THEME 7: UTILISING THE ENVIRONMENT

7.1 SURVEYING RESOURCES

The earliest utilisation of the environment by people in the Dunedin area was probably food gathering by the first Maori inhabitants. Midden sites along the coast have been studied archaeologically to determine how early Maori people lived, what they ate, and even what time of year they were resident at any particular site (e.g. Samson 1995). Maori also utilised lithic (stone) sources throughout the country, often travelling long distances to obtain suitable material. Pounamu (greenstone) was brought from the west coast, while stone such as silcrete was quarried at a number of inland sites, including Oturehua [site **H41/5**] and Nenthorn [**I43/23**].

When Europeans first arrived they were hunting seals and whales for their fur and oil, but they would also have needed timber for shelter and other food. As discussed in **Theme 8: Dunedin Economy**, the first farms in the area were established by whalers, and archaeological evidence of these sites survives. When the first settlers arrived in 1848, their first need was for timber to build shelter. Sawyers Bay was so named as it was the location of timber pit sawing activities, as discussed in **Theme 11: Industrial Development**.

Natural resources were of great interest to the settlers, both in terms of the land's ability to carry stock and support farming, and in the materials that could be quarried, extracted, felled or mined, such as building stone, lime, sand, gravel, gold, coal and timber. Surveying of Dunedin's mineral resources began in 1843 with Frederick Tackett's exploration of the Otago area for the New Zealand Company.

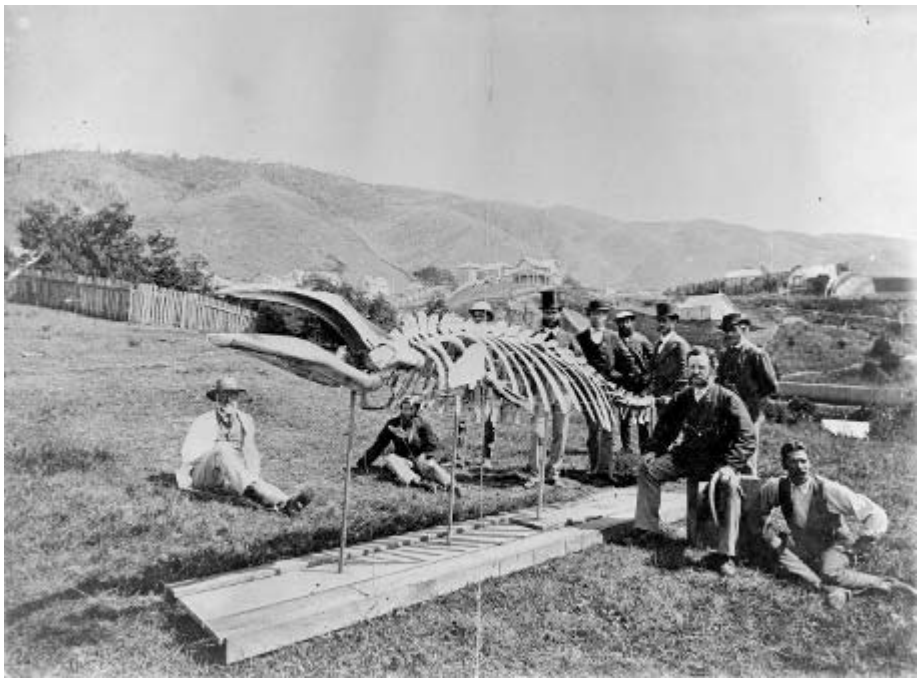

Figure 80: Group alongside a whale skeleton.

From left to right: **Walter B. D. Mantell, Dr B. D. Maxwell, Dr S. Key, Arthur Thomas Bothamley, R. P. Core, T. W. Kirk, Herbert S. Cox, J. Buchanan** (probably John Buchanan, 1819-1898)**, James Hector** and **Burton** (taxidermist).

