however, are not uncommon in relatively high rainfall country for they have been reported by Holmes *et al*. 1939) in the Berwick district of Victoria, Which has a comparable rainfall, and also by Teakle in parts of Western Australia.* It can be presumed that the salt is of cyclic origin, brought in by rain from the sea, but the reason for its concentration at certain places is not clear. The concentration of drainage may be the, result of one of two factors; firstly clearing of the trees on the slopes has allowed uneven infiltration and perhaps greater water movement than previously, or secondly some structural feature of the igneous mass may cause this concentration of drainage rather than a much wider distribution of seepage waters having a lower salt concentration which could be used by the vegetation. The increase of salinity in these places is followed by a replacement of the natural grasses by more salt-tolerant species such as barley grass (*Hordeum leporinum*) and ultimately by the elimination of all vegetation. The sodium-saturated soil is easily dispersed and consequently erosion proceeds rapidly, the severe sheet erosion ultimately turning to bad gully erosion.

From the general account of the erosion on the area and the description of. special forms, it is apparent that the development and execution of a plan of soil conservation on this area will be a big task, requiring the solution of a number of problems. The work on soil conservation at Dookie College is already having some effect in arresting soil erosion, but even with contour furrowing (Plate 6), the most common form of control measure, there remains much to be done in the determination of optimum spacing and/or vertical interval between the furrows. The recovery under a system of contour furrowing alone is relatively slow, since the cover obtained consists mainly of ephemeral species, and it seems therefore that although contour furrowing is most successful in preventing excessive run-off, something more should be done in an attempt to establish better pasture cover on the hills at the same time. Some such technique as this must be devised if the rehabilitation of the eroded country in the parishes of Gowangardie and Upotipotpon is to be achieved, for it is the hills themselves which have suffered most damage in that area. Associated with the problem is the prevention and control of tunnelling erosion. Although on the basis of the hypothesis of tunnel development, put forward in a previous publication, it is possible to make suggestions about possible control measures, there is no doubt that experimental work will be needed to devise the best method.

In the agricultural areas the use of broad base terraces and a widening of the rotation should achieve success provided the upper sections of the catchment units are treated to prevent excessive run-off. Erosion due to salinity is not really a serious problem either in size of area affected or in numbers of occurrences, but its ultimate development gives rise to such complete destruction of an area that it should be controlled if possible.

The fundamental necessity for successful soil conservation is not merely rehabilitation of the damaged areas but the development of systems of use under which there is an equilibrium between the soil, climate, man, animal, at as high a level of production as possible. This will constitute greatest problem of all since it is inescapably dependent on the mental attitude of the farming community toward the land and its use.

VIII. WATERSHEDS AND DRAINAGE PATTERN

The fundamental problem facing the soil conservation worker in an area object to water erosion is the determination of the origin of the excessive water movement and its control. It has been amply demonstrated that control by suitable treatment of the catchment areas to prevent excessive run-off, is better than control at the place of damage. Consequently a knowledge of the watershed units of an area is essential if effective soil conservation work is to be achieved.

The map of the four parishes showing the stream pattern and major watershed units has been compiled from a study of the aerial photographs and field observations. The value of such a map lies in the delineation of the area into units which can be treated separately for soil conservation, and consequently it indicates to the soil conservation worker a number of separate problems. Furthermore, when this map is used in conjunction with the soil erosion map, it enables him to decide which are the most urgent problems and also the size of the project necessary for a satisfactory solution, since watershed units must be treated as a whole.

