## 3. SECTION OF STUDY AREAS

The areas studies, typical of the topographically gentle Palaeozoic landscape of north central Victoria, were selected as they represent a large portion of the western uplands and contain a significant amount of dryland salting. The gentle Palaeozoic terrain occupies 49% of the uplands of north central Victoria, having a total area of 1 212 700 ha (LCC Report North Central Area).

The extensive area of Palaeozoic sedimentary outcrop made it possible to select zones containing identical parent material, but which varied systematically in climate, geomorphology, soil type and vegetation.

The catchments used in this study were three of those originally selected in 1973 for soil salinity and moisture comparisons (Jenkin and Timofeeff 1974; Jenkin and Irwin 1976), with the addition of two areas at Kamarooka which lacked well defined drainage basins (Figures 1 to 5). Essentially, selection involved the isolation, within the appropriate terrain types, of pairs of typical small catchments, one of the pair being forested and the other cleared. Using a 100 m grid, with one axis parallel to the catchment axis, 25 to 30% of the intersections were isolated randomly to be used as sampling sites.

In this way, varying soil types and geomorphic conditions within relatively small areas of uniform climate, and between areas of different climate, were evaluated.

The soil and regolith properties measured, the derived characteristics and the methods used as shown in Table I.

**Table I – Methods used for determination of soil and water properties**

| Properties | Method | Reference |
|---|---|---|
| Bulk density → Total porosity | Waxed core | McIntyre and Loveday (1974) |
| Particle density → Total porosity | Pycnometer | McIntyre (1974b) |
| Field capacity * → Macroporosity | Core | McIntyre (1974a) |
| Saturated hydraulic conductivity | Inverse auger hole (Porchet) | I.I.L.R.I. (1974) |
| Infiltration (saturated) | Cylinder (30 cm) | do |
| Soil salinity | Electrical conductivity of aqeous extract (1:5) | Tucker and Beatty (1974) |
| Water salinity | Electrical conductivity | |
| Soil water | Neutron probe | |

Derived properties

* In forested areas, derived from unpublished SCA data (1973-6)

**Table II – Mean Hydrological properties relating to soil and rock of cleared Eppalock Catchment No. 1**

| Geomorphic position | Horizon | Bulk density g/cc | Calculated total porosity % vol | Field capacity % vol | Marcoporosity % vol | Saturated hydraulic conductivity m/day | Saturated infiltration rate m/day | Electrical conductivity 1:5 aqueous extract µS/cm |
|---|---|---|---|---|---|---|---|---|
| Upper slopes: Shallow red-brown gradational and red brown duplex soils | A | 1.52 | 45.4 | 31.9 | 13.5 | | | 162 |
| | B1 | 1.63 | 41.2 | 30.9 | 10.4 | | 0.02 | 135 |
| | B | 1.59 | 42.7 | 35.2 | 7.6 | 0.06 | | 168 |
| | B/C | 1.67 | 38.4 | 32.5 | 6.7 | | | 150 |
| Intermediate slopes: Predominantly shallow red-brown duplex soils | A | 1.62 | 41.5 | 24.3 | 17.3 | | 1.0* | 100 |
| | B1 | 1.60 | 42.1 | 34.7 | 7.5 | | 0.005 | 120 |
| | B | 1.55 | 44.2 | 37.1 | 6.8 | 0.05 | | 174 |
| | B/C | 1.63 | 41.4 | 34.9 | 6.2 | | | 162 |
| Lower slopes: Predominantly shallow red-brown duplex soils. | A | 1.44 | 48.1 | 33.9 | 14.2 | | 0.6* | 143 |
| | B1 | 1.58 | 43.0 | 34.0 | 8.9 | | 0.007 | 111 |
| | B | 1.55 | 44.1 | 38.2 | 6.0 | 0.04 | | 119 |
| | B/C | 1.58 | 42.9 | 37.7 | 5.5 | | | 120 |
| Valley floor: Predominantly shallow yellow-brown duplex soils on bedrock and alluvium/colluvium | A | 1.50 | 46.0 | 33.3 | 12.7 | | 0.2* | 155 |
| | B1 | 1.61 | 41.8 | 34.1 | 6.2 | | 0.006 | 147 |
| | B | 1.65 | 40.5 | 34.6 | 6.0 | 0.04 | | 150 |
| | B/C | 1.73 | 37.6 | 30.9 | 6.8 | | | 132 |

Total number of soil samples collected = 564 (Statistical data in Appendix)