Photographer unidentified

Geological survey of Otago: The identification of mineral resources around Dunedin was seen as a means of unlocking the future wealth of the settlement. A newspaper article in 1858 named the search for lime, coal and gold a priority of the Provincial Council and expressed wonderment that these resources, already recognised as extensive and valuable, were not being worked. [THE OTAGO WITNESS: *Otago Witness*, Issue 326, 27 February 1858, Page 5]. The most significant geological survey of Otago was carried out by James Hector, beginning in 1862. Hector was appointed to the task by the Otago Provincial Council and he travelled extensively through the lower South Island recording the location of useful minerals. His staff collected fossils, conducted chemical analysis, and recorded botanical and zoological specimens (Fig. 80). Hector established the Geological Survey of New Zealand in 1865 and relocated to Wellington.

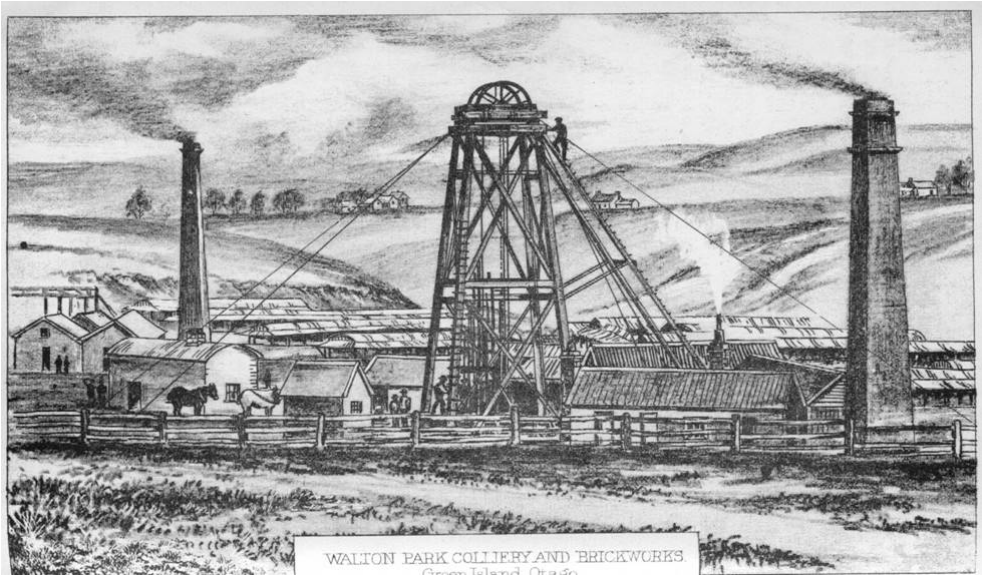

Figure 81: Walton Park Colliery, 1887.

7.2 EXTRACTIVE INDUSTRIES

Coal mining: Surveyor, Frederick Tuckett, discovered coal north of the Clutha when exploring the Otago coastline for the New Zealand Company in 1844 and an open seam of coal was worked at Saddle Hill in 1849, part of a system estimated by James Hector to contain over 100 million tons. Although no coal-mines are still in operation around Dunedin, historically there have been several sizeable operations. In 1849 the New Zealand Company built a dray road from Dunedin to coal mines on Saddle Hill (Hamel 2001: 108), and in the same coalfield the Walton Park Colliery (Fig. 81) was operated from 1861 until the mid-1950s by a number of different owners (Petchey 2001). During the construction of the Fairfield Bypass section of the Southern Motorway in 2001, the old workings of the Walton Park Colliery were encountered; an example of both the ancient geological history of Dunedin and the more recent industrial history (Petchey 2001). It was possible to look down the mine workings, with pit props still in place. Little evidence of this mine now remains on the surface, although a 'kinghole' (a surface slump caused by an underground collapse) can still be seen on the west side of the motorway, a short distance north of the Old Brighton Road over-bridge.