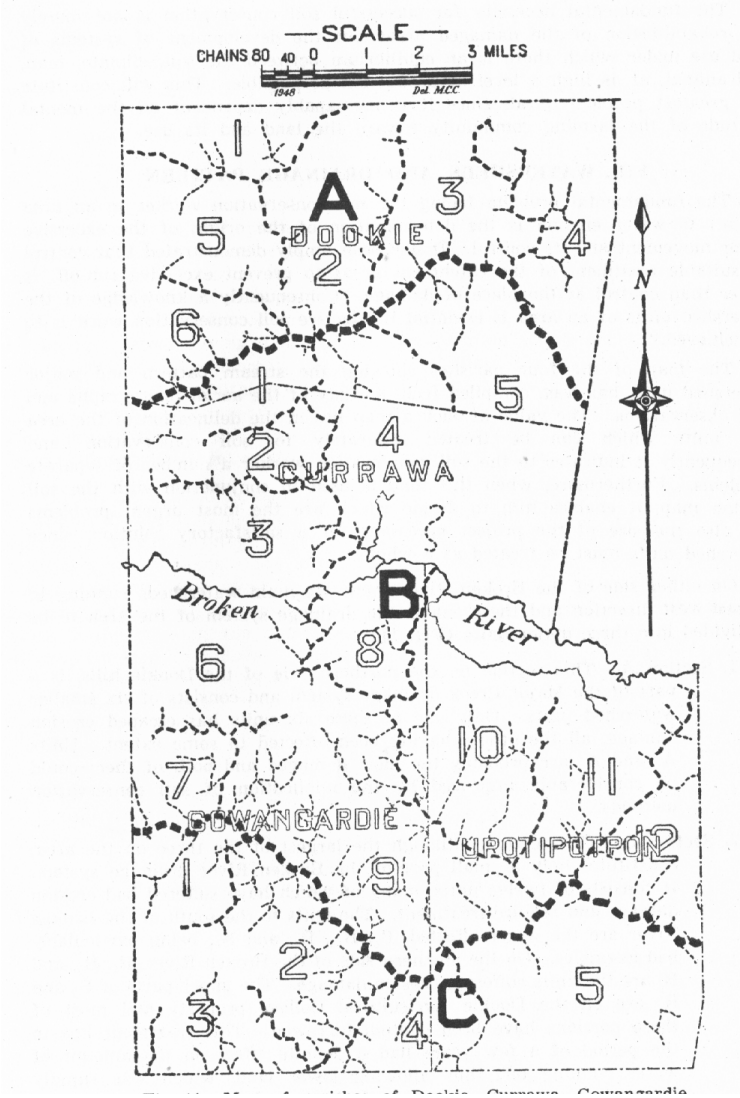
On either side of the Broken River there are main watersheds running in an east-west direction and these enable the drainage system of the area to be divided into three major units (Fig. 11).

* Private communication

1. Section A.-This section on the northern side of the Dookie hills, is a part of the Major Creek drainage system and consists of six smaller watershed units. Only one of these six units has escaped erosion damage, all the others having been affected to some extent. Units A 2 and A. are probably the most damaged and both of them could be considerably improved by the application of soil conservation methods.

2. Section B.-This section, although the largest of the three on the area, constitutes only a small part of the Broken River drainage system. It consists of twelve units, many of which have suffered bad erosion damage and require treatment. The units to the south of the Broken River are the worst affected, B_9 B_{10}, B_7, and B_{11}, being particularly bad examples. On the northern side of the Broken River, B_1, B_2 and B_4 are the units suffering erosion damage. The upper parts of B_2 and B_4 are on the Dookie Agricultural College property and most of these portions have been contour-furrowed. This treatment has in the period of a few years had a definite effect on the amount of water running off, thus allowing lower land, which was rapidly deteriorating, to recover and again be brought back into cultivation. Some of the units of the sections such as B_9 cover a large area, but they themselves are subdivided into smaller units which can be treated separately.

Fig 11 - Map of parishes of Dookie, Currawa, Gowangardie and Upotipotpon, showing main watershed units



3. Section C.-This section constitutes a part of the Stoney and Honeysuckle Creeks drainage system, and consists of five units of which C_l, C_2 and C_3 are the worst affected by erosion.

There is a fundamental difference between the two main watersheds on am, particularly in regard to the kind of soil. The northern watershed in parish of Dookie consists generally of steeper slopes whereas on the watersheds they are much gentler. The main erosion damage on the watershed has been done to the highly productive soils along the slopes of the hills, whereas in the southern watershed the main damage the hills themselves. In fact, B_9 and C_2 are the most badly damaged on the whole area and the watershed between these two units has been badly affected as to render it almost unproductive.

