

## NYIKA-VWAZA TRUST (UK)

### CONSERVATION RESEARCH NOTE No. 3

## **IMPACTS OF FIRE ON THE ECOLOGY OF THE NYIKA PLATEAU, WITH PARTICULAR REFERENCE TO MONTANE DAMBOS**

The Nyika National Park, in particular the high-altitude grasslands, supports many special upland grassland plant species including a wide range of orchids. Around 25 of the Nyika's 33 endemic plant species – that is, species confined to the Nyika – are associated with the grasslands, with the remainder mainly associated with the grassland–forest boundary (Burrows & Willis 2005). A recent checklist gives 205 orchid species, of which 7 are believed to be endemic. It is the Nyika's grassland flora that is its main biodiversity conservation interest.

One of the major concerns for National Park managers on the Nyika is the occurrence and extent of wildfires. To help control wildfires, an important management activity is the construction and early-burning of firebreaks across many parts of the plateau. These are relatively narrow areas that are burnt early in the season each year so that wildfires do not spread, and against which any wildfires can be controlled. The fighting of wildfires, often sweeping across the plateau from the park boundary, is a major management activity in the "fire season" from August to November. Burning early in the season (around June) means that fires are relatively "cool" and are much easier to control, whilst fires which occur in the hot dry season around October are generally "hot" and much fiercer, harder to control and can do much damage to woody vegetation. For protection of patches of forest or woodland firebreaks are obviously a useful tool, and ensure that any burn is less likely to be extensive and inflicts less damage on trees. But experience with indigenous woodlands elsewhere across the region suggests that even "cool trickle" fires have a deleterious effect on regeneration and can be as damaging. However, as the main conservation interest of the Nyika is the grassland flora, a flora that has almost definitely evolved in the face of occasional hot fires, a key conservation question is are frequent cool burns more deleterious to these species than the occasional hot wildfire?

Upland dambos (seasonally waterlogged valley grasslands) also form an important habitat on the Nyika, with many plant species and numerous birds being dependent on them. For example, Wattled Cranes appear to only use dambo margins for building their nests, and a number of orchid species are only found here. These dambos are often dependent on slow drainage from surrounding areas, on the presence of a natural subterranean "barrier" to drainage, while some are characterised by deep (and sometimes ancient) peat deposits. There have been concerns raised that some of the dambos are now drying out, which may be a natural process or an effect of burning and fire management practices. It is not clear if the dambos are being slowly damaged by an increased fire frequency, perhaps induced by the early-burning regime.

The incidence, extent and effects of fire on the Nyika have to date not been properly documented, nor has the conservation impact of fierce or regular fires across larger areas. Work elsewhere suggests that the greatest diversity might be maintained with a "pyroscape", a mosaic of burning that gives some areas full protection, others irregular burning, some are subject to controlled "cool" burns while others have "hot" burns. But what is now required is a clear and objective evaluation of existing burning practices, fire management and the effects of fire on the species and habitats of highest conservation significance.

A research programme is being suggested which would consist of a number of individual projects, aimed at understanding the effects of fire on the main habitats and species of the Nyika. It would be aimed at identifying the most important management practices to be implemented. The research questions that need addressing are:

1. Collate old burn records and early-burning plans going back to the 1960s to determine which areas have been frequently and/or regularly burnt. Are there differences in biodiversity between these and other areas.
2. Is there any evidence for an increasing "homogenisation" of grassland habitats and their biodiversity with frequent burning, or with continual early burning.
3. Investigate the link between fire frequency, extent or intensity and the measured spread of bracken (see Research Note No. 2). Is there any evidence that bracken spreads in areas which are regularly burnt.
4. Is there any evidence that dambos, so important for montane plants and various animals, are degrading with frequent burning, e.g. holding moisture for a shorter period of the year, being encroached with coarser grasses.
5. Are there any peat dambos on the Nyika. If so, do they have a differing biodiversity from the non-peat dambos, and how important and different are they from other areas. Have any been subject to underground burning as in Zambia and Zimbabwe.
6. What are the impacts of the current fire regime and any dambo deterioration on habitat suitability for the nesting of Wattled Crane and other bird species (see Research Note No.4).
7. Given our existing knowledge, what are the best burn management practices to recommend to National Park managers. What further research is required to determine the longer-term impacts of early-burning. What sort of monitoring scheme should be established, what should be monitored, and how frequently should monitoring be done.

Projects under this applied research programme could be implemented in stages by a range of people from National Parks staff to visiting foreign students or researchers and Malawian university students. It needs to be long-term in nature, with a strong monitoring and documentation component. Monitoring could possibly be carried out by local students on educational visits, although any analysis would need to be done by more experienced researchers.

#### References:

- Burrows, J.E. & Willis, C.K. (2005). Plants of the Nyika Plateau. Southern Africa Botanical Diversity Network Report No. 31. SABONET, Pretoria.
- Lemon, P.C. (1968). Effects of fire on an African plateau grassland. *Ecology* **49**: 316–322.
- Meadows, M.E. (1984). Past and present environments of the Nyika Plateau, Malawi. *Palaeoecology of Africa* **16**: 353–390.
- Meadows, M.E. (1985). Dambos and environmental change in Malawi, central Africa. *Zeitschrift für Geomorphologie* **52**: 147–169.
- Meadows, M.E. & Linder, H.P. (1993). A palaeoecological perspective on the origin of the afro-montane grasslands. *Journal of Biogeography* **20**: 345–355.