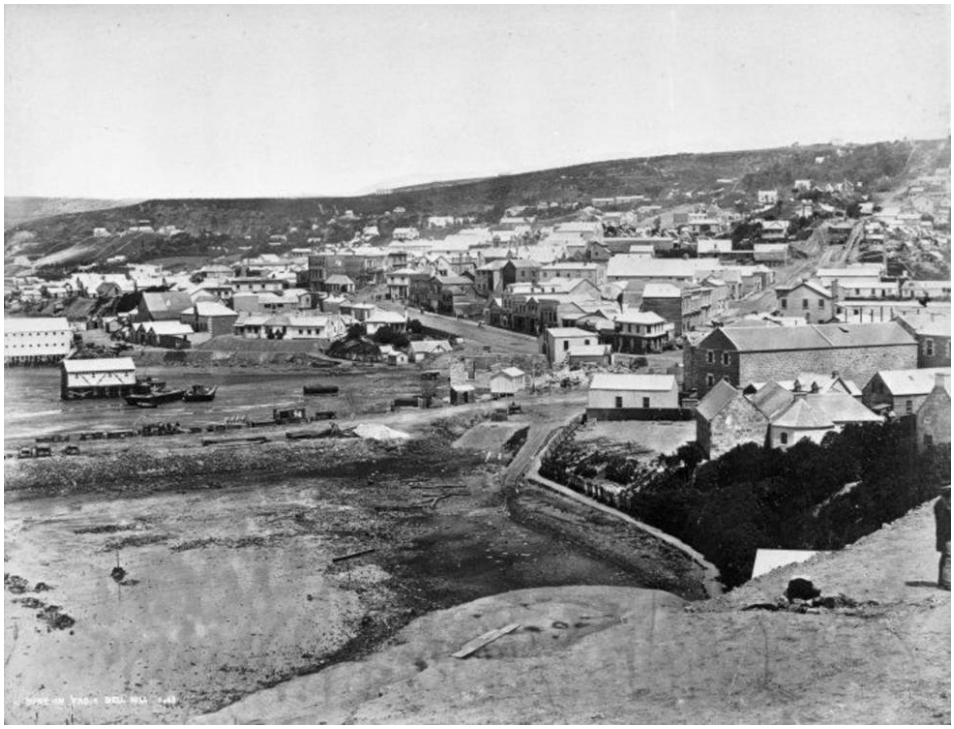

Figure 82: Dunedin city from Bell Hill, 1863.
This photograph [by William Meluish] shows the early stone church and school in the foreground as well as reclamation work in the bay.

Quarrying began in 1848 with the selection of a quarry site on the southern tip of the Peninsula at Andersons Bay for the New Zealand Company. This volcanic stone was used in the construction of the Presbyterian Church (Fig.82) and parts of Reverend Thomas Burns' house at Grants Braes [**B008**]. However, it had poor weathering properties and some buildings deteriorated quickly. A quarry was also established at Caversham in 1851 where lime stone was cut for William Valpy's house at St Clair. Lime was also uncovered at Portobello, where the burning of lime for building construction began on the beach in the late 1840s. The lime kilns at Sandymount on the Otago Peninsula [**B423**], accessible to the public, are an example of later exploitation of this important resource (Thornton 1982: 122-123).

Extensive quarrying took place at Port Chalmers, where stone was cut for construction as well as ballast. Port Chalmers breccia was quarried for kerbing, stone walls and foundations. It was used for the Masonic Hall in Wickliffe Terrace [**B667**], the earliest surviving stone building in Port Chalmers, as well as many large buildings in the city. The grey/green Port Chalmers breccia is evident in the basement and

ground floors of the William Mason designed Chief Post Office [**B482**] where it is used to form a contrast with the upper levels of Oamaru stone.

Gold mining: Although gold extraction is usually associated with the Central Otago goldfields, there were a number of gold workings within what is now the Dunedin City boundary. On the Otago Peninsula the Harbour Cone Mine operated for a brief period in the 1870s. (Knight 1964). At Fairfield four quartz reefs were worked between 1869 and about 1890 (Macdonald1972: 42), although these sites have not yet been the subject of an archaeological survey. The countryside around Hyde is more reminiscent of Central Otago than the alluvial plains of the Taieri, and the gold workings are similarly typical of the interior. An interesting field is Fullarton's Deep Sinkings [site **I42/117**] in the hills on the east side of Hyde. This small field was first worked in 1864, using a series of shallow shafts to reach the gold-bearing gravels. The field contains several small miners' hut sites, and a rare piece of miners' graffiti that reads "Oct 1864" confirming the historical accounts of the age of the field (Petchey 2003).