IX. AGRICULTURE AND LAND USE

The first white settlers arrived in the north-eastern part of Victoria soon after Major Mitchell had returned through this country to New South Wales from his journey to Portland in 1835. During the years from 1837 to 1841 large numbers of graziers moved there from the more southerly settlements in New South Wales, and by 1844 the whole of this particular area had been selected as grazing runs. At that time the area of 650 square miles covered the survey constituted the whole or portions of thirteen stations which carried between them about 6,000 head of cattle and 75,000 sheep (Billis and Kenyon 1930). The total area of the thirteen stations was 950 square miles m that the stocking rate was then about six head of cattle and 75 sheep to the square mile or about one sheep to 5 or 6 acres.

It was not until nearly 30 years later that any further development of the land took place. After the passing of a new Land Act in 1869, this area along with a large proportion of north-eastern Victoria, was selected in small units for agriculture. The new Act allowed a person to select up to 320 acres, which were leased for a period of three years at a fee of 2s. per acre per annum. At the end of this period the selector had the right to purchase for £1 per acre, the rate of payment being the same as the lease rate. Although 320 were intended to be the maximum area for any one person larger areas came under single management and virtual ownership, by acquirement through near relatives and "dummy" applicants. In a few years all the land suitable for agriculture and also some of the unsuitable land had been selected and was being used more intensively. At the time there was in the parish of Currawa an area of land, mostly hill country, which had not been selected and this was then reserved as a site for an Agricultural College. Although other arable land has since been acquired, this original area still remains the main proportion of the 6,000 acres of Dookie Agricultural College property. In the northern and north-western parts of the area clearing was comparatively easy, for the vegetation was savannah woodland, but to the south of the Broken River on the central hills the task must have been much greater. The northern parts have remained as arable land but the proportion of the area south of the river, which is now cultivated, is only small.

Within an area of this size exhibiting a considerable range of soils, climate, and topography, it is possible to delineate certain areas of country each of which by virtue of the integration of its particular soils, climate, vegetation, and topography constitutes a unit. Such areas may be called "units of land-husbandry" for each of them will require the development of their own particular forms of land husbandry if a proper land use is to be achieved, namely the raising of the level of production of the unit while still maintaining an ecological equilibrium between climate, soil, vegetation, animal, and man.

Several of these units have been recognized and they are found to be closely related to the major variations of land use which seems to indicate that the landholders have ultimately adopted suitable types of agriculture for the particular environments. This does not mean that the optimum forms of land husbandry for each unit have been achieved, for quite obviously the occurrence of soil erosion in some, and the decline of fertility and soil structure in others, indicates that although the level of production may have been raised, an equilibrium between the various components of the environment has definitely not been achieved.

In this area eight units of land husbandry have been defined and their extent and locations shown as edapho-climatic units on the accompanying map. (Fig. 12).

Unit 1 - Red-brown earth soils of the plains in the northern and north western parts of the area; relatively dry, 18 in. to 21 in. rainfall.

With the exception of local swamps, the whole of this area is arable country and in fact is similar to a large part of the north-eastern wheat growing area of Victoria. The form of agriculture is generally wheat in conjunction

with sheep for fat lamb raising. Wheat is grown mainly on the narrow wheat-fallow rotation and the sheep are used on the fallows in the spring to suppress weed growth. The relative importance of wheat and fat lambs in the land use depends largely on the relative prices to be obtained, for the products.

Unit 1 consists mainly of flat country and there has been no erosion problems, but the deterioration of soil structure after many years of cultivation constitutes the main land use problem. It has been shown by Downes and Leeper (1930) and Hayman (1945) that restoration of structure on such soils can be achieved by widening the rotation so that the land is left under pasture for a few years. Unfortunately in this area there is no good volunteer fodder grass to cover the fallows and consequently unless seed is sown the pastures on the stubble are merely low grade ephemeral species.

Unit 2 - Soils of the Dookie-Currawa, Major-Cashel associations; relatively dry, 19 in. to 21 in. rainfall.

