

Canterbury Region
Waste Data
Technical Report
(1998-2005)

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Executive summary

Environment Canterbury collects waste data from the Territorial Authorities to enable reporting on Canterbury's waste amounts and waste management systems. Some waste data are limited and reliability of data is not always assured. However, there has been an improvement in monitoring and recording of solid waste streams in Canterbury the past few years. To ensure that data is comparable we have worked with the Territorial Authorities to standardise its collection.

The data collected from the Canterbury Territorial Authorities shows that the amount of total measured waste (comprises all collected waste data; residual, recyclables, organic etc.) has been steadily increasing in Canterbury since 1998/99. Total measured waste per person per year has also been increasing since 2001/02. Many factors may have contributed and there is probably no single reason why waste is increasing. Economic indicators point to an increase in the wealth of the Canterbury population. This will affect the population's production and consumption patterns.

For the 2003/04 and 2004/05 financial years the largest component of the waste stream is material disposed of to cleanfills. This increase from previous years is due to a significant improvement in the collection of data from the cleanfills within Christchurch city. This improvement was brought about by the introduction of the Christchurch Cleanfill Bylaw on 1 March 2004. The Bylaw requires the gathering of basic data on the quantities and origin of all cleanfill materials. Prior to 1 March 2004 accurate records were not maintained and this would still be the case for the cleanfills operating outside of the Christchurch City Council boundary. Therefore, the true amount of cleanfill disposed of within Canterbury is yet to be determined.

The data collected also shows that the amount of residual waste to municipal landfill has been increasing since 2001/02 and is, for most districts, the second largest component of the waste stream after cleanfill.

Organics recovered are the third largest component of the waste stream. This does not include organics that may be disposed of as part of the residual waste stream. The amount of organic waste collected has fluctuated but appears to be increasing overall.

The amount of hazardous waste collected is small, but is increasing. This may be due to the increase, in some districts, of collection facilities for hazardous waste, such as used oil drop off points, the Hazmobile collections and the domestic hazardous waste drop off points. Improved waste acceptance criteria, better awareness and promotion of separation means that hazardous waste is now less likely to be mixed with the residual waste stream.

The percentage of waste diverted away from municipal landfills is increasing. Some of the increase in diversion is due to an increase in recycling. Not only is the total recycling amount increasing, but also the amount of recycling per person.

Comparisons between the districts show that the urban centres, Christchurch City and Timaru, have recorded larger quantities of waste produced per person than the rural councils. Most of the rural councils record fairly similar amounts. However, the percentage of waste diverted from landfill varies markedly between districts. The data collected shows that district schemes that encourage separation of waste at source are effective at reducing waste to landfill.

Waste management in the Canterbury region has significantly changed over the last few years. There has been a decrease in the number of small local landfills and the introduction of sub-regional landfills serviced by transfer stations/resource recovery parks, many of which have recycling facilities.

It is a concern that the total quantity of waste generated is increasing as it is an indicator of the material efficiency of society. Excessive waste represents an enormous loss of resources in the form of materials and energy. This can impact on the local environment through direct and indirect impacts on air, land and water quality and on the global environment through increased greenhouse gas emissions. Diverting waste away from landfill is shown to have benefits for climate change through reduction of greenhouse gas emissions.

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Glossary of terms

- **Cleanfill material:** This includes inert materials such as construction and demolition material disposed of to a private or council controlled cleanfill. For the types of material this can include, refer to “A Guide to the Management of Cleanfills” produced by the Ministry for the Environment, January 2002, section 4.2.1 and 4.2.2. Hardfill and cleanfill are distinguished in this report on the basis of their disposal points.
- **Contributing population:** The contributing population includes the population of the districts whose waste data were recorded in the relevant year. The whole population of Canterbury was not used in some years to ensure that the amount of waste per person per year was not under-reported. If the whole Canterbury population was used then the amount of waste per person per year would be calculated to be lower than it actually was. For example, in the 1998/99 financial year, Hurunui, Ashburton, Bank Peninsula, Kaikoura, Mackenzie and Waitaki districts did not record waste data. Therefore, the contributing population in 1998/99 only includes the populations of Christchurch City, Selwyn, Timaru and Waimakariri districts.
- **District populations:** Population figures obtained from either 1996 or 2001 census data for usually resident population in the districts or were provided by Territorial Authority staff.
- **Gross Domestic Product (GDP):** GDP is the total market value of goods and services produced within a given period after deducting the cost of goods utilised in the process of production. In this report real GDP is used. Real GDP is expressed in constant prices and is a measure of economic growth.
- **Hardfill material:** This includes construction and demolition material disposed of to municipal landfill. Hardfill and cleanfill are distinguished in this report on the basis of their disposal points
- **Hazardous waste:** This includes hazardous waste received at domestic hazardous waste drop-off points and any Hazmobile collections. Hazardous waste includes paint, garden chemicals, solvents etc. It also includes data from the agricultural chemical collection and waste oil collection facilities.
- **Kilograms per person per year:** These figures are obtained by dividing tonnes by the contributing population and multiplying by 1000.
- **Municipal landfill:** A waste disposal site, controlled by local authorities, used for the controlled deposit of solid wastes onto or into land
- **Organics:** This includes putrescibles (food scraps) and greenwaste from kerbside collection or dropped off at transfer stations/resource recovery parks
- **Recyclables:** This includes all material collected for recycling at the kerbside and received at transfer stations/resource recovery parks.
- **Recycling:** A resource recovery method involving the collection, separation, and processing to specification of unwanted materials and their use as raw materials for manufacture into new products.
- **Residual waste:** Residual waste is the waste disposed of to municipal landfill.
- **Reuse stores:** Includes waste that is salvaged or diverted from the waste stream that undergoes little or no modification and is sold at stores run by the Territorial Authorities. For example, the Supershed (Christchurch), The Crows Nest (Timaru) and others in Ashburton, Kaikoura and Hurunui.
- **Total measured waste:** Includes residual waste, hazardous waste, recyclables, reuse stores, organics and hardfill waste. It excludes Timaru's hardfill waste, cleanfill waste and data for Waitaki district

1. Introduction

Environment Canterbury collects waste data from the Territorial Authorities to enable reporting on Canterbury's waste amounts and waste management systems. Until recently it has been difficult to accurately quantify the total amount of waste generated and disposed of in the region because historically many of the councils were not routinely measuring the amount of waste going to landfill.

Information on the amount of waste produced and disposed of regionally is important for many reasons. Local councils and waste service providers need reliable data in order to make sound decisions. Other reasons include:

- Identifying trends in waste production and disposal
- Quantifying the effectiveness of recycling and other waste minimisation initiatives
- Providing data for the national indicator programme
- Meeting commitments set out in the Regional Policy Statement.

The quality of data collected by the Territorial Authorities has improved significantly with the closing of the old style dumps across the region and their replacement with controlled transfer stations or resource recovery parks. Most waste is now transferred to either Kate Valley Landfill in Hurunui (from 9th June 2005), or Redruth Landfill in Timaru. This has meant charging regimes have been established, and as a result, measurement of waste quantities has become more routine.

Discussions with staff from the Territorial Authorities in the region indicate that they all now have waste monitoring systems in place; some of these are quite sophisticated and others are simpler. In the absence of a national reporting system for waste, Environment Canterbury has developed a reporting mechanism which enables the collation of data on a regional basis. The use of this standard reporting tool will help to ensure that the data reported from each district are consistent.

2. Methodology

A waste data collection spreadsheet, adapted from the Ministry for the Environment (MfE) draft reporting tool, designed for the Waste Data Pilot programme, was used to collect data from all Canterbury Territorial Authorities in 2004/05. Territorial Authority staff were emailed a copy of the spreadsheet which they either filled in with the appropriate information and returned to us, or they provided waste data in the format in which they collected it. The appropriate data were then transferred into the spreadsheet. Some data had to be converted to allow for comparisons to be made (e.g. from cubic metres to tonnes or litres to tonnes). Further information and clarification on the data was sought through emails and phone calls.

A spreadsheet was compiled which contained all the completed worksheets for the districts. The district waste data were summed to provide the total measured waste amount for the Canterbury region. These data were combined into a regional worksheet. From this, trends in the amount of waste measured and its categories could be seen at a regional level.

The data were analysed to report on trends such as:

- Total measured waste produced in Canterbury;
- Kilograms of total measured waste per person per year;
- Kilograms of residual waste per person per year;
- Percentage of waste diverted from municipal landfills per year;
- Total tonnes of recyclables in Canterbury per year; and
- Kilograms recycled per person per year.

This was done at both the district and regional level.

As population size varies between districts and years, waste data has been reported on a per person basis. For example, the population within Canterbury has increased between 1998/99 and 2004/05. Also, larger districts will produce more waste than smaller districts as they have more people. Analysis on a per person basis eliminates the effect that these variations would have and allows comparisons to be drawn between districts.

The majority of population data was obtained from either 1996 or 2001 census data for usually resident population. However, to smooth changes between these two census dates, some councils choose to produce annual population growth estimates for planning purposes. Where councils have provided estimates of their population increases or decreases on an annual basis we have chosen to use this data, in preference to the census data.

3. Accuracy of the dataset

It is difficult to draw strong conclusions about trends in waste in the Canterbury region as the dataset is not complete. Gaps in data exist mainly because of the historical differences in the level of recording by the Territorial Authorities. Some districts have a comprehensive dataset, while others only began recording the amount of material going to landfill in the 2003/04 financial year. Gaps in waste composition data are due to some Territorial Authorities only collecting these data once every few years.

There are also difficulties encountered with Territorial Authorities categorising waste differently or combining waste categories. For example, some councils record recyclable categories in detail distinguishing between ferrous and non-ferrous metals. Other councils record this category simply as metals.

The dataset does not account for waste that is not dealt with by Territorial Authorities, which includes material disposed of to on-site landfills including dedicated industrial sites and farm dumps. It also does not account for private recycling companies who deal direct with businesses, for example Vodafone collect old cellphone batteries. There are also many organic wastes that do not enter the solid waste stream managed by Territorial Authorities. For example, commercial organic waste collectors that collect and process food scraps from restaurants and organic waste disposed of using insinkers or composted at home. We also have limited access to data from waste streams collected and disposed of by the commercial waste contractors. However, this material would be a component of the data from the landfill site.

Comparisons between districts have been difficult due to discrepancies in the accuracy, availability and method of data collection, especially in the years 1998/99 to 2001/02. Some of the data sent in by the councils were estimates, as they did not have the means to accurately record waste amounts. Other councils measured their waste amount on weighbridges. There also exists the potential for “double counting” of waste if waste materials have crossed Territorial Authority boundaries. For example, waste collected in the Mackenzie district is disposed of in the Timaru district at Redruth Landfill.

Limitations to the accuracy of the data also exist due to the use of the census population data. Census data are only collected every five years and therefore the accuracy of the population data declines over time. This will impact on the accuracy of the kilograms per person data as these are calculated using the population data.

To ensure that data are comparable in future we have worked with the Territorial Authorities to standardise its collection and will maintain this standard approach for future years.

