Mogumber drainage works succeed

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The loss of arable farmland from soil erosion, waterlogging and salinity is a severe problem on some Western Australian farms. When the arable land comprises only 40 per cent of the total area within the Mogumber Soil Conservation District, this loss is real cause for concern. So too is the resulting damage to roads, siltation of railway culverts, and deaths of roadside trees from rising saline watertables. However, drainage, contour and other works undertaken by the Mogumber Soil Conservation District have halted this degradation. Badly eroded areas that were fenced off now have a satisfactory ground cover. A wheat crop planted along a deep drain a year after it was built has shown few symptoms of waterlogging. Roadside trees are producing new growth.

About the district
The Mogumber Soil Conservation District is a small soil conservation district comprising about 3 400 hectares of agricultural land. It is about 50 km south of Moora. The area is bounded in the east by the Darling Scarp and then runs down across the valley to the west side which is bounded by the Moore River. The soil conservation district was formed in 1986 because the farmers within the district recognised they had severe problems of soil erosion and sedimentation. These problems were worsening waterlogging and salinity in the valley floors, resulting in a reduction of arable land. As well, trees along road and railway reserves were dying.

The loss of arable land is significant as only about 40 per cent of the total area within the conservation district is arable. The farms have large areas of non-arable rocky land which grow good pasture. The main crop is wheat, but coarse grains and lupins are also grown.

Land forms
The map shows the land forms of the Mogumber Soil Conservation District and the three drains that were constructed.

The landscape comprises a dissected laterite system with flat topped hills capped by blocky laterite. Run-off water from the laterite infiltrates the deep gravels in the joints and follows the bedrock down to the valleys, breaking out as springs on the valley floors.

The hillslopes adjoining the dissected laterite system are subject to gully erosion caused by run-off from the hilltops and from the shallow subsurface movement of infiltrated waters. Drainage from the hills reaches the valleys through overland and subsurface flow. This causes erosion, waterlogging and salinity of the valley and its floodplain systems. Seepage water flows in these valleys for most of the year.
The soil surface comprises water-borne gravels and sands over clay or rock. Underlying this is a semi-permeable strata of consolidated sediments which effectively prevent adequate drainage. The valley discharges into a seasonal lake system. The floors of this sluggish system have silty clay soils. Adjoining the lakes and to the north is a system of sandy soils with rolling low sand hills. The deep grey sands of the hills change to sand over clay on the interdunal flats. Water seeps out of the dunes and onto the flats and thence into the lake system. The fringes of this system are saline. The drainage waters finally flow into the Moore River system. The river is deeply incised and passes through an “A” class reserve. It flows seasonally and its waters are saline. The river banks are generally flat, with an occasional steep rocky hill.
Iron-stained water seeps out of the saline valley floors.

Large, bulldozer-built contour banks on the slopes control surface run-off.

The farmers’ approach

Before the conservation district was established, local farmers had to determine what were the problems before they could tackle any solutions.

The most serious problem was the loss of arable land caused by salinity and waterlogging. Interpretation of aerial photographs and validation on the ground showed that 390 ha of land within the conservation district were already saline and waterlogged, or at the risk of becoming affected. Water quality in bores and dams was also declining.

The main problem in these earlier years was soil erosion on the slopes. This was controlled by building large contour banks.

As the valley floors became waterlogged, severe erosion and braiding of the streams occurred, resulting in siltation of the valleys and drainage lines.

Although the potential exists for wind erosion on the sandy areas, erosion of the valleys and the high water table on the lower land was by far the greatest problem.

For the farmer community, damage caused to the bitumen road by waterlogging, the silting of the railway culverts, the loss of roadside trees and the likelihood of damage to the “A” class reserve was of concern.
Pump and intake floats in the drain. A float switch in the PVC tube controls the pump.

Solutions

The Soil Conservation District Advisory Committee decided that the first priority would be to prevent further silting of the valleys and drainage lines from the farmlands higher up the catchment, whilst continuing with the earlier strategy of building contour banks on the slopes. Badly eroded valleys would be fenced to encourage natural re-vegetation, thus stabilizing the soil surface. Fencing would allow controlled grazing and the planning of stock water supplies. In this way planned drainage works downstream would not be put at risk.

One farm, because of its location, was severely affected by erosion of the valley floor. Fencing of affected areas had started, but more was needed. The district committee successfully applied to the Western Australian Soil Conservation Advisory Committee for a $4,000 grant from State assistance to soil conservation district funds to buy fencing materials. The farmer supplied the labour to complete the fences.

The next move was to halt the loss of trees along the roadside and railway reserves. The rising watertable and consequent salinity had reached a point where trees were dying rapidly.

A joint drilling programme with the Department of Agriculture and the conservation district confirmed a high watertable with water under upward pressure rising in some of the piezometers. The indications were that east of the Bindoon-Moora Road, a two-metre deep drain would help to reduce waterlogging and lower the watertable.

West of the road, where the soil profile comprised massive clay, a shallow drain was planned to take away surface water. Drains were excavated in October 1984. As the outflow from the deep drain was below the level of the creek bed, a $7,000 solar-powered pump was installed to pump water into the creek. On a sunny day it can pump 90 kilolitres per day. Pump costs were met by the farmer directly concerned.
The next stage was to improve drainage between the road and railway reserves to the Moore river. The Department of Conservation and Land Management was invited to consider the proposal as the planned drain would pass through an "A" class reserve. Once approved, the Western Australian Water Authority designed a shallow, one-metre deep broad-section drain to clear surface waters. In September 1985, the State Government together with the Victoria Plains Shire Council and Westrail helped the six farmers to fund the required works. Tenders were called and the drain was constructed by a bulldozer.

**Effectiveness**

Natural grasses and pasture now cover the valley that was fenced off. During the first season, the farmer planted and fertilised kikuyu, couch and paspalum grasses and strawberry clover. This mixture was chosen because it has grown well in previous years on similar land in the catchment. Since the drains were built along the road and railway reserves, several of the dying wandoo trees have recovered and are producing new leaves. On the previously flooded areas large numbers of Casuarina seedlings have appeared.

A wheat crop planted along the deep drain has shown few symptoms of waterlogging. The large drain passing through the "A" class reserve has been most successful in clearing water away to the river. The drain has experienced one intense rainfall event in addition to seasonal rains and silting has been minimal. Alongside the drain Melaleuca trees have regenerated. A stable ground cover is expected within two or three years.

Before the formation of the Mogumber Soil Conservation District, the individual farmers had planted trees, salt tolerant pasture species and contoured their land. The formation of the soil conservation district has acted as a catalyst and given them and the wider community renewed enthusiasm for attempting to overcome areas of degraded land.