This unit constitutes one of the most productive wheat areas in the State for the relatively reliable rainfall and good structure of the soils malm cultivation easy, and yields are high. The main proportion of this country consists of the Dookie clay loam which can produce average yields of 36 bushels to the acre; but the Cashel clay loam is even more productive with average yields of the order of 45-48 bushels per acre, although the management of these soils is more specialized. Fat lamb raising is also a major part of the agriculture of the district and as in unit 1 the relative proportions of fat lamb and wheat production depend on the market prices. The narrow wheat-fallow rotation is common in this area, but the soils, because of their much better natural structure, do not deteriorate to the same extent under cultivation as those in Unit 1. For fat lamb production Southdown or Dorset Horn rams are used, in contrast with Unit 1 where Border Leicester rams are more common because of the possibility that the season may not allow the lambs to be finished off, and consequently they are held and fattened as two-tooths.

The, rougher country on the hill-tops in this area usually carries a goo4 natural pasture and is used for grazing; but on account of the good structure of the soils, cultivation has been extended up the, slopes, in some cases beyond the limit of safe land use, causing erosion damage.

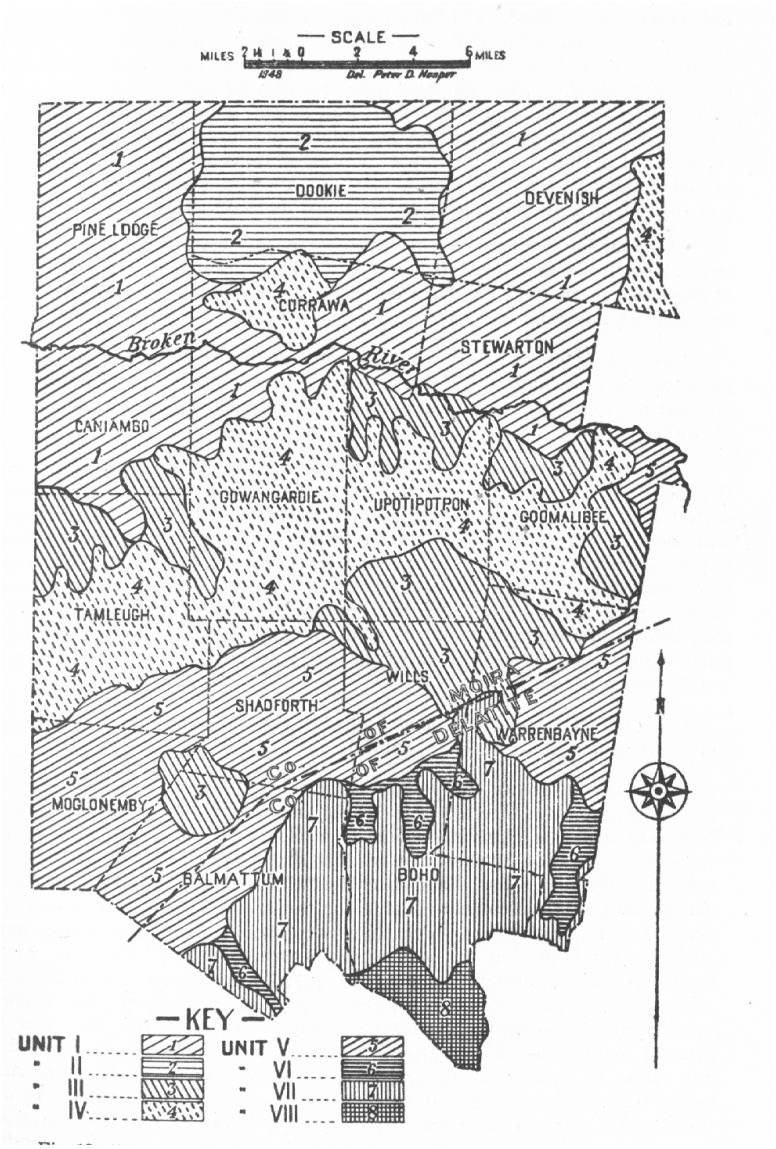
Unit 3 - Heavy poorly drained soils mainly Upotipotpon series in the parishes of Gowangardie, Upotipotpon, Goomalibee, Warrenbayne, WA Shadforth, Tamleugh, and Balmattum. Relatively moist, 21 in. to 24 IL rainfall.