4. Results and discussion

4.1 Total measured waste

FINANCIAL YEAR							
WASTE COMPONENT (TONNES)	1998/99	1999/2000	2000/01	2001/02	2002/03	2003/04	2004/05
Residual Waste	282,575	294,461	281,704	285,859	291,160	328,868	342,894
Hazardous Waste	5	66	66	90	139	218	298
Recyclables	12,549	14,881	16,749	18,556	21,863	28,675	34,406
Reuse stores	0	1,230	3,208	5,265	7,340	8,449	9,985
Organics	34,212	38,197	34,488	37,799	42,688	37,385	39,915
Hardfill	16,932	15,180	14,427	16,477	10,043	11,621	11,947
Total Measured Waste¹	346,273	364,015	350,643	364,047	373,234	415,217	439,445
Cleanfill ²	31,185	28,277	25,528	61,539	45,242	372,607	826,745
CONTRIBUTING POPULATION	427,231	449,316	450,851	479,797	486,347	508,399	515,759

Table 1: Total tonnes of measured waste recorded in Canterbury in each financial year

Table 1 shows the amount of measured waste (tonnes) recorded in Canterbury in each financial year from 1998 to 2005 and includes waste data from all the Territorial Authorities in the Canterbury region with the exception of Waitaki³. Definitions of the waste categories can be found in the Glossary of terms on page 2.

The main trends that can be seen in this table are:

- Residual waste to landfill has been steadily increasing since 2001/02.
- Hazardous waste collected is increasing.
- Recyclables collected is increasing.
- Diversion by reuse stores is increasing.
- Organics collected has fluctuated but appears to be increasing overall.
- Hardfill waste amounts are variable.
- Total measured waste has increased more than 26% from 1998 to 2005
- The amount of cleanfill waste has increased although this may be a consequence of better data collection from Christchurch City's cleanfills due to the implementation of the Christchurch Cleanfill Bylaw. The Christchurch Cleanfill Bylaw came into force on 1 March 2004 with the objective of encouraging the minimisation of wastes generated in Christchurch by the construction and demolition industry. The Bylaw requires the gathering of basic data on the quantities and origin of all cleanfill materials.

Population figures were either obtained from the 1996 and 2001 Census for usually resident population for each district or were provided by Territorial Authority staff. The contributing population includes the population of the districts whose waste data were recorded in the relevant year. The whole population of Canterbury was not used for the years 1998/99, 1999/2000, 2000/01, 2001/02 and 2002/03 to ensure that the amount of

¹ Timaru District's hardfill amounts are not included in the total measured waste figure. They are included in the cleanfill figure. Hardfill at Redruth landfill is used as engineering material; some is disposed of but >90% is used for engineering or as fill material.

² The total measured waste figure does not include cleanfill waste. It has been excluded as the amount of cleanfill recorded during the 2003/04 and the 2004/05 financial years was large and, if included, would skew the total measured waste relative to other years. This increase from previous years is due to a significant improvement in the collection of data from the cleanfills within Christchurch city. This improvement was brought about by the introduction of the Christchurch Cleanfill Bylaw on 1 March 2004. The Bylaw requires the gathering of basic data on the quantities and origin of all cleanfill materials. Prior to 1 March 2004 accurate records were not maintained and this would still be the case for the cleanfills operating outside of the Christchurch City Council boundary. Therefore, the true amount of cleanfill disposed of within Canterbury is yet to be determined.

³ Waitaki District's waste data were collected but are not included as part of this report. It is difficult to separate the waste that is disposed of in the Canterbury part of the Waitaki District from the Otago part. As approximately 90% of Waitaki's population live in the Otago part of Waitaki it was decided to exclude these data to avoid over reporting the waste disposed of in the Canterbury Region.

waste per person per year was not under-reported. If the whole Canterbury population had been used then the amount of waste per person per year would be calculated to be lower than it actually was. For example, in the 1998/99 financial year, Hurunui, Ashburton, Bank Peninsula, Kaikoura, Mackenzie and Waitaki districts did not record waste data. Therefore, the contributing population in 1998/99 only includes the populations of Christchurch City, Selwyn, Timaru and Waimakariri districts.

Some of the waste data are incomplete as until recently many of the landfills did not measure the amount of waste going into them. The financial years each Territorial Authority contributed data to are shown in Table 2 below.

Financial year							
Territorial authority	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05
Ashburton				✓	✓	✓	✓
Banks Peninsula		✓	✓	✓	✓	✓	✓
Christchurch City	✓	✓	✓	✓	✓	✓	✓
Hurunui						✓	✓
Kaikoura		✓	✓	✓	✓	✓	✓
Mackenzie						✓	✓
Selwyn	✓	✓	✓	✓	✓	✓	✓
Timaru	✓	✓	✓	✓	✓	✓	✓
Waimakariri	✓	✓	✓	✓	✓	✓	✓
Waimate		✓	✓	✓	✓	✓	✓

Table 2: Waste data contribution by each Territorial Authority

Table 2 shows that datasets are incomplete for the years 1998/99 to 2002/03. The data recorded for 1998/99 financial year are the most incomplete. Data recorded for 2001/02 and 2002/03 are more complete as most councils contributed data, except Hurunui and Mackenzie.

The quality of data collected by the Territorial Authorities has improved significantly in recent years. Data for the years 2003/04 and 2004/05 are complete, as all Territorial Authorities including Hurunui and Mackenzie districts have recorded waste data for these years.

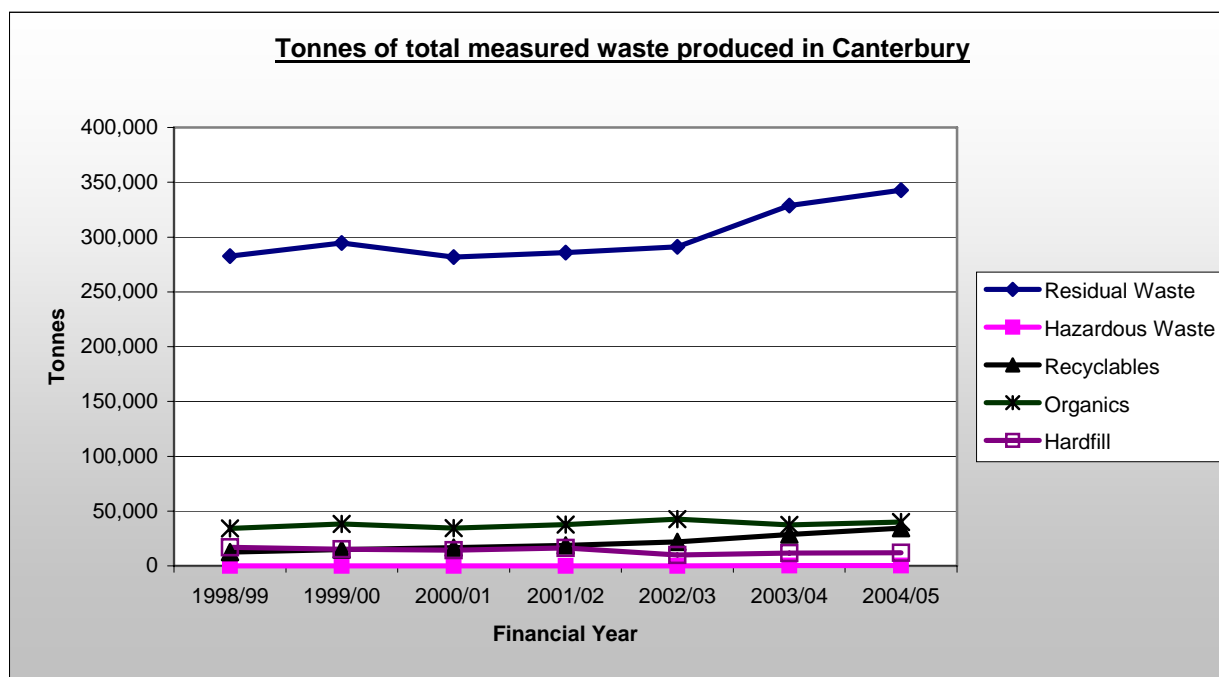


Figure 1: Tonnes of total measured waste produced in Canterbury per year

Figure 1 shows the amount of waste disposed of in Canterbury in each financial year from 1998/99 to 2004/05 and includes waste data from all the Territorial Authorities in the Canterbury region, except Waitaki.

The main trends that can be seen in this figure are:

- Residual waste to landfill is increasing after decreasing slightly between 1999/2000 and 2000/01. From 1998 to 2005 the amount of residual waste produced in Canterbury increased more than 21% percent. Residual waste makes up the largest amount of the total measured waste stream when compared to the other waste categories.
- The amount of hazardous waste is hard to judge given the scale of Figure 1. The quantities recorded are small, but have increased. This may be due to better separation by the public due to increased awareness and the additional collection facilities available in some districts.
- Recyclables collected is increasing.
- Organics collected has fluctuated but is increasing overall
- Hardfill waste amounts are quite variable

As shown in Table 2, datasets are incomplete for the years 1998/99 to 2002/03. Therefore, the actual amount of residual and other waste in Canterbury may have been higher during the period 1998 to 2003. However, we have no means of obtaining data for these years.

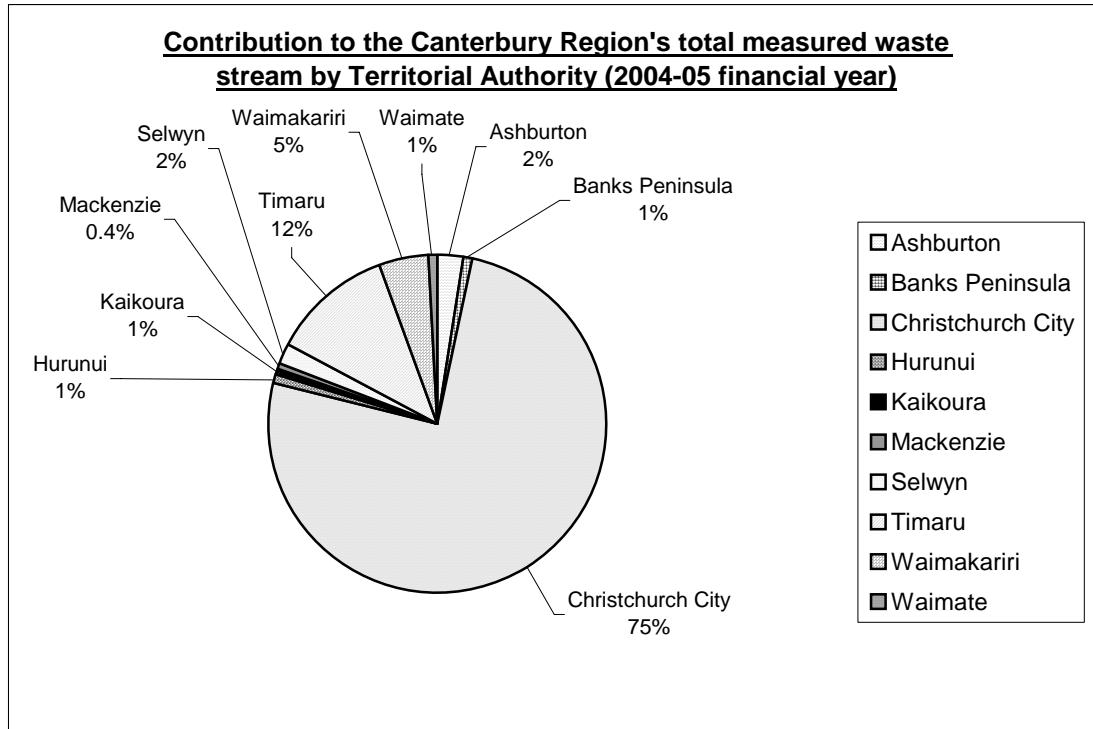


Figure 2: Contribution to the Canterbury region's total measured waste by Territorial Authority (2004/05)

