

## 15 Nelson's Ecological Footprint

### 15.1 Profile of the region

Nelson is by far New Zealand's smallest region covering only 44,430 ha. In terms of land coverage, it is 11.7 times smaller than Auckland, the next smallest region. A significantly large proportion of the region is covered by Nelson City urban area. As a result the Nelson region has the second largest population density of any region, at 93.18 people/km<sup>2</sup>. The population of Nelson was 44,430 in 1997/98, making it the fourth to lowest of out of the 16 regions. Nelson's population growth over recent years has been among the highest in the country. A favourable sunny climate amongst other factors has made it a popular retirement destination as well attracting people and businesses to the region.

Nelson's port plays an important role in the regional economy. It is one of the country's busiest ports in terms of ship arrivals and departures. Significant amounts of primary products are exported through the port including forestry and horticultural products. The port is also a significant fishing port. It caters for more than 100 fishing boats and there are around 20 seafood operations based in Nelson. This is reflected in the high location quotients for fishing and hunting (LQ 11.65) and other food manufacturing, including fish processing (LQ 5.15).

The close proximity of three natural parks, beaches, craft industry and other tourist attractions, coupled with a sunny temperate climate, makes Nelson a popular tourist destination. The number of jobs and income generated through tourism is significant and is dramatically increasing. This is seen in the higher than average location quotients for tourism related sectors such as accommodation, restaurants and cafés (LQ 1.16) and air transport (LQ 2.73).

The relative level of agricultural and horticultural activity is the lowest in the country due to Nelson high urban population. There is however some processing of agricultural and horticultural products imported from outside the region (mainly from the Tasman region) in Nelson City. This leads to relatively high employment in the food processing industry of 2115 jobs in 1997/98 out of a total regional workforce of 18,087.

### 15.2 Overall ecological footprint and comparison with other regions

Nelson has the smallest ecological footprint of any region in New Zealand at 76,910 ha. This represents only 0.72 percent of New Zealand ecological footprint.

Nelson also has the lowest ecological footprint, on a per capita basis, at 1.86 ha per person. This low per capita ecological footprint appears to be mainly due to two factors although further research is required. Firstly, there are indications that Nelson although small, does have pockets of highly productive land that will reduce the size of its ecological footprint as less land will be required to produce the same amount of product. Secondly, there could be significant land-use efficiencies achieved in Nelson as it is New Zealand's most urban region. Urban regions through higher population and housing densities can considerably reduce the land-use per resident and this may be a factor in the Nelson case.

The useful land area of Nelson is 35,230 ha, giving Nelson an ecological deficit of 41,680 ha, Nelson overshoots its useful land area by 2.18 times. This means Nelson is not self-sufficient

and ecologically depends on land appropriated from other regions and from overseas. The ratio of ecological footprint to useful land (degree of overshoot) for Nelson is second only to Auckland. Only Nelson, Auckland and Wellington (New Zealand’s most urban areas), overshoot their useful land areas.

### 15.3 Ecological footprint disaggregated by land type

The agricultural land component of the ecological footprint consists of 36,720 ha (refer to Table 15.1). This represents 47.2 percent of Nelson’s ecological footprint. Just under half (17,470 ha) of this agricultural land is embodied in products imported from overseas with about a third (12,910 ha) embodied in products imported from other regions in New Zealand. The agricultural land embodied in products imported from neighbouring Tasman (4600 ha) is the most significant. Only a relatively small amount of agricultural land is appropriated from within the region (5910 ha), not surprising given the urban nature of the region.

**Table 15.1 Nelson’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 | 5,910                   | 12,910                                   | 17,470                       | 36,290          | 0.88                       | 47.2                    |
| Forest land       | 3,140                   | 790                                      | 1,950                        | 5,880           | 0.14                       | 7.6                     |
| Degraded land     | 11,950                  | 600                                      | 1,160                        | 13,710          | 0.33                       | 17.8                    |
| Energy land       | 13,980                  | 620                                      | 6,420                        | 21,020          | 0.51                       | 27.3                    |
| Total             | 34,980                  | 14,920                                   | 27,000                       | 76,900          | 1.86                       | 100.0                   |

The forest land component of the ecological footprint consists of 5800 ha. This represents 7.6 percent of Nelson’s ecological footprint. Most (3140 ha) of this forest land is appropriated from within the region.

The degraded land component of the ecological footprint consists of 13,710 ha. This represents 17.8 percent of Nelson’s ecological footprint. On a per capita basis Nelson residents consume 0.33 ha degraded land per person, more than the New Zealand average of 0.25 ha degraded land per person. This is not surprising given the urban character of Nelson. Where there is a choice there will be tendency to use urban (degraded) land rather than agricultural land.