This unit consists of a series of disconnected areas extending from Broken River to the south of the area. It is mainly used in an unimproved state for crossbred sheep grazing and fat lamb raising. The soils are crabhole and poorly drained, but in the eastern portions of this region near Baddaginnie and to some extent in the south, some areas have been considerably imp by cultivation, grading, and sowing down of Wimmera ryegrass, and subterranean clover. Such areas have a rainfall approaching 24 in., but there is no do that similar improvement could be made in the slightly drier parts of this unit. Such improvement is said to raise the carrying capacity of this country from 1 to 21 sheep per acre.

Unit 4 - The relatively poor soils of the Gowangardie-Caniambo group. Relatively moist, 21 in. to 24 in. rainfall.

This unit presents the worst example of failure to develop a proper use. The area, once forested, was cleared and many of the lower slopes cultivated. Not only has this cultivated country eroded but the upper slopes have suffered as a result of excessive grazing and deterioration of pasture covet the naturally poor soils. This state of affairs is partly due to the nature of climate, which is sufficiently reliable for the farmers to take a chance in a year of maintaining more stock than they should during the winter and spring in the hope that the season may turn out alright. However, there have been three severe droughts during the past 46 years and it should by now be realized that such occurrences are a natural feature of the climate consequently necessitate precautions being taken. At the best this is grazing country and this at stocking rates of less than a dry sheep to the but statistics show that the stocking rate over the last 40 years has consistently higher. Some of the broader valleys in this region have areas the Earlston-Koonda soils large enough for cultivation, but they have in places from erosion due to excessive run-off from the eroded watershed.

Fig 12 - Map showing the edapho-climatic units of the area, each of which is a unit of land husbandry



Unit 5 - The light-textured podsolized soils of the southern alluvial fans and including soils of the Violettown-Balmattum and Earlston-Koonda groups. Relatively moist, 23 in. to 25 in. rainfall.

This unit consists mainly of gently sloping country which has not been used to its full productive capacity. Some cultivation is practised, usually restricted to the growing of hay for conservation, but the area is mainly used for grazing with fat lambs and sheep as the main objective. There appears to have been little effort to improve the pastures, and although topdressing with superphosphate is a regular practice on some properties it is not a widespread procedure. The rainfall is fairly reliable and the carrying capacity without improvement is from 1 to 1½ sheep per acre. Patches of heavier country are found in this area where Upotipotpon clay occurs; this type which also constitutes the main soil of Unit 3 is considered capable of improvement.

Unit 6 - The alluvial soils of the narrow valleys coming down from the south-eastern hills. Moist, 25 in. to 28 in. rainfall.

This unit consists of several isolated portions most of which are not more than a mile wide and narrow rapidly towards the hills. The largest single area is in the vicinity of Warrenbayne where the rainfall is about 27 in. Here the land use is dairying on improved top-dressed pastures which provide considerable amounts of grass hay for conservation, while up the slopes at the sides of the valley there is some fruit-growing on the light soils

of the Warrenbayne and Boho series. Near Violettown and Euroa the valleys are not so large as that at Warrenbayne and dairying becomes less important. However, in these areas the high grade pasture production from the valleys is used to supplement the diet of sheep grazing on the steep hills in the vicinity.

Unit 7 - The rough stony south-eastern hills. Moist, 25 in. to 28 in. rainfall.

The westerly face of the south-eastern hills consists of rough steeply sloping country with a high percentage of rock outcrop. Such country is only suitable for rough grazing on the basis of not more than one sheep to 5 or 6 acres, and is generally used in conjunction with land situated in one of the other regions, frequently Unit 6, which is adjacent to it.

Unit 8 - The podsolized soils of the plateau in the southern parts of the parishes of Boho and Warrenbayne. Moist, 28 in. to 30 in. rainfall.

This unit consists of gently rolling country at an elevation of 1,500 feet above sea level, the soils being those of the Warrenbayne and Boho series. After the forest has been cleared from this country the reliable rainfall and longer growing season assure high class pasture production, enabling a stocking rate of about three sheep to the acre. The constant menace of bracken invading the pastures and the continual need for rabbit extermination make the country more difficult to manage than some other units. Some forms of agriculture are practised, notably fruit-growing, potatoes, and hay for fodder conservation. There is only a small amount of this class of country included in the area studied, but it is representative of a larger area extending further eastward.

