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Farm planning for conservation

By W. J. Burdass,
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Collectively, Western Australia's agricultural land is its most productive capital asset.

Today, much of this land is at risk. In some areas, widespread wind erosion is sifting away the soil's fertility. Water erosion, carrying away the soil and dissecting our paddocks, has the potential to block rivers and silt up dams and estuaries. Salt encroachment is a problem on thousands of farms.

All these problems must be tackled at their source ... the farm. They must be tackled in an organised and sustained way.

A farm plan can provide the framework for doing this, and at the same time can contribute to more effective farming.

Planning the physical aspects of the farm is sometimes referred to as conservation farm planning.

It is aimed at managing the land so that its productivity, and other things of value such as wildlife habitat and aesthetic qualities are maintained or improved. Properly prepared and carried out, a farm plan ensures that the farm is developed so that each part serves the purpose for which it is best suited. Among the objectives are soil erosion control and saltland rehabilitation.

History

The Department of Agriculture became involved in conservation farm planning in the mid 1950s through its Soil Conservation Service Branch. The earliest farm plans were intended mainly for mixed wheat and sheep farms. They were an adjunct to contour farming plans, and usually included storm water disposal provisions as well as water supply and conservation systems.

Land was maintained in the biggest possible pieces to allow for easy cultivation and efficient machinery operation. This was done by locating fences along natural barriers to cultivation, such as creeks and waterways, the edge of bush or the margins of rocky outcrops. It was easy to superimpose contour bank systems on such plans.

Soil conservation officers also recognised that certain parts of the farm, such as salt affected and flood prone land could not be managed in the same way as normal arable land, so special aspects of land use were incorporated into farm plans.

The early plans took into account the need for stock movements, particularly in the medium rainfall areas. This included laneway systems and subdivision into smaller paddocks than dictated by natural boundaries.

Farm planning took on a new dimension in the 1960s when millions of hectares of new farm land were thrown open for selection.

Careful planning of clearing, cultivation and stocking practices can help prevent land degradation.
Improved aerial photography, the use of stereoscopes and the recruitment of staff skilled in photograph interpretation helped planners get a quick appreciation of the topography of the new uncleared land and identify ridge lines and creek systems.

Before such aids were available, new land evaluation was done by ground traverse, a difficult and time consuming job, particularly in gently undulating landscapes covered in dense scrub several metres high.

Towards the end of the 1960s, demand for farm plans had outstripped the Soil Conservation Service Branch's resources. In 1966/67, the Branch had drawn up 54 plans, which increased to 96 in 1967/68 and 173 in 1968/69 . . . with a waiting list of 420 by the end of 1969.

Thus, most of the new land opened for selection at the time was developed without any development plan, even though most of the farmers involved recognised the opportunity available.

Until the late 1960s, most new land subdivisions were square or rectangular. Traditionally, block boundaries ran east and west and north and south. Boundaries only followed the line of natural features, such as major creeks or rivers, when these were uncrossable.

Paddocks laid out in this traditional manner could be awkward to cultivate, and often left small unmanageable pieces of arable land between fences and natural features. Often it led to cultivation patterns and firebreak systems which contributed to erosion. Also, square paddock layouts, which ignore natural features, rarely lend themselves to contour bank layouts.

**Why plan?**

A big proportion of Western Australia's agricultural land has been settled for more than 20 years . . . some for 120. Yet there is still
plenty of scope for farm planning in these areas. Most of the farms have not been planned for conservation previously, and on many of those which have, there is often need for revision.

There is an opportunity, and a need, to redesign a paddock layout when existing fences need renewing, or erosion problems can be ignored no longer.

But there are many other reasons to develop a farm plan, or to modify an existing one. For example:

- The need to change land use because of degradation such as salt encroachment or severe wind erosion.
- A change of ownership, after which the new owner decides to pursue different types of agriculture, or to redevelop the farm to suit his own tastes and aspirations.
- Farm build-up, which means that newly acquired land must be added to the original holding.
- Intensification, requiring that smaller paddocks are fenced for better grazing management.
- The development of irrigation potential where part of a property is to be converted from dryland to irrigated agriculture.
- The adoption of new technology, for example the identification and special management of groundwater intake areas.
- Changed economic circumstances which cause the enterprise to be changed, for example towards more intensive cropping and shorter rotations.
- If the farmer decides to plant trees on a big scale.