Figure 2 shows the percentage of the total Canterbury measured waste stream contributed by each Territorial Authority. It includes:

- Residual waste
- Hazardous waste
- Recyclables
- Reuse stores
- Organics
- Hardfill waste

It excludes:

- Timaru's hardfill waste
- Cleanfill waste
- Data for Waitaki district

Christchurch City and Timaru have the largest and second largest populations in Canterbury respectively. Not surprisingly, it is these centres that contribute the greatest percentage of waste to the Canterbury waste stream. However, these districts contribute a higher percentage of the waste stream than their populations indicate. Christchurch City is home to 66% of the region's population but produces 75% of Canterbury's waste. Similarly, Timaru is home to 8% and produces 12% of the region's waste.

The urban centres of Christchurch and Timaru may contribute a higher percentage than their populations would suggest due to the location of industries and major businesses in these urban centres. Also, the alternative disposal methods used in rural areas, such as burning, composting, use as animal feed and farm pits, would reduce the amounts collected within rural districts.

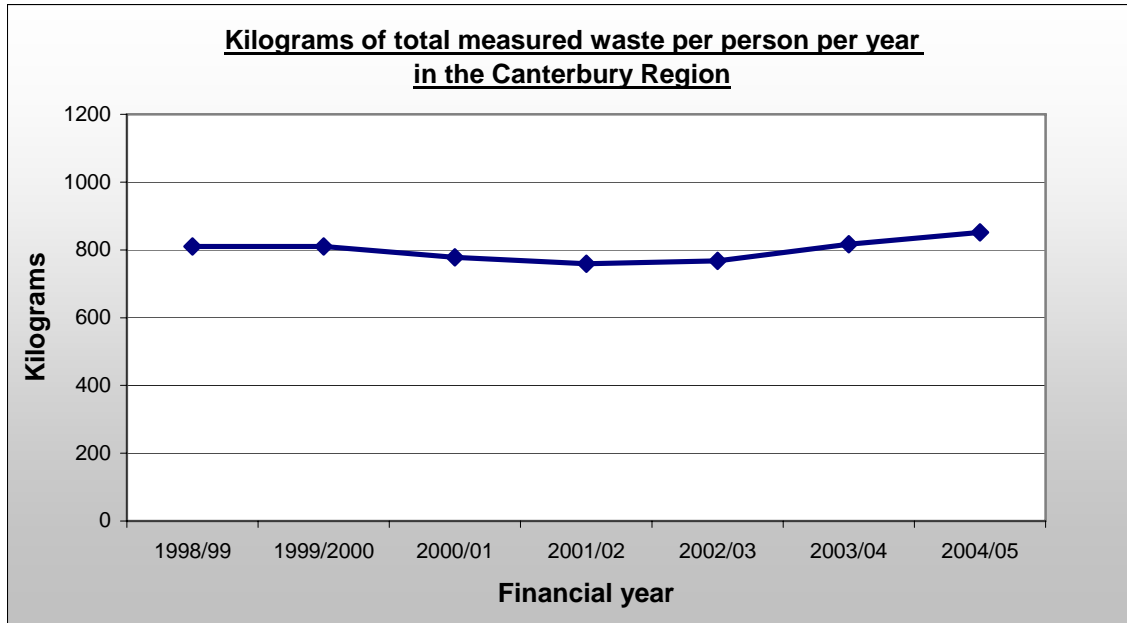


Figure 3: Kilograms of total measured waste per person per year produced in the Canterbury region

Figure 3 shows the total measured waste per person per year in the Canterbury region. Quantities illustrated in this figure are based on the same waste stream components as those incorporated in Figure 2.

Total measured waste per person per year in Canterbury has increased over 12% from 2001/02 to 2004/05 after dropping slightly between 1998/99 and 2000/01.

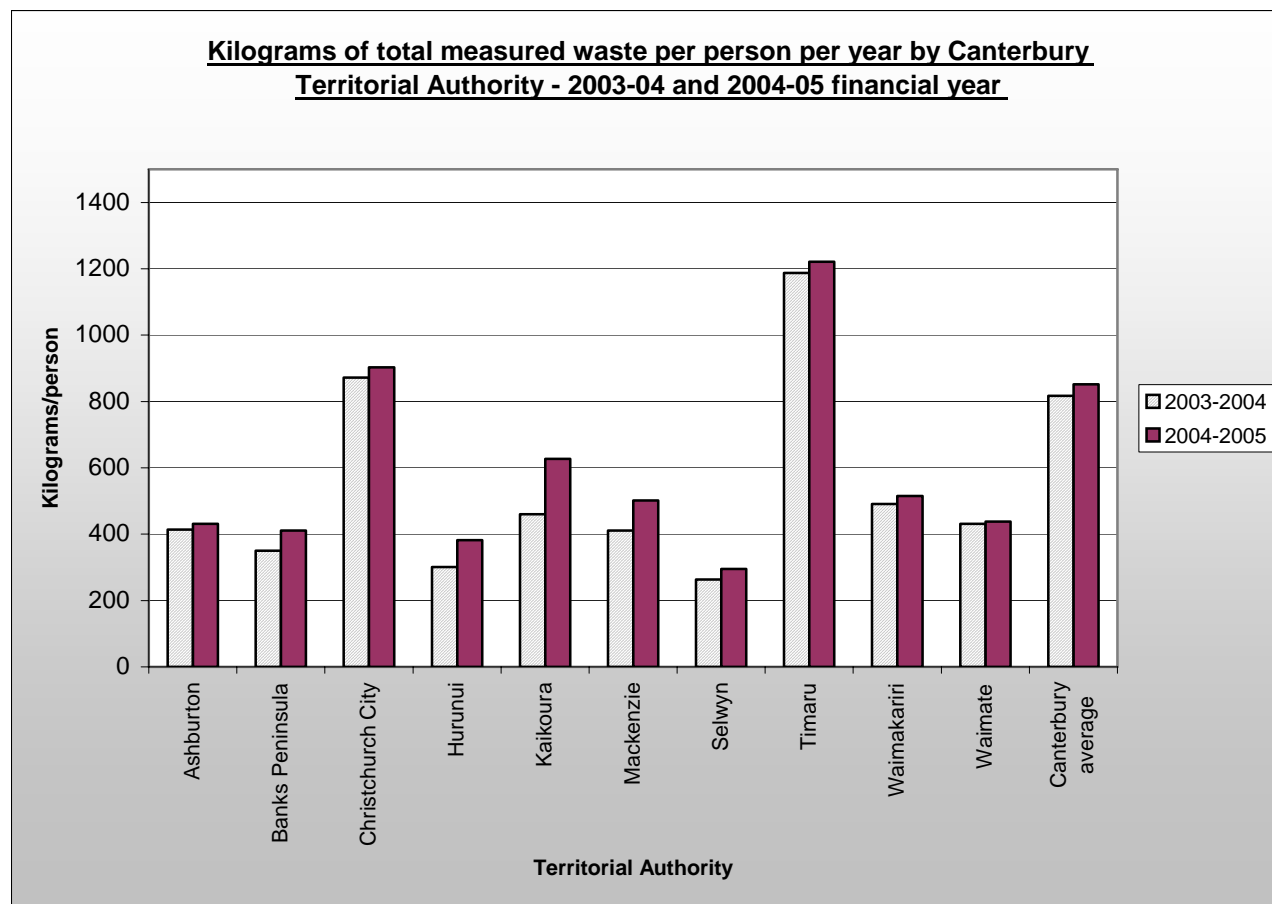


Figure 4: Kilograms of total measured waste produced per person per financial year by Canterbury Territorial Authority

Quantities illustrated in this figure are based on the same waste stream components as those incorporated in Figure 2.

As discussed, due to the location of industries and major businesses in urban centres, and the alternative disposal methods used in rural areas, it is Christchurch and Timaru that produce the largest amount of waste. Most of the rural councils produce fairly similar quantities.

All Territorial Authorities show an increase in total waste in the 2004/05 financial year. Of note is the large increase in total measured waste recorded in Kaikoura in 2004/05. There was an increase in both recyclables collected and residual waste in Kaikoura this year. The increase in recyclables received may be due to a 'snow ball' effect of education taking place regularly over a number of years. The increase in residual waste may be due to increased development in Kaikoura⁴.

⁴ Nicole Sherriff, Environmental Development Officer, Kaikoura District Council, *pers. comm.*

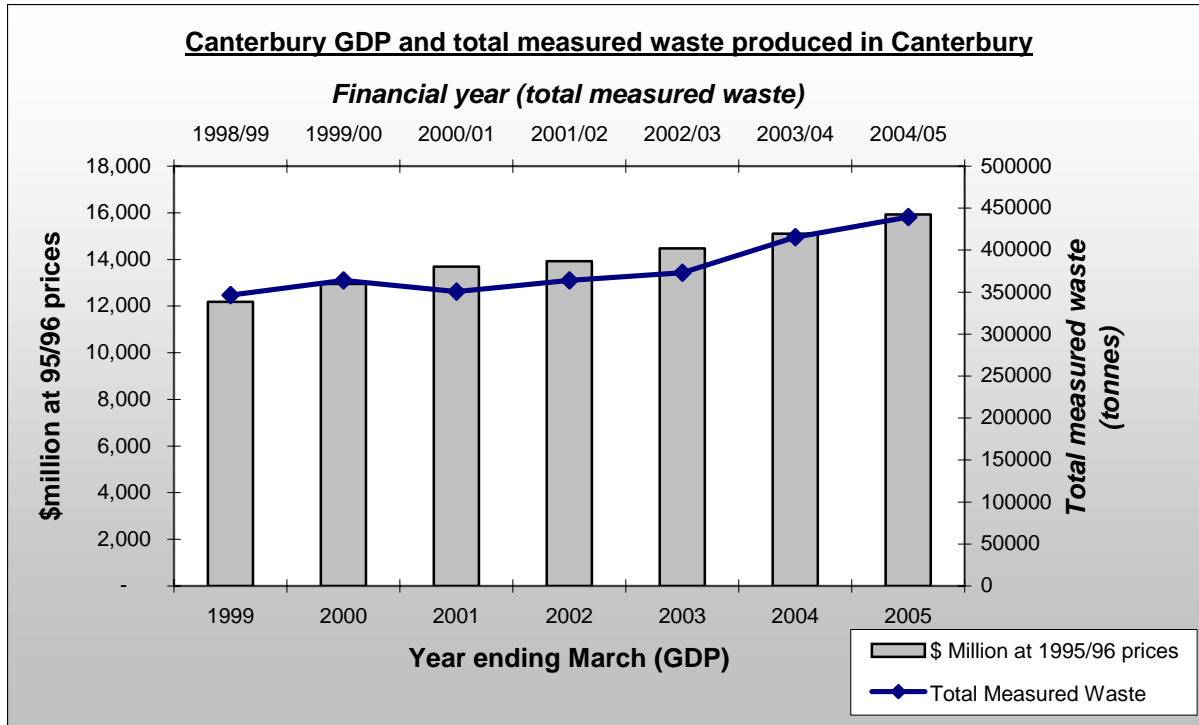


Figure 5: Canterbury Gross Domestic Product and total measured waste produced in Canterbury

Figure 5 compares Canterbury's Gross Domestic Product (GDP)⁵ with the total measured waste produced in Canterbury.