An inspection of the production statistics reveals some of the trends in the past land use of these various regions, but unfortunately the earliest data available in a convenient form are for 1906. From the numbers of horses, sheep, and cattle, the area occupied and the area cultivated, and the number of landholders, it has been possible to indicate trends in average size of holding, percentage of area cultivated, and average stocking rates for the past 40 years. These figures for five parishes, each of which can be considered indicative of a land-use unit, are given in Table 17. Pine Lodge is representative of Unit 1, Dookie of Unit 2, Gowangardie of Unit 4, although it includes in the north-western corner an area of Unit 1, Upotipotpon mainly of Unit 4 with some of Unit 3, and Moglonemby of Unit 5.

Table 17* - Trends as shown by means of 5-year periods of average size of holding, percentage of area cultivated, and stocking rate for each of five parishes

	1906-11	1916-21	1926-31	1936-41	1943-41†
A. Average size of Holding (acres)					
Pine Lodge	410	430	460	450	480
Dookie	710	460	540	570	560
Gowangardie	520	470	650	800	920
Upotipotpon	670	740	870	850	890
Moglonemby	540	630	650	860	700
B. Percentage of Total Area which is Cultivated					
Pine Lodge	46.6	43.0	55.1	38.1	20.1
Dookie	24.9	27.6	48.4	40.5	29.2
Gowangardie	14.5	14.5	17.1	10.8	7.2
Upotipotpon	8.0	7.0	7.1	4.0	1.9
Moglonemby	6.2	4.9	4.0	3.8	1.9
C. Average Stocking Rate (sheep per acre)†					
Pine Lodge	1.9	1.3	1.8	1.9	1.4
Dookie	1.2	1.2	1.4	1.4	1.2
Gowangardie	1.0	0.8	1.0	1.0	1.0
Upotipotpon	1.0	0.7	0.8	0.7	0.7
Moglonemby	1.2	1.1	1.0	0.9	0.8

* Stocking rate is in terms of sheep per acre of uncultivated land, the horses and cattle being assessed as equal to 10 and 8 sheep respectively.
† Figures for the latest year available are given to indicate the more recent trend.
‡ Figures used in the compilation of this table were obtained from Government Statist's Office, Victoria.

From Table 17A it will be noticed that on the more productive land in the parishes of Pine Lodge and Dookie the average sizes of holdings at the present time are 480 and 560 acres respectively, much less than the 700 to 900 acres for the other parishes. Further, the average size in the first two parishes seems to have stabilized at about 450 for Pine Lodge and 550 for Dookie, whereas in Gowangardie, Upotipotpon, and Moglonemby the trend seems to be upward.

From Table 17B it will be seen that there has been since the 1926-31 period a decline in area cultivated which is almost certainly associated with the relatively low prices to be obtained for wheat, particularly for the wheat-producing parishes of Pine Lodge and Dookie. The other feature is the small areas of cultivation in the other three parishes, Gowangardie having the highest figure which is due mainly to the fact that there is an area of country in the north-western corner of the parish similar to Pine Lodge.

The interesting feature of Table 17C is the high stocking rate in the parishes of Pine Lodge and Dookie. In Pine Lodge, particularly, there has been a fairly constant sheep population during the past 40 years and this is reflected in the very high stocking rate from 1926-1941 when 40 to 50 per cent of the land was cultivated. On the basis of total area these figures are reduced to about one sheep to the acre. In Dookie, however, there has been a tendency for total sheep numbers to be reduced when the percentage of cultivated land increased and the figures 1.4 sheep per acre for the periods 1926-31 and 1936-41 are much less than those for Pine Lodge. For Dookie the stocking rate taken on a total area basis for those periods becomes 0.7 and 0.9 sheep per acre respectively.