7.3 RECLAMATION

While the deep water at Port Chalmers and the sheltered upper reaches of the Otago Harbour provided an attractive location for the Otago settlement, the lack of flat land at Port Chalmers and lack of deep water at Dunedin required major changes to facilitate a practical port operation and useful settlement location. The decision to separate port and town, as at Christchurch, was pragmatic under the economic circumstances, but proved problematic in the long term. The solution, as in many New Zealand cities, was to physically adapt the harbour to the needs of the settlement. Little was achieved in the first 20 years but the expansion of the Otago settlement post-1862 compelled the authorities to act. Extensive foreshore reclamation development ensued to provide a city port and essential building space for commercial lease.

A plan presented to the Provincial Council in 1859 by John Turnbull Thomson proposed an ambitious reclamation of a little over 402 acres. [IMPROVEMENT OF OTAGO HARBOUR: *Otago Witness*, Issue 1171, 9 May 1874, Page 5] Work had already begun in the early 1860s which would substantially reshape the topography of Dunedin. Previous efforts had been directed to street forming and levelling but the economic expansion of the gold rush produced demand for the creation of dry level land suitable for warehouses and commercial buildings. Funds were made available for this work in 1861, with the *Otago Witness* wondering how it could be achieved with the limited resources and manpower available to the town. [RECLAMATION OF THE HARBOUR: *Otago Witness*, Issue 512, 21 September 1861, Page 5] This would, of course, soon change. Development was speeded by the decision to lower Bell Hill to create a building platform for the First Church [**B412**]. In 1862 the *Otago Witness* reported: "A busy scene has been presented for the last few days on the road by the beach to the Court House, hundreds of men being crowded like ants on the side and base of Bell Hill, all engaged in tumbling down the earth and stones of which the hill is composed, into the Bay**."** [*Otago Witness*, Issue 568, 18 October 1862, Page 4]

Figure 83: Two parts of a 10 part panorama of Dunedin in 1865 showing the new shape of the harbour edge.

This work was undertaken between 1862 and 1864 and was accompanied by the first large scale reclamation of the harbour, finally filling over 10 acres around the Toitu stream, Government Reserve and the bay where the town had originated. The 1862 scheme included provision for 100 acres of new land, of which 57 acres would be available for commercial lease. Victims of progress included the

Mechanics' Institute (1853) and the Maori Hostelry. Rattray Street was extended on a stone base into the harbour and terminated in a new wharf. (Fig. 83)

Reclamation of the bay between High and Rattray Streets provided a site for the new Custom House that fronted a triangular area that became known as Customhouse Square. Bond Street and later Crawford Street were constructed parallel to Princes Street. The reclamation designed by Provincial Engineer, Charles Swyer, was to eventually enclose an area of 55 ha (136 acres). Concern was raised by harbourmaster, William Thomson, that the silting of the harbour was being exacerbated by the encroachment of the reclamation, and in 1868 a stone training wall was extended from the Rattray Street Pier to aid tidal scour. [THE 'TRAINING WALL': *Otago Witness*, Issue 857, 2 May 1868, Page 9]

A private proposal was put to the Otago Provincial Council in 1873 to continue the reclamation towards Andersons Bay, extending the area by a further 250 acres. This was seen as the responsibility of the Government, although the potential return of £20,000 was attractive as it might have funded a Harbour Trust and removed the need for the complex fee structure levied on users of the harbour. Later in 1873, Provincial Engineer, D. L. Simpson estimated a cost of £38,000 for a 100-acre reclamation extending from Andersons Bay Road along the lines of the Clutha railway and the Peninsula Road. [RECLAMATION OF THE UPPER HARBOUR: *Otago Witness*, Issue 1138, 20 September 1873, Page 8]. Progress was reported in 1873, when harbour silt was being used to fill the harbour between the newly constructed Rattray Street Wharf and the pier at Jetty Street. The final report of the Provincial Council subcommittee looking into improvements to the upper harbour was completed in 1874 and recommended that no further major reclamation take place due to the damaging effects on the harbour. It also recommended that drainage, reclamation and harbour works be looked at as one planned operation. [FINAL REPORT OF THE SUB-COMMITTEE FOR IMPROVING DUNEDIN HARBOUR: *Otago Witness*, Issue 1169, 25 April 1874, Page 10]

Reclamation work proceeded steadily throughout the rest of the century. The Milburn Lime and Cement works were situated at the outer edge of the new foreshore in 1888 and were accessed across a causeway to Lake Logan, as the closed off Pelichet Bay became known. New industrial land on the seaward side of the railway line was opened up in the early 1900s and Andersons Bay was finally claimed from the harbour in the 1970s.

