

### **2.2.1 *Ngitiri*: a successful traditional method of land rehabilitation in Shinyanga, Tanzania**

#### ***Background***

In the past, Shinyanga region, Tanzania had been extensively forested with woodland and bush land species such as *Acacia*, *Brachystegia*, *Albizia*, *Commiphora* and *Dalbergia* species. However, massive deforestation through shifting cultivation, tsetse flies control campaign in early 1920's and most recently extensive grazing led to soil fertility decline and degradation and the subsequent low crop yields, shortage of dry season fodder, scarcity of fuelwood and construction poles and severe wind and soil erosion (MNTE, 1995). The report by Kamwenda (1999) indicates that between 20 - 30% of the livestock in Tanzania are found in Shinyanga where 18% of the land is utilized for livestock keeping. According to projections by URT (1996), Meatu district in Shinyanga region has the highest number of livestock totalling to 1 404 627. The pressure on grazing land in Shinyanga is quite intense and will continue to become worse due to the high annual growth rates of livestock of 3-5%, short duration of grasses and lack of multiple land use planning (MNTE, 1995). The magnitude of environmental degradation and its subsequent effects due to overgrazing and haphazard exploitation of rangelands forestry resources seem to have overwhelmed the indigenous people who previously used to live harmoniously with these vital environmental resources (Curtis and Ruddy, 1990).

#### ***Objective, approach, results and analysis of reasons for ngitiri success***

In an attempt to alleviate the dry season fodder supply shortages, conserve and protect soils and reclaim degraded land (Kilahama, 1994a,b; Maro, 1995; Msangi, 1995), the Sukuma agropastoral community use their indigenous silvopasture technology known as *ngitiri*. Studies by Kamwenda (1999) indicate that the *ngitiri* has the potential of improving the ecology of the site where trees enrich the soil surface through decomposition and mineralization of their litters (i.e. leaves, flowers, twigs and branches). The extensive ground cover of shrubs, grasses, herbs and forbs also help prevent soil erosion and facilitate water infiltration and percolation by reducing surface runoff and increasing soil water storage (Kamwenda, 1999). There is increasing evidence that *ngitiri* is a widespread and very popular system among the Wasukuma of Shinyanga region comprising six districts since 1920's. *Ngitiri* regarded, as traditional dry season fodder reserves (Otsyina and Asenga, 1994) are farmer led initiatives that evolved out of the traditional strategies in grazing. It encompasses retaining of an area of standing hay until the rain season ends, the area remains closed to livestock at the onset of rain season and opened up at the peak of the dry season to allow the livestock get dry season fodder (Maro, 1995; Mugasha *et al.*, 1996). Grazing under *ngitiri* normally starts from July/August of the year after crop residues and forage in fallow areas have been depleted; and animals are removed from *ngitiri* after all the fodder is exhausted or when fodder becomes available outside the *ngitiri* (Kilahama, 1994a,b; Otsyina and Asenga, 1994).

There are two types of *ngitiri* e.g. private *ngitiri* and communal *ngitiri* differing in size, location and management. Depending on availability of land the size of private *ngitiri* varies from 0.2 to 20 ha with an average of 20 ha. Communal *ngitiri*, on the other hand, are established with mutual consent of village members and, they consist

of large areas of 10 to 20 ha with an average of 50 ha. The communal ngitiri established during *Ujamaa* villages only exist in Shinyanga rural and Maswa districts (Otsyina, 1994; Maro, 1995).

Individual or private ngitiri are located around homestead along lowland river ways and on-farm lands away from homestead (Malcom, 1953; Brandstrom, 1985; Maro, 1995; Msangi, 1995). Homestead locations are more preferred for calves, oxen and lactating cows grazing during the wet season (Malcom, 1953; Brandstrom, 1985). Ngitiri on farmland serve several purposes including the provision of fodder during the dry season, soil restoration through fallowing and nutrient cycling and protection of land ownership rights (Otsyina, 1994). Individual ownership pattern of ngitiri proved to have very positive implications in management, improvement and development, as farmers had been more willing to undertake development work on their own land (Msangi, 1995).