The high stocking rates in the parishes of Gowangardie, Moglonemby, and Upotipotpon in the 1906-11 period are due mainly to the numbers of dairy cattle, but it will be noticed that although in Upotipotpon and Moglonemby the stocking rate has declined slightly, in Gowangardie it has been maintained. This is an interesting fact, for Gowangardie is the worst eroded parish on the area and in spite of that there has been no attempt to reduce the stocking rate. The comparative stocking rates for these two parishes during the crucial years preceding and during the 1914 drought are as follows:

	Gowangardie	**Upotipotpon**
1913-14	1.4 sheep/acre	0.9 sheep/acre
1914-15	1.2 sheep/acre	0.7 sheep/acre
1915-16	0.9 sheep/acre	0.6 sheep/acre
1916-17	0.7 sheep/acre	0.7 sheep/acre

The high stocking rate, in Gowangardie, in the year preceding and during the drought must have left the country exposed to the ravages of erosion when rain eventually came. In fact, tunnelling erosion which is most widespread in the parish of Gowangardie is known to have started just after the 1914 drought.

For the four parishes surveyed in detail, a land class map has been compiled on the basis of slope and soil type when considered both in relation to the rate of erosion damage and also the physical capabilities of the soils. This land class map is not intended to be accurate in specific detail, but sufficiently accurate to give a general indication of the relative amounts of the various classes and their general distribution over the area. For accurate specific detail, each farm unit would need to be treated separately on the basis of detailed slope measurements, soil type, and the general position of the farm in relation to the hydrography of the adjacent areas. Such work, of course, is beyond the scope of this survey and is really a task for the soil conservation worker.

The following classes have been used in the compilation of the map:

Class I - Land which is suitable for cultivation without special practices to prevent erosion. The soils, which are well drained, are sufficiently fertile for cultivation and the slopes, if any, are slight.

Class II - Land suitable for cultivation if special practices are used, either for the prevention of erosion on sloping country or the improvement of drainage on flat country; or land suitable for pasture without any special treatment for the prevention of erosion.

Class III - Land suitable for pasture but requiring some form of erosion protection, at least until the pastures are established, or in many places, rehabilitated. On such areas, grazing should not be so heavy as to prevent the growth of adequate cover for the summer months.

Class IV - Suitable only for light grazing with special care to ensure that sufficient cover is retained during the summer months. This class is normally represented by stony land on steep slopes.

Class V - Poorly drained areas, unsuitable for any form of agriculture other than grazing during the summer. This class consists entirely of swamps and depressions which are flooded during the winter.

Soil types within these classes would form a basis for creating grades on the basis of fertility, but such refinements in classification could only be treated on an individual farm basis. The soils occurring in each of these land classes are:

Class I - Dookie-Currawa and Major-Cashel, the Nalinga-Goorambat and the Lemnos-Goulburn and Shepparton-Broken soil associations.

Class II - (a) Soils requiring drainage modification are the type A and Upotipotpon clay.

(b) Soils requiring soil conservation measures are the Dookie, Major, and Cashel series on relatively steep slopes, the Gowangardie, Caniambo, and Nalinga series on slopes exceeding approximately 3^{o}.*

All these types are suitable for use under pasture without erosion control measures on slopes not exceeding from 5^{o} to 8^{o}* according to the soil type.

Class III - This class consists almost entirely of the Gowangardie and Caniambo series on slopes exceeding approximately 5^{o}.*

Class IV - Skeletal soils-rough stony areas.

Class V - Swamps and depressions-mainly Congupna clay.

In these four parishes the interesting features of land use are unfortunately in the nature of misuse, and over-grazing is probably the most important. This applies to the parishes south of the Broken River in general, and to Gowangardie in particular. The better class country of the Dookie hills, although it has not suffered to the same extent, has not been immune from abuse, and over-grazing on the watersheds has resulted in erosion of the better class land on the lower slopes rather than on the watersheds themselves. This country naturally carries a better vegetation than the southern parishes and the position can possibly be rectified by an alteration of the system of management. The poor cover on the northerly facing slopes in contrast with the southerly slopes indicates that these two aspects should be treated differently with respect to grazing management. There is no doubt that the sheep graze the northern slopes more heavily in the winter and spring, leaving them almost bare in the summer. The farmers consider that the differential grazing of the sheep is due to the more palatable pasture on the northern slopes, but it seems more likely that it is because the greater insolation affords the sheep more comfort during the colder months and further, the spring growth probably starts earlier. The relatively hotter and consequently drier environment on these slopes helps in the rapid deterioration of the pastures and, in fact, there is probably a big difference between the effective length of growing season on northern and southern slopes. It is reasonable to suggest that the animals should be prevented from differentially over grazing the northern slopes by means of subdivision wherever possible and that these northern slopes should be subjected to a much lower stocking rate so as to ensure the preservation of an adequate vegetative cover during the summer months.

