

9 Hawke's Bay's Ecological Footprint

9.1 Profile of the region

The Hawke's Bay region is one of the most urbanised regions in the country with only Nelson, Auckland and Wellington regions more urbanised. The 2001 Census estimates the resident population to be 142,947 people. This accounts for 3.8 percent of the national population, making the region the 11th largest in the country. The regional population has remained stable between the 1996 and 2001 censuses, with only a small increase of 159 people. Most people reside in the two main urban areas of Napier and Hastings, together accounting for 79.5 percent of the region's population in 2001. The age structure of the population reveals that the region had fewer people aged 20–34 years than the national average. Greater employment, career advancement and education opportunities account for migration out of the region by this age group. The region has an estimated population density of 10.23 people per square kilometre, making the region more sparsely populated than the New Zealand average (Statistics New Zealand, 1998j).

Situated on the east coast of the North Island, the Hawke's Bay region occupies an estimated 1,416,400 ha or 5.1 percent of New Zealand's land area. To the east the Pacific Ocean, and to the west by the Ruahine, Kaweka, Huiarau and Kaimanawa ranges bound the region. The region has a diverse topography characterised by mountains, hill country, alluvial terraces, sand dunes and swamps. The soils of the alluvial Heretaunga and Ruataniwha plains are very fertile, renewed of nutrients by seasonal flooding. The western mountains shelter the Hawke's Bay from the prevailing westerly weather. The region has a sunny temperate climate with warm summers and mild winters. As land used by horticulture and cropping has intensified, the potential for soil loss from wind erosion has also increased.

The 1997–98 GDP of the Hawke's Bay region is estimated to be 3.5 billion or 3.6 percent of the national GDP. The region's economy is an export commodity based economy and is vulnerable to commodity price changes on the world market. Sheep, beef and mixed livestock farming (LQ 1.92), horticulture (LQ 3.75) and services to agriculture (LQ 2.39) are the key primary industries in which the region has a comparative advantage. This spills over into the manufacturing sector where the region shows dominance in meat processing (LQ 3.32), manufacture of other foods (LQ 1.72) and beverage manufacture (3.01). Proximity to the central north island forests, particularly those surrounding Taupo District, has led to significant growth in paper and paper product manufacturing. At the 1 April 1998, the region had an estimated 119,200 ha of forest, or 9.9 percent of the North Island's forestry estate. The discovery of gas at the Kauhauroa-1 and Awatere-1 wells north east of Wairoa in early 1998 is expected to boost the regional economy.

The region's fertile soils and climate mean that horticulture, fruit growing, market gardening and viticulture are well established and dominant industries of the economy. In recent years there has been a significant increase in land set aside for horticulture. Pipfruit exports are the highest of any region in the country. The main fruits grown include apples, pears, nectarines and peaches. The Hawke's Bay is also the second largest grape producing region in New Zealand with local soils ideally suited to growing Chardonnay and Cabernet grapes. In 1997 the region accounted for 27.9 percent of New Zealand's total vineyard land area and since then this has increased significantly.

9.2 Overall ecological footprint and comparison with other regions

Hawke's Bay has an ecological footprint of 384,660 ha. This represents 3.58 percent of New Zealand's total ecological footprint and is the ninth highest ecological footprint of any region. The Hawke's Bay ecological footprint is comparable to Southland's (375,310 ha).

On a per capita basis, Hawke's Bay has the seventh lowest ecological footprint out of the 16 regions, at 2.63 ha per capita. This figure is relatively low compared with the national average, primarily because of the high productivity of agricultural land within the Hawke's Bay region. This means that less agricultural land per capita is required to produce agricultural products than in the nation. The highly fertile nature of the region's plains is a key influence.

The useful land area of Hawke's Bay is 1,048,480 ha, meaning that Hawke's Bay has an ecological surplus of 663,820 ha. Or, stated alternatively, the region's ecological surplus is 1.7 times its ecological footprint. In relative terms, Hawke's Bay has the fourth largest surplus of any region nationally. Overall this means that the region is self-sufficient in ecological footprint terms.

9.3 Ecological footprint disaggregated by land type

The agricultural land component of the Hawke's Bay region's ecological footprint equates to 259,850 ha (see Table 9.1). This represents 67.6 percent of the region's ecological footprint. This land is predominantly appropriated from within the region (190,830 ha). Lesser amounts of agricultural land are appropriated from other nations (57,670 ha) and from other regions (11,350) particularly from the Waikato region (9670 ha).

