



Selective wood harvesting from shelterbelt trees by the government, not by the farmers. Photo: Lambert Onyewotu

# Shelterbelts and farmers' needs

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Nigeria, with more than 100 million inhabitants, is situated in West Africa and shares borders with Niger, Benin, Chad and Cameroon. Climatic conditions vary considerably from south to north. The south has a wet, equatorial climate whereas on the northern border with Niger it is hot and (semi-) arid. Agriculture in the northern region is characterised by millet monoculture. In areas with a little more rainfall, millet and sorghum are intercropped with cash crops such as groundnut and cowpea. The use of fertilisers, pesticides, improved varieties and machinery is generally limited. The Hausa, Kanuri and Fulani are the main ethnic groups who inhabit the area. A small number of nomads, mainly Fulani, visit the region with large herds of livestock.

## Deterioration

Over the last 40 years serious desertification has occurred in northern Nigeria as a result of both natural causes and human activity. In recent years, there has been a gradual decline in rainfall. During the 1960s, the average annual rainfall in the city of Kano in Northern Nigeria was 825 mm. By the 1970s it had fallen to 700 mm and in the 1980s annual averages of about 650 mm were being recorded. Although rainfall remained fairly stable during the 1990s, farming under such conditions became increasingly difficult. In addition, population pressure has increased as labour migrants returned to the area after the oil boom in the South ended. As a result holdings have become smaller and fallow periods shortened. Vegetation cover has been eliminated as trees in natural parklands have been cut down, bush burning has intensified and overgrazing has continued uncontrolled. Over-used, unprotected and exposed to sun and wind, the soils in the area have degraded rapidly.

## Trying to cope with desertification

In the 1970s, and especially during the great drought of 1972-1973, the scale of human suffering was so great that passionate appeals were made for official intervention to halt desertification. As a result the Kano State Forestry Department devised a programme of land rehabilitation using shelterbelts.

They established more than 20 km of rainfed multiple shelterbelts - eleven in total - of *Eucalyptus camaldulensis* at Yambawa, 75 km north east of Kano and not far from the border with Niger. The area was a strategic one. It was near an important road used by caravans and traders and many returning migrants had started to resettle there.

The shelterbelts settled drifting sand and undulations and encouraged the return of soil protecting grasses. Farmers tried to make use of the improved microclimatic and soil conditions between the belts by growing millet.

## Design errors

Unfortunately the Forestry Department made its decisions alone and they did not involve any other stakeholders in the planning process. There were no contacts between Department officials and outside engineers and scientists who could have supplied useful information about how to construct shelterbelts. In addition, the Department had very poor access to the literature about previous research and experience with windbreaks.

As a result there were several design problems with the shelterbelts. In order to deal with the problem of seasonal changes in wind direction, shelterbelts were established at an angle to the prevailing winds. This diminished their wind protective functions in both the wet and the dry seasons. As a compromise, and in order not to occupy too much farmland, the belts had also been established too far apart. The usual distance between belts is about 10 times the final height of the trees. The Forestry Department, however, spaced its belts irregularly from between 15 to 25 times the estimated final height of the trees. Because the belts were so far apart, they were unable to protect all the land between the shelterbelts and much of the soil was, therefore, left unprotected against hot winds and solar radiation.

The width of the shelterbelts themselves was arbitrarily chosen as 30 m, which meant they still occupied about 20% of farmland. Better results would have been achieved if the width of the shelterbelts and the space between them had both been halved.

### No participation, no benefits

The farmers disliked the shelterbelts which took up much of their agricultural land. Our early research confirmed that the shelterbelts competed with their crops for water, light and nutrients, while offering limited protection to the fields they were designed to shield. Instead of Eucalyptus trees, the farmers would have preferred indigenous tree species that could have offered food, fruits, fodder or medical products. They disliked their farmland being occupied without compensation and the fact that they were not allowed to do any maintenance on the belts, such as pruning the front branches to stop the trees shading the front rows of crops, or coppicing (cutting back) which would have provided them with fuel wood.

The heavy demand for wood for fuel and for building provides an important reason for establishing a shared management system for shelterbelts and woodlots. However, at the moment management is in the hands of the Forestry Department and farmers are still not involved. Fuel wood from the shelterbelts can be obtained through official channels, but a survey indicated that only 40% of farmers get wood through these channels.

In 1993, it was estimated that some 3000 people were affected by these shelterbelts. Labour migrants continued to return home and the Forestry Department was convinced that these ex-farmers were returning because of the shelterbelts. This however, was a serious misconception.

### Repeating errors in the future?

In the late 1980s, the authors started doing research – partly farmer-managed – on the shelterbelts to find out how the situation could be improved. The results of this research enabled the development of a number of concrete recommendations. It showed, for example, that root pruning and branch pruning were necessary precautions to reduce competition between millet and trees. The farmers took to root pruning without any difficulty because they could see its benefits. However, the Forest Department did not allow them to prune the branches because fuel wood collection and sale is the exclusive right of the authorities.

Research also indicated that better crop yields could be achieved by using higher inputs of organic fertilisers in combination with either of the following:

- The better design of multiple shelterbelts,
- Planting farmer-friendly scattered trees at appropriate densities in the wide spaces between the shelterbelts;
- Replacing shelterbelts by a system of scattered trees – the so-called parkland agroforestry traditionally used in the area – but with considerably improved densities.



Shelterbelts were established too far apart. Photo: Lambert Onyewotu

The *Forestry Research Institute of Nigeria (FRIN)* has presented these recommendations and the outcome of the participatory experiments at several seminars that have been attended by government extensionists and forestry staff.

At the moment the Forestry Department does not seem to have any plans for improving the efficiency of the shelterbelts. Present policy, financial restrictions and the lack of a tradition, at the official level, of participatory approaches to these types of issues are important constraints. At present, no workable solutions to the problems associated with existing shelterbelts are being developed, and alternative options, such as parkland agroforestry to rehabilitate soil and stop desertification, are not being considered.



During the day, nomads and sedentary farmers like to use shelterbelts for shading their cattle and themselves. Photo: Lambert Onyewotu

### Real change requires participation, planning, coherence and resolve

The experience of Northern Nigeria confirms that soil management and rehabilitation policies must be set in the context of wider development objectives and a well-defined direction of social change. Federal and state authorities in Nigeria have an important responsibility in this respect. In developing a policy of soil rehabilitation, farmers' input not only provides important insights but is also necessary for establishing effective and communal management systems. These systems should have enabled the involvement of returning landowners and farmers, and must now also be capable of evolving to meet the agro-ecological and demographic challenges of the region.

In addition to securing farmers' participation, special extension intermediaries should be trained and equipped to improve the flow of information between researchers, farmers and government authorities.

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