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farms or houses which are to be protected. Where large mobile dunes would rapidly overwhelm the trees, farmers plant belts at an oblique angle to the wind, to encourage dune movement along the belt. Instead of working from the source of sand towards the mobile dune front, they usually work from the mobile front towards the source.

Time is a critical factor. By the time a large scale long-term programme is fully implemented the farmers (or householders) in the front line - those in fact who were most highly motivated to join in the work - may have seen their property engulfed.

The theoretical principle of working from the sand source towards the mobile dune front simply will not work in practice. Shelterbelts on the windward side of the dunes take longer to establish because of the harsher conditions. As they become established they will create a fore-dune. This will cut off sand supply to the main dune, and gradually reduce its size. The wind is relieved of its previous sand burden by the fore-dune, and as it passes over the main dune surface will entrain more sand particles. The rate of movement at the mobile dune front and the amount of downwind sheet sand deposition will increase.

A thick shelterbelt of Mesquite planted on good soil at the foot of the mobile dune front can reduce encroachment within its first year. As sand begins to pour into the shelterbelt, the Mesquite grows above dune level so that within two or three years the dune front has developed a "canopy" of Mesquite foliage, while the trees continue to tap the groundwater beneath the dune.

Farmers understand the role of mechanical fixation on sites where sand movement must be slowed to allow for shelterbelt establishment. Yet, an analysis of expert recommendations for the villages of Mora and Rekabiya in Northern Province showed that the sand fixation work itself required more labour than the villages could provide, without even considering the labour requirements of tree rais-

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ing, planting, and irrigation. So, they aim to minimise the need for fixation by choosing more favourable, less exposed sites for tree planting. Again, there is a case for planting at the foot of oncoming dunes in the zone of shelter. Farmers also make use of the remarkable properties of Mesquite. A shelterbelt planted on an exposed site will need at least one line of sand fencing to windward to protect the seedlings from sand-blasting. The fence will create a small fore-dune which will provide some degree of shelter. This fore-dune will begin to bury the first rows of trees. Irrigation by furrow may become impossible.

If the trees can keep pace with the sand accumulation, further mechanical fixation will no longer be needed. The trees are now the self-raising, self-renewing barrier. Once again, the outcome depends upon the race between competing factors: a combination of farmer commitment, shelter effects, irrigation, root growth, and groundwater table; up against abrasion and burial by wind-borne sand.

On sites with extreme exposure to sand blasting, farmers have invented various techniques for individual tree protection. Date palms are traditionally planted in small mud-lined "wells" sunk below ground level. Individual protectors for Mesquite trees may be made of mud, date leaves, or even an old up-turned bucket with the bottom punched out. The advantage is that sand passes between trees and does not accumulate until the belt is well established.

In Northern Sudan, farmers frequently own land on, near, or among mobile sand dunes. The nature of ownership varies, with complex arrangements for share-cropping or combined management of uneconomically small plots. Sometimes there is no title deed and the farmer may really be squatting. But in all cases, a farmer who has invested efforts in cultivating and irrigating the land will be highly motivated to protect it. The tenure status of land for community shelterbelts has to be clarified before planting starts.