Woody invasive alien species in Eastern Africa
Assessing and mitigating their impacts on ecosystems and rural livelihoods

INSIGHTS

Mrashia: *Prosopis* has started invading pastures and agricultural lands in Tanzania

Background

Prosopis (*Prosopis juliflora*), also known as *Mrashia* in Northern Tanzania, is an evergreen, multi-stemmed shrub or small tree with an umbrella-like canopy (Plate 1). It can reach over 10 m in height, and the branches usually carry long thorns. The flowers are fragrant golden-yellow, and the fruit is a 10 to 20 cm long, irregularly curved green pod that turns yellow upon ripening. Prosopis inhabits a wide range of soil types.

Prosopis is native to the Americas. It was introduced in various parts of Africa, mainly for provisioning of firewood, charcoal, wind shelter and rehabilitation of degraded landscapes. However, Prosopis has escaped from the original plantations and, in countries where the species has been present for a longer period than in Tanzania, the spread of the species has been accompanied by important negative impacts on land quality for livestock grazing and farming, on water availability and on human well-being. The species' spread is difficult to contain, physical removal is costly and eradication of large-scale infestations rather impossible. Therefore, coordination of activities and development of less expensive, sustainable management options are required. Kenya, Ethiopia, Sudan and South Africa have declared Prosopis a weed, and South Africa and Ethiopia have published National Management Strategies against this invasive tree.

Plate 1. Prosopis trees around a homestead and invading surrounding lands in Mwanga District. Detail showing flowers and seed pods.

Policy Implications

- *The invasion of Prosopis trees in Tanzania is still at an early stage. Therefore, a national Prosopis strategy and methods to prevent further expansion of Prosopis and to sustainably manage it in invaded areas should be developed.*
- *National and sub-national authorities should coordinate Prosopis management and make resources available for its implementation. Awareness about the negative impacts of this species should be raised among extension services and other stakeholders.*
- *Established stands of Prosopis should be mapped and managed. Surrounding areas as well as areas bordering neighbouring countries with Prosopis invasion should be regularly surveyed and new infestations mapped and eradicated.*
- *Building on the management know-how from other countries (e.g. Australia and South Africa), physical, chemical and biological control options should be developed for Tanzania to manage Prosopis infestations where eradication is not feasible.*
- *Planting and intentional spread of seeds and seedlings should be prohibited. Animal consumption of Prosopis pods and seeds should be discouraged and livestock kept in a Prosopis-free zone for at least 48 hours prior to being moved to unaffected areas. Especially, the spread of Prosopis into sensitive ecosystems, such as national parks and other protected areas should be prevented.*

Introduction into Tanzania and impacts

The introduction of Prosopis to Tanzania in 1988 was accidental, by traders between Taveta County (Kenya) and Mwanga District. It has been suggested that the donkeys used as a means of transport between the two areas fed on Prosopis pods and spread the seeds with their dung. By 1992, Prosopis had already established around market places in various towns in Mwanga District. The introduction to other parts of the country was probably due to livestock movements, especially cattle crossing district borders. There are also cases of intentional introductions of Prosopis for restoration of degraded sites, erosion control and for greening open areas, for example schools. Currently, Prosopis has been recorded in nine districts, but the potential for further spread is significant (Fig. 1). Despite its relatively scattered distribution, Prosopis is already posing management challenges in Tanzania. It invades

agricultural fields under fallow, making crop production laborious and more expensive. There are also concerns that it invades, as in other African countries, grasslands and savannas and thereby reduces the land available for livestock grazing.