Table 9.1 Hawke's Bay'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 | 190,830 | 11,350 | 57,670 | 259,850 | 1.78 | 67.6 |
| Forest land | 29,300 | 1,190 | 4,900 | 35,390 | 0.24 | 9.2 |
| Degraded land | 16,410 | 3,670 | 3,700 | 23,780 | 0.16 | 6.2 |
| Energy land | 46,270 | 1,360 | 17,930 | 65,560 | 0.45 | 17.0 |
| Total | 282,810 | 17,570 | 84,200 | 384,580 | 2.63 | 100.0 |

The forest land component of the Hawke's Bay's ecological footprint consists of 35,390 ha or 9.2 percent of the region's footprint. This is mostly within region land (29,300 ha) although some 4900 ha is embodied in goods and services purchased from other nations. The remaining 1190 ha are appropriated from other regions, mainly Gisborne. Forest land does not include the planted forest required to sequester CO₂ emissions.

The degraded land component of the ecological footprint is 23,780 ha or 6.2 percent of the entire ecological footprint. This is mostly within region land, consisting primarily of residential properties and land embodied in goods and services purchased from local manufacturing and service sector businesses (excluding farming and forestry). Similar quantities of degraded land are imported interregionally (3670 ha) and internationally (3700 ha).

The energy land component of the region’s footprint is estimated to be 65,560 ha, 17.0 percent of the region’s total footprint. In relative terms, energy land embodied in the goods and services consumed by Hawke’s Bay residents (0.45 ha per capita) is similar to that consumed by New Zealanders generally (0.50 ha per capita). A warmer than average climate, and hence lower energy requirement among other things explains this figure.

9.4 Ecological footprint disaggregated by goods and services purchased

9.4.1 Purchase of Hawke’s Bay produced goods and services (P₁+P₂ ... P_n)

The purchase of manufacturing sector products by Hawke’s Bay residents accounts for 173,310 ha (45.1 percent) of the region’s ecological footprint (refer to Table 9.2). The vast majority of this land is embodied in manufactured goods produced locally (145,530 ha), in particular processed food products. Smaller quantities of land (16,840 ha) are also embodied in manufactured goods purchased by the region’s residents from overseas. Overall, the land embodied in manufactured products purchased by Hawke’s Bay residents (1.19 ha per capita) is only 86 percent of the New Zealand average (1.37 ha per capita).

Table 9.2 Hawke’s Bay’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 | 34,050 | 70 | 730 | 34,850 | 0.24 | 9.1 |
| Forestry | 1,770 | 10 | 20 | 1,800 | 0.01 | 0.5 |
| Fishing and hunting | 10 | 0 | 10 | 20 | 0.00 | 0.0 |
| Mining and quarrying | 20 | 10 | 20 | 50 | 0.00 | 0.0 |
| Manufacturing | 145,530 | 10,940 | 16,840 | 173,310 | 1.19 | 45.1 |
| Utilities and construction | 12,530 | 810 | 3,450 | 16,800 | 0.11 | 4.4 |
| Services | 64,670 | 430 | 15,910 | 81,000 | 0.55 | 21.1 |
| Domestic final demand | 24,210 | 5,390 | 47,220 | 76,830 | 0.53 | 20.0 |
| Total | 282,800 | 17,660 | 84,200 | 384,660 | 2.63 | 100.0 |

Significant quantities of land (81,000 ha) are also embodied in service sector products consumed by Hawke’s Bay residents. On a per capita basis, this amounts to 0.55 ha per Hawke’s Bay resident. At first glance this figure appears very high, but can be explained by backward linkages to primary sectors in the economy. Thus while a service sector business may physically occupy only a small land area, the products that it purchases from other industries (such as food, paper, equipment, machinery etc) may contain substantial amounts of embodied land. A significant majority of land embodied in service sector products (64,670 ha) comes from within the region.

Land embodied in the purchases from other sectors by Hawke’s Bay residents (53,520 ha) is significantly smaller than that embodied in manufactured and service sector products. Consumption of products produced by the agricultural and utility and construction sectors respectively account for 34,850 ha and 16,800 ha of the region’s ecological footprint.

9.4.2 Purchase of goods and services produced outside Hawke’s Bay (D₁+D₄)

Hawke’s Bay residents also directly purchase products from outside the region, which accounts for 52,610 ha of the region’s footprint. The bulk of this land (47,220 ha) is derived from international sources. This includes land embodied in goods purchased from local retailers that were made overseas but sold with an additional mark-up. Thus land embodied in items such as motor vehicles, computers, household appliances and imported food products is included in this figure.

9.5 Ecological Balance of Trade and ecological interdependencies

The land embodied in imports into the Hawke’s Bay regional economy is 195,060 ha. In comparison, land embodied in exports from the Hawke’s Bay economy equates to 1,066,330 ha. This means that the Hawke’s Bay region is an overall net producer of embodied land with a positive Ecological Balance of Trade of 871,270 ha (refer to Table 9.3).