The energy land component of the ecological footprint consists of 21,020 ha. This represents 27.3 percent of Nelson ecological footprint. On a per capita basis the energy land consumption is the same as the New Zealand average, indicating that Nelson has an energy efficiency at about the national average.

### 15.4 Ecological footprint disaggregated by goods and services purchased

#### 15.4.1 Purchase of Nelson produced goods and services (P<sub>1</sub>+P<sub>2</sub> ... P<sub>n</sub>)

The purchase of manufacturing products accounted for 23,180 ha of embodied land in Nelson’s ecological footprint (refer to Table 15.2). This amounts to 31.0 percent of the entire ecological

footprint of the Nelson region. Nearly half (12,210 ha) of the embodied land is in manufacturing products imported from other regions, most notably food and agricultural products from: Tasman (4550 ha), Taranaki (2820 ha) and Southland (4550 ha). Significant amounts of overseas land (5660 ha) is also embodied in the manufacturing products purchased. Only a relatively small amount of land compared with other regions is appropriated by manufactured goods from within the region (5940 ha).

**Table 15.2 Nelson’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                | 4,430                   | 1,120                                    | 110                          | 5,660           | 0.14                       | 7.4                     |
| Forestry                   | 270                     | 180                                      | 0                            | 460             | 0.01                       | 0.6                     |
| Fishing and hunting        | 0                       | 0  | 0                            | 10              | 0.00                       | 0.0                     |
| Mining and quarrying       | 10                      | 10                                       | 0                            | 20              | 0.00                       | 0.0                     |
| Manufacturing              | 5,940                   | 12,210                                   | 5,660                        | 23,810          | 0.58                       | 31.0                    |
| Utilities and construction | 9,090                   | 330                                      | 1,230                        | 10,650          | 0.26                       | 13.8                    |
| Services                   | 8,000                   | 220                                      | 6,350                        | 14,570          | 0.35                       | 18.9                    |
| Domestic final demand      | 7,220                   | 870                                      | 13,640                       | 21,730          | 0.52                       | 28.3                    |
| Total                      | 34,970                  | 14,930                                   | 27,000                       | 76,910          | 1.86                       | 100.0                   |

The purchase of service sector products accounted for 14,570 ha of embodied land in the Nelson ecological footprint. This accounts for 18.9 percent of the entire ecological footprint of the Nelson region. On a per capita basis, the land embodied in the purchase of service sector products is 0.35 ha/person, which is significantly below the national average of 0.51 ha per person. It is unlikely that Nelson residents consume significantly less service sector products and more likely that the land intensity per dollar of service product is lower than the national average. This could be a result of the urban nature of the Nelson economy.

The land embodied in other products purchased by Nelson residents is smaller than for manufacturing and service sector products: agricultural products (5660 ha), forestry products (460 ha), fishing and hunting products (10 ha), mining and quarrying products (20 ha) and utilities and construction products (10,650 ha).

#### 15.4.2 Purchase of goods and services produced outside Nelson (D<sub>1</sub>+D<sub>4</sub>)

Nelson residents purchased products imported from outside the region, amounting to 14,510 ha of land. Most of these purchases appropriate land directly from overseas (13,640 ha). The amount of land appropriated by these purchases from other regions is small (870 ha).

### 15.5 Ecological Balance of Trade and ecological interdependencies

The land embodied in imports into Nelson is 81,550 ha. Whereas, the land embodied in exports from Nelson is 68,600 ha (refer to Table 15.3). This results in the Ecological Balance of Trade of the Nelson economy being negative 12,950 ha, making it overall a net consumer of land from outside the region. This makes Nelson along with Auckland and Wellington the only regions

that are net consumers of land. This is to be expected as they are the three most urban regions in New Zealand.

