

16 West Coast's Ecological Footprint

16.1 Profile of the West Coast region

The resident West Coast population at the 2001 Census was estimated to be 30,303 people. In the period between censuses the region experienced the greatest percentage decline (6.8 percent) in population of any region in the country, equating to 2211 people. The West Coast has New Zealand's smallest population, making up less than 1 percent of the national population. While more than 85 percent of the nation's population lives in urban areas, only an estimated 56.9 percent of West Coasters are urban dwellers. The most significant urban area is Greymouth with a usually resident population of 9525 people, 31.4 percent of the region's population in 2001. The West Coast has a population density of only 1.41 people per square kilometre, compared with the national average of 13.97 per square kilometre in 1998. This makes it the most sparsely populated region in New Zealand.

The West Coast has an estimated land area of 2,333,600 ha, 8.5 percent of New Zealand's land area. The region is elongated extending more than 600 kilometres from Kahurangi in the north to Awarua Point in the south. The Southern Alps separate the West Coast from Canterbury while the Tasman Sea marks the western boundary. The West Coast region is the fifth largest in New Zealand. Te Waipounamu (one of the country's two World Heritage sites) traverses the region and it includes four national parks: namely Fiordland, Mt Aspiring, Mt Cook and Westland. The Southern Alps act as a barrier to the predominantly westerly weather, which in turn, ensures that the region experiences the highest annual rainfall of any region nationally. Poor climatic conditions coupled with the region's inaccessible mountainous nature result in the region experiencing regular flooding, landslides and earthquakes. The region's soils are generally infertile as a result of constant water leaching. These factors make most of the region's land unsuitable for farming.

The West Coast's GDP in 1997–98 was estimated to be \$0.8 billion or 0.8 percent of the national GDP. Mining, forestry, fishing and dairy farming are significant industries. In recent years tourism has also established a strong foothold in the economy. The West Coast has an estimated 260 million tonnes of recoverable coal reserves with between 1 and 1.5 million tonnes annually extracted and exported overseas for steel production. Gold mining is still a significant industry, although not as large as in the past. The contribution made by mining to the local economy is reflected in the high location quotients for the mining and quarrying industry (LQ 21.95) and in the processing of non-metallic minerals (LQ 3.08).

Until recently, indigenous forests formed the basis of a significant wood felling and logging industry (LQ 4.41). This included harvesting of beech and podocarps such as rimu. Planted exotic forest is now becoming the mainstay of the industry. As at 1 April 1998 exotic forest plantations accounted for 32,607 ha. Other industries with a comparative advantage relative to the nation include dairy farming (LQ 2.88), dairy processing (LQ 2.25) and fishing and hunting (LQ 3.93). The transportation of mining and forestry products has resulted in a high location quotient for the water transport industry (LQ 2.70). The growing emphasis on tourism is reflected in the accommodation, restaurant and cafés sector location quotient of 1.95.

16.2 Overall ecological footprint and comparison with other regions

The West Coast has an ecological footprint of 121,890 ha. This represents 1.1 percent of New Zealand’s total ecological footprint and is the third lowest of any region. It is slightly higher than the Tasman region (82,180 ha) but lower than Marlborough (163,810 ha). The West Coast region’s footprint is only 7.0 percent of Canterbury’s.

The West Coast region’s ecological footprint per capita is 3.70 ha. This is similar to the per capita footprints of Manawatu–Wanganui region (3.80 ha) and Canterbury (3.57 ha) but is 20.1 percent higher than the New Zealand average of 3.08 ha. This figure is higher relative to the nation primarily because of the low productivity of the land on the West Coast. Susceptibility to flooding, landslips and the like, irrespective of land fertility, has meant that farming is often conducted on marginal land that produces variable yields over time. It is estimated that lower than average productivity exists across the entire agriculture industry, including sheep, beef and mixed livestock, dairying, horticulture and fruit growing.

The useful land area of the West Coast is estimated to be 266,250 ha, meaning that West Coast has an ecological surplus of 144,360 ha. In ecological footprint terms this means that the West Coast is largely self-sufficient.

16.3 Ecological footprint disaggregated by land type

The agricultural land component of the West Coast region’s ecological footprint consists of 78,440 ha (refer to Table 16.1). In this way, agricultural land comprises 64.4 percent of the region’s footprint. Like most rural regions in New Zealand, this land is predominantly located within the region. Some 6100 ha (5.0 percent of the region’s footprint), however, is embodied in goods and services imported interregionally with a significant proportion originating from Southland. This includes land embodied in purchases of sheep and beef related food products. West Coast industries are unable to met local demand for these products and hence the importation from Southland.