Ngitiri are traditionally established on degraded croplands and rangelands, mainly for fodder supply. The sites are demarcated during the wet season, and regularly protected from grazing animals until the most critical fodder shortage period in the dry season (Kilahama, 1994a,b; Otsyina and Asenga, 1994; Maro, 1995). Initial setting of ngitiri area is the responsibility of the family head in the case of private ngitiri whereas a group of elders is involved in the case of communal ngitiri. Site selection is governed by land availability, proximity to homestead, production potentials and ease of protection (Kilahama, 1994a,b; Otsyina, 1994; Maro, 1995; Msangi, 1995). Although ngitiri boundaries are not rigidly demarcated, the ownership right is highly respected and protected by the local community bylaws, which employ local scouts known as *Sungusungu* and impose heavy penalties on offenders.

Ngitiri grazing minimizes weight loss, improves condition of oxen just before the onset of the cultivation season, increases the animal survival and possibly increases milk yield among lactating cows (Otsyina, 1994). Farmers prefer to graze on communal ngitiri or rangelands first and serve private ngitiri for later use when feed sources are exhausted (Otsyina, 1994). To ensure prolonged availability of fodder in ngitiri during dry season and minimize land degradation, the Wasukuma also developed various rotational grazing management strategies (Malcom, 1953). The most common system presently used can be described as progressive deferred grazing which involves demarcation of paddock for specific periods. Upon completion of fodder on particular paddock, animals are moved to a fresh paddock. Duration of grazing on a paddock depends on its size, availability of fodder and the number of animals (Malcom, 1953; Otsyina, 1994; Kamwenda, 1999). In communal ngitiri, paddocks and movements of animals between paddocks is controlled by well informed and experienced elders, who apparently make management decisions on specific indicators such as level of utilization and availability of fodder (Kilahama, 1994a, b). The ngitiri by virtue of their composition mainly trees, shrubs, grasses and their interaction with livestock constitute an ideal agroforestry system capable of eliminating most of the fodder shortage, fuelwood and pole scarcity and soil degradation constraints. The traditional ngitiri system together with the underlying ecological and management concepts, therefore, provide a valuable opportunity and a basis development of sustainable silvopastoral agroforestry systems in Sukuma-land (Mugasha *et al.*, 1996). The extensive farmers and animal keepers' indigenous knowledge about the values of trees and grasses, ecological bases of ngitiri location

and management and general acceptance of the system provided potential tools for developing parallel agroforestry technologies such as fodder banks and improved fallow systems (Kilahama, 1994a, b; Maro, 1995). In addition to the development of sustainable silvopastoral systems, it is also possible that the ngitiri system analogy could be valuable for developing other agroforestry technologies on croplands, which could combine fodder production as well as soil fertility restoration in space and time (Mugasha *et al.*, 1996).

Despite the great role played by ngitiri in reclaiming degraded lands this system is presently confronting problems of land scarcity, invaders, encroachment, land insecurity, fire hazards, conflicts, overgrazing, low quality of fodder during the dry season attributable to low availability of quality fodder species and the land restrictions by Government laws (Maro, 1995; Msangi, 1995; Kamwenda, 1999).

### ***Overall assessment of ngitiri success***

The success of the traditional ngitiri fodder reserves in Shinyanga region can be attributed to the fact that this system is established traditionally and managed by farmers themselves implying that any land rehabilitation project (e.g. HASHI/ICRAF project) based on this valuable indigenous knowledge is also likely to succeed. This can be testified by the results from Kamwenda's (1999) studies demonstrating that 95% of the respondents (farmers) supported the use of ngitiri to supply dry season fodder and reclaim degraded lands.

### ***Improvements to the ngitiri***

Generally, although the agropastoralists of Shinyanga attained the planned objective using their traditional technology, it can be noted that to efficiently conserve land in Shinyanga and increase the availability of high quality dry season fodder and wood based products, however, ngitiri need to be improved and this can be achieved through (Otsyina, 1994):

- introduction of improved fodder grasses,
- planting of fodder trees (MPTs),
- rotational grazing and destocking,
- thinning of the existing trees to encourage grass growth, expansion of ngitiri coverage areas,
- introduction of bylaws protecting these ngitiri and,
- training farmers on how to plant, conserve and manage trees.

Although the Wasukuma have a good knowledge on uses of trees and browse species, studies by Kamwenda (1999) showed a number of technical issues for ngitiri management and improvement including:

- lack of knowledge by farmers about propagation, planting and management of trees,
- absence of tree seedlings,
- lack of proper treatment or care at early stages of tree establishment,

- inadequate knowledge of the site requirements of the tree species (especially MPTs),
- lack of integration of the produce to satisfy various end needs, and
- conflicting primary objectives of land management.

Farmers need to be assisted in some of these aspects in order to improve the ngitiri system.