* Individual values highly variable

**Table III – Mean Hydrological properties relating to soil and rock of forested Eppalock Catchment No. 2**

| Geomorphic position | Horizon | Bulk density g/cc | Calculated total porosity % vol | Field capacity % vol | Marcoporosity % vol | Saturated hydraulic conductivity m/day | Saturated infiltration rate m/day | Electrical conductivity 1:5 aqueous extract µS/cm |
|---|---|---|---|---|---|---|---|---|
| Upper slopes: Shallow red-brown gradational and red brown duplex soils | A | 1.56 | 44.1 | 26 | 18 | | | 81 |
| | B1 | 1.64 | 40.7 | 37 | 4 | | 0.30 | 72 |
| | B | 1.66 | 40.2 | 37 | 4 | 0.10 | | 43 |
| | B/C | 1.69 | 38.9 | 37 | 3 | | | 27 |
| Intermediate slopes: Predominantly shallow red-brown duplex soils | A | 1.62 | 41.7 | 32 | 12 | | | 96 |
| | B1 | 1.62 | 41.7 | 36 | 6 | | 0.23 | 69 |
| | B | 1.70 | 37.3 | 36 | 1 | 0.06 | | 370 |
| | B/C | 1.78 | 35.8 | 31 | 5 | | | 100 |
| Lower slopes: Predominantly shallow red-brown duplex soils. | A | 1.66 | 40.3 | 36 | 4 | | | 111 |
| | B1 | 1.71 | 38.3 | 34 | 4 | | 0.004 | 238 |
| | B | 1.74 | 37.2 | 34 | 3 | 0.11 | | 437 |
| | B/C | 1.65 | 404 | 38 | 2 | | | 320 |
| Valley floor: Predominantly shallow yellow-brown duplex soils on bedrock and alluvium/colluvium | A | 1.49 | 46.4 | 36 | 10 | | | 189 |
| | B1 | 1.71 | 38.1 | 35 | 3 | | 0.003 | 137 |
| | B | 1.76 | 366 | 35 | 3 | 0.05 | | 388 |
| | B/C | 1.79 | 35.6 | 33 | 3 | | | 648 |

*estimates based on previous work (See text)

**Table IV – Mean hydrological properties relating to soil and rock of Kamarooka (Areas 1 and 2)**

| Geomorphic position | Horizon | Bulk density g/cc | Total porosity % vol | Field capacity % vol | Marcoporosity % vol | Saturated hydraulic conductivity m/day | Saturated infiltration rate m/day | Electrical conductivity 1:5 aqueous extract µS/cm |
|---|---|---|---|---|---|---|---|---|
| Gentle slopes with heavy sodic red duplex soils. (Northcote class DR 2.13) | A | 1.67 | 39.7 | 32* | 8* | | | 149 |
| | B1 | 1.63 | 41.2 | 38* | 3* | | 0.005 | 214 |
| | B | 1.55 | 44.0 | 40.0 | 4.0 | 0.08 | | 613 |
| | B/C | 1.73 | 37.5 | | | | | 325 |

* Estimated from previous data (See text)

**Table V – Mean hydrological properties relating to soil and rock of Kamarooka Catchment No. 1**

| Geomorphic situation | Soil horizon | Bulk density g/cc | Total porosity % vol | Wilting point moisture % vol | Electrical conductivity 1:5 aqueous extract µS/cm |
|---|---|---|---|---|---|
| Upper slope: Shallow red duplex soils | A | 1.54 | 44.4 | | 109 |
| | B1 | 1.66 | 39.8 | | 160 |
| | B | 1.75 | 36.8 | 24.1 | 1293 |
| | B/C | 1.72 | 37.0 | 21.0 | 947 |
| Intermediate slope: Shallow red duplex soils | A | 1.74 | 37.2 | | 78 |
| | B1 | 1.72 | 37.5 | | 548 |
| | B | 1.80 | 34.9 | 21.8 | 655 |
| | B/C | 1.82 | 34.3 | | 736 |
| Lower slopes: Shallow red duplex soils | A | 1.75 | 36.8 | | 52 |
| | B1 | IS | IS | | |
| | B | 1.67 | 39.7 | 24.1 | 1293 |
| | B/C | 1.78 | IS | | 980 |
| Valley floor: Shallow red duplex soils | A | 1.52 | 45.2 | | 43 |
| | B1 | 1.75 | 36.9 | | 294 |
| | B | 1.80 | 34.3 | 22.3 | 690 |
| | B/C | IS | IS | | 500 |

IS – insufficient number of samples