

12 Wellington's Ecological Footprint

12.1 Profile of the region

Wellington's population was 428,699 in 1997/98, the third most populated region behind Auckland and Canterbury. In terms of population the region is dominated by the Wellington metropolitan area (population about 335,000). The 1996 Census showed that Wellington had the second highest percentage of urban population of any region in New Zealand after Nelson. This is despite farming occupying about two-thirds of the land area in the Wellington region mainly in the Wairarapa. Over the last decade the total population in the Wellington region has remained reasonably static.

The land area of the Wellington region is 812,503 ha, the fourth smallest region in the country. It includes the Wellington metropolitan area, the Kapiti Coast northwards to south of Levin and most of the Wairarapa. Few energy or mineral resources exist in the region, although the Wairarapa provides Wellington with a considerable land resource suitable for pastoral farming, horticulture and forestry. The region is also relatively rich in biodiversity with three forest parks, Kapiti Island and other areas of ecological significance.

The Wellington regional economy is heavily dominated by the service sector. In a sense, the Wellington economy operates in a reverse way to many other economies – that is, it is the service sector that drives the rest of the regional economy, rather than the primary or manufacturing sector which is usually the case. Accordingly, many of the economic activities in the Wellington region exist and thrive only because they supply the service sector with intermediate goods and services. For example, specialist niches have been developed in the manufacturing sector especially to supply commercial furniture, printing supplies and computer equipment to the service sector.

Based on this picture of service sector dominance, there are relatively high location quotients for finance (2.15), services to finance and insurance (2.49), business services (1.55), health and community services (1.23), cultural and recreation services (1.26) and central government (2.02). Most of the manufacturing sectors have relatively low location quotients, reflecting a lower than average presence in the Wellington economy. The two exceptions are printing and publishing (1.12) which is higher due to the derived service sector demand for printing and publishing products; and rubber and plastic and other chemicals (1.37) which is primarily due to head office activities for these industries in the Wellington region. At below the 48 sector level, location quotient analysis reveals some specialist manufacturing activities which Wellington has a predominant role in (eg. commercial furniture, computer equipment). However, the effect of the removal of tariff barriers and the opening of the economy has led to the decline of several traditional manufacturing industries such as car assembling and textiles.

Wellington City is an important transportation hub. It is a transit point between the North and South Islands for rail, road and water traffic. It has New Zealand's busiest domestic airport. Wellington also has the most well-developed metropolitan rail network in New Zealand, providing Wellington with an efficient public transport system.

12.2 Overall ecological footprint and comparison with other regions

The Wellington ecological footprint is the fourth largest in the country at 1,029,050 ha. Only Auckland, Canterbury and Waikato have larger footprints. It makes up 9.57 percent of New Zealand’s ecological footprint.

Wellington’s per capita footprint is 2.40 ha/capita, below the New Zealand average of 3.08 ha/capita. It is ranked the fifth to lowest per capita footprint of any region in the country, behind Nelson, Auckland, Tasman and Taranaki. The main factor that seems to contribute to this relatively low per capita footprint is the efficiency achieved through the concentration of the urban population in the Wellington region. The Wellington region is very urban (even with the Wairarapa sub-region considered), and has relatively high population density (52.76 people/km²) which is the third highest in the country. Urban populations can achieve relatively good resource use efficiencies and this seems a primary factor in explaining Wellington’s lower per capita footprint. It’s well known, for example, that the Wellington public transport and rail system is efficient which will decrease the size of its per capita footprint. The relatively small size of Wellington’s per capita ecological footprint cannot be explained by land productivity factors as it can in some other regions. Wellington’s land productivity is close to the New Zealand average.

Overall, the Wellington region has an ecological deficit of 305,820 ha. It is one of the only three regions in New Zealand that has an ecological deficit – that is, it uses more land (1,029,010 ha) in domestic consumption than there is available useful land (723,190 ha). The other two regions that have ecological deficits (rather than surpluses) are Auckland and Nelson. Wellington and these two regions are the most urban and most densely populated. This means, almost by necessity, they need to draw a significant amount of their ecological footprint (for food supply and other products) from outside their regions. This results in Wellington overshooting its useful land area by 1.42 times which is still far less than Auckland’s overshoot of 4.82 times.

12.3 Ecological footprint disaggregated by land type

The agricultural land component of Wellington’s ecological footprint consists of 705,610 ha (refer to Table 12.1). This represents 68.6 percent of Wellington’s ecological footprint. The largest amount (286,350 ha) of this agricultural land is imported from other regions in New Zealand: Taranaki (122,280 ha), Canterbury (100,010 ha), Southland (48,080 ha) and all other regions (15,990 ha). Agricultural land sourced from within the Wellington region, mainly from the Wairarapa, amounts to 236,800 ha. A significant amount (182,300 ha) of agricultural land was imported from other countries, being embodied in imports such as foodstuffs and other manufactured products.