Already there is a well established trend away from stock and into more intensive cropping in the wheatbelt. Closer to the coast, in the higher rainfall areas, sheep are replacing cattle on many farms.

These changes are being made mainly for economic reasons, accelerated in the wheatbelt by droughts, and made more attractive by technological advances in machinery and herbicides.

Such changes have big implications for soil conservation. As more paddocks are cultivated, a much bigger area is vulnerable to water erosion early in the winter. Even though today’s big machinery can offset some of this danger by allowing the crop to be sown more quickly, the need for contour farming is as strong as ever. Minimum tillage reduces the danger of erosion also, but does not eliminate it. If contour farming is to be workable in these circumstances, layouts must be planned carefully making a farm plan a valuable asset.

The new land role

Government policy requires a farm plan to be developed for conditional purchase land. Today, successful applicants for this land must prepare an initial development plan for their blocks "to minimise environmental hazards consequent to clearing and cultivation of virgin land".

Such plans are prepared in consultation with Department of Agriculture officers, and must be lodged with the Department of Lands and Surveys for approval by the Minister for Lands.

Then the new land farmer must ensure that all farm development, including clearing follows this approved development plan. As development proceeds, the plan may be modified as necessary in consultation with Departmental officers. Once again such modified plans must be sent for approval by the Minister for Lands.

As these provisions are implemented and monitored, we should be able to avoid the mistakes of the past, particularly that of clearing unproductive and erosion-prone land. To make this possible it is important that enough expert Departmental staff are available to help successful new land applicants with their plans.

"The bulldozer waits for no one". Clearing the bush is a quick and simple exercise, but once it is done it cannot be undone. This highlights the importance of having the initial development plans completed before the bulldozer appears.

Some Departmental officers with planning experience argue that vegetation will regenerate, at least partly, after being chained and burnt . . . as long as the land has not been blade ploughed. Certainly, it is easier to make a ground evaluation of new land once it has been chained and burnt. On areas with shallow slopes and ill defined drainage lines, it may be the only way.

But it is important that areas to be left uncleared should be defined as early in the process as is practicable. It is easier and cheaper to retain the original vegetation than it is to plant shelter belts later.

Assessing land and problems

The first important step in developing a farm plan is to "take stock of the land".

In the Western Australian wheatbelt and adjacent farming areas, relatively small areas of land are non-arable. Salt lakes and big rock outcrops are examples.

Few farms have more than 10 per cent of their area that cannot be cultivated. Land generally slopes in a range from 0 to 5 per cent and only in a few districts, such as parts of the Avon Valley, along the Darling Scarp or in districts such as Bridgetown, do we find steep slopes that limit cultivation.
The farming system practiced in most parts of the Western Australian agricultural areas has been relatively uncomplicated in the past. Thus, a very simple system of land classification has been very successfully used to assess land for farm planning. It separated land on three main criteria:

- Agricultural from non-agricultural land. Salt lakes, major rivers, large rocky outcrops, steep and stony ground, deep sands with poor water holding capacity, and areas of native poison plants which could not be eradicated by normal clearing methods because of difficult terrain.

- Arable from non-arable land. Creeks, watercourses, shade and shelter belts, rocky outcrops, moderately steep land too dangerous to cultivate with wheeled tractors, but capable of growing pasture, permanent seepage areas, deep sand areas cleared for rabbit control in low rainfall zones, and saline areas carrying perennial vegetation are in the non-arable category.

- Arable land from arable land with disabilities. Land affected by salinity, prone to flooding or frequent waterlogging in winter, subject to wind or water erosion, and combinations of these disabilities are in the third category. Differences in soil type, where they have a bearing on management practices, would be noted in the arable land category.

Planners normally use stereoscopic aerial photographs to do a preliminary assessment of a farm. Later, the detail is checked and elaborated on in the field when the adviser and the farmer inspect the property together. Land assessment, fence placement, land use decisions and the like usually are completed in one operation taking no more than a day on an average sized farm.

Most of the relevant information is used in the planning process, but this system of land assessment lacks formality. Planning does not produce a land classification map which can be retained for future reference.

Other systems of land assessment, for example that designed by the United States Department of Agriculture, are far more detailed. They involve soil pit inspection and classification of the land on the basis of potential hazards. This process can take several weeks on large properties.

T. R. Negus has prepared a booklet “Land classes in the Upper Great Southern of Western Australia” (Bulletin 4016), in which he adopted a land classification system developed by CSIRO workers. This is a valuable guide for anyone planning a farm in that region. Negus gives details on 13 different land classes including information on potential hazards, ... and preferred management practices.

