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A Central Midlands catchment study...
the prospects for land drainage

By B. Hillman,
Adviser, Information Branch

Flooding, waterlogging and salinity problems in Western Australia are complex. Usually broad areas of land are affected, thus it is hard for one farmer alone to combat the effects because the problem so often starts and finishes off his farm.

For instance a farmer’s drainage works may fail when uncontrolled waters arrive from further upstream. Also, flood waters discharging from his own drainage channels may disadvantage his neighbour downstream.

One means of solving or easing such problems is for affected farmers to form catchment control groups.

Although the nature of flooding, waterlogging and salinity problems can vary from farm to farm (and from catchment to catchment) this article shows how one group has identified its problems and now is attempting a solution.

- Typical flood and salt-affected land in the Central Midlands.
- Far left: The author in an oats stubble on mildly salt-affected land.
- Group President Ian Hudson inspects a paddock destroyed by salt.
The Watheroo-Coomberdale Land Improvement Group

The group, comprising about 50 farmers, was formed because those involved were concerned with the salting of once productive land stretching from Moora north to Watheroo and straddling the Geraldton Highway. The members wanted to reduce waterlogging and halt salt encroachment by improving drainage, and thus at least maintain the area suitable for cereal cropping, or even increase it.

The group asked the Departments of Agriculture and Public Works to conduct a feasibility study on land drainage in their area. Then as a preliminary measure, staff of the Moora district office of the Department of Agriculture conducted a study of the catchment.

They used aerial photographic interpretation and ground surveys to measure and describe the extent and severity of saline and waterlogging-prone land. Rainfall figures, cereal yields and management practices on the affected areas were assessed from results of interviews held with five members of the group.

The following is a summary of the study report.

The catchment

The size of the catchment was hard to determine because it expands greatly in years of above-average rainfall with drainage from the Morawa, Perenjori and Dalwallinu Shires spilling into Yarra Yarra Lake before heading south to Moora. The area from Yarra Yarra Lake to Moora alone covers 150,000 ha. The study however, concentrated on the Moora to Watheroo section—an area of about 60,000 ha.

Drainage north of Moora is through a complex of interconnecting creeks and lakes running parallel to the Geraldton Highway and joining the Moore River at Moora. As part of this complex, the Coonderoo River connects most of the lakes between Yarra Yarra and Moora. It has flowed along its entire length only three times since the last major flood in 1963.

Topography and soils

The hills to the east of the Geraldton Highway consist of chert outcrops, ironstone gravels or yellow earthy sands. The valleys comprise red loamy soils and gilgai ('crab-hole') soils. A few of the valleys show evidence of salinity. Some are affected extensively.

A flat area of poorly drained land lies west of the Highway. This is associated with the Coonderoo River. The major soil type is a red to grey hard-setting loam, bordered on its western fringe with an area of swamps and lakes winding through yellow sand dunes.

The creeks from the hills in the east cross the highway then either filter through to the Coonderoo system or trend south, parallel to the highway. There are no defined drainage lines from the sand areas to the west of the Conderoo River.

Land development

Clearing of the valleys started in the early 1900s. The sands and gravels in the surrounding areas were cleared in the 1950s and 60s.

Apart from shelter belts and the western lakes (including a section of the Watheroo National Park to the northwest) all land has been cleared for agriculture.

Present land use

Wheat and sheep production are the major industries in the catchment. In the Moora Shire, 90,000 ha of cereals are sown each year (almost 70,000 ha to wheat) and 160,000 ha remain under pasture.

The common rotation has been one year of crop followed by two years of pasture but farmers are swung to a 50 per cent rotation of either one year crop and one year pasture, or two years crop and two years pasture.

Wheat yields in the Moora Shire over the past 10 years have averaged 1.34 t/ha, oats 1.13 t/ha and barley 1.29 t/ha. The Shire carried nearly 700,000 sheep, 49 per cent of which are breeding ewes (mainly Merinos). Over the past five years the average total wool cut has been close to 3.5 million kilograms. Fat lamb and
Floods
Rainfall data for the past 30 years show average April to October rainfall around Watheroo to be about 340 mm. As an arbitrary measure, years when April to October rainfall totalled 366 to 425 millimetres were classed as 'wet'. On this basis, wet years occur about one year in four.

If April to October rainfall exceeded 425 mm, then it was classed as a 'flood' year. Flooding years occur in nearly 15 per cent of years.

Wet and flood years were separated because of their different frequency, and also because any drainage works to control floods would have to be of different design to that aimed at reducing waterlogging.

Salinity and waterlogging
Saline ground was categorised on the nature of its vegetation. Severely affected areas were either completely bare, carried samphire (Halosarcia spp.) and/or Casuarina trees, while mildly affected areas carried either thick barley grass (Hordeum marinum) and some ryegrass, or crop noticeably affected by salinity.

Mildly saline areas often are waterlogged, yet waterlogged areas are not necessarily saline. However, since the treatment for both is similar and is likely to achieve similar results, mildly saline and waterlogging-prone areas were classed as one. This also allowed for any likely salting in the near future.

The study showed that 6500 ha of the catchment comprised salt lake channels which were saline before settlement. Since clearing for agriculture started, more than 3000 ha have become severely saline and a further 7000 ha mildly saline or prone to waterlogging.

On a per farm basis, the amount of saline area varied from less than 1 per cent to 85 per cent.

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The importance of catchment groups

Groups such as the Watheroo-Coomberdale Land Improvement Group provide a forum for discussion, not only between farmers, but also with advisers and research staff of Government Departments. The problems can be pinpointed and given priorities, and possible solutions can be presented. If no solutions can be offered, new research programmes can be started.

Catchment groups are essential if big-area problems are to be tackled because flooding and salinity rarely “end at the farm gate”. Neighbours are usually involved. Group meetings can help avoid disputes and legal complications, which would otherwise arise from isolated, haphazard drainage schemes. They also can help in the examination and collation of relevant farm records.

Conclusions

The formation of the Watheroo-Coomberdale Land Improvement Group enabled a catchment survey to be conducted as the first step in a feasibility study of land drainage.

This survey outlined the possible benefits to the catchment from a number of drainage options which depended on the extent of drainage works needed to avoid flooding and to reclaim different types of salt land.

It also highlighted the need to determine:

- the feasibility of controlling all floods
- the feasibility of deep drainage
- accurate cereal yields from reclaimed land
- the maintenance costs of all types of drainage
- the effect of drainage works on existing channels downstream.

The next step will be the estimation of construction costs.

Because of the uneven distribution of saltland from farm to farm, the benefits of improved drainage will be uneven. Costs may have to be apportioned accordingly.

Regardless of what system is followed, work will be needed on a whole-catchment basis with the catchment group operating as one incorporated body.