Table 9.3 Hawke’s Bay’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 | 860 | 79,170 | 78,310 |
| Forestry | 340 | 10,150 | 9,810 |
| Fishing and hunting | 0 | 80 | 80 |
| Mining and quarrying | 30 | 20 | -10 |
| Manufacturing | 47,940 | 34,850 | -13,090 |
| Utilities and construction | 830 | 480 | -350 |
| Services | 520 | 480 | -40 |
| Domestic final demand | 5,390 | 0 | -5,390 |
| Interregional Balance of Trade | 55,910 | 125,220 | 69,310 |
| International trade | | | |
| Agriculture | 8,800 | 307,130 | 298,330 |
| Forestry | 450 | 40,510 | 40,060 |
| Fishing and hunting | 550 | 1,010 | 460 |
| Mining and quarrying | 110 | 200 | 90 |
| Manufacturing | 59,920 | 577,740 | 517,820 |
| Utilities and construction | 3,550 | 70 | -3,480 |
| Services | 18,550 | 14,460 | -4,090 |
| Domestic final demand | 47,220 | 0 | -47,220 |
| International Balance of Trade | 139,150 | 941,110 | 801,960 |
| Total Balance of Trade | 195,060 | 1,066,330 | 871,270 |

9.5.1 Exports and imports by economic sectors

Over half of the land embodied in imports (107,860 ha) into the Hawke's Bay region is in goods and services purchased by the manufacturing sector. Although this may appear high it is comparatively small when compared with the region's exports of land embodied in manufactured products (612,590 ha). The vast majority of this land (577,740 ha) is embodied in processed food products destined for locations offshore. These products include processed sheep and beef meat, processed horticulture and fruit produce.

The Hawke's Bay is also a net exporter of land embodied in agriculture sector products both regionally (78,310 ha) and internationally (298,330 ha). International exports encapsulate land embodied in wool, unprocessed fruit and horticulture products. Like many regions in New Zealand, the Hawke's Bay is driven by external (particularly international) demand for its primary sector products. Thus, it is not surprising that the land embodied in exported agricultural sector products outweighs imported equivalents by approximately 10.8 times.

Unlike the region's agriculture and manufacturing industries, the service sector is a net importer of embodied land (4130 ha). The vast majority of land embodied in service sector products originates from offshore (18,550 ha). While this figure may appear high, it is explained by indirect purchases of products with high embodied land contents (eg. food, paper, and equipment). All the remaining sector groups of the Hawke's Bay economy have a positive Ecological Balance of Trade with the exception of the utilities and construction sector which imports some 3850 ha of embodied land.

9.5.2 Exports and imports by type of land

The Hawke's Bay region is a very large net provider of embodied agricultural land, exporting an estimated 837,910 ha to other countries and a further 109,340 ha to other New Zealand regions (refer to Table 9.4). This represents primarily the land occupied by the region's sheep, beef and mixed livestock farms and orchards. Generally speaking, the region's agricultural land is embodied in farm products that flow onto local processing/manufacturing facilities and, in turn, leave New Zealand destined for international markets.

Table 9.4 Hawke's Bay'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 | 47,860 | 109,340 | 61,480 |
| Forest land | 1,910 | 11,800 | 9,890 |
| Degraded land | 3,960 | 620 | -3,340 |
| Energy land | 2,180 | 3,460 | 1,280 |
| Interregional Balance of Trade | 55,910 | 125,220 | 69,310 |
| International trade | | | |
| Agricultural land | 103,780 | 837,910 | 734,130 |
| Forest land | 7,310 | 64,900 | 57,590 |
| Degraded land | 6,930 | 3,530 | -3,400 |
| Energy land | 21,140 | 34,770 | 13,630 |
| International Balance of Trade | 139,160 | 941,110 | 801,950 |
| Total Balance of Trade | 195,070 | 1,066,330 | 871,260 |

Forest land embodied in exports is also a significant proportion of the region’s large positive ecological trade balance. Forest land embodied in products sold internationally equates to 64,900 ha, while the equivalent interregional figure is 11,800 ha. The region’s forest land is primarily located in the west and north. It is exported internationally from the port of Napier.

Less energy land (14,910 ha) is exported in products produced by the region’s industries. In the case of degraded land, the Hawke’s Bay is a net consumer both interregionally (-3340 ha) and internationally (-3400 ha). There are at least two possible reasons for this, namely:

- (1) local service sector businesses are unable to meet local demand for their products
- (2) critically, service sector industries are absent from the Hawke’s Bay economy.

In both cases, this results in the importation of degraded land embodied in the goods and services required to fill these gaps.

9.5.3 Overall picture

Figure 9.1 provides a summary of the overall flows of embodied land through the Hawke’s Bay region economy. This diagram shows that the region’s ecological footprint (384,660 ha) is significant less than the land embodied in overseas exports (941,110 ha). The region is exporting most of its ecological capital overseas. Considering land embodied in both international and interregional trade, the Hawke’s Bay region has an overall Balance of Trade surplus of 871,270 ha.

Figure 9.1 Flows of embodied land through the Hawke’s Bay economy