Table 16.1 West Coast’s ecological footprint by land type, 1997–98

Land type	Within region land (ha)	Land from other New Zealand regions (ha)	Land from other nations (ha)	Total land (ha)	Total land (ha per capita)	Total land (% of total)
Agricultural land	59,800	6,100	12,540	78,440	2.38	64.4
Forest land	3,030	160	980	4,170	0.13	3.4
Degraded land	22,710	110	700	23,520	0.71	19.3
Energy land	11,630	440	3,640	15,710	0.48	12.9
Total	97,170	6,810	17,860	121,840	3.70	100.0

The forest land component of the ecological footprint consists of 4170 ha. This represents only 3.4 percent of the West Coast's ecological footprint and in relative terms is among the lowest of any region. By comparison, the average West Coast resident appropriates 0.13 ha annually while the average New Zealand appropriates nearly 1.7 times this figure (0.2 ha per person). One possible reason for this difference is a declining population, resulting in a depressed housing market which in turn leads to fewer new houses being built. Overall, an estimated 3030 ha of forest land is embodied in local goods and services purchased by West Coast residents annually. This component of the footprint does not include the hypothetical land area occupied by trees planted to sequester CO₂ emissions.

The degraded land component makes up 19.3 percent (23,520 ha) of the West Coast's ecological footprint. This figure is substantially higher than the comparable figure nationally (8.2 percent). Two key explanations are:

- (1) significantly larger residential section sizes
- (2) similarly, significantly larger manufacturing/commercial section sizes.

This component is almost entirely (96.6 percent) made up of within-region land.

The energy land component of the region's footprint is estimated to be 15,710 ha. Whilst the relative share of the energy footprint (12.9 percent) differs greatly from its national equivalent (16.6 percent), in per capita terms the two are similar. Most of this land is appropriated from within the region (11,630 ha) although an additional 3640 ha is embodied in goods and services purchased from overseas.

16.4 Ecological footprint disaggregated by goods and services purchased

16.4.1 Purchase of West Coast produced goods and services (P₁+P₂ ... P_n)

The purchase of manufacturing sector products accounted for 42,290 ha of embodied land in the West Coast's ecological footprint (refer to Table 16.2). Over 80 percent of this figure, 34,840 ha, comes from within the region. It is also predominantly made up of agricultural land. A further 5930 ha is embodied in manufactured products purchased from other regions in particular Southland.

Table 16.2 West Coast's ecological footprint by economic products, 1997–98

Economic products consumed	Within region land (ha)	Land from other New Zealand regions (ha)	Land from other nations (ha)	Total land (ha)	Total land (ha per capita)	Total land (% of total)
Agriculture	10,380	100	160	10,630	0.32	8.7
Forestry	270	0	0	270	0.01	0.2
Fishing and hunting	0	0	0	0	0.00	0.0
Mining and quarrying	120	0	0	120	0.00	0.1
Manufacturing	34,840	5,930	1,520	42,290	1.29	34.7
Utilities and construction	7,070	50	720	7,840	0.24	6.4
Services	38,570	180	4,880	43,630	1.33	35.8
Domestic final demand	5,930	580	10,580	17,090	0.52	14.0
Total	97,170	6,850	17,870	121,890	3.70	100.0

Land embodied in the purchase of service sector products required to support West Coast residents constitutes 35.8 percent of the region's footprint. In this way, land embodied in service sector purchases (43,630 ha) is slightly greater than land embodied in manufactured goods (42,290 ha). Backward linkages from the service sector to the farming sector on the West Coast economy partially explain why this figure is so high. The actual physical space occupied by the region's service sector also contributes to this finding. Unlike the manufacturing sector, a significant proportion of land embodied in service sector products consumed by West Coast residents comes from other nations (4880 ha).

Of the land embodied in purchases from other sectors by West Coast residents, agriculture products contribute 10,630 ha while utility and construction purchases make up 7840 ha of the region's ecological footprint. Once again, these figures are made up of almost entirely within-region land.

16.4.2 Purchase of goods and services produced outside the West Coast (D₁+D₄)

West Coast residents also purchase products that are made outside of the region. The vast majority of land embodied in these purchases (10,580 ha) comes from abroad. This includes land embodied in goods purchased from overseas by retailers that are on-sold to West Coast households within an additional margin. Thus, land embodied in purchases of motor vehicles, computers, many household appliances and furniture is included in this figure.

16.5 Ecological Balance of Trade and ecological interdependencies

The land embodied in imports into the West Coast economy is 36,030 ha, while exports into the region embody 235,910 ha of land (refer to Table 16.3). This means that the West Coast is a net provider of land to other regions and nations, having a positive Ecological Balance of Trade of 199,880 ha.

