" THE COST OF IRRIGATION IN TERMS OF CAPITAL AND OPERATIONAL COSTS OF PUMPS, WELLS AND CANALS, TRANSPORT OF WATER, LABOUR, AND TIME, IS THE KEY CONSTRAINT TO RE-VEGETATION."

sites to plant limited numbers of trees where they will have the greatest effect in the shortest time. Blanket re-vegetation is never possible.

Irrigation methods need to be manageable by farmers. Most farming relies on water pumped directly from the Nile. However, further from the river - such as at the shelterbelt or dune sites - farmers use shallow *matara* wells. The diesel pump is placed in a shallow well from the base of which a rising main is inserted into the aquifer. Pumps in *matara* wells can supply a simple canal and furrow system for shelterbelt irrigation on fairly level ground. The advantage of this method is that it is well known and understood by local communities. In some cases, farmers simply extend furrow systems already used for crops.

The disadvantages include water loss by seepage on sandy soils, and clogging of furrows by blown sand. Open furrow systems are difficult to use on sites with high exposure to rapid sand movement. Often it is better to deliver water directly to individual trees. Pipe systems operated from pumps or storage tanks deliver water effectively to the trees. Four-wheel drive lorry tankers can deliver water even to trees planted on dunes. The risk is that the offer of such assistance undermines local self reliance. Determined farmers can achieve impressive results watering trees by hand from simple rope-and-bucket wells, or transporting water by donkey cart.

WATER MUST OFTEN BE DELIVERED INDIVIDUALLY TO EACH TREE.

Farmers need species with a root system which can reach the groundwater table-typically between eight and fifteen metres deep-as fast as possible, because this is the point where they can cease irrigation (Ibrahim 1994). Shallow-rooting grass or shrub species which perform well under conditions of low rainfall are useless where there is no rainfall.

Foresters are often blamed for imposing fast-growing exotic tree monocrops on rural people in place of better adapted indigenous species. Not so in this case! Most foresters and external experts recommend diversification and use of indigenous species. Some have re-

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commended shelterbelts composed of mixed species of differing height and form, to achieve ideal porosity and shelter characteristics. The SOS Sahel projects have devoted substantial effort to propagation and use of fine native shrubs and trees including *Leptadenia pyrotechnica, Salavadora persica, Tamarix nilotica, T. aphylla, Capparis decidua, Acacia nilotica, A. tortilis, A. Seyal, A. Ehrenbergiana,* and *Balanites aegyptiaca*.

It is the farmers who insist on the hard-headed economic choice. None of the native trees comes close to matching the performance of the exotic Mesquite (*Prosopis chilensis* or *juliflora*). Mesquite has been widely planted in Sudan since it was introduced from South America around 1940; it is a nitrogen-fixing leguminous tree. The timber is strong and heavy though rarely straight and it makes excellent firewood and char-