### Planning guidelines

There are some basic incompatibilities between stock and crop enterprises. For example, if there are no stock, there is no need for fences.

If a farm is to be devoted to crop production only, planning should be centred on:

- Mapping land classes so that management practices and choice of crops can be tailored to each land class.

- Providing water disposal systems such as waterways, contour banks and seepage interceptors to control erosion and waterlogging.

- Ensuring all-weather access to paddocks so that super and seed can be moved freely at seeding, and grain can be taken out at harvest.

Other factors which could be included in such a plan are disposing of flood waters, establishing windbreaks, and planting trees for other purposes.

The planning emphasis changes completely in a stock enterprise without any cash cropping. It is still important to map land classes, particularly if pasture is to be re-seeded ... or seeded for the first time ... because the choice of pasture varieties could be important. Also trace elements could be needed on some land classes. Sometimes it is important to fence different land classes for good grazing management.

Disposing of water is less important to an all stock enterprise, though the farmer should still provide for the disposal of dam overflows and preventing water collecting on access ways and firebreaks. The main planning needs are:

- Every paddock must have a water supply, and the property as a whole should have a drought-proofing strategy. If the enterprise is to be based on cattle, a fenced central supply and reticulation is often best if dams are the main sources of water. This prevents the cattle from fouling the water.

- Different classes of stock need to be segregated, so paddock numbers and sizes must be planned to accommodate separate mobs.

- Stock enterprises must be planned so that mobs can be moved and handled efficiently. Permanent yards must be sited carefully. Laneways can save time and labour, but portable yards could be a cheaper alternative.

- Any plan for a stock enterprise should ensure that plenty of shade and shelter is left, but the plan also should provide for this shelter to be protected from the long-term damage stock can do. There should be some provision for regeneration. If shade and shelter are lacking, a tree planting programme should be planned.

Salt-affected land should be protected from stock by fencing, and if drainage works are
planned, it is best to install these before erecting the fences.

Sandy surfaced soils, susceptible to wind erosion, also require special plans. Often they are best fenced into separate paddocks for counter-erosion strategies.

If the farm is to be a stock and crop enterprise, the plans must make special provision for fencing which will not interfere with machinery operations. This can be done by siting them along existing barriers to cultivation such as creeks, rock outcrops, vegetation strips and shelter belts, or along tracks, contour banks and waterways.

New land planning

The first step in planning a new land farm is to site the clearing boundaries and select the first area to be cleared. If the homestead is to be built in the first year of operation, selecting a site, giving it access and arranging a water supply are all important considerations. Features which may influence homestead siting are proximity to services, such as power, telephone and school bus, suitability of the soil for foundations and septic systems, and outlook.

Planning clearing boundaries is most important for new land farms. Enough bush should be left to provide shade and shelter, as well as wind breaks in areas with a potential wind erosion problem. Also, clearing boundaries should coincide with natural barriers to cultivation.

Implementing the plan

There is a general sequence for implementing a farm plan, though each could have unique problems. This sequence is essentially the same for long settled and new land farms, except for the need for clearing.

The general sequence is:

- Establish water supplies, as sites for dams and catchments and bores are often limited.
- Stabilize waterways as a first step in erosion prevention, and to allow for water disposal from structures such as contour bank systems.
- Construct soil conservation systems such as contour banks and interceptor banks.
- Locate access ways.
- Erect fences. On long settled properties, this is often triggered by the need to renew old fences.
- Establish wind breaks and shelter belts.

Future challenges

Up to now, land assessment for farm planning has been relatively superficial in the sense that it has only assessed the surface of the land, usually ignoring what is underneath.

Today it is becoming increasingly important to know what lies underneath. This is particularly the case if salt encroachment is likely to be a threat. We know now that before a rational plan can be developed for attacking salt encroachment on a farm, we must know something about local groundwater movement and the location of intake areas.

The same applies to controlling waterlogging in cropping paddocks.

Other aspects not dealt with in past plans are the build-up of soil acidity and the development of hardpans. Research has proved that both can limit crop growth on some soil types.

In the future, there should be big advantages in formalising the system of land assessment. Detailed information should be recorded accurately so that it can be referred to when needed in the future, as for example when a plan must be revised.

Properly used, farm planning has a major part to play in protecting our agricultural land and maintaining its productivity.

Sitting roads and vegetation strips is part of good planning.