GDP is a measure of how big an economy is. Real GDP is expressed in constant prices and is a measure of economic growth. In this figure GDP is expressed at 1995/96 prices. GDP is recorded from 1 March to 28 (or 29) February. For example, the year 1999 contains data collected from 1 March 1998 to 28 February 1999. Total waste is recorded in council financial years (1 July to 30 June). Total measured waste is as described in Figure 2. The GDP figures are estimates only and due to a change in methodology, regional GDP data pre 2000 is not directly comparable with the later years. However, as the datasets do not vary much at a regional level, data for the 1999 year has been included for completeness.

Figure 5 shows that both total measured waste and GDP have increased during the period that data were recorded. It is difficult to say conclusively that growth in GDP has caused the increase in total measured waste. However, they appear to be increasing at about the same rate. Waste amounts are influenced by the quantities of goods produced and consumed. As GDP increases, there is an increase in the affluence of the population. People can afford more consumer goods and can afford to buy new items rather than repair old ones. These factors may contribute to an increase in total measured waste produced in Canterbury.

⁵ Source: Infometrics New Zealand

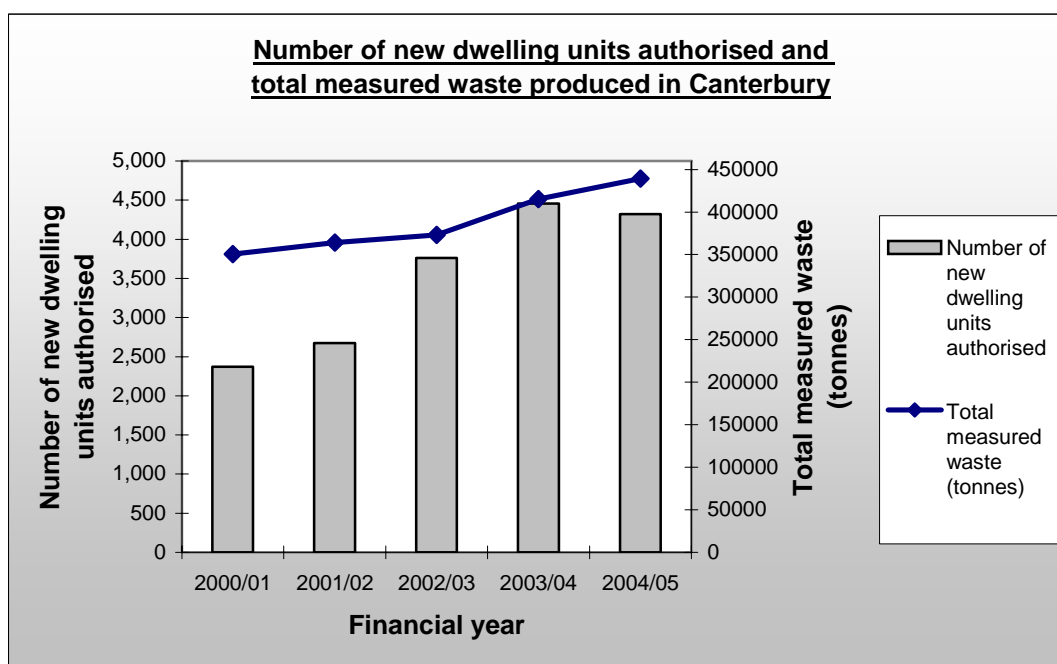


Figure 6: Number of new dwelling units authorised and total measured waste produced in Canterbury

Figure 6 compares the number of new dwellings authorised in Canterbury⁶ with the total measured waste produced. The number of new dwelling units authorised per year in was not available for the years 1998/99 or 1999/2000. The number of new dwellings authorised in Canterbury can be used as an indicator of economic activity as it indicates the number of new buildings being built.

It can be seen from Figure 6 that total measured waste produced in Canterbury has been increasing since 2000/01. The number of new dwelling units authorised has also been increasing since 2000/01, until 2004/05 when the number of dwellings authorised decreased from the previous year. The number of new dwellings being built may not cause the increase in total waste produced in Canterbury, but it may indicate an increase in the wealth of Canterbury. As discussed, an increase in the affluence of the population may contribute to an increase in production of total measured waste in Canterbury.

⁶ Source: Statistics New Zealand

4.2 Residual waste

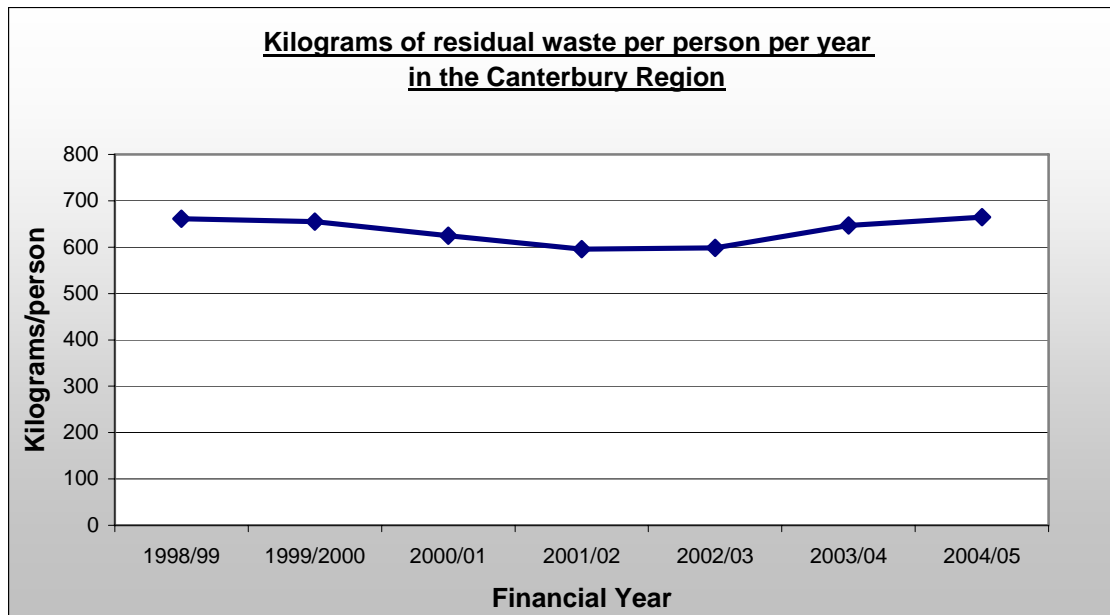


Figure 7: Kilograms of residual waste per person per year in the Canterbury region

Residual waste is defined as waste (kerbside collected and dropped at landfills or transfer stations) disposed of to landfill once all other recycled, reused material has been removed. This is ideally what it should comprise. However, in reality it includes material that could have been recycled, composted or reused.

Figure 7 shows that the amount of residual waste per person to landfill increased 12% from 2001/02 to 2004/2005 after decreasing slightly between 1998/99 and 2001/02. Due to its large quantity, residual waste heavily influences the amount of total measured waste stream (Figure 3). Therefore, both graphs show a similar pattern.

The total waste records for the years 1998/99 to 2000/01 are not as complete as for the later years. Therefore, the amount of residual waste in Canterbury may have actually been higher in 1998/99 and 1999/00.

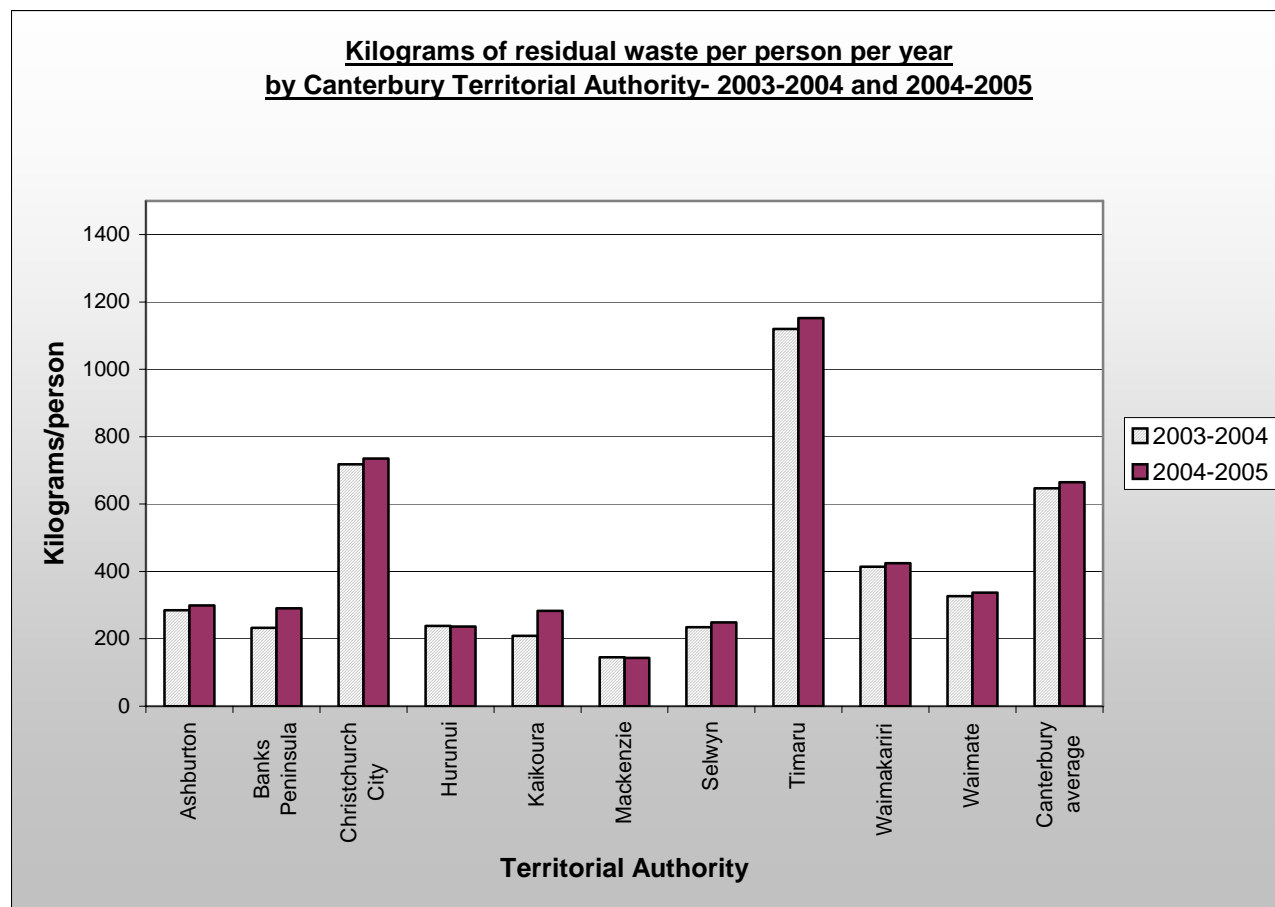


Figure 8: Kilograms of residual waste disposed of per person per financial year by Canterbury Territorial Authority

Residual waste is as defined for Figure 7.