Figure 84: This watercolour [artist unknown] **of White Island off the Dunedin coast, shows William Valpy's first house and outbuildings at right and cabbage trees and flax swamp further left.**

7.4 DRAINAGE

While Dunedin soils were clay based, early agricultural reports noted that they were more free draining than in the 'old country' and therefore required less labour. Despite this optimistic outlook, the varied nature of the land around early Dunedin meant that its future use for agriculture required much investment and labour to drain low lying and boggy areas. This was equally so on the Taieri Plain as it was the site of the future city. The area to the south of the town from the top of the harbour to where William Valpy established his farm *The Forbury* 1849 in present day St Clair, was largely flax swamp (Fig. 84). Valpy's farm was set partly on the rise under the St Clair ridge but also occupied a low

lying flat behind the ocean sand dunes. Much drainage work was carried out later in the century by Chinese market gardeners when the area was developed for vegetable growing. Similarly, at the north end of the town site on the Water of Leith flood plain, the harbour edge was broken by Pelichet Bay and a small unnamed lagoon on the lower quadrant of Moray Place. The land between these points was also low and boggy, divided roughly north/south by a spur that descended from the Town Belt, behind which ran the Water of Leith. This extended to a point north of present day Albany Street, where the stream turned sharply towards the harbour. While the Town Board attended to roads, the draining of private land was the property owner's responsibility and substantial capital or labour input was required to make wet land usable.

In an article [FENCING AND DRAINING: *Otago Witness*, Issue 318, 2 January 1858, Page 7], advice was given not to attempt to sew into land that was improperly drained but to excavate deep channels and link smaller transverse channels to these, completing the process with plough furrows. The three priorities for farmers were given as drainage, rotation and seed, in that order. The Scots referred to the open style drain as a 'rumlin' due to the sound of water over the rocks used to line the base of the channel. By the 1870s, drainage technology had shifted towards clay pipe tiles or field tiles. These had been an expensive, imported item and were consequently a product of many early Dunedin potteries.

The Taieri Plain: The benefit of developing agricultural land on the Taieri was evident to all but the most parochial of the first settlers. Farms were first established towards the north end of the valley where land was relatively free draining, although still subject to inundation in flood conditions (Fig. 85). Over the later part of the 19th century flood control measures using earth embankments and mechanical pumps were put in place by the various drainage boards that had authority over particular areas on the plain, but the south end of the valley remained a difficult prospect for farmers. A united drainage board for the whole Taieri Plain was suggested in 1903 and it set its sights on around 2000

Figure 85: [John Buchanan 1819-1898]**: Serpentine Valley on the Taieri. 1856.**

acres near the Waipori Lake. [DRAINAGE OF THE TAIERI PLAIN:*Otago Witness,* Issue 2559, 1 April 1903, Page 11] Under the Taieri Land Drainage Act 1907, the management of drainage, flooding and drainage of the plain for agriculture was given national significance. The 1907 Act resulted from a Taieri River Commission which recommended the creation of a single board. The new Taieri Drainage Board was able to grant leases, set the rent for users and carry out flood control works.

In 1909 Mr Elliot, the Taieri Drainage Board's newly-appointed engineer, began by taking levels in the southern part of the valley and found that the West Taieri district was below sea level at high tide and would need to be pumped.

Three lakes on the Taieri; Tatawai, Potaka and Marama Te Taha were completely drained and disappeared. Other smaller waterways were filled in and a network of ditches was dug to drain the soils for grazing and cropping. It is estimated that 70 per cent of the original wetland has been drained. This drainage scheme was a blow to Kai Tahu who used the lakes of the Taieri for mahika kai. Lake Tatawai, was taken under the Taieri River Improvement Act of 1920 and drained without consultation or recompense.