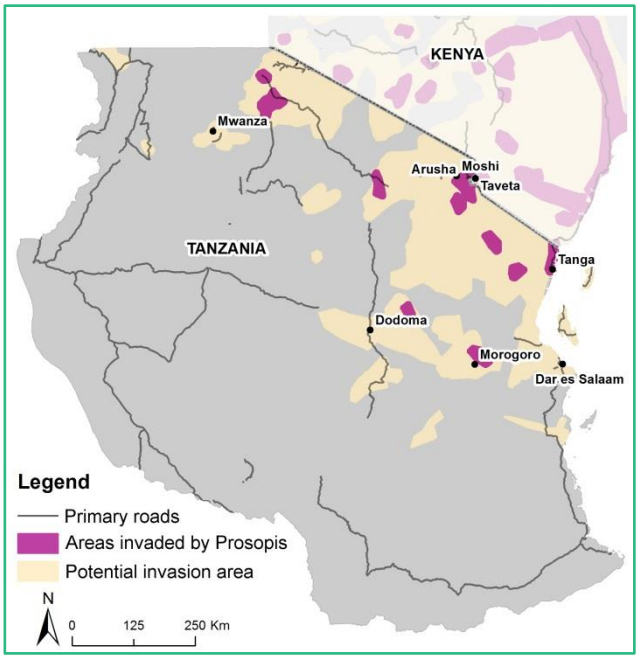

Fig.1 Current and potential distribution areas of Prosopis in Tanzania were manually delineated and generalized based on distribution probabilities obtained from three species distribution models (RF, SVM and MAXENT). Only areas with >50% invasion probability are shown in yellow.

Management options

Successful management of Prosopis requires strategies that are adapted to local conditions, involving actors at regional, national, sub-national and local scale. Integrated management, using a combination of physical, chemical and biological control, may be most cost-effective. In areas where invasive Prosopis does not occur, but which are suitable for invasion, strategies to prevent the arrival and establishment of Prosopis are appropriate. Whenever possible, small infestations should be eradicated. In case of large infestations, containment should be a priority to prevent further spread. A number of management options are available and have been tested and implemented successfully in countries that have a longer history of Prosopis invasion, such as Australia and South Africa.

Preventing the introduction and further spread

The most effective strategy against negative impacts is prevention of the introduction of the species. Monitoring of unaffected areas, in particular close to roads and migratory routes, and removal of detected Prosopis plants should be prioritized. Planting of the species should be discouraged or prohibited and awareness of the negative impacts of the species be raised among stakeholders, including the general public. Prosopis is spread by animals that feed on the pods, and as such livestock should be retained in an area where there is no Prosopis for at least 48 hours prior to being moved into an uninvaded region.

Control of established plants

Physical control

Prosopis coppices abundantly if the stems are cut, resulting in impenetrable thickets. Effective mechanical control of Prosopis therefore requires removal of the growing point, meaning that the roots must be removed at least 15 cm below the ground. Removal by hand using a machete is effective and possible in the case of small infestations and individual trees, if the roots are removed 15cm below the ground. Blade ploughing and stick raking are considered to be the most cost effective techniques in larger infestations in Australia. Mechanical control requires frequent follow-up to remove seedlings, as control can promote germination of seeds in the soil seeds bank.

Chemical control

Chemical control of Prosopis can be an effective control method and several methods have been tested and are being used in other countries. Application of a herbicide immediately after cutting the stems ("cut-stump") and treatment of uncut stems via application of herbicides to the bark of each stem up to 75cm above the ground ("basal bark") are recommended in countries like South Africa and Australia. Care should be taken to use appropriate herbicides to avoid environmental and human health impacts.

Biological control

The introduction of specialist natural enemies from the native range can be a safe, economic and effective way to reduce the spread, growth or impacts of invasive species. The results of modern host-range testing procedures provide reliable indications of the host-specificity (i.e. safety) of biological control agents, an important component of risk assessment and the regulatory approval process. A leaf tying moth of the genus *Evippe* was introduced as biological control agent of Prosopis in Australia, and it has been found to reduce the growth rate and seed production of this invasive species. Two seed-feeding beetles have been introduced to reduce the spread of Prosopis in South Africa and other agents to control the growth and seed production are currently being considered for field release.

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Further reading

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The Woody Weeds project

The Woody Weeds project is funded by the Swiss National Science Foundation (SNSF) and the Swiss Agency for Development and Cooperation (SDC). It aims to quantify the impacts of invasive woody plant species on biodiversity, ecosystem services, and human well-being 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).