Table 12.1 Wellington’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	236,880	286,350	182,380	705,610	1.65	68.6
Forest land	10,180	11,420	18,500	40,100	0.09	3.9
Degraded land	84,270	1,420	11,400	97,090	0.23	9.4
Energy land	116,210	6,200	63,590	186,000	0.43	18.1
Total	447,540	305,390	275,870	1,028,800	2.40	100.0

The forest land component is 40,000 ha, representing 3.9 percent of Wellington’s ecological footprint. Nearly half (18,500 ha) is embodied in products imported from overseas. A significant amount (11,420 ha) of the forest land is drawn from within the region mainly embodied in wood-based construction products. The remainder of the forest land is appropriated from outside the region, particularly from the Waikato, Hawke’s Bay, Nelson and Marlborough.

The degraded land component of the ecological footprint is 84,270 ha. This represents 9.4 percent of the Wellington ecological footprint, significantly above the national average of 8.2 percent. Most of this degraded land is drawn from the Wellington urban area. Comparatively little degraded land is embodied in products imported into the region. The relatively high proportion of degraded land in Wellington’s ecological footprint is probably explained by the large service sector and urban dominance of the Wellington economy.

The energy land component of Wellington’s ecological footprint is 186,000 ha. This represents 18.1 percent of Wellington’s ecological footprint, which is slightly higher than the national average but significantly lower than other largely urban areas in New Zealand such as Auckland (23.7 percent) and Nelson (27.3 percent). This is explained by Wellington’s economy being relatively energy efficient, perhaps due to its efficient commuter rail system and high urban densities.

12.4 Ecological footprint disaggregated by goods and services purchased

12.4.1 Purchase of Wellington produced goods and services ($P_1 + P_2 \dots P_n$)

The purchase of manufacturing products accounted for 443,990 ha of embodied land in Wellington’s ecological footprint (refer to Table 12.2). This amounts to 43.1 percent of the entire ecological footprint of the Wellington region, which is slightly less than the New Zealand percentage. Most of the 443,990 ha is embodied in products imported from rural regions (282,190 ha) particularly from Taranaki, Canterbury and Southland although a significant proportion is surprisingly sourced from within the Wellington region (107,990 ha).

Table 12.2 Wellington’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	123,980	9,660	2,270	135,910	0.32	13.2

Forestry	1,830	2,330	40	4,210	0.01	0.4
Fishing and hunting	20	10	20	50	0.00	0.0
Mining and quarrying	120	30	30	180	0.00	0.0
Manufacturing	107,990	282,190	53,810	443,990	1.04	43.1
Utilities and construction	29,840	3,090	11,320	44,240	0.10	4.3
Services	108,880	3,580	67,310	179,770	0.42	17.5
Domestic final demand	74,900	4,720	141,040	220,660	0.51	21.4
Total	447,550	305,610	275,860	1,029,010	2.40	100.0

Consumption of service sector products (eg. insurance, finance, business consulting, retailing) accounts for 179,770 ha of embodied land which makes up 17.50 percent of Wellington’s ecological footprint. This is significantly below the national average of 26.0 percent. This does not mean that Wellingtonians consume less service sector products rather that they consume service sector products that require less land per unit of product. Much of the service sector product is sourced within Wellington and the Wellington service sector seems to require less land per unit of product – in other words, typically service sector premises in Wellington are in multi-storeyed buildings that take up comparatively little land area per business.

The land embodied in agricultural products purchased by Wellingtonians account for 135,910 ha. This makes up 13.2 percent of the ecological footprint which is relatively high compared to the New Zealand average of 7.8 percent.

The land embodied in other products purchased by Wellingtonians is relatively small: forestry (4210 ha), fish (50 ha), mining and quarrying (180 ha) and utilities and construction (44,420 ha).

12.4.2 Purchase of goods and services produced outside Wellington (D₁+D₄)

Wellingtonians also directly purchase products outside the region, which accounted for 220,660 ha of land. Most of these imported purchases are from overseas (141,040 ha) such as the purchase of motor vehicles, computers, electronics and other household items. There is only a small amount of embodied land in direct purchases of products from other regions (4470 ha). The embodied land in these purchases is 12.04 percent of the Wellington footprint, which is above the New Zealand average of 10.55 percent.

12.5 Ecological Balance of Trade and ecological interdependencies

The land embodied in imports into the Wellington region is 770,810 ha. Whereas the land embodied in exports from the Wellington region is 385,050 ha (refer to Table 12.3). This means that the Ecological Balance of Trade of the Wellington economy is -385,760 ha, making Wellington a net consumer of land from outside the region.