The same arguments would apply to the hills in the southern part of the area, but the irregular topography makes such subdivision impracticable. In such circumstances the stocking rate of these areas should be reduced to a level which will ensure the retention of vegetative cover on the northern slopes. A substantial reduction in

* The figures quoted for slope gradients are only approximations based on general observation. More accurate figures should be derived by the soil conservation worker forllowing detailed experimental work on control of erosion under varying conditions on the different soil types.

stocking rate must be made on these hills in any case, both for restoration by conservation methods and to prevent a recurrence of the trouble.

Another feature of the misuse of land has been the tendency to cultivate on slopes, which on the particular soil type are far too steep. The rapid loss of fertility with erosion has mostly lead to the abandonment of such projects, but not before some damage has been done. However, in the Dookie district, because the nature of the soil makes the detection of erosion and loss of fertility more difficult, the practice persists. In many places severe erosion may not have occurred it there had not been excessive run-off from the hills beyond, but in many other places there has been damage without such an excuse. Because of the high productive capacity of this land, fairly steep slopes could be cultivated safely and economically if the necessary soil conservation devices were used. Broad base terraces installed at a cost of approximately £3 per acre have been used on this soil on a 6 per cent slope at Dookie College, with much success.

A pleasing feature of the land use is the development and management of the dark soils of the Dookie district-the Major and Cashel series. For many years these soils were not used to any extent, and it was only after some of the local farmers had made a study of the Wimmera soils of western Victoria and their husbandry that they were developed and used successfully. These soils are now considered to be the most highly productive wheat soils in the area.

At the southern end of the parish of Gowangardie, one farmer has made good use of a particular small area on his property. The property is situated in the hill country, and through it runs a small valley. Near the house the valley broadens and there are about 10 acres of the Earlston-Koonda soil types. About 300 yards up the valley, he has constructed an earth dam, which is capable of impounding about 50 acre-feet of water, which is sufficient to irrigate grape vines growing on the 10 acres. The grapes grown are mainly table varieties and the owner maintains that the revenue obtained from these 10 acres is equal to that obtained from the rest of the property, which consists of about 800 acres of relatively poor, eroded soils of the Gowangardie and Caniambo series. Not only has the productivity of these 10 acres been increased, but the soil has been conserved from further erosion.

In general the land use of the sixteen parishes is good, so far as the kind of production being obtained from the area, but the management is at fault in some places. Seasonal variability has already been indicated in the section on climate, and for the most effective land use these conditions must be accepted as a basis for planning. This is particularly true for grazing management, where misjudgment can so easily lead to physical damage of the land as opposed to the mere financial loss due to bad seasons in areas under cultivation.

As in so many other rural districts in Australia, the attitude of the farmer has been in the main an exploitative one and consequently the agricultural practices are not in the best interests of the country as a whole.

It has been said (Wadham 1939), that "In no case can a system, (of agriculture) be permanent if it fails to ensure the maintenance of the general level of fertility of the soils it uses". The need in this area is the development of "permanent" systems of agriculture, not only for the hill country, but for the flatter arable areas, because they too have their troubles in the wheat-growing areas of the red-brown earth soils, it has been shown that there has been a deterioration of soil structure under cultivation and further, that a widening of the rotation to include pasture can improve this condition. The general rotation in this area continues to be the narrow wheat-fallow type, although at the Rutherglen State Research Farm the use of temporary ley in a broader system of rotation has been successful not only in improving -structure, but also yields.

The extent of erosion damage on the hill country has been indicated and such damage can now only be rectified by the introduction of soil erosion control methods, not by one, but by all the farmers co-operatively in any particular watershed unit. The control of erosion is only the first step toward the rehabilitation of the. land. The most important step is the development of a soil conserving system of land husbandry for the various regions and the different soils within them.

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