Figure 8 shows that Christchurch City and Timaru produce more residual waste per person than the rural councils. As discussed, due to the location of industries and major businesses in urban centres, and the alternative disposal methods used in rural areas, it is the urban centres of Christchurch and Timaru that record the largest amount of waste.

Of note is the relatively low amount of residual waste disposed of per person in Mackenzie. Mackenzie provides separate kerbside collection for organics, recyclables and residual waste. This encourages separation of waste at source and may account for the relatively low amount of residual waste going to landfill.

Most Territorial Authorities show an increase in total waste in the 2004/05 financial year with the exception of Mackenzie and Hurunui.

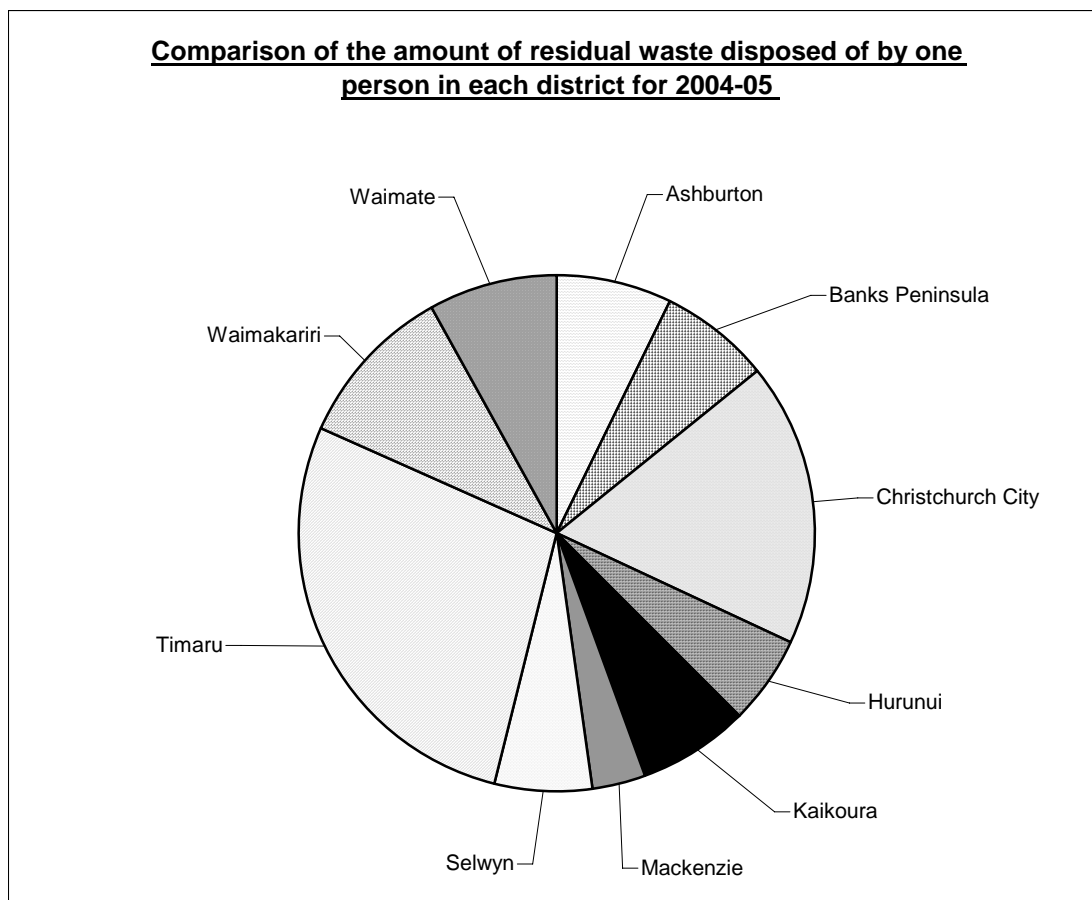


Figure 9: Comparison of the amount of residual waste disposed of by one person in each district for 2004/05

Residual waste is as defined for Figure 7.

Figure 9 compares the amount of residual waste disposed of per person in each district in the 2004/05 financial year.

This figure shows that Timaru and Christchurch recorded more disposal of residual waste per person than the other councils. The amount of residual waste per person disposed of in the other districts was fairly similar with the exception of Mackenzie. Mackenzie can be clearly seen to be recording the lowest amount of residual waste disposal per person. As discussed this may be due to the separate kerbside collection for organics, recyclables and residual waste, together with the alternative disposal options used in rural communities.

4.3 Composition of waste to landfill

The composition of waste to landfill varies between urban centres and rural districts. This information is currently incomplete for the Canterbury region as not all Territorial Authorities collect waste composition data and some only collect it once every few years. Information on the composition of waste to landfill is available for Christchurch City and the Waimakariri district for the 2003/04 financial year. This information has been included to enable a comparison between the composition of waste to landfill of a major urban centre and a smaller rural district.

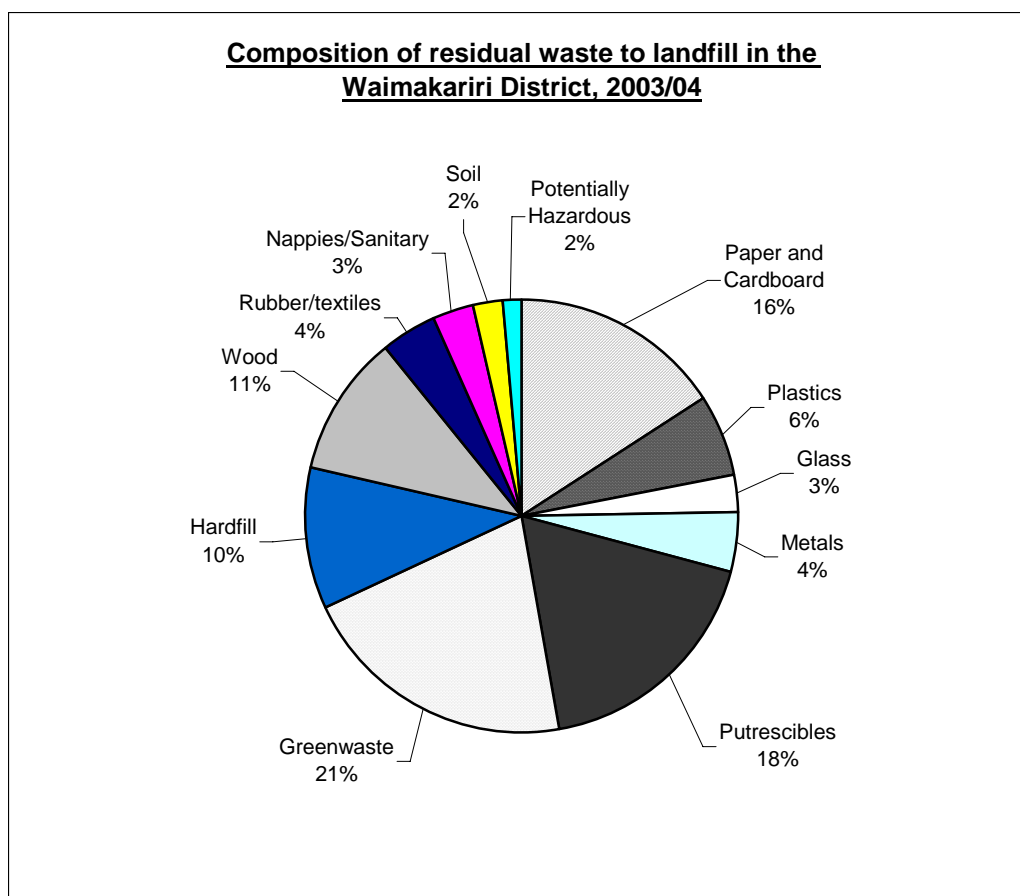


Figure 10: Composition of residual waste to landfill in Waimakariri district, 2003/04

Figure 10 shows that the three largest components of the residual waste stream in the Waimakariri district are greenwaste, putrescibles and paper and cardboard respectively. Greenwaste and putrescibles combined comprise 39% of the waste stream.