The Act allowed for claims for compensation if lodged within six months of its passage but the notice was missed and no claim was lodged. Most

of the Kai Tahu owners lived at the Henley kaika of Maitapapa and the loss of this important resource was a major setback. The grievance went to the Native Land Court, but to no avail.

Figure 86: Portrait of Te Kuhene, Kai Tahu chief of Taieri Mouth.
circa **1870s** [unknown photographer]

7.5 RIVERS AND COASTAL FRINGE

The use of land around rivers and coastal fringes has been a feature of habitation in and around Dunedin since first human occupation. As earlier outlined in **Theme 2: The peopling of Dunedin** (page24), prehistoric archaeological sites have been the subject of many surveys and excavations. Two significant pa sites are within Dunedin City; Huriawa [**I43/1**] at Karitane, and Mapoutahi [**I44/23**] between Purakaunui and Waitati. Both were established on narrow headlands that project out into the sea, and both are easily accessible to the public.

In inland areas prehistoric occupation was more sparse and seasonal, but regular trips were made in the warmer months to gather resources. Moa hunter sites have been recorded at Rocklands and Deep Stream near Middlemarch, while further inland, large sites have been recorded at Millers Flat, Coal creek and Hawksburn. Even after the moa became extinct expeditions continued. Herris Beattie recorded that annual trips

were made from Otago Peninsula and Henley to the Maniototo Plains and Central Otago until about the 1870s (Beattie 1994: 175). A sealing camp established on Green Island, 1809/10, was probably the first European settlement in Otago, and sites on the north side of the Green Island estuary may have been the first place in Otago occupied by both Maori and Europeans together. (Refer **Theme 2: The Peopling of Dunedin**, page 27.)

Whaling stations also abounded around the Otago coast and have been the subject of archaeological survey (Refer **Theme 2: The Peopling of Dunedin**, page 29.)

The coastal settlements around Dunedin each have a history of separate development to the main urban area and deserve further detailed study.

Figure 87: Postcard view of St Clair, 1905. This shows the ragged line of the sand dunes prior to efforts to stabilise the shoreline.

Erosion: The exposure of archaeological sites around the coast is often itself a result of erosion as wave action and wind shift loose material away. This was perceived as a hazard early in the history of Dunedin when it was realised that the sand dunes at Ocean Beach closing off South Dunedin from the Pacific Ocean had breached in the past and could do so again. This occurred in 1883 when the dunes were swept away close to the Forbury Racecourse. A privately built stone wall at St Clair failed in 1884 and further efforts to construct a stone

seawall and esplanade failed to hold back the waves (Fig. 87). The Ocean Beach Domain Board had been set up in 1884 to oversee Dunedin's coastal barrier but had been inactive due to lack of funds. The dunes themselves belonged to the Crown, but the boroughs of St Kilda and South Dunedin were at major risk of flooding. The sea flooded areas of St Clair again in 1891, breaking through the dunes and carrying away the recently completed seawall. Groynes were placed along the dunes and plantings of lupins and marram grass were introduced to stabilise the sand. The amalgamation of Caversham Borough with the Dunedin City Council placed the issue in front of the city at large. A substantial seawall was built and opened in 1913 along with a raised esplanade and pavilion. Efforts to secure the St Clair Esplanade against the natural forces that cause erosion have been ongoing over the past century.

7.6 FORESTRY

'Government Bush' all along the eastern Otago coastline was surveyed out from private sale under the Wasteland Acts of 1850s and 1860s and the licenses to control their use were issued for individuals to take the trees for fencing or firewood or to operate as "pairs of sawyers." [LIST OF APPLICANTS WHO HAVE REEIVED TIMBER LICENSES FOR THE YEAR 1862: *Otago Provincial Gazette*, 1862. Pages.75-78] By the 1870s this naturally growing timber remnant began to run out and a belief and fear arose that climatic change – less rainfall – was being caused by the loss of these places. Forest Tree Encouragement Acts were passed at local and national level as one political way of increasing man-made tree densities in country areas to meet an increasing demand for fencing and firewood. Certain timbers, such as jarrah for fencing, were imported from Australia. Native forests continued to decline until they were saved by their scenic and biological values. Some bush areas were incorporated into private gardens that have now become public parks.