Table 16.3 West Coast’s Ecological Balance of Trade by economic sector, 1997–98

Economic sector	Imports purchased by the economic sector (embodied ha)	Exports sold by the economic sector (embodied ha)	Balance of Trade (embodied ha)
Interregional trade			
Agriculture	770	56,140	55,370
Forestry	130	6,500	6,370
Fishing and hunting	0	630	630
Mining and quarrying	10	380	370
Manufacturing	9,030	3,800	-5,230
Utilities and construction	60	1,120	1,060
Services	230	1,080	850
Domestic final demand	580	0	-580
Interregional Balance of Trade	10,810	69,650	58,840
International trade			
Agriculture	1,230	16,450	15,220
Forestry	410	16,860	16,450
Fishing and hunting	470	970	500
Mining and quarrying	220	7,180	6,960
Manufacturing	4,750	112,710	107,960
Utilities and construction	790	40	-750
Services	6,770	12,050	5,280
Domestic final demand	10,580	0	-10,580
International Balance of Trade	25,220	166,260	141,040
Total Balance of Trade	36,030	235,910	199,880

16.5.1 Exports and imports by economic sectors

Sales of manufactured products from the West Coast embody an estimated 116,510 ha of land. This represents approximately half of the region’s embodied land exports. Like many regions in New Zealand this land consists of Agricultural and forest land destined for other countries. Small quantities of land associated with mining are also included. On an interregional basis, however, the region is a significant net importer of land embodied in manufactured products (5230 ha). This occurs because either:

- (1) base manufacturers are not present (ie. goods are imported non-competitively) or
- (2) local supply is unable to met local demand for many manufactured products.

The region’s export-driven focus is also apparent in the quantity of land embodied in forestry products. On an annual basis some 23,360 ha of land embodied in forestry products leaves the region with slightly more than two-thirds heading offshore. Similarly, the region’s export focus on mining is also highlighted. It is estimated that 7180 ha of embodied land is exported annually in mining sector products.

Of the remaining sectors in the West Coast economy the following have fairly small and close to neutral Ecological Balance of Trade results: fishing and hunting (1600 ha) and utilities and construction (310 ha). The exception is the region’s service sector, which has an Ecological Balance of Trade surplus of 6130 ha – this finding is explained by backward linkages to forestry and mining.

16.5.2 Exports and imports by type of land

The West Coast is a net producer of agricultural land (refer to Table 16.4). Agricultural land embodied in international exports (128,520 ha) outweighs that embodied in international imports (17,550 ha) by 7.3 times. This land is sourced from all farming types but more so from dairying and less so from horticulture crops and fruit.

Table 16.4 West Coast’s Ecological Balance of Trade by land type, 1997–98

Economic sector	Land embodied in imports (ha)	Land embodied in exports (ha)	Balance of Trade (ha)
Interregional trade			
Agricultural land	9,790	58,330	48,540
Forest land	320	6,530	6,210
Degraded land	160	2,310	2,150
Energy land	540	2,480	1,940
Interregional Balance of Trade	10,810	69,650	58,840
International trade			
Agricultural land	17,550	128,520	110,970
Forest land	1,620	18,360	16,740
Degraded land	1,580	9,000	7,420
Energy land	4,480	10,380	5,900
International Balance of Trade	25,230	166,260	141,030
Total Balance of Trade	36,040	235,910	199,870

The West Coast’s comparative advantage in forestry products is clearly highlighted. In Balance of Trade terms, forest land embodied in products sold (24,890 ha) by the West Coast economy outweigh equivalent purchases from both other regions (320 ha) and nations (1620 ha).

The trade flows of both degraded land and energy land for the West Coast economy show a positive net Balance of Trade. Specifically, in net terms degraded and energy land embodied in the exports out of the region respectively accounts for 9570 ha and 7840 ha of land. The region’s net outflow of embodied degraded land, particularly to international locations, is linked with the region’s large precious metal and coal mining operations.

16.5.3 Overall picture

Figure 16.1 provides a summary of the overall flows of embodied land of the West Coast economy. This diagram indicates that the West Coast is self-sufficient in embodied land with relatively few imports required to support local households. In addition, the diagram indicates that the West Coast’s economy is export orientated. Embodied land flows out of the region equates to 235,910 ha, 6.5 times greater than flows into the region. In this way, the West Coast is has positive Balance of Trade of 199,880 ha.

Figure 16.1 Flows of embodied land through the West Coast economy