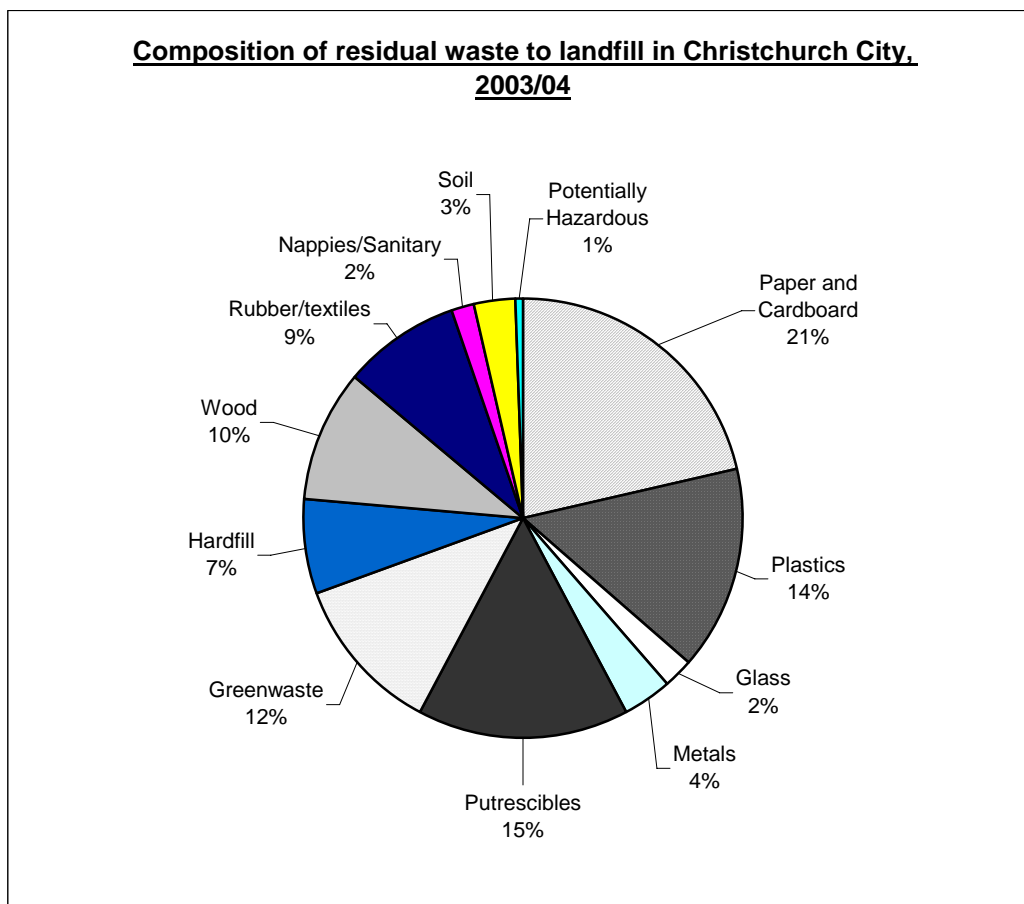


Figure 11: Composition of residual waste to landfill in Christchurch City, 2003/04

Figure 11 shows that the three largest components of the residual waste stream in Christchurch City are paper and cardboard, putrescibles and plastics respectively. Greenwaste and putrescibles combined comprise 27% of the residual waste stream.

Figures 10 and 11 show the following waste composition trends:

- Paper and cardboard comprise a larger component of the waste to landfill in Christchurch City than in the Waimakariri district.
- Plastics comprise a much larger component of waste to landfill in Christchurch City than in the Waimakariri district.
- Over a quarter of the waste sent to landfill in Christchurch City could potentially be composted.
- Over a third of the waste sent to landfill in the Waimakariri district could potentially be composted.
- More than half of all the waste disposed to landfill in Christchurch City is potentially recyclable or compostable.
- More than half of all the waste disposed to landfill in the Waimakariri district is potentially recyclable or compostable.

It is a concern that more than half of all the waste disposed of to landfill in the Waimakariri district and Christchurch city is potentially recyclable or compostable despite the availability of kerbside recycling in both districts.

4.4 Waste diversion

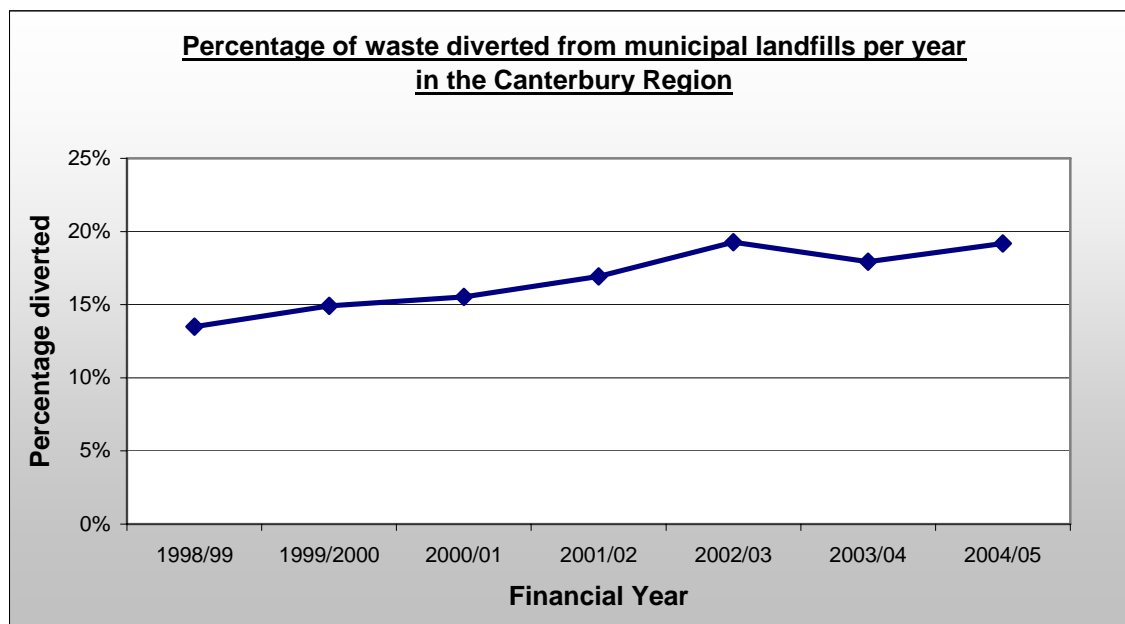


Figure 12: Percentage of waste diverted from municipal landfill in the Canterbury region

The percentage of waste diverted from all landfills in Canterbury by Territorial Authorities includes the following data:

- Organics
- Recyclables
- Reuse stores

It excludes:

- Residual waste
- Hazardous waste
- Hardfill waste
- Cleanfill waste

This information includes waste diverted by councils but does not include waste already taken out of the waste stream by householders through home composting or waste diverted by industry.

The percentage of waste being diverted away from all municipal landfills in the Canterbury region appears to be steadily increasing between 1998/99 and 2004/05. There has been a small decrease in 2003/04. However, overall there has been an increase in the percentage of waste diverted from landfill in Canterbury. The percentage diverted increased from 14% in 1998/99 to almost 20% in 2004/05.

It should also be noted that although the percent diverted decreased in 2003/04, the actual amount of waste diverted increased. The fall in the percent diverted can be attributed to an increase in the amount of residual waste (refer to Figure 7). The amount of residual waste increased which meant that the relative amount of waste diverted fell.

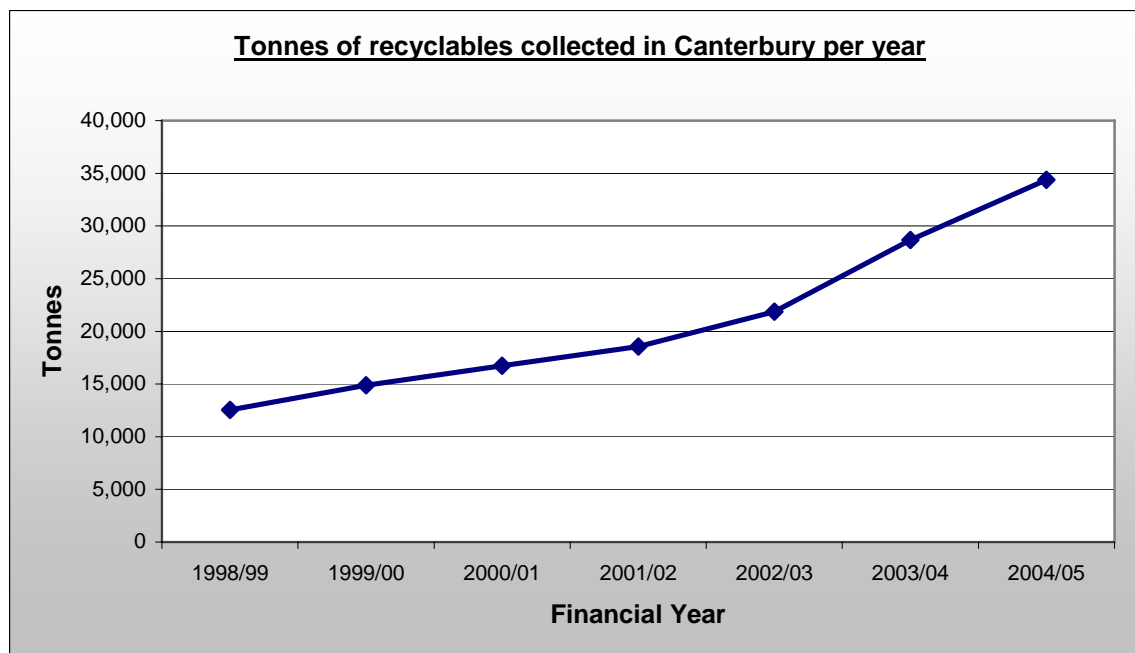


Figure 13: Tonnes of recyclables collected in the Canterbury region per year

Figure 13 includes recyclables collected by kerbside recycling and received at transfer stations/resource recovery parks. From Figures 13 and 14 it can be seen that recycling in Canterbury is increasing in terms of both total recyclable quantities (Figure 13) and kilograms per person per year (Figure 14).

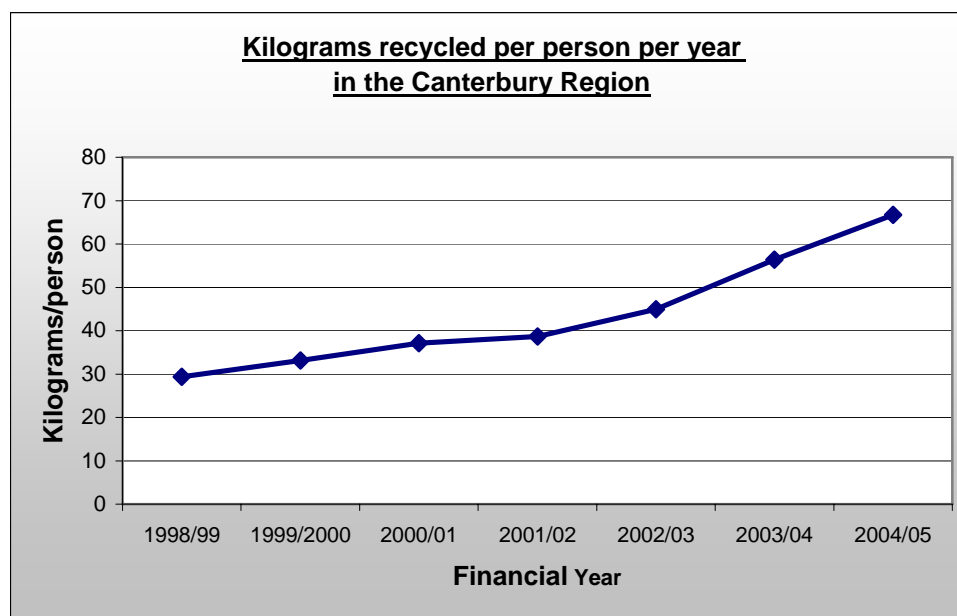


Figure 14: Kilograms recycled per person per year in the Canterbury region

Note that the kilograms recycled per person per year is a conservative estimate as calculations are based on the entire Canterbury population although not all of the population has access to recycling facilities. Therefore, if the data just included figures for people with access to recycling, the amount per person would be higher.