Table 12.3 Wellington’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)
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Interregional trade			
Agriculture	16,530	0	-16,530
Forestry	22,660	1,850	-20,810
Fishing and hunting	180	0	-180
Mining and quarrying	150	0	-150
Manufacturing	391,300	1,550	-389,750
Utilities and construction	3,100	2,000	-1,100
Services	4,920	10,360	5,440
Domestic final demand	4,720	0	-4,720
Interregional Balance of Trade	443,560	15,750	-427,810
International trade			
Agriculture	3,880	96,590	92,710
Forestry	440	34,810	34,370
Fishing and hunting	780	1,520	740
Mining and quarrying	160	660	500
Manufacturing	80,430	186,240	105,810
Utilities and construction	11,420	180	-11,240
Services	89,090	49,300	-39,790
Domestic final demand	141,040	0	-141,040
International Balance of Trade	327,240	369,300	42,060
Total Balance of Trade	770,800	385,050	-385,750

12.5.1 Exports and imports by economic sectors

A large percentage (61.20 percent) of land embodied in imports into Wellington is associated with purchases of products by the manufacturing sector. Most of these purchases by the Wellington manufacturing sector are the raw materials obtained from other regions for further processing in Wellington. Eventually, most of this land is channelled into local consumption but some is re-exported as value-added processed products. The level of further processing of products for export, however, is lower than for the Auckland urban economy.

The service sector also consumes considerable embodied land appropriated into the region (94,010 ha) particularly from international sources. For instance, the purchase of computers and professional services from overseas involves the appropriation of land from other countries – in Wellington’s case, this amounts to 89,090 ha, which interestingly is more than the land embodied in international imports into the manufacturing sector in Wellington. This is not surprising given the relative size of the service sector in the Wellington economy. Although the service sector appropriates considerable amounts of land into Wellington, it also exports embodied land (59,660 ha) in the products it sells to businesses in other regions in New Zealand and overseas.

Overall, the manufacturing sector (-283,940 ha), utilities and construction (-12,340 ha), services (-34,350 ha) and domestic final demand (-145,760) sectors all have negative Balances of Trade – they consume more land than they export out of the region. The agriculture (76,180 ha), forestry (13,560 ha), fishery and hunting (560 ha) and mining and quarrying (350 ha) sectors all have positive Balance of Trades, albeit involving relatively small amounts of embodied land.

12.5.2 Exports and imports by land type

Wellington is a very large net consumer of agricultural land from outside the region (refer to Table 12.4). Wellington imports 397,580 ha of agricultural land from the regions and a further 215,320 ha of agricultural land from overseas. Although Wellington does export considerable amounts (273,260 ha) of embodied agricultural land to overseas destinations, there is virtually no (3950 ha) embodied agricultural land exported to the regions. Overall, accounting for these trade flows, the net effect is that Wellington consumed 385,760 ha of agricultural land appropriated from outside the region.

Table 12.4 Wellington'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	397,580	3,950	-393,630
Forest land	35,140	2,560	-32,580
Degraded land	2,210	3,880	1,670
Energy land	8,640	5,360	-3,280
Interregional Balance of Trade	443,570	15,750	-427,820
International trade			
Agricultural land	215,320	273,260	57,940
Forest land	22,070	43,770	21,700
Degraded land	19,760	9,270	-10,490
Energy land	70,090	43,000	-27,090
International Balance of Trade	327,240	369,300	42,060
Total Balance of Trade	770,810	385,050	-385,760

Energy land embodied in imports is the next most significant but much smaller than agricultural land imports. Imports of appropriated energy land were 78,730 ha compared to exports of energy land at 48,360 ha. Again, the net effect is that Wellington consumed 30,370 ha of energy land appropriated from outside the region.

The trade flows of forest land and degraded land in and out of the Wellington region are even of less significance. Wellington is a net consumer of -10,880 ha of forest land from outside the region (exports: 46,330 ha; imports: 57,210 ha). It is also a net consumer of degraded land (exports: 13,150 ha; imports: 21,970 ha).

12.5.3 Overall picture

Figure 12.1 presents a summary of the overall flows of embodied land through the Wellington regional economy. More than any other region apart from Auckland, the production patterns are oriented to supplying the local regional consumption with relatively light exports to both other regions and overseas. Exports of embodied land (385,050 ha) are significantly outweighed by imports of embodied land (770,880 ha). Wellington therefore has a negative Balance of Trade of 305,750 ha. Wellington is a net consumer rather than a producer of ecological capital.

Figure 12.1 Flows of embodied land through the Wellington economy