**Table 15.3 Nelson’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) |
|--------------------------------|--|---|--------------------------------|
| <b>Interregional trade</b>     |  |   |                                |
| Agriculture                    | 1,730  | 10  | -1,720                         |
| Forestry                       | 2,440  | 420   | -2,020                         |
| Fishing and hunting            | 0  | 2,330   | 2,330                          |
| Mining and quarrying           | 20   | 0   | -20                            |
| Manufacturing                  | 38,260   | 910   | -37,350                        |
| Utilities and construction     | 330  | 50  | -280                           |
| Services                       | 300  | 370   | 70                             |
| Domestic final demand          | 870  | 0   | -870                           |
| Interregional Balance of Trade | 43,950   | 4,090   | -39,860                        |
| <b>International trade</b>     |  |   |                                |
| Agriculture                    | 180  | 3,110   | 2,930                          |
| Forestry                       | 60   | 5,350   | 5,290                          |
| Fishing and hunting            | 2,280  | 2,990   | 710                            |
| Mining and quarrying           | 10   | 30  | 20                             |
| Manufacturing                  | 11,080   | 45,630  | 34,550                         |
| Utilities and construction     | 1,250  | 30  | -1,220                         |
| Services                       | 9,100  | 7,370   | -1,730                         |
| Domestic final demand          | 13,640   | 0   | -13,640                        |
| International Balance of Trade | 37,600   | 64,510  | 26,910                         |
| Total Balance of Trade         | 81,550   | 68,600  | -12,950                        |

### 15.5.1 Exports and imports by economic sectors

A large percentage (60.50 percent) of the land embodied in imports into Nelson is associated with purchases of products by the manufacturing sector (49,430 ha). Most of these purchases by the Nelson manufacturing sector are the raw materials purchased from other regions (particularly from Tasman) for further processing. Most of the land embodied in these imported materials is eventually re-exported from Nelson in the form of value-added products that are destined for overseas markets.

The imports purchased by the other sectors in the Nelson economy are smaller in terms of their appropriated land: domestic final demand (14,510 ha), services (9400 ha), fishing and hunting (2280 ha), forestry (2500 ha), agriculture (1910 ha), utilities and construction (1580 ha) and mining and quarrying (30 ha).

The exports are again dominated by those from the manufacturing sector (46,540 ha). Quite simply, raw materials are imported by the manufacturing sector then processed and almost all of them are then exported out of the region. The land embodied in exports from the forestry sector (5770 ha) and the fishing sector (5770 ha) are also significant. Notably, the figure for the fishing sector would be much higher if the ‘marine area’ were included in the ecological footprint calculations.

## 15.5.2 Exports and imports by land type

Nelson is a significant net consumer of agricultural land from outside the region (refer to Table 15.4). Nelson imports 63,770 ha of agricultural land both from New Zealand (38,760 ha) and international (25,010 ha) sources. A significant amount of this imported agricultural land is consumed within the Nelson economy. Overall, however Nelson does have a negative Ecological Balance of Trade for agricultural land of -24,790 ha.

**Table 15.4 Nelson'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) |
|--------------------------------|-------------------------------|-------------------------------|-----------------------|
| <b>Interregional trade</b>     |                               |                               |                       |
| Agricultural land              | 38,760                        | 1,080                         | -37,680               |
| Forest land                    | 3,510                         | 640                           | -2,870                |
| Degraded land                  | 680                           | 210                           | -470                  |
| Energy land                    | 1,000                         | 2,160                         | 1,160                 |
| Interregional Balance of Trade | 43,950                        | 4,090                         | -39,860               |
| <b>International trade</b>     |                               |                               |                       |
| Agricultural land              | 25,010                        | 37,900                        | 12,890                |
| Forest land                    | 2,520                         | 7,830                         | 5,310                 |
| Degraded land                  | 2,070                         | 2,430                         | 360                   |
| Energy land                    | 8,000                         | 16,350                        | 8,350                 |
| International Balance of Trade | 37,600                        | 64,510                        | 26,910                |
| Total Balance of Trade         | 81,550                        | 68,600                        | -12,950               |

There are significant imports (6030 ha) and exports (8470 ha) of forest land. Although Nelson does import considerable forest land, most of this is just re-exported out of the region which, combined with the export of within region forest land, leads to a positive Ecological Balance of Trade for forest land (2440 ha).

There is also a significant net export of energy land. Value-added manufacturing industries in Nelson are energy intensive, which means when agricultural and forest raw materials are purchased and then processed for re-exporting out of the region, an energy land component is essentially added to them.

## 15.5.3 Overall picture

Figure 15.1 provides a summary of the overall flows of embodied land through the Nelson economy. This diagram indicates that the Nelson economy has two foci of about equal importance with 76,910 ha of land is channelled into household consumption and 64,510 ha being used to make products for exports to international markets. The exports to other regions (4090 ha) are very much a subsidiary function of the Nelson economy. Exports of embodied land (68,600 ha) are outweighed by imports of embodied land (81,550 ha). This gives Nelson a negative Ecological Balance of Trade of -12,950 ha. Nelson is therefore a net consumer rather than provider of ecological capital.

**Figure 15.1 Flows of embodied land through the Nelson economy**