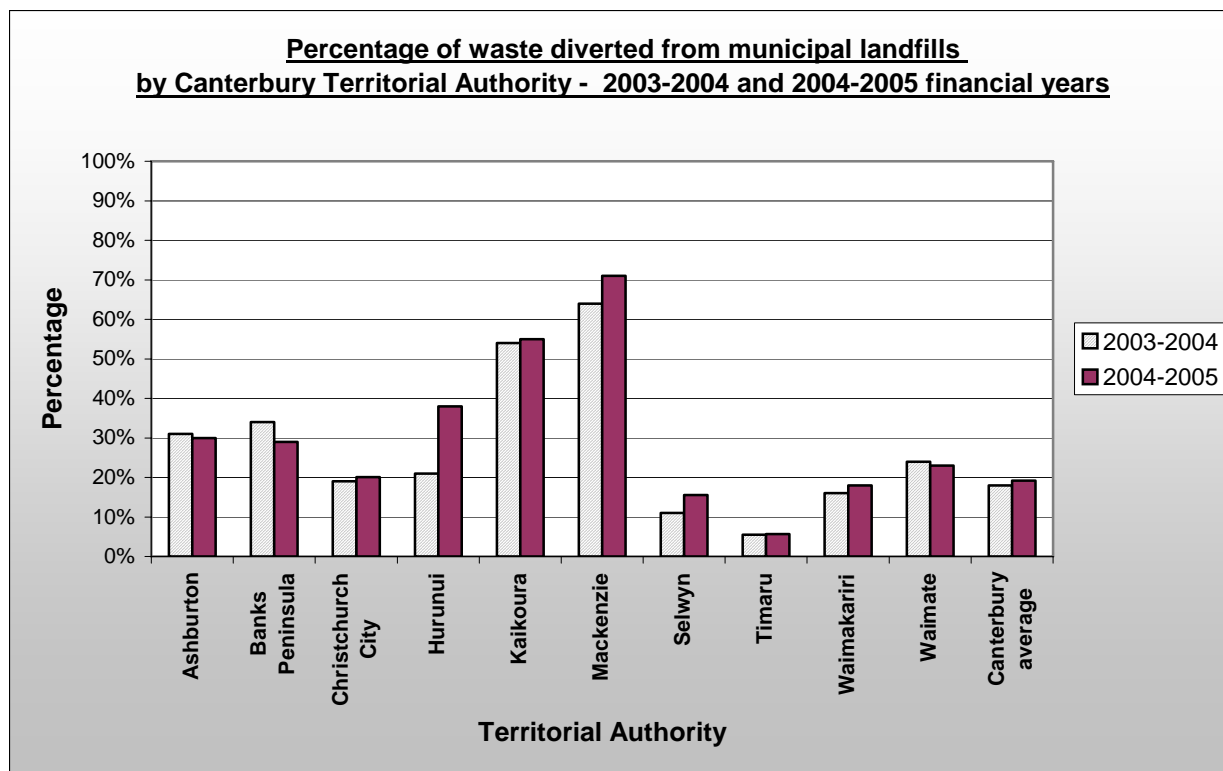


Figure 15: Percentage of waste diverted from landfill per year by Canterbury Territorial Authority

The diverted waste from all landfills is as described in Figure 10.

From Figure 15 it can be seen that the percentage of waste diverted from landfill varies markedly between districts. Christchurch City, Selwyn, Waimakariri and Waimate have diversion rates close to the Canterbury average. As Christchurch has the largest population in the region it would be expected that it would heavily influence the determination of the average. Ashburton, Banks Peninsula and Hurunui have diversion rates slightly higher than the Canterbury average. Selwyn had only 9 months of kerbside recycling collection in 2003/04. This may explain the increase in diversion in 2004/05. Hurunui has seen a significant increase in diversion, from 21% in 2003/04 to 38% in 2004/05. This is mainly due to the increased amount of recyclables collected in 2004/05. In 2003/04, recyclables were only collected in the Hurunui district for 7 months and the annual average was estimated from the 7 months of kerbside collection.

Kaikoura and Mackenzie districts have diversion rates significantly higher than the Canterbury average. In 2003/04 Kaikoura's diversion rate was 55% and Mackenzie's was 71%. Kaikoura District Council does not pick up residual waste from the kerbside limiting its services to recyclables only. Residual waste must be taken to the landfill and its disposal paid for by the disposer. This encourages people to divert as much waste as they can from landfill. As discussed, Mackenzie provides separate kerbside collection for organics, recyclables and residual waste. This encourages separation of waste at source. The council produces compost from the organic waste collected using an invessel composting unit in Twizel, which is sold back to the public.

Timaru's diversion rates are lower than the Canterbury average. This is due to the relatively large amount of residual waste recorded in Timaru. Furthermore, Timaru District Council's kerbside collection of recyclables is limited to a fortnightly service solely for Geraldine and no kerbside collection for organics. However, a solid waste management plan was adopted on 21 November 2003 and the Timaru District Council will be implementing new solid waste initiatives for residents of the Timaru district from 1 July 2006. This new service will include a three-bin system with a weekly organic garden and food waste collection, along with a fortnightly recycling and residual waste collection from residential households and some rural households.

4.5 Access to waste services

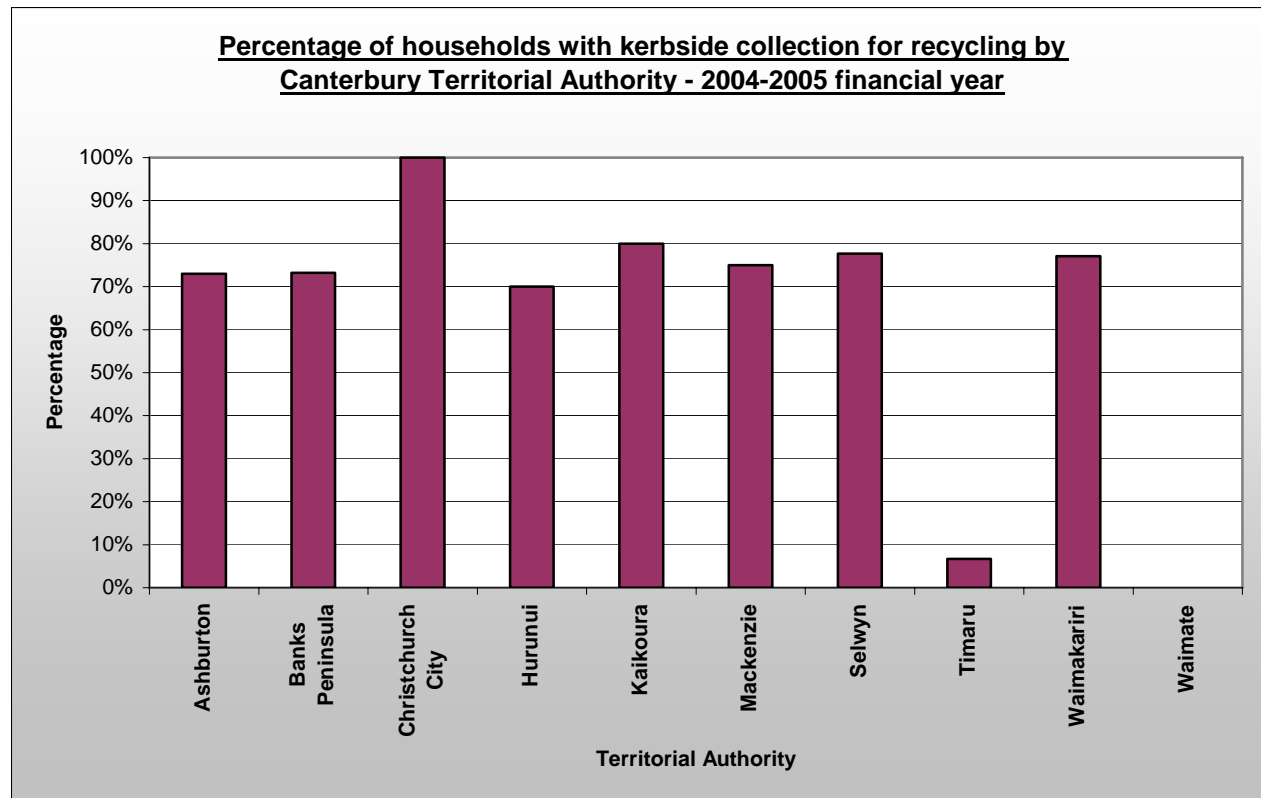


Figure 16: Percentage of households with kerbside collection for recycling by Canterbury Territorial Authority, 2004/05 financial year

Figure 16 shows that:

- 100% of the households in Christchurch City Council have kerbside collection for recycling
- 70-80% of the households in most districts have kerbside collection of recyclables.
- Timaru district has a very low percentage of households with kerbside access to recycling (~7%). This is the fortnightly collection of recyclables in Geraldine.
- Waimate district did not have kerbside recycling in June 2005

Overall, the access to kerbside recycling in the Canterbury region is good. Many of the resource recovery parks and transfer stations also have recycling facilities. In 2004/05, 25 of the 36 council operated waste handling facilities within the district had recycling facilities.

Since this information was collected, kerbside recycling started in Waimate in July 2005 and Timaru will expand their collection from 1 July 2006.

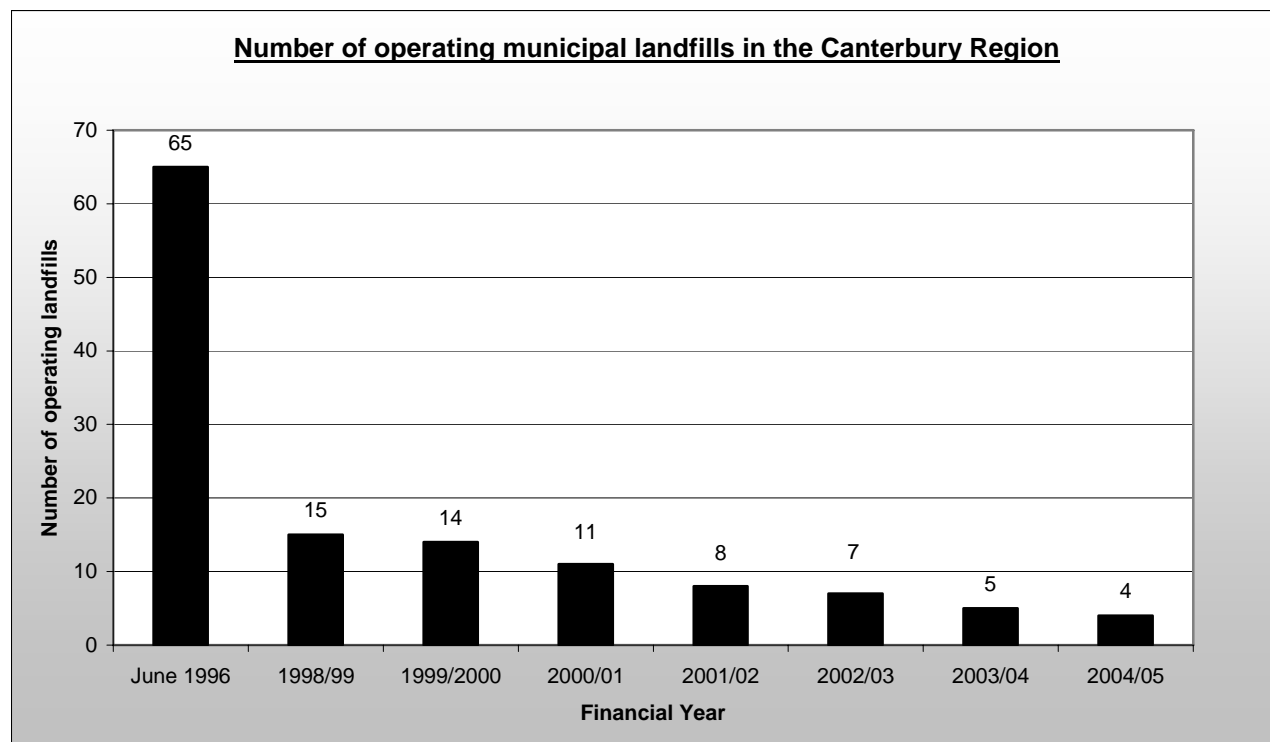


Figure 17: Number of operating municipal landfills in the Canterbury region

Waste management in the Canterbury region has changed significantly over the last few years. Figure 17 shows that the number of landfills in Canterbury decreased from 65 small local landfills in June 1996, to 15 in 1999 and to four in 2004/2005 (Burwood, Kaikoura, Methven and Redruth).