Early exploitation of the timber resource around Dunedin was extractive and little replanting was undertaken. The Acclimatisation Society was

considering forestry in Otago in 1870 as it looked at progress made in India. A lengthy article in the *Otago Witness* later that year put the case for forestry development in Otago using exotic trees. The leading contender was Scotch Fir (*Pinus Sylvestris*) and it was suggested that the minimum economic planting area was around 6,400 acres. [PASTORAL AND AGRICULTURAL: *Otago Witness*, Issue 1194, 17 October 1874, Page 6]. Plantings of Scotch Fir in wet areas proved susceptible to blight and the cost of seedling trees much greater than in Scotland. The price of two year old plants in Dunedin was reported in 1880 at 7/6d per 100 while in Scotland the cost was 15/- per 1000. [PLANTING: *Otago Witness*, Issue 1491, 12 June 1880, Page 7].

Amenity: 'Forest Tree' planting schemes moved from rural areas to the cities as way of developing streetscape and parks with the formation of amenity, beautifying and scenery conservation societies throughout New Zealand. Exotic fast growing conifers and some deciduous trees were now being planted into public landscapes to smother weeds, such as gorse, that were seen to be a fire hazard to the planted trees or to the small patches of valued native regeneration. The long-held custom of animal grazing as a means of controlling weedy vegetation lost favour. Specialist interest groups of local scientists argued for allowing native vegetation to regenerate. Young eucalyptus and conifers were valued aesthetically for their dark conical forms but they tended to quickly outgrow the preferred native vegetation or they died from the severe cold Thus the local beech or 'birch' with its light green foliage appears to have become a favoured local colour as did the lime green native *Olearia* used for hedging.

City Council estates: With the growth of the city population, water catchments for domestic water reticulation and select recreational use were purchased by local Councils. Vegetation management was again an issue with fire and weed control high on the agenda. It was seen by local authorities that tree planting could produce timber for use as fence posts and firewood. The economic benefits were limited and the search began to identify a species of tree that could grow strongly in local conditions and be harvested. The discovery of rapidly growing *pinus radiata* was the answer. Managed forestry was defined by single species of large blocks of highly managed (pruning, fertiliser, fungicides)

forests replacing a mixed canopy in short rotation. Technological advances to make wood pulp from trees then transformed the 'afforestation' phase. The protected native and production exotic forests were now separated by land use.

The Dunedin City Council became involved in the forestry industry and the first plantings took place in 1906, when 15,540 pine, spruce and ash seedlings were planted in the Ross Creek Reservoir and Leith Valley areas on land managed by the Water Department. This ambitious programme was overseen by David Tannock, Scottish born head of the Dunedin City Council Reserves Department, Tannock laid out the economic and social benefits of the scheme to the council and by the time of his retirement in 1940, Dunedin's publicly owned forests covered 13,000 acres. Tannock's knowledge of silviculture was in demand internationally and he advised governments and companies on the management of pine plantations throughout New Zealand and the world.

Tannock arranged for the importation of Douglas Fir seedlings from North America and forests were planted at Whare Flat where a nursery and workers' camp were established in 1911. Further plantings were established at Flagstaff, Bethune's Gully and Sullivan's Dam. The forestry labour force was boosted by the return of servicemen from the First World War and planting began at Waipori in 1924 in the catchment area owned by the Dunedin Electricity Light and Power Company. Plantings reached 1,000 acres (400 hectares) in 1931 with over 628,000 trees growing in the Council-owned forests. Cropping began at Flagstaff in 1934 with the felled trees selling for five shillings per 100 feet. Exports to Japan began in 1970 and the Waipori forest area was doubled in size. The Dunedin City Council rationalised the structure of the forest business in 1980, forming the DCC Forestry Department and transferring management from the Parks and Recreation Department. [City Forests Ltd. *100 Years in the Making: Dunedin City Celebrates 100 Years of Forestry Investment*]