completeness**: Has the expressed opinion considered all aspects of the issue? Quite often, advice from interested parties considers only part of the problem, ignoring others. For example, an opinion may expound benefits, but ignore negative impacts. If more aspects have been included in arriving at an opinion, it would increase the level of confidence in the opinion. Proposals or projects that suggest simple solutions to complex problems should be reviewed particularly critically.
- **Standing**: Is the opinion made by a person or organization with a reputation for unbiased assessments? Has the opinion been subjected to peer review? Is the person or organization in a position to formulate an opinion based on evidence? Proposals must be subjected to inter-disciplinary and or transdisciplinary teams for validation.
- **Consensus**: Is the opinion expressed a consensus opinion, or is it a minority view? While minority views may well have some validity, opinions that are widely supported by appropriately qualified people should be given a higher level of confidence. The review panel should assess the credibility of the expressed opinions based on agreed standards. Examples include the Environmental Social Impact Assessment (ESIA) developed by the World Bank [iii], or a Pest Risk Analysis according to the standards of the International Plant Protection Convention (IPPC), such as the International Standard for Phytosanitary Measures No. 2 on Guidelines for Pest Risk Analysis [iv].
- **Motivation**: The interests of the person or organization expressing the opinion should be examined. Is there any reason to believe that a certain point of view is being expressed to promote a particular agenda? Power and policy may influence decision and therefore it is important to recognize values and perspectives.

time should be assessed. The invasive potential and thus the potential impact of species is higher if the species a) has a history of being invasive elsewhere, and b) can change the environment to its own advantage, for example through competition for resources or production of chemical compounds that inhibit the growth of other plants. Hence, the ecology of the species must be considered during the risk assessment. It is worth mentioning that countries that have ratified the Convention on Biological Diversity have committed themselves to avoid the introduction of new, and to control the already introduced invasive alien species.

### *Projects that promote established alien species*

Species with known negative environmental or societal impacts anywhere in the world should not be promoted and projects that promote these species should not be supported. Risk assessments should be compulsory for funding projects that promote propagation and utilizing of established alien species, for example using the "weed risk assessment scheme" of the Australian government [i] or of the Global Biodiversity Information Facility [ii]. Utilization of alien tree species that are known to be invasive, or that are potentially invasive, needs to be particularly critically reviewed, as utilization can result in further spread and often does not kill highly invasive species. Panels reviewing funding or actions should consult diverse experts for an assessment of potential impacts; a panel should include persons with expertise in economics, social and ecological fields. The review panel should use a checklist to ensure that short term and long-term effects on the environment, economy and livelihoods in the area have been considered in the decision process.

Woody Weeds


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## Policy implications

In order to avoid long-term negative impacts, projects or project proposals that envision promoting alien tree species should be reviewed thoroughly and critically by diverse expert panels. Evidence regarding the predicted impacts of proposed projects should be complete and verifiable; simple solutions for complex socio-environmental issues should be critically reviewed.

Proponents of project proposals should show that they have contacted implementers of ongoing projects on the same topic to identify synergies and opportunities for potential collaboration to avoid duplication of efforts and communicating conflicting messages to stakeholders.

### Notes

[i] www.agriculture.gov.au/biosecurity/risk-analysis/weeds/system/weed_risk_assessment
[ii] www.gbif.org/data-use/83009/assessing-weed-risk-assessments
[iii] www.worldbank.org/en/projects-operations/environmental-and-social-framework
[iv] www.ippc.int/en/core-activities/standards-setting/ispms/

### Further reading


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The Woody Weeds project is funded by the Swiss National Science Foundation (SNSF) and the Swiss Agency for Development Cooperation (SDC). It aims to quantify the impacts of invasive woody plant species on biodiversity, ecosystem services, and human wellbeing in selected study areas in Ethiopia, Kenya and Tanzania, and to develop sustainable land management strategies in the invaded areas.

**Project website:** http://www.woodyweeds.org **Twitter:** @woodyweeds_org

The Woody Weeds project is implemented by CAB International, Sokoine University of Agriculture (Tanzania), Tanzania Forestry Research Institute, Kenya Forestry Research Institute, Haramaya University (Ethiopia), the Water and Land Resource Centre (Ethiopia), Centre for Invasion Biology (South Africa) and the Centre for Development and Environment, University of Bern (Switzerland).

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