Christchurch City's Burwood Landfill closed in June 2005 and was replaced by the opening of the Kate Valley facility in the Hurunui district. With the closure of the Methven landfill at the beginning of 2005, the landfills in Canterbury now number three (Kate Valley, Kaikoura and Redruth). There have also been changes to the standards of the landfills as they have transitioned from many landfills with variable standards of management, to a few well-managed facilities.

5. Climate change implications

Named after the Japanese city where it was concluded in 1997, the Kyoto Protocol is an international agreement to address global warming and delay climate change. It aims to reduce the total greenhouse gas emissions of developed countries to 5% below the level they were in 1990⁷. New Zealand's target is to reduce its greenhouse gas emissions over the commitment period (2008 to 2012), to the level they were in 1990.

Different wastes and waste management options have a range of climate change implications due to their energy consumption, greenhouse gas emissions (carbon dioxide, methane etc) and potential for carbon sequestration⁷. For example, recycling of paper and cardboard products will reduce energy consumption, decrease landfill emissions and increase forest carbon sequestration⁸.

The USEPA report "Greenhouse Gas Emissions from Management of Selected Material in Municipal Solid Waste", shows that recycling mixed paper saves 0.67 metric tonnes of carbon equivalent (MTCE) per short ton⁹ of material¹⁰.

To convert this to per metric tonnes the following formula was used:

$$0.67 \div 0.9071847 = 0.74$$

Recycling mixed paper saves 0.74 MTCE per tonne of mixed paper.

One MTCE is the equivalent of 3.66 tonnes of carbon dioxide (CO₂).

$$0.74 \times 3.66 = 2.7$$

Therefore, for every 1 kilogram of mixed paper recycled, 2.7 kilograms of CO₂ is not emitted.

One way to reduce New Zealand's green house gas emissions is to reduce petrol consumption. So we can look at the CO₂ savings from recycling paper in terms of petrol consumption. Combustion of 1 litre of petrol produces 2.5 kilograms of CO₂. In every kilogram of mixed paper recycled there is 2.7 kilograms of CO₂ saved. Therefore, recycling 1 kilogram of mixed paper saves the same amount of CO₂ as produced through the combustion of 1.1 litres of petrol (2.7 ÷ 2.5 = 1.1).

To put this into a Canterbury context, in the 2004/05 financial year approximately 56,500 tonnes of paper and cardboard¹¹ were sent to landfill by businesses and households from Christchurch City¹². Recycling this amount of mixed paper would save 152,724 Metric tonnes of CO₂. In order to achieve the same level of greenhouse gas reduction, Canterbury would need to reduce its consumption of petrol by more than 61 million litres.

Alternatively, landfilling this volume of paper and cardboard would produce CO₂ emissions. Landfilling mixed paper produces 0.06 MTCE⁸ per short ton of material⁷ (0.07 per metric tonne). Therefore, every 1 kilogram of mixed paper landfilled produces 0.2 kilograms of CO₂. Landfilling 1 kilogram of mixed paper produces the same amount of CO₂ as produced through the combustion of 0.097 litres of petrol. So, landfilling 56,500 tonnes of paper and cardboard produces the equivalent amount of CO₂ as is produced through the consumption of over 5.4 million litres of petrol.

It is clear from this example that recycling paper and cardboard reduces CO₂ emissions, while landfilling increases CO₂ emissions. Therefore, diverting waste away from landfill would have benefits for climate change through the reduction of greenhouse gas emissions.

⁷ Source: www.climatechange.govt.nz

⁸ Source: USEPA, Greenhouse Gas Emissions from Management of Selected Material in Municipal Solid Waste, September 1998

⁹ A short ton is 907.1847 kg

¹⁰ Emissions counted from a waste generation reference point

¹¹ Includes office paper, newsprint, magazines, cereal boxes, corrugated cardboard and envelopes

¹² Source: Christchurch City Council, Towards Zero Waste - draft waste management plan 2005

6. Conclusion

The data collected from the Territorial Authorities show that the amount of total measured waste has been steadily increasing in Canterbury since 1998/99. Many factors may have contributed to this increase and there is probably no single reason why waste is increasing. It is difficult to say conclusively that growth in GDP or the increase in the number of new dwelling units authorised, has caused the increase in total measured waste. However, increases in these economic indicators do point to an increase in the wealth of the population, which will affect its production and consumption patterns. Waste amounts are influenced by the quantities of goods produced and consumed. Therefore, an increase in production and consumption could lead to an increase in waste produced. As the wealth of the population increases people can afford more consumer goods and can afford to buy new items rather than repair old ones. These factors may contribute to an increase in total measured waste produced in Canterbury. Increase in quantities of waste may also result from:

- Inefficient production processes;
- Poor durability of goods;
- Unsustainable consumption patterns;
- Insufficient waste minimisation initiatives.

As discussed, some waste data are limited and reliability of data is not always assured. However, there has been an improvement in monitoring of solid waste streams in Canterbury and the level of waste data recording has improved in the last few years. The use of weigh-bridges has enabled recording of solid waste data and has made reporting more accurate. To ensure that data are comparable in the future, we have worked with the Territorial Authorities to standardise its collection and will aim to maintain this standard approach for future years. Limitations to the accuracy of the data still exist due to the use of the census population data. Census data are only collected every five years and therefore the accuracy of the population data declines over time. This will impact on the accuracy of the kilograms per person data as these are calculated using the population data.

The comparisons between the districts shows that the urban centres, Christchurch City and Timaru, have recorded larger quantities of waste per person than the rural councils. This may be due to the location of industries and major businesses in urban centres, and the alternative disposal methods used in rural areas. Most of the rural councils record fairly similar amounts of waste.

The percentage of waste diverted from landfill varies markedly between districts. High diversion rates were recorded by Mackenzie and Kaikoura. Kaikoura District Council does not collect residual waste from the kerbside limiting its services to recyclables only. Mackenzie provides separate kerbside collection for organics, recyclables and residual waste. Both these methods encourage separation of waste at source and Kaikoura also provide disincentives as residual waste must be taken to the landfill separately and its disposal paid for by the disposer. The waste data collected shows that schemes that encourage separation of waste at source are effective at reducing waste to landfill.

Collection of waste data also shows that the percentage of waste diverted away from municipal landfills in Canterbury is increasing. Some of the increase in diversion is due to an increase in recycling. Not only has the total amount recycled been increasing but also the kilograms per person per year, from 29 kg per person per year in 1998/99 to almost 67 kg per person per year in 2004/05. However, this varies by district as some districts have had a decrease in the percentage of waste diverted between the 2003/04 and 2004/05 financial years.

Overall, access to kerbside recycling in Canterbury is good with 8 of the 10 councils included in the report providing 70-100% of the houses in their districts with a kerbside collection for recyclables. 100% of Christchurch's population, 66% of the region's population, has had access to kerbside recycling over the whole period this data was recorded. Many of the transfer stations and resource recovery parks also have recycling facilities. In 2004/05, 25 of the 36 waste handling facilities within the region had recycling facilities.

In Christchurch City it was shown that landfilling waste has implications for climate change through the emission of greenhouse gases. In the 2004/05 financial year, approximately 56,500 tonnes of paper and cardboard from Christchurch City was landfilled, which was calculated to produce the equivalent amount of CO₂ as is produced through the consumption of over 5.4 million litres of petrol. However, recycling this volume of paper and cardboard would save the equivalent amount of CO₂ as is produced through the consumption of more than 61 million litres of petrol. It is clear that diverting waste away from landfill would have benefits for climate change through the reduction of greenhouse gas emissions.

It is a concern that the total quantity of waste generated is increasing as it is an indicator of the material efficiency of society. For many wastes, the materials we dispose of represents what is left over after a long series of steps including extraction and processing of raw material, manufacture of products, transportation of materials and products to markets, use by consumers and waste management¹³. Therefore, excessive waste represents an enormous loss of resources in the form of materials and energy. This can impact on the local environment through direct and indirect impacts on air, land and water quality and on the global environment through increased greenhouse gas emissions.

¹³ Source: USEPA, Greenhouse Gas Emissions from Management of Selected Material in Municipal Solid Waste, September 1998

7. Recommendations for future work

Environment Canterbury recognises the value of collating and reporting regional waste data on an annual basis and plans to collate and report this data from the Canterbury Territorial Authorities annually. For the 2006/07 financial year, work will be undertaken to improve the collation and representation of the waste data. This could include:

- Reporting kerbside data separately so that the influence of industry in the urban centres is removed.
- Reporting the composition of waste to landfill for all Territorial Authorities.
- Adding other waste categories to gain a more accurate picture of the waste stream.
- Reporting the composition of the recyclables.
- Reporting data from the waste exchanges. This data was recorded this year. However, due to current differences in the method of reporting, the waste exchange volumes and weights cannot be compared between facilities. Solutions to this could be investigated.
- Identification of cleanfills outside of Christchurch City.
- Standardising the population data so that population changes between census years are smoothed. This could be done in a similar way to the Christchurch City Council population projections where the figures are based on the census population, and changes in population are calculated on natural population increase plus immigration.
- Further investigations into why waste produced in Canterbury is increasing. For example, determining Local Authority's spending on waste minimisation initiatives.

These are suggestions for work that could be undertaken and it may be found that these data are not available. It has already been found that differences currently exist between the Territorial Authorities in the accuracy and availability of waste composition data. Therefore these data may remain incomplete.

Environment Canterbury will request waste data from each Territorial Authority annually. Discussions with several Territorial Authorities have indicated that July or August are the most suitable months for providing data, as by this time they have a complete dataset for the preceding year.

8. Acknowledgments

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